

MAINE STATE LEGISLATURE

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JOHN ELIAS BALDACCI
GOVERNOR

STATE OF MAINE
OFFICE OF THE GOVERNOR
22 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0001

JOHN M. KERRY
DIRECTOR
OFFICE OF ENERGY
INDEPENDENCE AND SECURITY

January 15, 2010

Maine Standing Committee on Utilities and Energy
Statehouse Station
Augusta, ME 04333

Dear Senator Hobbins and Representative Hinck:

I am writing to report on the **"State of Maine's wind energy goals and realization of tangible benefits"** as required by Public Law 2007, c.661 (LD 2283), the culmination of the Governor's Task Force on Wind Power Development that was in effect in 2007-2008. The Governor's Office of Energy Independence and Security (OEIS) is responsible for reporting to the Standing Committee on Utilities and Energy on the above by January 15th of each year. In addition, by December 2013, the OEIS is responsible, in consultation with other state agencies as appropriate, for conducting a full review of the status of meeting the goals for 2015 and the likelihood of achieving the goals for 2020.

The OEIS has been monitoring the progress and has made an assessment of the State's progress toward meeting the wind energy development goals established in the Maine Revised Statutes, Title 35-A, section 3404, subsection 2 and the realization of the tangible benefits of wind energy developments as well as other considerations and pertinent questions included in the law.

According to the statute, the goals for wind energy development in the State are that there be:

- A. At least 2,000 megawatts of installed capacity by 2015; and
- B. At least 3,000 megawatts of installed capacity by 2020, of which there is a potential to produce 300 megawatts from generation facilities located in coastal waters, as defined by Title 12, section 6001, subsection 6, or in proximate federal waters.

To accomplish the above task, the OEIS has conferred with both Department of Environmental Protection (DEP) and the Land Use Regulation Commission (LURC), the State's two permitting and regulatory entities responsible for permitting wind projects. The OEIS has also met with and had discussions with wind power developers to gauge process and progress of wind power development in the State.

I. Assessment of Progress Toward Meeting Wind Power Goals:

Currently, a total of five large-scale wind power projects are operating in the State of Maine with a total capacity of 174 MW. In addition, there are two large-scale wind power projects under construction with a potential total of 91.5 MW of capacity, two projects that have been permitted (although both have been appealed) with a potential of 115 MW and another seven projects under development with the total potential capacity of 520.3 MW. Other projects are in discussion or appear in ISO-NE's queue but are not far along enough to be counted by either the DEP or LURC as a serious project at this time.

- The State of Maine has met 8.7% of wind power goals with 174 MW of installed capacity. (Based on the 2015 goal.)
- The percentage would rise to 13.28% if all 91.5 MW of capacity under construction are operational.
- The percentage would rise to 19.02% if all 115 MW permitted are constructed and operational.
- The percentage would rise to 45.04 % if all 520.3 MW in development are constructed and operational.

At the current rate, Maine will need to bring online 183 MW of capacity a year, starting in 2010 to meet the state's wind power development goals by the end of 2015.

Project Summaries

Current Wind Power Development Projects in the LURC's Jurisdiction:

Wind energy developments operational in LURC's jurisdiction.

[Total operational: 123 MW in LURC jurisdiction]

1. **Kenetech** – Rezoning approved 1995, Development Permit never applied for (Kibby, Skinner, Merrill Strip, and Haynestown Twps., Franklin Co.) **No project.**
2. **STETSON I (Stetson Wind Project)**
Evergreen Wind V, LLC (First Wind)
 - a. T8 R3 NBPP and T8 R4 NBPP, Washington County
 - b. 57 MW Stetson Wind Project (fully operational the week of January 19, 2009)
 - c. The company estimated the facility would produce 164,776 megawatt-hours of energy per year, equivalent to the energy consumed by 27,500 Maine homes.
 - d. Thirty-eight (38) 1.5 MW General Electric turbines
 - e. Development Permit DP 4788, signed January 3, 2008
 - f. **57 MW operational.**
3. **KIBBY Wind Power Project [Zoning Petition ZP 709 and Development Permit DP 4794]**
TransCanada Maine Wind Development, Inc.
 - a. Kibby and Skinner Twps., Franklin County
 - b. 132 MW Kibby Wind Power Project

- c. The company estimated the facility would produce 357 million kilowatt- hours of energy per year, equivalent to the energy consumed by 50,000 Maine homes.
- d. Forty-four (44) 3.0 MW Vestas turbines
- e. Development Permit DP 4794, signed July 9, 2008
- f. 66 MW operational.**
- g. Amendments to Development Permit DP 4794
 - i. Amendments A and B, approved minor changes to the layout of the Kibby Wind Power Project, issued in fall of 2008
 - ii. Amendment C, approved relocation of three turbines
 - iii. Amendment D, approved minor relocation of transmission line
 - iv. Amendment E, approved re-arrangement of turbine layout
- h. Amendment F - submitted January 2010 requesting minor changes to allow connection of the proposed Kibby Expansion project (see TransCanada, DP 4860, below)
- i. Amendment G – submitted January 2010 requesting minor changes to the layout of the Kibby Wind Power Project

Wind energy developments under construction in LURC's jurisdiction.

[Total under construction: 91.5 MW in LURC jurisdiction]

4. STETSON II (Owl Mtn. and Jimmey Mtn. Wind Project)

Stetson Wind II, LLC (First Wind)

- a. 25.5 MW, Stetson Wind II Project
- b. Seventeen (17) General Electric 1.5 MW turbines
- c. T8 R4 NBPP, Washington County
- d. Development permit issued March 4, 2009 (subject to Tangible Benefits policy)
- e. 25.5 MW under construction.**

5. KIBBY Wind Power Project [Zoning Petition ZP 709 and Development Permit DP 4794]

TransCanada Maine Wind Development, Inc.

- a. 66 MW under construction**

Wind energy development currently under development and under review by LURC.

[Total under development: 171.8 MW in LURC jurisdiction]

1. Evergreen Wind Power V, LLC (First Wind)

- f. Amendment B to DP 4788 submitted to allow for connection to Stetson II Wind Project, approved
No additional MW

2. TransCanada Maine Wind Development, Inc.

- a. Development Permit DP 4860 – Kibby Expansion Project
15 turbines to be located within the existing expedited permitting area
45 MW (3.0 MW Vestas turbines)

3. TransCanada Petition for Rulemaking to Expand Expedited Permitting Zone

- a. Proposed addition of a 631 acre parcel in Chain of Ponds Twp.
- b. Petition for rulemaking submitted to LURC on July 1, 2009

- c. Public comment period started November 25, 2009
- d. Two-part public hearing scheduled for December 16, 2009 and March 17, 2010
- e. Record closes April 5, 2010
- f. LURC is currently developing a Guidance Document addressing the three statutory criteria that must be met to add land to the expedited permitting area

4. Independence Wind/Highland Wind, LLC

- a. Highland Plantation
 - i. Draft application **under review by LURC** for completeness for a 44 turbine wind energy development
 - ii. total megawatts proposed *126.8 MW*

Wind energy development under discussion, no project size designated to date; either to be permitted by LURC, or permitting authority for a wind energy development not yet identified

- 1. First Wind - Champlain Wind, LLC
 - a. Carroll Plantation, met tower permit issued by LURC
 - b. Possible project under discussion, likely to be permitted by LURC
 - c. May request expedited area expansion – undetermined at this time
 - d. No time frame for submitting a wind energy development permit known at this time
- 2. First Wind – Met towers permitted by LURC in Blanchard Twp. Kingsbury Plt., and Mayfield Twp.; No concrete discussions about a wind energy development at this time
- 3. First Wind – Devereaux Twp. area: Met towers permitted by LURC in T34, T28, and Devereaux Twp. May request expedited permitting area expansion – undetermined at this time.
- 4. First Wind - Other locations where met towers have been approved: T16 MD and Codyville Plt.

Other possible wind energy development to be located in LURC jurisdiction that may be reviewed by MDEP; no determination made at this time

- 2. Aroostook Wind Energy (Horizon Wind), Phase One (the so-called “Bridgewater” project) [see below under “Projects in DEP jurisdiction”]
- 3. Independence Wind
 - a. Rangeley Plantation and The Forks Plantation
 - b. Currently met towers only, permitted by LURC
- 4. Nobel Environmental
 - a. Grand Falls Plantation – met tower only, permitted by LURC

Source: LURC, January, 2010

Current Wind Power Development Projects in the DEP’s Jurisdiction:

Wind energy developments operational in DEP jurisdiction:

[Total operational: 51 MW in DEP jurisdiction]

A. MARS HILL

Evergreen Wind Power, LLC. (First Wind)

Permit #L-21635-26-A-N issued June 1, 2004 approved the construction of 35, 1.5 MW wind turbines and associated facilities on Mars Hill Mountain in Mars Hill, Maine.

As permitted the Mars Hill wind project would produce 52.5 MW of electricity.

Project operational. [Note: To date the developer has constructed only 28 of the approved turbines and is currently producing approximately 42 MW of electricity.]

B. FREEDOM

Beaver Ridge Wind, LLC.

PBR # 44177 issued on March 11, 2008 approved the construction of a storm-water management plan for the proposed Beaver Ridge wind project in Freedom, Maine. In its permit, Beaver Ridge Wind LLC proposed to build 3, 1.5 MW wind turbines and associated facilities producing a total of 4.5 MW of electricity. **Project operational.**

[Note: The Beaver Ridge project was approved by the Freedom Planning Board prior to the enactment of the Chapter 661 provisions requiring certification by the department for smaller-scale wind energy developments in organized areas]

C. VINALHAVEN

Fox Island Wind, LLC.

The development consists of 3, 1.5 MW wind turbines producing at total of 4.5 MW of electricity in the town of Vinalhaven, Maine. **Project operational.**

2. Permitted applications in DEP jurisdiction:

[Proposed: Total 115 MW]

A. ROLLINS MTN.

Evergreen Wind Power II, LLC. (First Wind) Application #L-24402-24-A-N was submitted to the department on October 30, 2008 and accepted for processing on November 21, 2008. The application proposes to construct 40, 1.5 MW wind turbines and associated facilities on Rollins Mtn. in the towns of Lee, Winn, Burlington, Lincoln and Matawaumkeag, Maine. The total expected output from the facility will be 60 MW. The application was approved by the Department, appealed, the appeal denied and appealed to the Maine law court.

B. RECORD HILL

Record Hill Wind, LLC. (Independence) Application #L-24441-24-A-N was submitted to the department on December 2, 2008 and accepted for processing on December 22, 2008. The application proposes to construct 22, 1.5 MW wind turbines and associated facilities on Record Hill in the town of Roxbury, Maine. The total expected output from the facility will be 55 MW. The application was approved by the Department and appealed.

3. Pending/Under Development Applications currently within DEP jurisdiction:

[Estimated Total 348.5 MW]

A. ROXBURY

Longfellow Wind, LLC. (The proposed development contemplates the construction of approximately 20 wind turbines producing approximately 50 MW of electricity in the towns of Rumford and Roxbury, Maine. The project will require a permit pursuant to the Site Law.

B. BRIDGEWATER

Horizon Wind Energy. (Aroostook Wind) The proposed development (phase 1) contemplates the construction of approximately 130 wind turbines producing approximately 195 MW of electricity within the town of Bridgewater, Maine and a portion of LURC territory. The project will require a permit pursuant to the Site Law.

C. OAKFIELD

Evergreen Wind Power II, LLC. (First Wind) The proposed development contemplates the construction of between 30 and 40, 1.5 MW wind turbines producing approximately 51 MW of electricity in the town of Oakfield, Maine. The project will require a permit pursuant to the Site Law.

D. SPRUCE MOUNTAIN

Patriot Renewables – 18MW

E. SADDLEBACK RIDGE

Patriot Renewables – 34.5 MW

Source: DEP, January, 2010

Summary of Operational, Under Construction, Permitted and Under Development Wind Projects in Maine:

Total “Operational” Wind Power Projects: 174 MW

Total “Under Construction” Wind Power Projects: 91.5 MW

Total “Permitted” Wind Project Developments: 115 MW

Total “Under Development” Wind Project Developments: 520.3 MW

Offshore Wind Power Development

The State of Maine does not have any proposed or operational commercial off-shore wind projects at this time. However, the state has been approached by a few developers that are interested in learning about the permitting process and potentially developing near-shore off-shore wind projects.

In addition, through the efforts of the Governor’s Ocean Energy Task Force and recently enacted legislation, three offshore-wind demonstration and research sites have been chosen off the coast of Maine in state waters. These sites, one designated for the University of Maine, Orono and two others will act as test sites for ocean energy, particularly emerging offshore-wind development technologies.

The Governor's Ocean Energy Task issued its final report on December 31, 2009 and included several recommendations related to off-shore wind power development. These include: 1) The State establish a goal of pursuing 5,000 MW of ocean energy by 2030. (This recommendation does not specify the amount of energy that would be generated from off-shore wind power but it is fair to assume that the bulk of the power generation would be from off-shore wind development.) 2) The State streamline state permitting of appropriately-sited offshore wind energy development. (For a complete list of recommendations from the Ocean Energy Task Force Report go to http://www.maine.gov/spo/specialprojects/OETF/Documents/finalreport_123109.pdf.)

A. Examination of Experiences from the Permitting Process:

The OEIS, in conversations with both regulators and developers has found that overall the law is working as intended. However, with the increased numbers of operational and proposed wind power developments, public controversy has increased and appeals in some cases have lengthened the permitting process considerably and agency staff time. Concerns about limits on the permitting and development of adequate transmission infrastructure to transmit potential wind power generation through and out of the region is a timely issue and will likely be addressed this legislative session.

Progress on permitting as related to the LURC:

In response to a number of issues that were identified last year by LURC, such as not having an adequate budget to hire outside consultants for sound or scenic review, and other inconsistent policies with the DEP, LURC has proposed a few minor "clarification" changes to Chapter 661 included in proposed legislation, LD 1680 (Hobbins). LD 1680 proposes to require a pre-application notice of filing; a specific timeline for the commission to determine an application is complete, with a decision to be rendered within 270 days if it holds a hearing on the application; allow the commission to require an applicant to attend a public meeting during the review of a wind energy development; allow the commission to extend the processing time with the consent of the applicant; and clarify that in certain circumstances, associated facilities are not subject to the same time limits. It also clarifies that provisions of law regarding a development's efforts on scenic character apply to all wind energy developments, of 100 kw or greater in the expedited areas of the commission's jurisdiction, including those that do not qualify as grid-scale. It also specifies that in the jurisdiction of the commission, all wind energy developments are subject to fee provisions as extraordinary projects, allowing the commission to recover costs associated with processing of the applications, including the noise of noise or other studies. This bill will be heard before the Utilities and Energy Committee on January 28th, 2010.

- A. Additions of land to the expedited area. LURC has not identified any land areas to be added to the expedited area at this time, however, TransCanada has filed a petition to expand the expedited permitting area to include their project area for additional turbines as related to the Kibby project. A decision is expected sometime in 2010.
- B. Comprehensive Land Use Plan. Section C-7 of Chapter 661 specified that LURC amend its Comprehensive Land Use Plan by July 1, 2009 to assure consistency with its provisions. LURC is in the process of completing the Plan and has incorporated the appropriate language to assure consistency with Chapter 661. A date of final approval of the Plan by the Governor has not yet been identified.

Progress on permitting as related to the DEP:

There were no substantive changes made to Chapter 661 by the DEP over the last year.

B. Identified successes in implementing the recommendations contained in the February, 2008 final report of the Governor's Task Force on Wind Power Development in Maine pursuant to the Executive Order issued May 8, 2007.

The successes that OEIS has identified over the last year in implementing the recommendations contained in the Governor's Task Force on Wind Power Development in Maine include the following:

- Maine continues to be a leader in wind power development in New England and the nation.
- Maine continues to protect Maine's quality of place and natural resources as projects are developed.
- Significant meaningful benefits are being delivered to the economy, environment, and Maine people.
- The Community Wind sub-committee developed and secured passage of LD 1075 "An Act to Establish the Community-based Renewable Energy Pilot Program" that will promote community wind project development in the state.
- Considerable progress was made on the potential development of off-shore wind power through the Governor's Task Force and legislation to designate research and testing sites off the coast of Maine.

C. Projections of wind energy developers' plans and technology trends and their state policy implications.

There has been much interest in developing wind projects in Maine due to the excellent wind resources, potential development of transmission line projects, many operational wind projects and interest in renewable energy generation and reduction of greenhouse gas emissions.

However, the continuing economic recession, somewhat lower petroleum prices and the credit crunch, as well as growing local opposition to projects have some developers scrambling for financing, fighting lengthy appeals and potentially re-thinking plans for new projects and/or looking to states where existing transmission lines or lower project costs may exist.

The OEIS did not find any new technology trends that are being pursued in Maine for land-based wind power development or would have any impacts or considerations to the existing permitting processes. Typically, the types of grid-scale turbines being used and proposed for use in Maine, are either 1.5 MW turbines or 3 MW Vestas turbines. However, off-shore wind power development technologies are just emerging and it remains to be seen which technologies will prove to be commercially viable.

D. The State of Maine and each of the other New England states in making progress toward reducing greenhouse gas emissions.

The 121st Maine State Legislature passed, and Governor Baldacci signed into law, L.D. 845, "An Act to Provide Leadership in Addressing the Threat of Climate Change" As enacted, the bill became PL 2003 Chapter 237, 38 M.R.S.A. §574-579. The act set goals (§576) for the reduction of greenhouse gas emissions within the state, adopting similar targets previously proposed by the New England Governors/Eastern Canadian Premiers conference in 2001, signed by then-Governor King, and subsequently endorsed by Governor Baldacci. These call for a reduction of

greenhouse gas emissions to 1990 levels by 2010, to 10% below 1990 levels by 2020, and in the long term potential reductions sufficient to eliminate any dangerous threat to the climate which could be as much as 75% to 80% below 2003 levels.

The Maine DEP tracks bi-annually and reports to the Natural Resources Committee the progress the State of Maine is making toward reducing greenhouse gas emissions. The 2010 biannual report will be submitted by the end of January, 2010 and OEIS has asked that a copy of the full report be sent to the Utilities and Energy Committee.

DEP's report will include the results of EPA's state inventory tools to estimate Maine's greenhouse gas emissions for 1990-2008. It will include an analysis of data looking at trends and examples showing that economy-wide greenhouse gas emissions peaked in 2003 and have been showing an overall downward trend since. The report will also discuss the policies and programs that they believe are contributing to those trends. Finally, it will also address how the state is to meet its next target in 2020.

Preliminary data from the Northeast States for Coordinated Air Use Management (NESCAUM) is attached and shows Maine's greenhouse gas emission from 1990-2006. Also attached is greenhouse gas emissions data for each New England State.

E. OEIS Recommendations.

At this time, the OEIS does not have any recommendations or changes regarding identification of places to be included in the expedited permitting areas or creation of an independent siting authority. However, OEIS does recommend that the Legislature consider changing the state's wind power development goals to be consistent with the Governor's Ocean Energy Task Force's recommendation which is the "installation of 5,000 MW of offshore wind energy generating capacity in Maine's coastal waters and adjoining federal waters by 2030."

II. Tangible Benefits

Grid-scale, commercial wind projects proposed in the State of Maine must provide "significant tangible benefits". In making findings, the primary siting authority (DEP/LURC) shall presume that an expedited wind energy development provides energy and emissions-related benefits and shall make additional findings regarding other tangible benefits provided by the development.

"Tangible benefits" is defined as environmental or economic improvements attributable to the construction, operation and maintenance of an expedited wind energy development, including but not limited to: construction-related employment; local purchase of materials; employment in operations and maintenance; reduced property taxes; reduced electrical rates; natural resource conservation; performance of construction, operations and maintenance activities by trained, qualified and licensed workers in accordance with Title 32, chapter 17 and other applicable laws; or other comparable benefits, with particular attention to assurance of such benefits to the host community to the extent practicable and affected neighboring communities."

The two LURC permits (Transcanada and Stetson I) issued for wind energy development in 2008 (prior to Ch. 661) included a permit condition requiring annual reporting by the permittee after the project becomes operational to report back to the LURC Commission on the benefits realized. Such benefits included, but were not limited to, actual amounts of energy produced by

the project. (Reports will be submitted in 2010. However, see tangible benefits information on these projects obtained from the developer below.)

A tangible benefits policy, defining the principles considered when reviewing project applications and determining if tangible benefits are significant, was developed by an interagency group. (See attached.)

At this time, the OEIS does not recommend any additional funding for conducting the analysis and reporting of tangible benefits realized from wind energy development. However, this may change in the future depending on the number of future wind power development proposals submitted and determination from the DEP and LURC on the need for hiring sub-contractors and to what degree a quantitative analysis will need to be undertaken to determine tangible benefits.

Tangible Benefits from Stetson II and TransCanada projects in LURC's jurisdiction:

TransCanada's projections for the Kibby project are approximately \$81 million in total overall benefits to the state of Maine as related to the 132MW Kibby project. TransCanada currently has a "host community agreement" with nearby communities in which they have agreed to pay \$1,000 per installed MW which totals \$132,000 per year over the life of their project (not including their proposed expansion). In addition to local jobs and taxes TransCanada has entered into a conservation agreement with the Trust for Public Land on Stowe Mountain in the amount of \$500,000. (See attached for more information on dollars spent on local contractors and vendors.)

Tangible Benefits from Oakfield and Rollins projects in DEP's jurisdiction:

(See attached information.)

Proposed legislation related to the Tangible Benefits Policy:

Senator Peter Mills has submitted legislation (LD 1504) that proposes to change the existing "tangible benefits" policy by requiring that proposals for expedited wind energy development projects must, in addition to current applicable criteria, demonstrate to the siting authority that the proposed generating facility will provide a tangible benefit to Maine ratepayers in the form of a reduction in long-term electric rates. An amendment to this proposal is said to be in the works but OEIS has not seen or reviewed the amended language at this time.

III. Relevant Issues Related to Wind Power Development

The Wind Power Development law has been in effect since 2007. Since that time several projects have begun operating, are under construction or are in different stages of development. Over the last year several issues have arisen in relation to wind power development in the state that are worth noting.

Public Opposition:

A recent poll conducted by Portland-based Critical Insights in November, 2009 found that 90% of Maine people support the development of wind power as a source of electricity; nearly nine in ten Mainers agree that wind power can improve energy security and reduce Maine's dependence on fossil fuels, and eight in ten agree that wind power will produce jobs and other forms of economic benefits. However, public opposition to proposed wind power development is on the rise. Citizens groups have formed to slow, oppose and appeal proposed wind power

developments. In addition, communities have initiated moratoriums on wind power development and have passed local wind ordinances that are highly restrictive to wind power development in their communities. The biggest issues that are cited include potential health impacts, sound levels and shadow flicker that are potentially disruptive to homeowners and property values. (See attached press articles.)

In relation to potential health impacts, the Maine Center for Disease Control's Director, Dora Mills recently responded to concerns that she was hearing about possible health effects from the noise produced by wind turbines. After reviewing the medical and public health literature and conducting interviews with experts, she developed some conclusions to these concerns. For Director Mills' responses and more in-depth information go to <http://www.maine.gov/dhhs/boh/wind-turbines.shtml>.

I look forward to appearing before your committee soon to answer any questions you may have regarding the above report.

Sincerely,

John M. Kerry

John M. Kerry, Director
Governor's Office of Energy Independence and Security

Statutory Wind Power Goals:

- At least 2,000 Megawatts (MW) of installed capacity by 2015;
- At least 3,000 MW of installed capacity by 2020, of which there is a potential to produce 300 MW of offshore wind power.



Governor's Office of Energy Independence & Security

Status of Wind Power Projects in Maine: Assessment of Progress

5 Large-Scale Wind Projects in Operation:

- Mars Hill, (First Wind) - 42 MW
- Freedom, (Beaver Ridge) – 4.5 MW
- Stetson I, (First Wind) – 57 MW
- Kibby Mtn. (TransCanada) 66 MW
- Vinalhaven Island, (Fox Islands, LLC) – 4.5 MW

A total of 174 MW of installed capacity.



Governor's Office of Energy Independence & Security

Assessment of Progress

2 Large-Scale Projects Under Construction:

- Kibby, (TransCanada) – 66 MW (Phase II)
- Stetson II, (First Wind) – 25.5 MW

Total: 91.5 MW of capacity under construction.



Governor's Office of Energy Independence & Security

Assessment of Progress

2 Large-Scale Projects Permitted:

- Rollins Mtn., (First Wind) – 60 MW
(approved & appealed, appeal denied,
appealed to Maine law court)
- Record Hill/Roxbury, (Independence) – 55
MW (approved & appealed)

Total: 115 MW of capacity permitted.



Governor's Office of Energy Independence & Security

Assessment of Progress

7 Large-Scale Projects In Development:

- Rumford/Roxbury, (Longfellow/First Wind) – 50 MW
- Bridgewater, Phase I (Horizon/Aroostook Wind) – 195 MW
- Oakfield, (First Wind) – 51 MW
- Highland Wind, LLC (Independence) – 126.8 MW
- Spruce Mtn., (Patriot Renewables) – 18 MW
- Saddleback Ridge, (Patriot Renewables) – 34.5 MW
- Kibby Expansion, (TransCanada) – 45 MW

Total: Approximately 520.3 MW of capacity in development.



Assessment of Progress

- State of Maine has met 8.7% of wind power goals with 174 MW of installed capacity. (Based on 2015 goal.)
- Would rise to 13.28% if all 91.5 MW of capacity under construction are operational.
- Would rise to 19.02% if all 115 MW permitted are constructed and operational.
- Would rise to 42.04% if all 520.3 MW in development are constructed and operational.

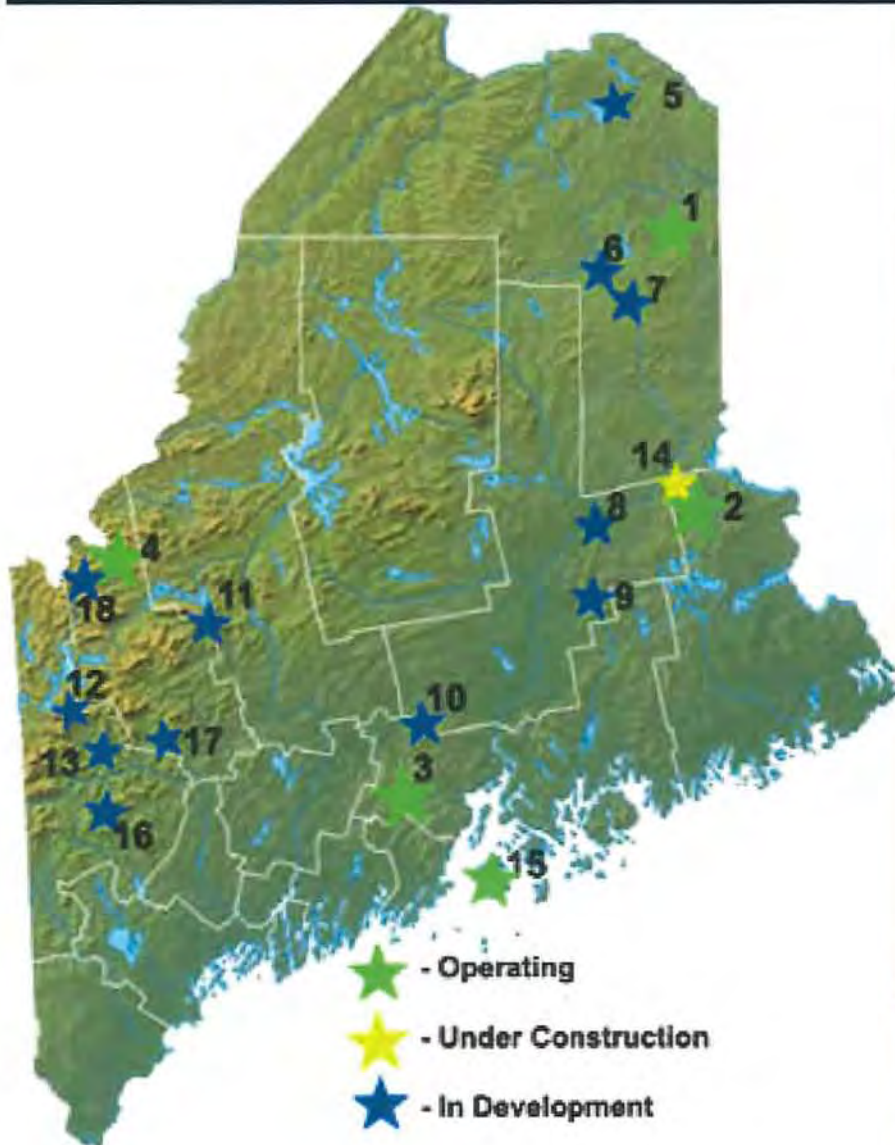


Assessment of Progress

- At the current rate, Maine will need to bring online 183 MW of capacity a year, starting in 2010 to meet the state's wind power development goals by the end of 2015.
- Ambitious goals but OEIS doesn't recommend revising goals at this time.



Maine Wind Power Development Map



- 1. [Mars Hill](#)
- 2. [Stetson Ridge](#)
- 3. [Beaver Ridge, Freedom](#)
- 4. [Kibby Mountain](#)
- 5. [\(Aroostook County Wind, Future Phases\)](#) —not included in OEIS report
- 6. [Aroostook Wind, Bridgewater Phase](#)
- 7. [Oakfield](#)
- 8. [Rollins, Lincoln](#)
- 9. [\(Passadumkeag Mountain, Grand Falls Twp\)](#) —not included in OEIS report
- 10. [Mount Harris, Dixmont](#)
- 11. [Stewart Mountain, Highland Plantation](#)
- 12. [Record Hill, Roxbury](#)
- 13. [Longfellow, Rumford](#)
- 14. [Stetson II, Stetson](#)
- 15. [Vinalhaven](#)
- 16. [Spruce Mountain](#)
- 17. [Saddleback Ridge](#)
- 18. [Kibby Expansion](#)

Source: Natural Resources Council of Maine

Policy on implementing the tangible benefits provision of P.L. 2008 Chapter 661

The DEP and LURC are charged with reviewing applications for wind energy projects subject to the provisions of this law.

35-A MRSA § 3451 defines tangible benefits as:

10. Tangible benefits. "Tangible benefits" means environmental or economic improvements attributable to the construction, operation and maintenance of an expedited wind energy development, including but not limited to: construction-related employment; local purchase of materials; employment in operations and maintenance; reduced property taxes; reduced electrical rates; natural resource conservation; performance of construction, operations and maintenance activities by trained, qualified and licensed workers in accordance with Title 32, chapter 17 and other applicable laws; or other comparable benefits, with particular attention to assurance of such benefits to the host community to the extent practicable and affected neighboring communities.

Where the permitting agencies are required to make findings as directed in 35-A MRSA §3454 based on comments provided by the State Planning Office, Department of Labor, and the Public Utilities Commission.

The review standard for tangible benefits at 38 MRSA § 484 (3) (G) for DEP, and 12 MRSA § 685-B (4-B) for LURC, is that they must be found by the permitting agency to be "significant." The agencies therefore shall be looking for projects that demonstrate a particular and earnest commitment to the requirements of this law.

This standard is applicable to "expedited wind energy development" which is statutorily defined to include large-scale, commercial wind energy development projects in the State's organized area that require the department's approval under the Site Location of Development Act as well as comparable projects located in specified areas within the State's unorganized territory managed by the Land Use Regulation Commission. *See* Title 35-A MRS sections 3451(4). Statutory provisions expedite review of these projects principally through streamlined administrative procedures and a wind-power specific standard regarding potential effects on scenic resources and related public uses. In enacting these provisions, designed in part to serve the public interest by reducing controversy associated with siting wind energy facilities, the Legislature recognized wind power's potential for both significant energy-related and economic public benefits and, as a potentially highly visible and new landscape feature, site-specific adverse effects on scenic and other natural resources. Accordingly, the Legislature further found that the State's wind energy resources should be developed with assurance that project-specific benefits accrue to the people of the State while addressing as appropriate site-specific natural resources-related issues. The "significant tangible benefits" provision is a key tool for achievement of these legislative policies in a flexible manner adaptable to the unique issues and opportunities presented by each development proposal.

The agencies will consider the following principles when reviewing project applications and determining "significance."

- Tangible benefits that create reduced electrical rates can be structured as either a long-term contract to sell capacity and/or energy to a utility that serves the project area and state or to a particular industry or facility in the project area or state at rates significantly below projected market rates or rates that are indexed at fixed amount or a percentage below market prices.
- Tangible benefits that offset increases in utility rates that occur as a result of transmission line improvements through long-term contracts at rates significantly below projected market rates or rates that are indexed at fixed amount or a percentage below market prices could be considered.
- Tangible benefits should be permanent, or of significant duration
- Tangible benefits do not mitigate for project impacts, nor should mitigation requirements for impacts to wetlands or habitat, for example, count as tangible benefits
- Tangible benefits that are presented as developed projects are preferred, however it is recognized that payments to the State or third-parties to undertake projects that will provide tangible benefits, such as land conservation, habitat improvement, or recreational access, are acceptable so long as additional to required regulatory compensation.
- Tangible benefits to natural resource conservation can be either designed to provide recreational amenities or ecological services. As such a project that provides improved recreational access but is located on ordinary or non-significant habitat is still a viable benefit project.
- Tangible economic benefits can include projects that create educational opportunities, including scholarships or educational programs, at institutions that support the facility, the wind power industry, the project area, and economic development of the project area and region.
- Tangible benefits are not to be presented as conditional on a tax increment financing proposal being approved by a local or county jurisdiction.

The following chapters are enacted regarding grid-scale wind energy development:

DEP:

Sec. B-12. 38 MRSA §484, sub-§10 is enacted to read:

10. Special provisions; grid-scale wind energy development. In the case of a grid-scale wind energy development, the proposed generating facilities, as defined in Title 35-A, section

3451, subsection 5:

Final version

Version: October, 7 2008

Prepared by Andrew Fisk

A. Will be designed and sited to avoid unreasonable adverse shadow flicker effects;

B. Will be constructed with setbacks adequate to protect public safety. In making a finding pursuant

to this paragraph, the department shall consider the recommendation of a professional, licensed

civil engineer as well as any applicable setback recommended by a manufacturer of the generating

facilities; and

C. Will provide significant tangible benefits as determined pursuant to Title 35-A, section 3454, if

the development is an expedited wind energy development.

The Department of Labor, the Executive Department, State Planning Office and the Public Utilities

Commission shall provide review comments if requested by the primary siting authority.

For purposes of this subsection, "grid-scale wind energy development," "primary siting authority,"

"significant tangible benefits" and "expedited wind energy development" have the same meanings as in

Title 35-A, section 3451.

LURC:

Sec. C-4. 12 MRSA §685-B, sub-§4-B is enacted to read:

4-B. Special provisions; wind energy development. In the case of a wind energy

development, as defined in Title 35-A, section 3451, subsection 11, with a generating capacity greater

than 100 kilowatts, the developer must demonstrate, in addition to requirements under subsection 4, that

the proposed generating facilities, as defined in Title 35-A, section 3451, subsection 5:

Final version

Version: October, 7 2008

Prepared by Andrew Fisk

A. Will meet the requirements of the Board of Environmental Protection's noise control rules

adopted pursuant to Title 38, chapter 3, subchapter 1, article 6;

B. Will be designed and sited to avoid undue adverse shadow flicker effects;

Public Law, Chapter 661, 123rd Legislature, Second Regular Session

Page 17

C. Will be constructed with setbacks adequate to protect public safety, as provided in Title

35-A, section 3455. In making findings pursuant to this paragraph, the commission shall consider

the recommendation of a professional, licensed civil engineer as well as any applicable setback

recommended by a manufacturer of the generating facilities; and

D. Will provide significant tangible benefits, as defined in Title 35-A, section 3451, subsection 10,

within the State, as provided in Title 35-A, section 3454, if the development is an expedited wind

energy development, as defined in Title 35-A, section 3451, subsection 4.

Proposed Tangible Benefits in DEP's Jurisdiction:

Oakfield:

On the local level, the host community will benefit through lease payments for land, employment opportunities, the local purchase of materials and supplies, taxes paid on the Project, and, if the community so elects, an annual Community Benefit Fund payment (up to \$255,000 per year for up to twenty years). A significant portion of the estimated \$130 million dollar project cost is expected to be spent on development, engineering, and construction-related activities, much of which may stay within Maine. The local host community and immediately surrounding areas can benefit through construction-related employment opportunities and the ancillary economic benefits of that construction activity. There will be the opportunity for direct jobs for activities like tree clearing and excavation, and ancillary jobs in businesses that support construction such as lodging, restaurant, fuel and concrete supply. Following the construction phase, Evergreen Wind Power II, LLC (Evergreen II) anticipates hiring three to eight permanent employees to operate and maintain the facility. The Project provides a direct economic benefit to the approximately 34 local landowners participating in the Project through land leases and easements. On a larger scale, the Project will increase energy diversity, thereby helping to reduce electric price volatility in Maine. The project will also help Maine meet its commitments under the Regional Greenhouse Gas Initiative (RGGI), which establishes limits for emissions associated with the generation of electricity. The operation of the Project would have the capacity to generate approximately 135,000 megawatt hours of electric generation each year without any air or water pollution and with no greenhouse gas emissions, a leading cause of global warming.

Rollins:

- (1) Landowner benefits. The applicant states that the project will provides a direct economic benefit to approximately 30 landowners directly participating in the project through land lease and easement agreements with the applicant. These land leases and easements will allow the landowners to gain an economic benefit from their land by providing steady annual revenue during the life of the project. The revenue will be paid directly to local landowners with no investment requirement.
- (2) Employment. The applicant states that a significant portion of the estimated \$130 million dollar project cost is expected to be spent on development, engineering and construction-related activities, much of which may stay within the State of Maine. The local host communities and immediately surrounding areas will benefit through construction-related employment opportunities, and the ancillary economic benefits of that construction activity. There will be the opportunity for employment in the areas of timber harvesting and construction as well as ancillary jobs that support construction, including: lodging, restaurant, fuel, and concrete supply. Following the construction phase, the applicant anticipates hiring permanent employees to

operate and maintain the facility. The project will hire locally whenever possible, providing construction, operations, and maintenance employment opportunities to community residents.

- (3) Property taxes. The applicant states that tax payments from the proposed project are expected to represent a substantial addition to the tax base in Penobscot County and will likely make the project one of the largest taxpayers in the region. The project infrastructure will bring similar direct tax benefits to the towns of Lincoln, Lee, Burlington, Winn, and Mattawamkeag, as annual tax revenue from the proposed project could be used to reduce the local property tax burden, improve schools, maintain roads, increase economic development activities, or enhance public services.
- (4) Local contributions. In addition to local property taxes, the applicant has offered to contribute directly into a Community Benefits Fund (CBF) within the host communities of Lincoln, Lee, Winn, and Burlington. Each community, at their sole discretion, can decide to accept the contribution or negotiate their own community benefit through tax increment financing (TIF) or other mechanisms as determined by the community. If all communities participate in the CBF, the applicant will make a total annual contribution of \$300,000 to the host communities for 20 years. The contribution will be divided among the host communities, at the applicant's sole discretion, based on the level of project investment in each community. If one or more host communities opt out of the CBF, the applicant will reduce the total annual contribution by an amount commensurate with the level of project investment in those host communities. The funds received by each community may be used at their discretion to create new programs, fund existing programs or provide additional tax relief.
- (5) Additional contributions. In addition to the community benefits, the applicant has made, or will make, voluntary contributions to the following organizations: the Mattawamkeag Wilderness Park, WonderJam (local music and alternative energy festival), Burlington 4H Club, four (4) local snowmobile clubs and one (1) ATV club.
- (6) Energy price volatility. The applicant states that new power generation facilities, particularly renewable power facilities like wind projects, will lead to lower and less volatile electricity prices. The State of Maine has adopted a Renewable Portfolio Standard (RPS) to diversify the electricity supply portfolio, stabilize rates, increase energy security, improve environmental quality, invigorate the clean energy industry, and promote economic development. The adoption of the RPS has resulted in an increased regional demand for renewable energy that exceeds the currently available and qualifying supply of renewable energy. The proposed 60 megawatt Rollins Wind Project will help meet this growing demand and take an important step toward achieving the policy objectives of the Maine RPS law.

Stetson II - First Wind

Excerpts from wind power development application to LURC 12/08

21.0 TANGIBLE BENEFITS

The Stetson II Wind Project will provide significant tangible benefits to surrounding communities, Washington County, and the entire State of Maine.⁶ On a local level the nearby communities will benefit through employment opportunities and the local purchase of materials and supplies. The unorganized territories will benefit through the taxes paid on the project. On a larger scale, the project will increase energy diversity thereby helping to reduce electric price volatility in Maine. The project will also help Maine meet its commitments under the Regional Greenhouse Gas Initiative, which establishes limits for emissions associated with the generation of electricity.

21.1 Economic Benefits

21.1.1 Local Landowner Benefits

The Stetson II Wind Project provides a direct economic benefit to the local landowner participating in the project through a land lease. The project allows the landowner to realize an additional economic benefit from land that will supplement what the landowner typically makes from logging and other uses of the land. This will help maintain traditional economic and recreational uses while creating a new source of clean energy.

21.1.2 Increased Employment Opportunities

Washington County's estimated 2005 population was 33,448; the land area of the county encompasses 2,568 square miles.⁷ The local community in this area suffers from chronic high unemployment due to the lack of an established employment base. The average unemployment rate for 2006 in Washington County was 7.6 percent, well above the Maine's average of 4.6 percent.⁸ Since 1990, the unemployment rate in this area has exceeded the state average.⁹ Moreover, according to a recent report to LURC, the Rim Region, which includes Washington County, has a disproportionately small share of the State's earnings and employment relative to its population. That is, "the LURC-related economy provides fewer jobs per resident than the economy of the rest of the state and the earnings made in those jobs are less than those made in the rest of the state."¹⁰ That report points out that employment and earnings in interior Maine, including Washington County, have been stagnant for over a decade. This has led to a large number of LURC households living below the poverty level. In fact, Washington County has the highest poverty rate in the state, calculated at 20.9 percent in 2000.¹¹ Washington County, according to the last U.S. census, also has the lowest median household income in Maine at \$25,869.¹² Per capita income is 28 percent below the state average, and median household income is 31 percent below.¹³ Land Use Regulation Commission Application Stetson II Wind Project, Washington County, ME Page 20 14

In an unorganized territory, the county acts in the place of the municipality in creating and implementing a TIF program. 30-A M.R.S.A. § 5235.

The Stetson II Wind Project would respond directly to area needs and to the people who live and work in the vicinity of T8 R4 NBPP. A significant portion of the estimated \$60 million dollar project cost is expected to be spent on development, engineering, and construction-related activities that will directly benefit Maine. The surrounding areas will benefit through construction-related employment opportunities, and the ancillary economic benefits of that construction activity. There will be the opportunity for direct jobs for activities like tree clearing and excavation, and jobs in ancillary businesses that support construction such as lodging, restaurant, fuel, and concrete supply. Following the construction phase, Stetson II anticipates hiring additional employees to maintain and operate the project. Stetson II will hire locally whenever possible, providing construction, operations, and maintenance employment opportunities to community residents.

Although the exact amount of direct and indirect economic benefits of a project cannot be predicted, the actual economic spending associated with the development and construction of Stetson is evidence of the tangible economic benefits that can be expected from the Stetson II Wind Project. Included as Exhibit 21 is a graphic representing the local and statewide economic benefits associated with Stetson. The economic benefits of a wind project are significant and can provide value and stability to the local and regional economy. As indicated in that graphic, of the approximately \$65 million spent for construction, engineering, and development services, about \$50 million was spent in Maine. This includes contractors throughout the state from Fryeburg to Presque Isle, consultants with offices throughout the state, and local businesses in the Lincoln and Danforth area. These amounts reflect only direct spending by the developer and do not capture the indirect jobs and benefits that may result from that direct spending. For example, the contractors hired by the developer to build the project will spend money on food, lodging, and fuel in the area. Similar benefits during construction are expected for the Stetson II Wind Project.

21.2.3 Property Tax Benefits

Utility-scale wind power projects require significant capital investments that have been estimated from \$95 million to \$270 million.[1] These large investments in grid-size wind power projects typically result in a dramatic increase in property value, and typically have the corresponding effect of substantially increasing the local property tax base. The Stetson II project, like the Stetson Project, is located solely within the Unorganized Territory of Washington County. Similar to the Stetson project, the applicant expects that it will pay significant annual property taxes on the Stetson II wind power facilities, which would make the Stetson II Project one of the largest taxpayers in the region.

Host communities to large projects with high taxable value, such as a grid-size wind power project, enjoy tangible benefits related to the taxes paid on these projects, and can select the manner in which the community wishes to enjoy those benefits. Some communities choose to use the new property taxes to reduce local property taxes. As an example, the mil rate in Mars Hill decreased significantly (from \$25.00 to \$20.00) in 2007 as a result of the tax payments associated with the Mars Hill wind power project.

Under the terms of a Tax Increment Financing ("TIF") agreement, Evergreen Wind Power, LLC (an affiliate of this applicant) pays the Town of Mars Hill \$500,000 in property taxes annually, and will continue to pay that amount annually through 2026. Thus, TIF agreements such as that between Mars Hill and Evergreen Wind Power, LLC can provide long-term stability, predictability and property tax relief to the municipality arising from the substantial property tax payments associated with commercial wind power facilities.

Other host communities choose to enjoy their tangible tax-related benefits by segregating the new property taxes in a TIF program, and by using the community's share of those new taxes to fund municipal economic development projects that have been approved by the legislative body of the municipality and the State of Maine Department of Economic and Community Development.¹⁴ As an example, the Washington County Commissioners entered into a TIF agreement with Evergreen Wind Power V, LLC (an affiliate of this applicant) for the Stetson Wind Power Project (the "Stetson TIF").

The Stetson TIF will provide an average annual payment of approximately \$185,000 to Washington County for Land Use Regulation Commission Application Stetson II Wind Project, Washington County, ME Page 21 15 MPUC Review Comments for the Land Use Regulation Commission, Zoning Petition ZP 702 (Maine Mountain Power, LLC), April 14, 2006, page 4. ¹⁶ According to PUC staff, the Commission plans to initiate shortly a process intended to use their authority to direct investor-owned utilities to enter into long-term contracts for capacity and energy. the County's use in funding economic development projects within the Unorganized Territories of Washington County during the 20-year life of the TIF.

The Washington County Commissioners have expressed a strong interest in exploring a TIF agreement for this Stetson II project as well. While the terms of any potential TIF program for the Stetson II project have not yet been determined, it is clear that the addition of the significant new property tax value this project will inject into the Unorganized Territory of Washington County will provide a considerable and tangible tax-related benefit within Washington County generally, and within the Unorganized Territory of Washington County in particular.

21.1.4 Reduced Energy Price Volatility

The addition of new power generation facilities in Maine will likely lead to lower and less volatile electricity prices. This is particularly true in the case of the addition of renewable power facilities like wind projects. The price and reliability benefits of new renewable resources have been described by the Maine Public Utilities Commission (MPUC) as follows:

*The addition of diverse (non-gas) resources in Maine and elsewhere in the region will be beneficial for several reasons. As more non-gas generation is added to the mix, cheaper gas resources and non-gas resources will set the clearing prices in a greater number of hours. **This would have the general effect of reducing both the level and volatility of electricity prices***

throughout the region. To the extent new generation is constructed within Maine's borders, the benefit to Maine consumers is more direct in that the result would be lower prices within the Maine zone. In addition, any overall reduction in the demand for gas that results from the addition of non-gas resources in the region should have the effect of reducing the price of natural gas which translates into lower electricity prices. Finally, a reduction in the region's reliance on natural gas would result in a more secure system that is less vulnerable to gas shortages and thus less susceptible to curtailments and blackouts.¹⁵

Given that the cost of wind power is stable and is not subject to fluctuations in fossil fuel prices, the development of new wind facilities like the project will also create an opportunity to reduce price volatility directly for certain consumers. In addition to opportunities to work directly with consumers, the cost stability of wind energy makes it a strong candidate for long-term contracts under the auspices of the MPUC.¹⁶ Additionally, in a number of New England states, including Maine, some type of Renewable Portfolio Standards (RPS) have been adopted to diversify the electricity supply portfolio, stabilize rates, increase energy security, improve environmental quality, invigorate the clean energy industry, and promote economic development. Essentially, RPSs create market demand for clean power, and the Maine Legislature has reaffirmed its support for the Maine RPS, and in fact expanded it, in recent sessions. The combined effect of the RPSs in New England is an increasing regional demand for renewable energy that far outstrips the currently available and qualifying supply of renewable energy. This 25.5-MW project will help meet this growing demand, and thereby take an important step toward achieving the policy objectives of the Maine RPS law.

21.2 Environmental Benefits

The operation of the project is expected to generate approximately 25.5 MW of electricity each year without any air or water pollution and with no greenhouse gas emissions, a leading cause of global warming. Land Use Regulation Commission Application Stetson II Wind Project, Washington County, ME Page 22

Wind projects create zero air or water pollution. Each local, clean MW produced through wind energy means less produced through costly and polluting fossil fuels. To put this into perspective, the clean energy produced last year at the nearby Mars Hill Wind Project in Mars Hill, Maine, is the equivalent of burning approximately 260,000 barrels of oil or 70,000 tons of coal per year, but without the associated toxicity, health, or cost issues.

Maine and the region have set aggressive greenhouse gas reduction goals. State and regional experts, including the MPUC and ISO-New England, have concluded that Maine and the region cannot meet these greenhouse gas policy goals without significant additions of wind power and other renewable in Maine and elsewhere. The significant environmental benefits associated with wind power, including avoided air pollution benefits, were recently recognized by the Governor's Task Force on Wind

Power Development, and affirmed by the Legislature with enactment of “An Act to Implement the Recommendations of the Governor’s task Force on Wind Power Development, Public Law 2008, Chapter 661.”¹⁷

KIBBY WIND POWER PROJECT

Reed & Reed and Cianbro

LOCAL COMMITMENT / TOTAL CONSTRUCTION EMPLOYMENT / LONG TERM EMPLOYMENT

3-Nov-09

LOCAL COMMITMENT

SCOPE	VENDOR	COUNTY
Electrical Office Trailers	Whiting	Franklin
O&M Building	Riverside Builders	Franklin
O&M Site Work	Jordan Excavating	Franklin
O&M Foundation	Norton Concrete	Franklin
O&M Drywall	Swanson Drywall	Franklin
O&M Electrical	EMI Electrical, Whiting	Franklin
O&M Mechanical, Propane	Valley Gas	Franklin
Well Drilling	Goodwin	Franklin
Survey	Sackett & Brake	Somerset
Janitorial Services	Sue McFarland	Franklin
Tower Bolt Templates, Misc Steel	ARC	Franklin
Grading & Trucking	TTH	Franklin
Gasoline Supply	Multiple Businesses	Franklin
Fuel Supply	Multiple Businesses	Franklin
Signs	Signworks	Franklin
Port-a-Johns	Brackett's Plumbing	Franklin
Port-a-Johns	Foss Enterprises	Somerset
Power Washing / Office Trailer Modifications / Guard Sha	KR Builders	Franklin
Snow Removal / Lay Down Yard Rental	JL Brochu	Franklin
Trucking / Plowing / Sanding Office Trailer Modifications / & Propane Heater Installation / Gravel & Materials	Absolut Services	Franklin
Gravel & Materials	Flagstaff Construction, Jordan Excavation	Franklin
Gravel/Fill & Substation Site Work	M&H Logging	Franklin
Gravel/Fill	Sheridan Scribner	Franklin
Assorted Consumables	Fotter's Market	Franklin
Lumber & Building Supplies	Jordan Lumber	Franklin
Hay & Erosion Control Mix	Norpine Landscaping	Franklin
Underground Site Work	Haley Construction	Franklin
Room & Board	Multiple Businesses	Franklin
Substation Fencing	ADA Fence	Somerset
Trash Removal	Wattles	Franklin
Vehicle Service & Repair	T&L Repair	Franklin
Meetings & Catering	Sugarloaf Mountain Co	Franklin
Project T-Shirts	LogoLogic	Somerset
Total Local Commitment		\$7,367,000

Note: This figure does not include wages paid to local workers working directly for contractors and major subcontractors.

Total Maine Commitment (including contractor and subcontractor payroll.)	~\$81 million
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EMPLOYMENT

	TOTAL	ORIGIN
Total Construction Positions Supported at Peak Construction	"+/-" 300	Over 90% from Maine
Total Long Term Operations and Maintenance Positions Filled	8	All from Maine

Weighing wind against the future

Submitted by Sun Journal on Wed, 01/06/2010 - 13:11

Editorial Board

If Buckfield residents were to enact a moratorium on wind power projects, as they are now considering, they wouldn't be the first Mainers to do so.

Thorndike enacted a moratorium in March. Rumford enacted one last month.

The moratorium in Jackson was adopted, and then extended 180 days. Same thing happened in Dixmont.

As in Thorndike, officials in each of these towns supported moratoriums to allow time to study wind power development, and its effect "on public health, safety and welfare, and the laws and experiences of other jurisdictions."

In Rumford, townspeople felt they needed time to look at the facts and consider options.

Thoughtful consideration of anything this important is justified, but no one is inventing a new wheel here. Wind turbines enjoy widespread use in European nations, and have been spinning for years in Upstate New York, Vermont and northern Maine, among many other mountaintop regions in this country.

Study after study has been conducted to consider public health needs, safety and welfare, and experiences of other jurisdictions, and it would be quite an astonishing development if hyper-local, town-specific studies uncovered radically new scientific or enjoyment-of-life evidence.

In Buckfield, contemplation of a moratorium is a curious thing, especially for turbines to be sited on Streaked Mountain. The mountain is already home to a highly-visible and vast cluster of antenna and communications towers used by emergency service agencies and cell phone users.

These towers and antenna were the subject of public meetings and hearings, but there was never a whisper of moratorium on construction because the elevated site is well-suited for communication equipment.

Does that mean we need to communicate more than we need to create alternative energy sources in our towns? Hardly. The two needs are equally important, but aren't being equally welcomed.

Before rushing headlong into a moratorium, residents in Buckfield and elsewhere in Maine where these moves are being considered might give equal thought to the cost of delaying or banning wind power in their communities.

Wind power is a proven energy source, and taking advantage of an increasing number of available grants to launch construction of these projects offers a real boost to the local economy by increasing the property tax base and creating jobs.

The Maine Department of Environmental Protection has regulations in place governing turbine noise and placement, based on years of review by experts, so we're not talking about rogue placement of towers in Maine's hamlets.

If we can stomach the sight of a cell phone tower so we can chat with our neighbors, doesn't it make sense to do the same to foster renewable energy to power our homes and businesses?

editorialboard@sunjournal.com

Maine's wind-power future may depend on Dixmont

Tux Terkel 11-29-09

Kennebec Journal

DIXMONT -- At 1,165 feet, Mount Harris is little more than a broad hill in a small town along Route 9, southwest of Bangor. And as residents debated an ordinance to regulate wind power development here, it seemed like a local matter.

That changed Nov. 19. By a wide margin -- 229 to 78 -- voters approved an ordinance that's being called one of the most restrictive in New England. It requires a one-mile setback between turbines and homes, a standard that likely has the effect of banning grid-scale wind power on Mount Harris and other wooded ridges in town.

But almost immediately, the impact of the vote began rippling beyond Dixmont.

Three months ago, state government unveiled a model ordinance that it hopes towns will use to guide wind power. It's part of an ambitious goal of reducing the state's dependence on fossil fuels by generating 2,000 megawatts of electricity from wind by 2015, and 3,000 megawatts by 2020.

Now developers, environmentalists and state officials are wondering whether growing public backlash against wind power will prompt more towns to use Dixmont's ordinance to restrict similar proposals. Mainers have a long history of craving economic development in general, but fighting it in their backyards. Does Dixmont's vote signal that the apparent public support for renewable energy only extends to wind projects that are very far from where people live?

"I'm sensing the tide is changing a bit," said Rich Silkman, a partner at Competitive Energy Services in Portland. "It does raise questions about the state's ability to meet its goal."

Silkman has good reason to ponder this. Last year his company built a three-turbine project on Beaver Ridge in nearby Freedom. He wanted to continue development along the rolling hills of Thorndike, Jackson and, finally, Dixmont, adding another dozen or more turbines. Now the investment, valued at between \$40 and \$70 million, is on hold, as Silkman waits to see whether neighboring Thorndike and Jackson follow Dixmont's lead.

Dixmont's vote seems to be one of the forces pushing wind power to a crossroads in Maine, where it's heavily promoted by state government as both an economic development and energy security strategy.

Some projects have strong local support, such as the community wind turbines on Vinalhaven and a 17-turbine wind farm in the Washington County town of Danforth. But a recent string of bad-news stories about wind, including the delay of a controversial project near Rumford and turbines that didn't work in Saco and Kittery, have given ammunition to emerging citizen groups that are against virtually all land-based wind development.

Opponents are benefiting from other factors: Falling petroleum prices during the recession have dampened the public's sense of urgency around energy. Media stories about the potential for wind power far offshore, and imported energy from Canada, also create the sense that local wind projects aren't really needed.

These things may have played a role in Dixmont, where planners spent a year studying wind power and how it might affect their town.

Dixmont's farming heritage is reflected in its forests and open fields, but the town has become part of the rural commutershed for Bangor, Newport and Waterville. There are few local businesses; the elementary school is the largest employer. So when developers began measuring wind speeds atop Mount Harris, Hog Hill and Peaked Mountain, some residents saw the chance to lower taxes through revenue kicked off from renewable energy.

Others, however, saw their town with no protection from industrial development. That led to a moratorium on wind projects last November, while the town crafted rules.

What followed was a deliberate process in which the planning board studied wind power ordinances in other states and countries, as well as Maine's model ordinance. The town encouraged residents to make the half-hour drive to Freedom, where they could stand under the whirling blades on Beaver Ridge. Some residents even visited the wind farm at Mars Hill in Aroostook County.

Several townspeople spoke to homeowners next to these projects. Among the messages they heard is that the turbines disrupted the lives of abutters. Complaints ranged from noise and visual flicker to health effects that some people blame on living near wind farms.

These anecdotes seemed to have a decisive impact, according to Judy Dann, the town's first selectman. They helped convince a majority that wind turbines weren't a good fit for Dixmont, she said.

"I think people listened to the stories that these people had to tell," she said.

These concerns were shared by residents including Anne Warner, an organic grower who's married to the planning board chairman. In her view, there's an analogy between today's surge of wind power proposals in rural Maine and the wave of Walmart stores that began appearing in the 1990s. Residents knew of Walmart, but they really didn't understand the impact of big-box stores, until they began springing up in their towns.

"I hope this vote will open a dialogue," she said. "Towns, developers and the state need to start talking about the impact wind power does have."

Wind power's impact seems strongly linked to how close people are to turbines.

Driving from Dixmont to Freedom, the Beaver Ridge turbines are visible on the horizon from miles away. It's only after ascending a country road onto the ridge that the scale of the towers can be appreciated against the surrounding landscape. The dozen or so homes near the site are dwarfed by the 262-foot towers and their 122-foot blades.

Standing under the towers in a light breeze last week, it was possible to hear a quiet whoosing and a high-pitch whistle that fell away. But variations in wind speed, pressure and direction can change the sound. Despite engineering studies and rules that set maximum decibel limits, some abutters complain about intrusive noise inside their homes.

A handful of the homes on Beaver Ridge are between 1,000 and 1,500 feet of a turbine. Dixmont's ordinance would set a buffer roughly four times greater. That buffer can only be reduced if a homeowner signs a waiver with a developer.

Dixmont's ordinance has been a gift for Citizens Task Force on Wind Power, a newly-formed umbrella group of local residents fighting wind projects around the state. They plan to circulate the ordinance in other communities, according to Brad Blake, a spokesman for the group.

Blake's family has a lakefront cottage in Lee, near Lincoln, where the 40-turbine Rollins wind farm is being proposed. But his opposition extends to all grid-scale wind projects. In his opinion, the industry is driven by tax breaks and doesn't produce enough power to justify the damage caused by roads, transmission lines and towers.

Blake doesn't mince words, calling Gov. John Baldacci and state officials "wind turbine zombies" whose policies threaten to turn Vacationland into "turbine land."

Blake's strident position isn't shared by mainstream environmental groups focused on climate change and oil dependency, such as the Natural Resources Council of Maine. The group is reviewing the Dixmont ordinance and trying to get a sense of what it might mean for other projects in organized towns.

"If this is indicative of a pattern, we have a lot of work to do," said Dylan Voorhees, the group's clean energy director.

The NRCM supports the state's model ordinance. But Voorhees said the Dixmont vote, and abutter problems in Freedom and Mars Hill, raise questions about whether the state guidelines strike the right balance.

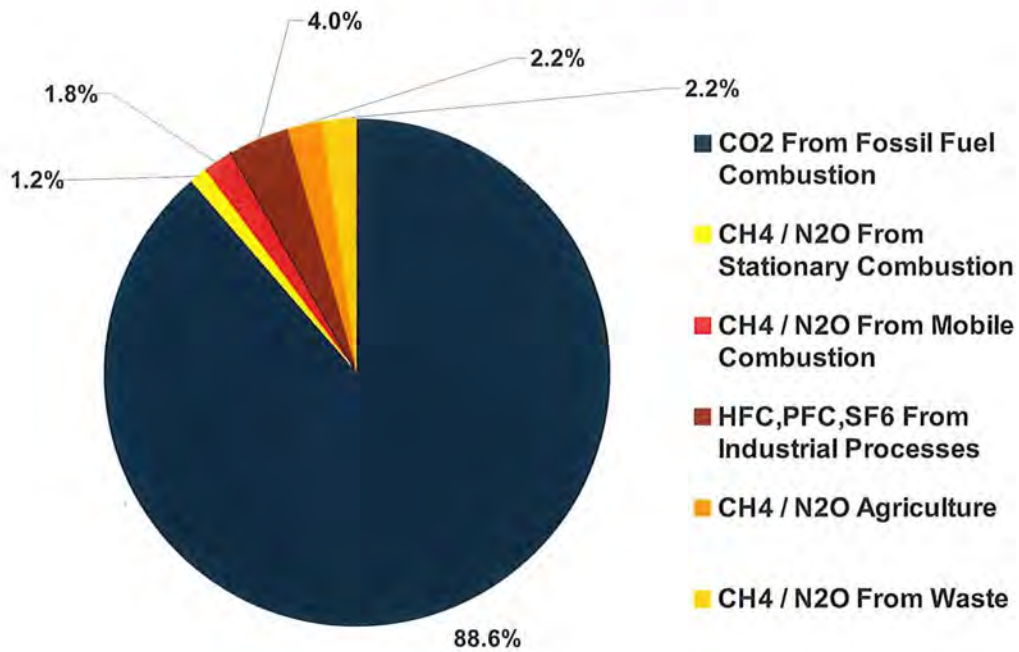
Community opposition to wind power also worries John Kerry, the state's energy director. He expects the next governor and Legislature will confront this problem.

Maine can't wait for the promise of offshore wind, Kerry said, which faces technological challenges and may be a decade away. In a state with broad opposition to nuclear power and limited support for liquefied natural gas, he said, there has to be room for wind.

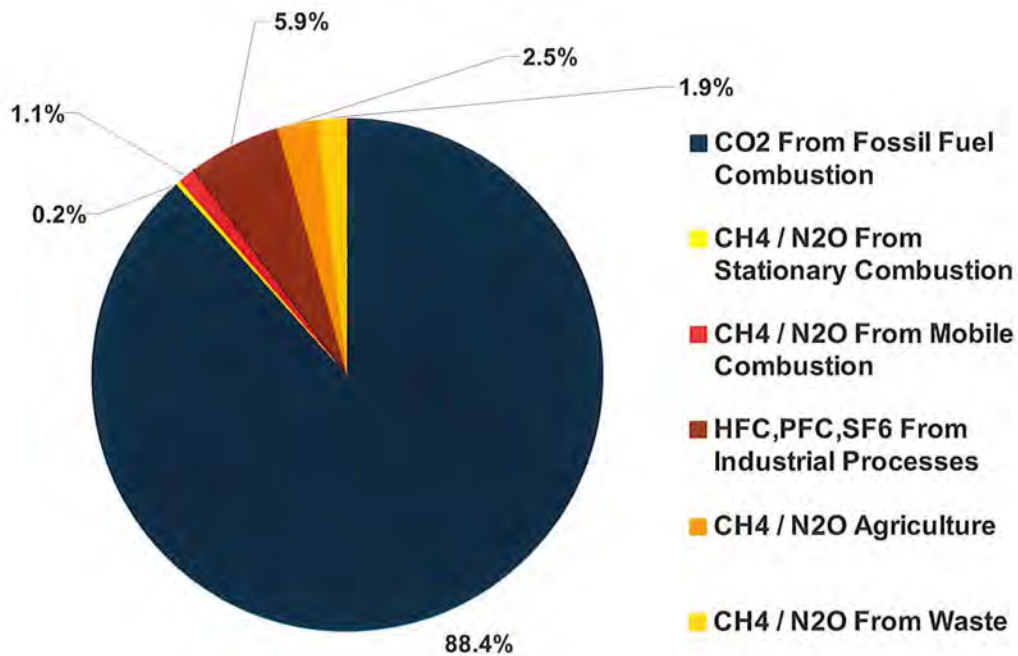
"You can't say no to everything," he said. "At some point you're going to have to make a choice."

Maine GHG Emission Summary

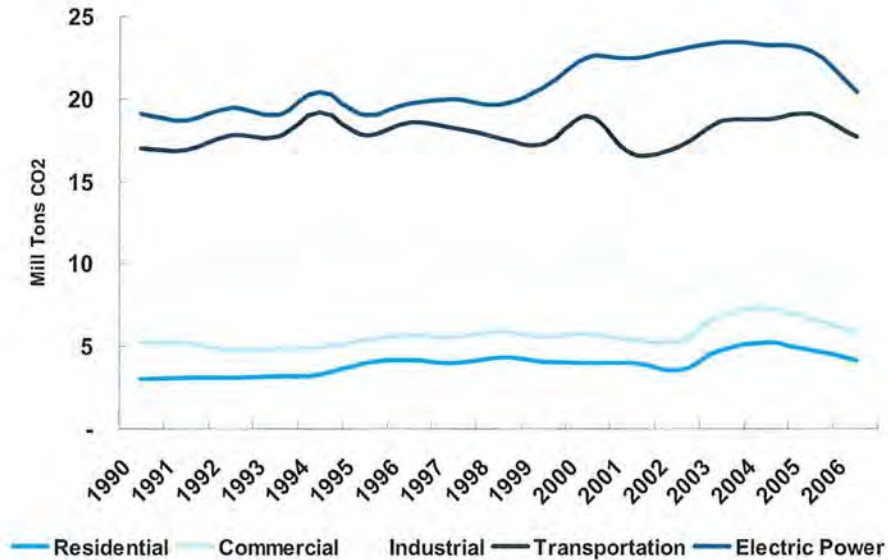
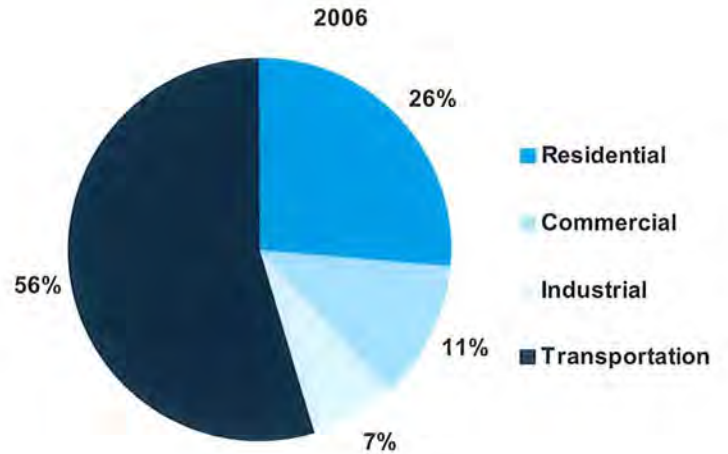
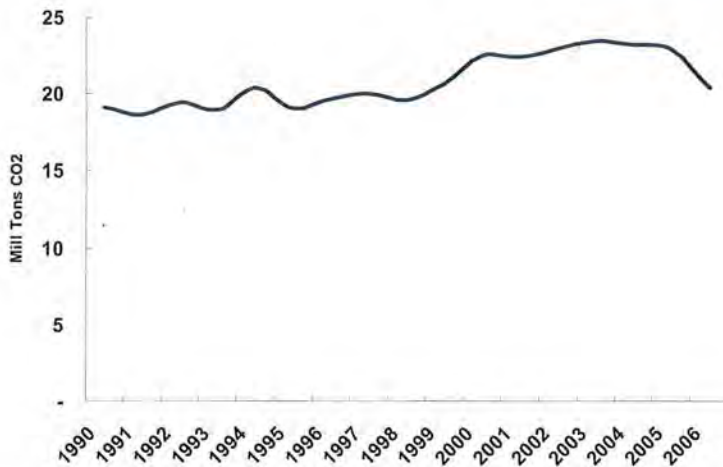
1990 CO₂e Emissions



2006 CO₂e Emissions



CO2 Emissions from Fossil Fuel Combustion



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Change 1990-2006
Residential	3.0	3.0	3.0	3.2	3.3	4.0	4.1	4.0	4.3	4.1	4.0	4.0	3.5	4.7	5.2	4.8	4.1	36.3%
Commercial	2.2	2.2	1.7	1.7	1.7	1.4	1.5	1.6	1.6	1.5	1.8	1.5	1.8	2.2	2.1	1.9	1.7	-23.2%
Industrial	3.5	4.1	5.5	5.2	6.5	5.1	5.4	4.8	4.0	3.7	4.6	3.6	3.0	2.5	2.7	3.0	2.7	-23.2%
Transportation	8.3	7.6	7.5	7.6	7.7	7.3	7.5	7.9	7.7	8.0	8.6	7.7	8.7	9.3	8.7	9.4	9.2	11.7%
Electric Power	2.1	1.7	1.7	1.3	1.2	1.3	1.1	1.8	2.0	3.4	3.6	5.7	5.9	4.8	4.5	3.8	2.7	25.8%
Total	19.1	18.7	19.4	19.0	20.4	19.1	19.7	20.0	19.6	20.7	22.5	22.4	23.0	23.5	23.3	22.9	20.4	6.9%

Connecticut GHG emissions

Emissions (MMTCO ₂ E)	1990	1991	1992	1993	1994	1995
Energy	42.03	41.34	41.63	39.74	39.05	38.28
CO ₂ from Fossil Fuel Combustion	40.98	40.25	40.51	38.59	37.91	37.12
Stationary Combustion	0.20	0.20	0.21	0.21	0.20	0.21
Mobile Combustion	0.85	0.89	0.90	0.93	0.93	0.95
Coal Mining	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-
Industrial Processes	0.31	0.30	0.31	0.34	0.43	0.62
Agriculture	0.34	0.33	0.38	0.38	0.39	0.38
Enteric Fermentation	0.14	0.13	0.13	0.13	0.13	0.13
Manure Management	0.05	0.05	0.07	0.07	0.07	0.07
Rice Cultivation	-	-	-	-	-	-
Agricultural Soil Management	0.16	0.14	0.18	0.18	0.19	0.18
Burning of Agricultural Crop Waste	-	-	-	-	-	-
LULUCF	(8.01)	(7.55)	(7.47)	(6.53)	(6.24)	(5.91)
Waste	1.55	1.72	1.60	1.49	1.71	1.70
Municipal Solid Waste	1.24	1.40	1.29	1.18	1.40	1.39
Wastewater	0.31	0.31	0.31	0.31	0.31	0.31
Gross Emissions	44.23	43.68	43.92	41.96	41.58	40.99
Sinks	(8.01)	(7.55)	(7.47)	(6.53)	(6.24)	(5.91)
Net Emissions	36.22	36.13	36.45	35.43	35.33	35.08

CO₂ from Fossil Fuel Combustion

MMTCO ₂ E	1990	1991	1992	1993	1994	1995
Residential	8.11	7.86	9.33	8.90	8.51	7.82
Coal	0.01	0.01	0.01	0.01	0.00	0.01
Petroleum	6.06	5.82	7.01	6.60	6.23	5.58
Natural Gas	2.05	2.03	2.31	2.30	2.27	2.23
Other	-	-	-	-	-	-
Commercial	3.76	3.58	4.22	3.76	4.10	3.76
Coal	0.02	0.03	0.04	0.03	0.03	0.05
Petroleum	2.13	2.08	2.55	2.02	1.94	1.65
Natural Gas	1.61	1.47	1.63	1.71	2.14	2.07
Other	-	-	-	-	-	-
Industrial	3.17	3.43	3.68	3.68	3.28	3.01
Coal	0.00	0.01	0.03	0.07	0.07	-
Petroleum	1.80	1.67	1.70	1.65	1.57	1.30
Natural Gas	1.37	1.75	1.95	1.97	1.64	1.72
Other	-	-	-	-	-	-
Transportation	14.67	14.55	14.61	14.75	14.69	14.38
Coal	-	-	-	-	-	-
Petroleum	14.64	14.52	14.58	14.73	14.65	14.32
Natural Gas	0.03	0.03	0.03	0.03	0.04	0.07
Other	-	-	-	-	-	-
Electric Power	11.26	10.83	8.68	7.50	7.33	8.14

Coal	3.55	3.55	3.57	3.37	3.49	3.73
Petroleum	7.02	6.45	4.38	3.49	2.84	2.84
Natural Gas	0.69	0.83	0.74	0.63	1.00	1.57
Other	-	-	-	-	-	-
International Bunker Fuels	-	-	-	-	-	-
Petroleum	-	-	-	-	-	-
TOTAL	40.98	40.25	40.51	38.59	37.91	37.12
Coal	3.58	3.59	3.64	3.47	3.59	3.79
Petroleum	31.65	30.56	30.22	28.48	27.23	25.68
Natural Gas	5.75	6.10	6.65	6.64	7.09	7.65
Other	-	-	-	-	-	-

1996	1997	1998	1999	2000	2001	2002	2003	2004
41.47	44.50	42.12	43.31	44.55	42.67	41.04	43.13	45.17
40.31	43.36	41.01	42.27	43.50	41.68	40.16	42.28	44.36
0.22	0.21	0.19	0.19	0.21	0.19	0.17	0.19	0.19
0.94	0.93	0.92	0.86	0.85	0.81	0.71	0.66	0.62
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.74	1.69	1.68	1.64	1.80	1.83	1.93	1.87	2.12
0.32	0.31	0.33	0.34	0.32	0.33	0.35	0.33	0.32
0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.10	0.10
0.05	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04
-	-	-	-	-	-	-	-	-
0.15	0.15	0.16	0.17	0.16	0.17	0.20	0.19	0.18
-	-	-	-	-	-	-	-	-
(5.61)	(5.54)	(0.46)	2.81	2.83	2.80	2.77	2.94	3.04
1.66	1.31	1.59	1.57	1.62	1.54	1.33	1.65	1.94
1.35	1.00	1.28	1.25	1.29	1.20	1.00	1.31	1.60
0.31	0.31	0.31	0.32	0.33	0.33	0.33	0.33	0.34
44.18	47.80	45.72	49.67	51.13	49.16	47.43	49.93	52.58
(5.61)	(5.54)	(0.46)	-	-	-	-	-	-
38.57	42.26	45.26	49.67	51.13	49.16	47.43	49.93	52.58

1996	1997	1998	1999	2000	2001	2002	2003	2004
8.30	8.06	7.03	7.92	8.66	8.40	8.16	9.48	10.12
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.91	5.85	5.11	5.84	6.40	6.17	5.95	7.04	7.78
2.39	2.21	1.92	2.08	2.26	2.22	2.21	2.43	2.33
-	-	-	-	-	-	-	-	-
4.04	4.20	3.92	4.19	4.44	4.20	4.04	4.72	3.75
0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
1.86	1.86	1.60	1.60	1.78	1.79	1.80	2.64	1.87
2.17	2.32	2.30	2.58	2.64	2.41	2.22	2.07	1.87
-	-	-	-	-	-	-	-	-
3.55	3.46	3.32	3.34	3.41	2.62	2.56	2.96	2.72
-	(0.00)	-	-	-	-	-	-	-
1.82	1.62	1.60	1.65	1.71	1.28	1.00	1.74	1.67
1.73	1.84	1.72	1.69	1.70	1.35	1.55	1.22	1.05
-	-	-	-	-	-	-	-	-
15.16	15.20	15.41	16.68	16.17	16.89	16.81	17.30	19.18
-	-	-	-	-	-	-	-	-
15.08	15.05	15.36	16.52	16.00	16.72	16.67	17.11	18.99
0.08	0.14	0.05	0.17	0.17	0.17	0.15	0.19	0.19
-	-	-	-	-	-	-	-	-
9.26	12.45	11.32	10.13	10.81	9.56	8.59	7.82	8.60

2005	2006	2007	2008	2009	2010	2011	2012	2013
43.94	42.19	-	-	-	-	-	-	-
43.18	41.59	-	-	-	-	-	-	-
0.19	0.08	-	-	-	-	-	-	-
0.57	0.52	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
2.03	2.01	-	-	-	-	-	-	-
0.43	0.29	-	-	-	-	-	-	-
0.10	0.09	-	-	-	-	-	-	-
0.10	0.04	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.23	0.15	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.00	2.96	4.49	-	-	-	-	-	-
2.09	2.06	0.34	-	-	-	-	-	-
1.75	1.72	-	-	-	-	-	-	-
0.34	0.34	0.34	-	-	-	-	-	-
51.48	49.51	4.83	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
51.48	49.51	4.83	-	-	-	-	-	-

2005	2006	2007	2008	2009	2010	2011	2012	2013
9.28	8.05	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
6.84	5.89	-	-	-	-	-	-	-
2.43	2.16	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.66	3.28	-	-	-	-	-	-	-
0.01	0.01	-	-	-	-	-	-	-
1.70	1.46	-	-	-	-	-	-	-
1.95	1.81	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
2.74	2.66	-	-	-	-	-	-	-
0.00	-	-	-	-	-	-	-	-
1.66	1.50	-	-	-	-	-	-	-
1.08	1.16	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
17.60	18.20	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
17.42	18.20	-	-	-	-	-	-	-
0.19	0.00	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
9.89	9.40	-	-	-	-	-	-	-

Rhode Island GHG Emissions

Emissions (MMT _{CO2E})	1990	1991	1992	1993	1994	1995
Energy	9.22	11.10	13.39	11.18	13.15	12.38
CO ₂ from Fossil Fuel Combustion	8.91	10.81	13.08	10.88	12.85	12.09
Stationary Combustion	0.04	0.05	0.05	0.05	0.05	0.05
Mobile Combustion	0.24	0.24	0.26	0.25	0.24	0.23
Coal Mining	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas and Oil Systems	0.02	0.01	0.01	0.00	0.00	0.00
Industrial Processes	0.08	0.08	0.08	0.09	0.12	0.19
Agriculture	0.04	0.04	0.05	0.06	0.04	0.04
Enteric Fermentation	0.01	0.01	0.01	0.01	0.01	0.01
Manure Management	0.00	0.00	0.00	0.00	0.00	0.00
Rice Cultivation	-	-	-	-	-	-
Agricultural Soil Management	0.03	0.03	0.04	0.04	0.03	0.02
Burning of Agricultural Crop Waste	-	-	-	-	-	-
LULUCF	(1.76)	(1.62)	(1.59)	(1.44)	(1.35)	(1.25)
Waste	0.37	0.38	0.37	0.35	0.33	0.35
Municipal Solid Waste	0.27	0.29	0.28	0.26	0.24	0.25
Wastewater	0.09	0.10	0.10	0.10	0.09	0.09
Gross Emissions	9.71	11.60	13.90	11.69	13.65	12.95
Sinks	(1.76)	(1.62)	(1.59)	(1.44)	(1.35)	(1.25)
Net Emissions	7.94	9.99	12.31	10.25	12.29	11.70

CO₂ from Fossil Fuel Combustion

	1990	1991	1992	1993	1994	1995
Residential	2.34	2.35	2.78	2.66	2.71	2.50
Coal	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum	1.37	1.40	1.69	1.58	1.75	1.55
Natural Gas	0.96	0.95	1.08	1.08	0.95	0.95
Other	-	-	-	-	-	-
Commercial	1.11	1.16	1.08	1.13	1.38	1.25
Coal	0.01	0.01	0.01	0.01	0.01	0.01
Petroleum	0.66	0.70	0.58	0.62	0.71	0.59
Natural Gas	0.44	0.45	0.49	0.50	0.66	0.66
Other	-	-	-	-	-	-
Industrial	0.66	1.81	3.00	1.00	2.63	2.24
Coal	0.00	-	-	-	-	-
Petroleum	0.43	0.37	0.47	0.50	0.44	0.37
Natural Gas	0.23	1.43	2.54	0.51	2.19	1.87
Other	-	-	-	-	-	-
Transportation	4.13	4.14	4.06	4.09	4.01	4.12
Coal	-	-	-	-	-	-
Petroleum	4.12	4.13	4.04	4.08	3.99	4.09
Natural Gas	0.01	0.01	0.02	0.01	0.02	0.03
Other	-	-	-	-	-	-
Electric Utilities	0.67	1.36	2.17	1.99	2.12	1.98
Coal	-	-	-	-	-	-

Petroleum	0.18	0.09	0.09	0.04	0.05	0.04
Natural Gas	0.50	1.27	2.08	1.96	2.07	1.94
Other	-	-	-	-	-	-
International Bunker Fuels	-	0.00	0.00	-	-	-
Petroleum	-	0.00	0.00	-	-	-
TOTAL	8.91	10.81	13.08	10.88	12.85	12.09
Coal	0.01	0.01	0.01	0.01	0.01	0.01
Petroleum	6.76	6.69	6.86	6.82	6.95	6.64
Natural Gas	2.14	4.11	6.21	4.05	5.89	5.45
Other	-	-	-	-	-	-

2005	2006
11.45	10.91
11.26	10.76
0.04	0.02
0.15	0.14
0.00	0.00
0.00	0.00
1.03	1.00
0.05	0.05
0.01	0.01
0.00	0.00
-	-
0.04	0.03
-	-
(0.14)	(0.15)
0.43	0.46
0.32	0.36
0.10	0.10
12.96	12.43
(0.14)	(0.15)
12.83	12.29

2005	2006
2.74	2.23
0.00	0.00
1.67	1.29
1.07	0.94
-	-
1.15	0.96
0.01	0.00
0.53	0.40
0.62	0.56
-	-
0.62	0.62
-	-
0.30	0.27
0.32	0.35
-	-
4.37	4.61
-	-
4.32	4.61
0.05	0.00
-	-
2.39	2.33
-	-

0.01	0.01
2.38	2.32
-	-
-	-
-	-
11.26	10.76
0.01	0.01
6.83	6.58
4.42	4.17
-	-

Vermont GHG Emissions

Emissions (MMTCO ₂ E)	1990	1991	1992	1993	1994	1995
Energy	5.68	5.89	6.35	6.43	6.27	6.22
CO ₂ from Fossil Fuel Combustion	5.46	5.67	6.11	6.19	6.02	5.98
Stationary Combustion	0.03	0.04	0.04	0.04	0.04	0.04
Mobile Combustion	0.18	0.19	0.20	0.20	0.21	0.20
Coal Mining	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-
Industrial Processes	0.12	0.12	0.12	0.14	0.18	0.25
Agriculture	1.04	0.98	1.00	1.00	1.00	0.97
Enteric Fermentation	0.56	0.54	0.54	0.55	0.53	0.53
Manure Management	0.13	0.12	0.12	0.13	0.13	0.13
Rice Cultivation	-	-	-	-	-	-
Agricultural Soil Management	0.36	0.32	0.34	0.32	0.34	0.31
Burning of Agricultural Crop Waste	-	-	-	-	-	-
LULUCF	(9.43)	(9.44)	(9.44)	(9.48)	(9.48)	(9.48)
Waste	0.07	0.07	0.07	0.09	0.11	0.14
Municipal Solid Waste	0.02	0.02	0.02	0.04	0.05	0.08
Wastewater	0.05	0.05	0.05	0.05	0.06	0.06
Gross Emissions	6.91	7.06	7.54	7.66	7.55	7.58
Sinks	(9.43)	(9.44)	(9.44)	(9.48)	(9.48)	(9.48)
Net Emissions	(2.52)	(2.38)	(1.90)	(1.82)	(1.93)	(1.90)

CO₂ from Fossil Fuel Combustion

MMTCO ₂ E	1990	1991	1992	1993	1994	1995
Residential	1.42	1.49	1.63	1.58	1.51	1.46
Coal	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum	1.31	1.38	1.50	1.45	1.38	1.34
Natural Gas	0.11	0.12	0.13	0.13	0.13	0.12
Other	-	-	-	-	-	-
Commercial	0.53	0.59	0.67	0.63	0.62	0.53
Coal	0.01	0.01	0.01	0.01	0.01	0.01
Petroleum	0.41	0.47	0.53	0.49	0.47	0.39
Natural Gas	0.11	0.11	0.12	0.13	0.14	0.14
Other	-	-	-	-	-	-
Industrial	0.46	0.48	0.55	0.55	0.43	0.39
Coal	0.00	0.02	0.03	-	-	-
Petroleum	0.36	0.38	0.41	0.45	0.33	0.28
Natural Gas	0.10	0.09	0.10	0.11	0.10	0.11
Other	-	-	-	-	-	-
Transportation	3.00	3.03	3.22	3.41	3.44	3.56
Coal	-	-	-	-	-	-
Petroleum	3.00	3.03	3.21	3.40	3.44	3.56
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00
Other	-	-	-	-	-	-
Electric Power	0.04	0.06	0.05	0.02	0.02	0.02

Coal	-	-	-	-	-	-
Petroleum	0.00	0.01	0.00	0.01	0.01	0.02
Natural Gas	0.04	0.06	0.04	0.01	0.01	0.01
Other	-	-	-	-	-	-
International Bunker Fuels	-	-	-	-	-	-
Petroleum	-	-	-	-	-	-
TOTAL	5.46	5.67	6.11	6.19	6.02	5.98
Coal	0.02	0.03	0.05	0.01	0.01	0.01
Petroleum	5.09	5.27	5.66	5.79	5.62	5.59
Natural Gas	0.35	0.37	0.40	0.38	0.38	0.38
Other	-	-	-	-	-	-

1996	1997	1998	1999	2000	2001	2002	2003	2004
6.50	6.70	6.46	6.70	6.93	6.84	6.56	6.72	7.17
6.26	6.46	6.22	6.48	6.71	6.56	6.31	6.51	6.98
0.04	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.04
0.21	0.20	0.20	0.18	0.18	0.25	0.22	0.17	0.15
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.29	0.33	0.32	0.31	0.27	0.24	0.23	0.24	0.27
0.99	0.96	1.04	1.01	1.01	1.00	1.00	0.99	1.01
0.52	0.52	0.54	0.54	0.53	0.53	0.52	0.52	0.51
0.13	0.13	0.15	0.16	0.15	0.16	0.16	0.16	0.15
-	-	-	-	-	-	-	-	-
0.34	0.31	0.36	0.32	0.33	0.31	0.32	0.30	0.35
-	-	-	-	-	-	-	-	-
(9.48)	(0.61)	3.06	3.06	3.06	3.06	3.05	3.05	3.05
0.21	0.10	0.15	0.08	0.11	0.12	0.13	0.14	0.15
0.15	0.04	0.09	0.03	0.05	0.06	0.07	0.08	0.09
0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
7.99	8.10	7.98	8.10	8.32	8.19	7.92	8.08	8.60
(9.48)	(0.61)	-	-	-	-	-	-	-
(1.49)	7.48	7.98	8.10	8.32	8.19	7.92	8.08	8.60

1996	1997	1998	1999	2000	2001	2002	2003	2004
1.54	1.50	1.44	1.41	1.63	1.63	1.53	1.59	1.83
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.41	1.36	1.31	1.28	1.48	1.49	1.39	1.43	1.67
0.14	0.14	0.13	0.14	0.15	0.15	0.15	0.17	0.17
-	-	-	-	-	-	-	-	-
0.59	0.65	0.69	0.64	0.70	0.70	0.64	0.70	0.74
0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.44	0.48	0.52	0.51	0.56	0.56	0.51	0.55	0.59
0.15	0.16	0.16	0.12	0.14	0.13	0.13	0.15	0.14
-	-	-	-	-	-	-	-	-
0.42	0.67	0.46	0.63	0.56	0.48	0.47	0.51	0.58
-	0.25	-	0.18	-	-	-	-	-
0.31	0.30	0.35	0.30	0.36	0.34	0.31	0.38	0.44
0.10	0.12	0.11	0.15	0.21	0.14	0.16	0.13	0.14
-	-	-	-	-	-	-	-	-
3.70	3.63	3.58	3.75	3.70	3.70	3.65	3.68	3.81
-	-	-	-	-	-	-	-	-
3.69	3.62	3.58	3.75	3.69	3.70	3.64	3.68	3.81
0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	-	-	-	-	-	-	-	-
0.01	0.02	0.06	0.04	0.12	0.04	0.02	0.03	0.02

2005	2006	2007	2008	2009	2010	2011	2012	2013
6.95	6.88	-	-	-	-	-	-	-
6.78	6.74	-	-	-	-	-	-	-
0.04	0.01	-	-	-	-	-	-	-
0.14	0.13	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.28	0.28	-	-	-	-	-	-	-
0.98	0.97	-	-	-	-	-	-	-
0.50	0.50	-	-	-	-	-	-	-
0.16	0.16	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.32	0.31	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.05	3.05	4.28	-	-	-	-	-	-
0.05	0.06	0.06	-	-	-	-	-	-
(0.01)	(0.00)	-	-	-	-	-	-	-
0.06	0.06	0.06	-	-	-	-	-	-
8.26	8.19	0.06	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
8.26	8.19	0.06	-	-	-	-	-	-

2005	2006	2007	2008	2009	2010	2011	2012	2013
1.66	1.57	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
1.50	1.42	-	-	-	-	-	-	-
0.16	0.15	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.66	0.62	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
0.52	0.49	-	-	-	-	-	-	-
0.14	0.13	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.59	0.68	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.45	0.54	-	-	-	-	-	-	-
0.14	0.15	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.86	3.87	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.86	3.87	-	-	-	-	-	-	-
0.00	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.01	0.01	-	-	-	-	-	-	-

New Hampshire GHG Emissions

Emissions (MMT _{CO2E})	1990	1991	1992	1993	1994	1995
Energy	15.10	14.77	14.88	15.41	15.48	15.54
CO ₂ from Fossil Fuel Combustion	14.68	14.34	14.44	14.95	15.02	15.08
Stationary Combustion	0.10	0.10	0.11	0.11	0.10	0.10
Mobile Combustion	0.31	0.32	0.33	0.35	0.35	0.35
Coal Mining	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-
Industrial Processes	0.11	0.11	0.11	0.12	0.16	0.23
Agriculture	0.19	0.18	0.19	0.19	0.19	0.19
Enteric Fermentation	0.08	0.09	0.09	0.08	0.08	0.08
Manure Management	0.02	0.02	0.02	0.02	0.02	0.02
Rice Cultivation	-	-	-	-	-	-
Agricultural Soil Management	0.09	0.08	0.08	0.08	0.09	0.08
Burning of Agricultural Crop Waste	-	-	-	-	-	-
LULUCF	(3.46)	(3.47)	(3.49)	(4.49)	(4.51)	(4.53)
Waste	0.44	0.47	0.51	0.53	0.54	0.48
Municipal Solid Waste	0.33	0.37	0.40	0.42	0.43	0.37
Wastewater	0.10	0.11	0.11	0.11	0.11	0.11
Gross Emissions	15.84	15.53	15.69	16.24	16.37	16.44
Sinks	(3.46)	(3.47)	(3.49)	(4.49)	(4.51)	(4.53)
Net Emissions	12.38	12.05	12.20	11.75	11.86	11.91

CO₂ from Fossil Fuel Combustion

	1990	1991	1992	1993	1994	1995
Residential	2.47	2.46	2.57	2.56	2.63	2.76
Coal	0.01	0.01	0.01	0.00	0.00	0.00
Petroleum	2.14	2.15	2.22	2.21	2.27	2.41
Natural Gas	0.32	0.30	0.34	0.35	0.35	0.35
Other	-	-	-	-	-	-
Commercial	1.32	1.29	1.14	1.12	1.27	1.15
Coal	0.02	0.05	0.03	0.02	0.02	0.02
Petroleum	1.02	0.97	0.80	0.77	0.91	0.79
Natural Gas	0.27	0.27	0.31	0.33	0.34	0.35
Other	-	-	-	-	-	-
Industrial	0.83	0.87	1.18	1.40	1.18	1.09
Coal	0.07	0.12	0.10	0.18	-	0.00
Petroleum	0.59	0.56	0.87	1.02	0.95	0.85
Natural Gas	0.17	0.18	0.20	0.20	0.23	0.24
Other	-	-	-	-	-	-
Transportation	5.21	5.31	5.27	5.39	5.53	5.76
Coal	-	-	-	-	-	-
Petroleum	5.21	5.31	5.26	5.38	5.48	5.75
Natural Gas	0.00	0.00	0.00	0.02	0.05	0.00
Other	-	-	-	-	-	-
Electric Utilities	4.85	4.42	4.28	4.46	4.41	4.32

Coal	2.86	3.08	3.10	3.30	3.12	3.31
Petroleum	1.99	1.34	1.15	1.15	1.22	0.90
Natural Gas	-	-	0.03	0.01	0.07	0.12
Other	-	-	-	-	-	-
International Bunker Fuels	-	-	-	-	-	-
Petroleum	-	-	-	-	-	-
TOTAL	14.68	14.34	14.44	14.95	15.02	15.08
Coal	2.96	3.26	3.25	3.51	3.14	3.33
Petroleum	10.95	10.33	10.30	10.54	10.83	10.69
Natural Gas	0.76	0.75	0.90	0.90	1.05	1.06
Other	-	-	-	-	-	-

1996	1997	1998	1999	2000	2001	2002	2003	2004
16.15	17.44	17.43	17.57	18.16	17.20	17.88	20.91	22.15
15.68	16.98	16.97	17.13	17.73	16.79	17.51	20.53	21.79
0.11	0.10	0.10	0.10	0.10	0.09	0.08	0.09	0.11
0.36	0.36	0.36	0.34	0.33	0.32	0.29	0.28	0.26
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.27	0.32	0.33	0.36	0.39	0.41	0.44	0.47	0.50
0.18	0.18	0.18	0.18	0.19	0.18	0.19	0.18	0.19
0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
-	-	-	-	-	-	-	-	-
0.09	0.08	0.09	0.08	0.09	0.09	0.09	0.09	0.10
-	-	-	-	-	-	-	-	-
(4.54)	(7.17)	(7.47)	(7.49)	(7.50)	(7.52)	(7.54)	(7.56)	(7.57)
0.47	0.29	0.22	0.22	0.11	0.03	0.00	0.09	0.09
0.36	0.18	0.11	0.11	(0.01)	(0.09)	(0.12)	(0.03)	(0.03)
0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13
17.07	18.23	18.16	18.34	18.84	17.82	18.51	21.65	22.94
(4.54)	(7.17)	(7.47)	(7.49)	(7.50)	(7.52)	(7.54)	(7.56)	(7.57)
12.53	11.05	10.69	10.85	11.34	10.30	10.97	14.09	15.36

1996	1997	1998	1999	2000	2001	2002	2003	2004
2.94	2.91	2.84	2.87	2.93	2.86	2.68	3.24	3.40
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.56	2.53	2.50	2.51	2.52	2.47	2.28	2.84	3.00
0.38	0.37	0.34	0.35	0.41	0.38	0.39	0.40	0.40
-	-	-	-	-	-	-	-	-
1.28	1.31	1.14	1.16	1.44	1.31	1.31	1.52	1.81
0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
0.88	0.89	0.76	0.77	0.97	0.88	0.81	1.03	1.30
0.38	0.40	0.36	0.39	0.47	0.41	0.49	0.49	0.51
-	-	-	-	-	-	-	-	-
1.45	1.45	1.43	1.39	1.62	1.23	1.12	1.06	1.10
-	-	-	-	-	-	-	-	-
1.19	1.14	1.12	1.09	1.16	0.75	0.67	0.67	0.69
0.26	0.31	0.31	0.31	0.46	0.47	0.44	0.39	0.41
-	-	-	-	-	-	-	-	-
5.91	6.23	6.84	7.10	7.24	7.25	8.10	7.54	7.77
-	-	-	-	-	-	-	-	-
5.90	6.21	6.83	7.10	7.24	7.25	8.10	7.54	7.77
0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-	-	-	-	-	-	-	-	-
4.11	5.09	4.73	4.61	4.49	4.14	4.30	7.17	7.71

2005	2006
21.50	20.06
21.15	19.79
0.11	0.05
0.24	0.22
-	-
-	-
0.52	0.54
0.20	0.19
0.08	0.08
0.02	0.02
-	-
0.10	0.09
-	-
(7.59)	(7.61)
(0.03)	0.00
(0.16)	(0.13)
0.13	0.13
22.19	20.79
(7.59)	(7.61)
14.60	13.19

2005	2006	2007	2008	2009	2010	2011	2012	2013
3.17	2.82	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
2.75	2.45	-	-	-	-	-	-	-
0.42	0.36	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.93	1.30	-	-	-	-	-	-	-
0.01	0.01	-	-	-	-	-	-	-
1.39	0.83	-	-	-	-	-	-	-
0.53	0.46	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.92	1.52	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.56	1.20	-	-	-	-	-	-	-
0.36	0.32	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
7.43	7.42	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
7.43	7.42	-	-	-	-	-	-	-
0.00	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
7.70	6.73	-	-	-	-	-	-	-

Maine GHG Emissions

Emissions (MMT _{CO2E})	1990	1991	1992	1993	1994	1995
Energy	19.74	19.32	20.13	19.70	21.13	19.76
CO2 from Fossil Fuel Combustion	19.10	18.65	19.43	19.00	20.42	19.05
Stationary Combustion	0.25	0.27	0.29	0.28	0.28	0.29
Mobile Combustion	0.38	0.39	0.41	0.42	0.42	0.42
Coal Mining	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-
Industrial Processes	0.87	0.85	0.91	1.02	0.99	1.12
Agriculture	0.48	0.49	0.48	0.49	0.49	0.48
Enteric Fermentation	0.19	0.19	0.19	0.19	0.19	0.18
Manure Management	0.05	0.05	0.05	0.05	0.05	0.05
Rice Cultivation	-	-	-	-	-	-
Agricultural Soil Management	0.24	0.25	0.25	0.25	0.25	0.25
Burning of Agricultural Crop Waste	-	-	-	-	-	-
LULUCF	9.05	9.04	9.04	9.38	9.37	3.12
Waste	0.47	0.50	0.52	0.40	0.43	0.41
Municipal Solid Waste	0.35	0.38	0.40	0.28	0.31	0.29
Wastewater	0.12	0.12	0.12	0.12	0.12	0.12
Gross Emissions	30.60	30.20	31.09	30.98	32.41	24.89
Sinks	-	-	-	-	-	-
Net Emissions	30.60	30.20	31.09	30.98	32.41	24.89

CO2 from Fossil Fuel Combustion

	1990	1991	1992	1993	1994	1995
Residential	3.03	3.04	3.05	3.18	3.26	4.00
Coal	0.02	0.01	0.02	0.01	0.00	0.00
Petroleum	2.98	3.00	2.98	3.12	3.21	3.95
Natural Gas	0.03	0.04	0.05	0.05	0.05	0.05
Other	-	-	-	-	-	-
Commercial	2.18	2.16	1.73	1.68	1.71	1.41
Coal	0.08	0.03	0.07	0.05	0.01	0.01
Petroleum	2.01	2.03	1.54	1.50	1.57	1.27
Natural Gas	0.09	0.10	0.12	0.12	0.13	0.13
Other	-	-	-	-	-	-
Industrial	3.47	4.15	5.51	5.21	6.48	5.07
Coal	0.52	0.84	1.91	0.98	1.06	0.65
Petroleum	2.85	3.19	3.49	4.14	5.33	4.32
Natural Gas	0.11	0.12	0.11	0.09	0.09	0.11
Other	-	-	-	-	-	-
Transportation	8.27	7.57	7.45	7.60	7.73	7.30
Coal	-	-	-	-	-	-
Petroleum	8.27	7.57	7.45	7.60	7.72	7.30
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.01
Other	-	-	-	-	-	-
Electric Utilities	2.14	1.73	1.70	1.34	1.24	1.27
Coal	0.36	0.57	0.57	0.58	0.57	0.37

Petroleum	1.77	1.15	1.12	0.75	0.66	0.89
Natural Gas	0.01	0.01	0.01	0.01	0.01	0.01
Other	-	-	-	-	-	-
International Bunker Fuels	-	0.00	0.00	0.00	0.00	0.00
Petroleum	-	0.00	0.00	0.00	0.00	0.00
TOTAL	19.10	18.65	19.43	19.00	20.42	19.05
Coal	0.98	1.44	2.57	1.63	1.65	1.03
Petroleum	17.88	16.94	16.58	17.10	18.49	17.72
Natural Gas	0.24	0.26	0.28	0.27	0.28	0.30
Other	-	-	-	-	-	-

1996	1997	1998	1999	2000	2001	2002	2003	2004
20.42	20.68	20.30	21.33	23.18	23.05	23.55	24.01	23.79
19.71	19.98	19.63	20.66	22.51	22.41	22.96	23.46	23.26
0.29	0.28	0.26	0.27	0.28	0.26	0.25	0.24	0.24
0.42	0.42	0.42	0.40	0.39	0.38	0.34	0.31	0.29
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.12	1.23	1.28	1.29	1.26	1.25	1.25	1.23	1.30
0.50	0.57	0.61	0.61	0.49	0.51	0.55	0.56	0.60
0.18	0.18	0.17	0.17	0.17	0.16	0.16	0.16	0.16
0.05	0.08	0.10	0.10	0.05	0.06	0.06	0.06	0.05
-	-	-	-	-	-	-	-	-
0.27	0.32	0.34	0.34	0.27	0.30	0.33	0.35	0.39
-	-	-	-	0.00	0.00	0.00	0.00	0.00
(0.14)	(0.14)	(0.14)	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
0.43	0.42	0.52	0.50	0.52	0.55	0.54	0.52	0.49
0.31	0.30	0.41	0.38	0.40	0.43	0.41	0.40	0.36
0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.13
22.48	22.90	22.72	23.73	25.45	25.37	25.90	26.32	26.18
(0.14)	(0.14)	(0.14)	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
22.34	22.76	22.57	23.58	25.30	25.21	25.74	26.16	26.02

1996	1997	1998	1999	2000	2001	2002	2003	2004
4.13	3.97	4.28	4.07	3.95	3.96	3.53	4.74	5.22
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.07	3.91	4.23	4.02	3.89	3.90	3.46	4.67	5.15
0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.07
-	-	-	-	-	-	-	-	-
1.55	1.55	1.60	1.48	1.78	1.45	1.79	2.16	2.10
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
1.40	1.40	1.46	1.34	1.60	1.28	1.44	1.85	1.81
0.14	0.15	0.13	0.14	0.17	0.16	0.35	0.30	0.29
-	-	-	-	-	-	-	-	-
5.39	4.76	4.05	3.75	4.64	3.61	3.00	2.49	2.73
0.53	0.44	0.32	0.27	0.53	0.30	0.21	0.29	0.28
4.74	4.19	3.61	3.35	3.34	2.65	2.55	2.00	2.30
0.12	0.13	0.12	0.13	0.77	0.66	0.24	0.21	0.16
-	-	-	-	-	-	-	-	-
7.53	7.90	7.71	7.98	8.57	7.65	8.75	9.27	8.67
-	-	-	-	-	-	-	-	-
7.53	7.90	7.71	7.98	8.53	7.58	8.69	9.22	8.63
0.00	0.01	0.00	0.00	0.05	0.07	0.06	0.05	0.04
-	-	-	-	-	-	-	-	-
1.12	1.80	1.99	3.38	3.57	5.74	5.89	4.79	4.53
0.38	0.39	0.35	0.36	0.39	0.43	0.53	0.40	0.40

2005	2006	2007	2008	2009	2010	2011	2012	2013
23.43	20.70	-	-	-	-	-	-	-
22.91	20.41	-	-	-	-	-	-	-
0.25	0.04	-	-	-	-	-	-	-
0.27	0.25	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.33	1.37	-	-	-	-	-	-	-
0.66	0.58	-	-	-	-	-	-	-
0.16	0.16	-	-	-	-	-	-	-
0.05	0.05	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
0.45	0.37	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
(0.16)	(0.17)	5.54	-	-	-	-	-	-
0.56	0.44	0.13	-	-	-	-	-	-
0.43	0.32	-	-	-	-	-	-	-
0.13	0.13	0.13	-	-	-	-	-	-
25.98	23.09	5.67	-	-	-	-	-	-
(0.16)	(0.17)	-	-	-	-	-	-	-
25.82	22.92	5.67	-	-	-	-	-	-

2005	2006	2007	2008	2009	2010	2011	2012	2013
4.75	4.13	-	-	-	-	-	-	-
0.00	0.00	-	-	-	-	-	-	-
4.68	4.07	-	-	-	-	-	-	-
0.07	0.06	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.92	1.68	-	-	-	-	-	-	-
0.01	0.01	-	-	-	-	-	-	-
1.64	1.38	-	-	-	-	-	-	-
0.27	0.29	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.02	2.67	-	-	-	-	-	-	-
0.30	0.26	-	-	-	-	-	-	-
2.58	2.22	-	-	-	-	-	-	-
0.15	0.19	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
9.39	9.24	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
9.36	8.97	-	-	-	-	-	-	-
0.03	0.27	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
3.83	2.69	-	-	-	-	-	-	-
0.35	0.35	-	-	-	-	-	-	-

Massachusetts GHG Emissions

Emissions (MMTCO ₂ E)	1990	1991	1992	1993	1994	1995	1996	1997
Energy	85.84	84.71	86.64	83.91	84.12	81.23	82.35	88.53
CO ₂ from Fossil Fuel Combustion	83.92	82.73	84.60	81.87	82.08	79.19	80.26	86.49
Stationary Combustion	0.40	0.40	0.42	0.41	0.41	0.39	0.40	0.38
Mobile Combustion	1.52	1.57	1.63	1.62	1.64	1.65	1.69	1.67
Coal Mining	-	-	-	-	-	-	-	-
Natural Gas and Oil Systems	-	-	-	-	-	-	-	-
Industrial Processes	0.59	0.56	0.59	0.75	0.93	1.29	1.50	1.74
Agriculture	0.38	0.37	0.38	0.37	0.36	0.36	0.35	0.35
Enteric Fermentation	0.14	0.13	0.13	0.13	0.13	0.12	0.12	0.11
Manure Management	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Rice Cultivation	-	-	-	-	-	-	-	-
Agricultural Soil Management	0.21	0.20	0.21	0.21	0.20	0.20	0.20	0.21
Burning of Agricultural Crop Waste	-	-	-	-	-	-	-	-
LULUCF	(5.56)	(5.58)	(5.61)	(5.73)	(5.75)	(5.77)	(5.80)	(6.98)
Waste	4.67	4.25	4.06	4.19	4.01	4.00	3.86	3.12
Municipal Solid Waste	4.11	3.68	3.49	3.61	3.44	3.42	3.27	2.54
Wastewater	0.57	0.57	0.57	0.57	0.58	0.58	0.58	0.58
Gross Emissions	91.50	89.90	91.67	89.22	89.43	86.88	88.06	93.74
Sinks	(5.56)	(5.58)	(5.61)	(5.73)	(5.75)	(5.77)	(5.80)	(6.98)
Net Emissions	85.93	84.32	86.07	83.49	83.67	81.10	82.27	86.77

CO₂ from Fossil Fuel Combustion

	1990	1991	1992	1993	1994	1995	1996	1997
Residential	15.01	14.23	16.31	16.43	16.27	14.69	14.50	14.33
Coal	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.01
Petroleum	9.12	8.54	9.70	9.73	9.77	8.93	8.27	8.25
Natural Gas	5.86	5.67	6.59	6.69	6.50	5.75	6.22	6.07
Other	-	-	-	-	-	-	-	-
Commercial	8.40	9.18	8.93	7.96	8.85	8.94	9.02	9.41
Coal	0.12	0.06	0.11	0.09	0.05	0.06	0.07	0.06
Petroleum	5.50	6.19	5.27	4.26	4.21	4.40	3.72	3.63
Natural Gas	2.78	2.93	3.55	3.61	4.59	4.47	5.23	5.72
Other	-	-	-	-	-	-	-	-
Industrial	5.96	5.41	7.19	7.35	6.38	5.61	6.06	6.22
Coal	0.17	0.20	0.36	0.27	0.15	0.10	0.09	0.09
Petroleum	3.41	2.26	2.99	3.23	2.76	2.13	2.68	2.71
Natural Gas	2.38	2.96	3.84	3.85	3.47	3.38	3.29	3.42
Other	-	-	-	-	-	-	-	-
Transportation	28.91	27.62	27.42	27.86	28.05	28.46	29.75	30.16
Coal	-	-	-	-	-	-	-	-
Petroleum	28.85	27.54	27.32	27.74	27.95	28.35	29.63	30.02
Natural Gas	0.07	0.08	0.10	0.12	0.10	0.10	0.12	0.13
Other	-	-	-	-	-	-	-	-
Electric Utilities	25.64	26.29	24.75	22.27	22.53	21.50	20.94	26.38

Coal	10.36	10.79	10.01	8.97	9.34	9.71	10.49	11.35
Petroleum	11.90	12.16	10.62	9.05	7.72	4.81	4.85	8.63
Natural Gas	3.38	3.34	4.12	4.24	5.47	6.98	5.60	6.39
Other	-	-	-	-	-	-	-	-
International Bunker Fuels	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	83.92	82.73	84.60	81.87	82.08	79.19	80.26	86.49
Coal	10.68	11.06	10.52	9.35	9.54	9.88	10.66	11.51
Petroleum	58.77	56.69	55.89	54.01	52.40	48.63	49.14	53.24
Natural Gas	14.47	14.99	18.19	18.51	20.13	20.69	20.46	21.74
Other	-	-	-	-	-	-	-	-

1998	1999	2000	2001	2002	2003	2004	2005	2006
86.36	83.68	84.69	83.90	84.83	85.82	84.54	86.11	76.27
84.36	81.82	82.86	82.17	83.28	84.34	83.13	84.75	75.19
0.35	0.34	0.36	0.33	0.32	0.33	0.33	0.33	0.16
1.66	1.52	1.47	1.40	1.23	1.15	1.09	1.03	0.93
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1.92	2.12	2.29	2.31	2.48	2.61	2.75	2.87	2.96
0.33	0.32	0.33	0.32	0.32	0.33	0.34	0.36	0.30
0.11	0.11	0.10	0.09	0.10	0.09	0.09	0.09	0.09
0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
-	-	-	-	-	-	-	-	-
0.18	0.19	0.20	0.20	0.20	0.21	0.22	0.24	0.19
-	-	-	-	-	-	-	-	-
(10.51)	(10.53)	(10.55)	(10.57)	(10.60)	(10.62)	(10.64)	(10.66)	(10.68)
3.15	3.12	2.54	3.52	3.77	3.27	2.92	3.16	3.15
2.56	2.53	1.92	2.90	3.15	2.65	2.30	2.53	2.53
0.59	0.59	0.61	0.62	0.62	0.62	0.62	0.62	0.62
91.75	89.24	89.84	90.05	91.40	92.03	90.56	92.50	82.69
(10.51)	(10.53)	(10.55)	(10.57)	(10.60)	(10.62)	(10.64)	(10.66)	(10.68)
81.24	78.71	79.29	79.47	80.80	81.41	79.92	81.84	72.00

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
13.15	13.96	15.53	15.87	15.88	16.18	14.97	14.80	12.75	-	-
0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.01	0.00	-	-
7.65	8.01	9.21	9.96	9.76	9.16	8.71	8.44	7.24	-	-
5.49	5.94	6.32	5.91	6.09	7.00	6.25	6.35	5.51	-	-
-	-	-	-	-	-	-	-	-	-	-
8.02	6.14	6.69	5.67	5.86	7.00	6.56	6.59	1.30	4.90	-
0.06	0.09	0.04	0.03	0.18	0.11	0.07	0.09	0.01	0.03	-
3.11	2.39	3.13	2.22	2.07	3.42	3.33	3.46	0.83	2.10	-
4.85	3.66	3.53	3.42	3.61	3.48	3.15	3.03	0.46	2.77	-
-	-	-	-	-	-	-	-	-	-	-
6.13	6.73	6.46	7.10	7.06	4.79	4.58	4.76	6.07	-	-
0.08	0.08	0.14	0.14	0.11	0.14	0.14	0.17	0.19	-	-
2.75	2.39	2.30	2.60	2.29	2.26	2.10	2.11	3.58	-	-
3.30	4.26	4.02	4.36	4.66	2.39	2.34	2.47	2.30	-	-
-	-	-	-	-	-	-	-	-	-	-
30.12	30.94	32.04	31.60	31.72	31.50	33.41	34.27	33.74	-	-
-	-	-	-	-	-	-	-	-	-	-
30.01	30.79	31.91	31.42	31.48	31.38	33.30	34.14	33.61	-	-
0.11	0.15	0.14	0.18	0.24	0.12	0.11	0.14	0.12	-	-
-	-	-	-	-	-	-	-	-	-	-
26.94	24.04	22.12	21.93	22.75	24.87	23.61	24.33	21.32	-	-

[illegible]