

*DRAFT – For Review and Comment by Task Force Members – November 23, 2008  
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RECOMMENDATIONS OF THE TASK FORCE*

**New Hampshire Climate Change Policy Task Force  
Draft Climate Change Action Plan**

**Draft**

**Prepared by NHDES  
November 23, 2008**

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## **Chapter 1: Introduction**

Addressing climate change means using energy more efficiently, with lower cost, and with less environmental impact. Actions to address climate change emissions are nearly always consistent with the economic goals of developing new opportunities and jobs, thus addressing the high cost of energy to our citizens as well as our businesses, as well as protecting natural resources. New Hampshire's Climate Change Action Plan focuses on those actions that provide the greatest reductions in greenhouse gases while providing the greatest net long term economic benefits -- in other words, a "no-regrets" approach. The recommended actions in this plan will: reduce the cost of energy to our citizens, businesses, and government; promote growth of new jobs in energy services, the building trades, and renewable energy; and encourage growth of our communities in a way that retains our rural character and quality of life.

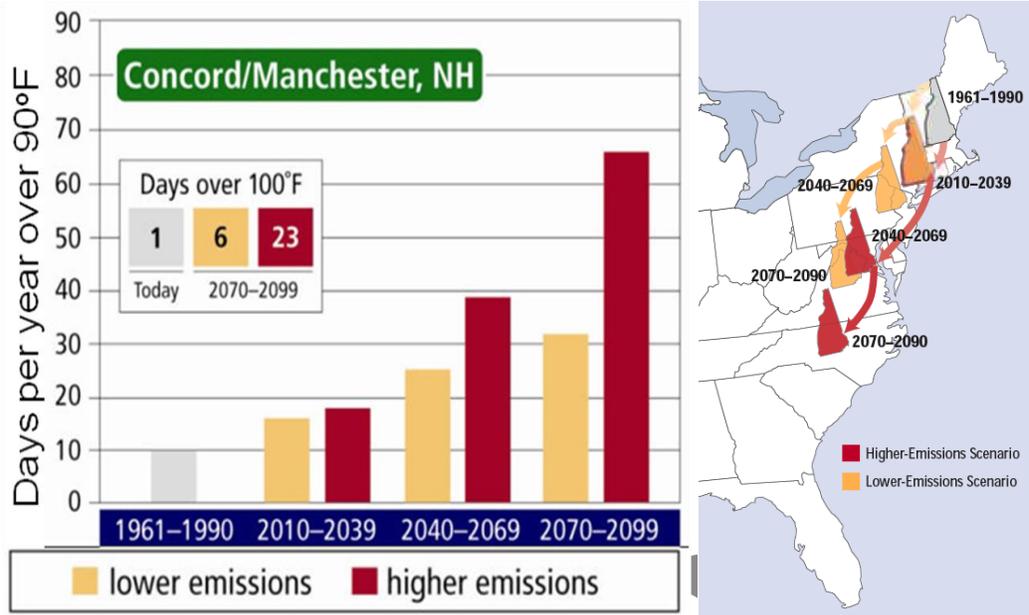
Changes in our New England climate are already occurring, including warmer winters, reduced snowfall, sea level rise, increased total rainfall, and more severe weather events that result in increased risk of flooding<sup>1</sup>. These changes are predicted to accelerate in the future and include other potential impacts such as a decrease in the abundance of sugar maples, stresses on our fisheries, greater distribution of insect-borne diseases, and an increase in heat-related illnesses<sup>2</sup>. Though the severity and timing of these potential impacts is uncertain, the cost of not taking action, particularly with "no-regrets" policies, could be significant. The Stern Review found that failure to take actions to avoid the worst effects of climate change could risk global gross domestic product (GDP) being up to twenty percent lower than it otherwise might have been. On the other hand, avoiding the most severe impacts of climate change would require the investment of one percent of global GDP *per year*<sup>3</sup>.

While New Hampshire is a small state and by no means responsible for the bulk of the emissions contributing to climate change, the identified actions establish a plan that will enable New Hampshire to continue to do its part to address climate change, especially when aggregated with those of its neighbors in the Northeast. These actions, in turn, will benefit the economy, increase state and regional energy security, and improve environmental quality. Taking action now in the areas of energy efficiency, renewable energy and more efficient transportation will provide New Hampshire a competitive advantage as energy resources become even more costly in the future.

### *Climate Change Science*

The presence of greenhouse gases in the atmosphere has contributed to the warming of the earth throughout its geologic history and helped make life possible. However, levels of carbon dioxide and other so-called greenhouse gasses in the atmosphere are currently accumulating at a rate greater than any natural process and these levels are causing air and ocean temperatures to rise at a substantial rate. There is consensus among scientists that a significant portion of these concentrations of carbon dioxide are from emissions of fossil fuels from human activities (Appendix #). Scientists also predict that the impacts of this warming will cause significant changes to our climate affecting our health, economy, and quality of life.

The 2007 Northeast Climate Impacts Assessment (NECIA) published in July 2007 predicts that if greenhouse gas emissions continue to increase, by late in the century the Northeast will see the winter snow season cut in half, sea-level rise up to nearly three feet, and more than 60 days with temperatures over 90°F in most cities, including 14 to 28 days with temperatures over 100°F compared to one or two days per year historically. With these changes, the New Hampshire climate will be similar to the current climate of South Carolina by 2070 (Figure X).



Such large-scale changes resulting from climate change have the potential to significantly affect human health, well being, and economic activity over the long term. These impacts will affect many aspects of New Hampshire's economy, including the forest industry and tourism, and additional significant infrastructure costs for cities and towns. Increased summer high temperatures exacerbate air pollution and create health concerns for all citizens especially children, the elderly, and those with respiratory ailments.

In New Hampshire, impacts on the state's ecosystems and aesthetics are of particular concern given the dependence of the state's economy on tourism, forestry, and wildlife activities. These changes, therefore, have implications for the New Hampshire way of life. Already the ski industry has been affected<sup>4</sup> and there are implications for the maple syrup industry as well. The State was also hard hit by 100-year floods during both 2005 and 2006, resulting in loss of life and an estimated \$130 million in property damage in the Northeast<sup>5</sup>; a third 100-year flood occurred during the spring of 2007 and caused major damage in several communities.

### Reduction Goals

New Hampshire has participated in a cooperative effort to develop a regional climate change action plan under the auspices of the Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP). The 2001 NEG/ECP Climate Change Action Plan calls for a long term goal that reduces regional greenhouse gas emissions "sufficiently to eliminate any dangerous threat to the climate: current science suggests this will require reductions of 75-85% below current levels". In a 2007 resolution, the NEG/ECP established a target date of 2050 to achieve "a 75-85% worldwide target reduction in emissions, subject to further scientific analysis of this target".

Increasingly, the goal of reducing greenhouse gases an average of 80% by 2050 has been adopted by more and more states, cities and organizations. This goal is based on the reductions believed by climate scientists to be necessary to stabilize greenhouse gases in the atmosphere at or below 450 parts per million CO<sub>2</sub>-equivalent<sup>6</sup>. Scientists believe that this level will avoid the most severe and dangerous potential impacts of climate change. However, recent research questions whether even this goal will be adequate and argues for reducing emissions even more aggressively.

Clearly, stabilizing the concentrations of greenhouse gases in the atmosphere will only occur through global action. Even regionally, the NEG/ECP Climate Change Action Plan recognized that different jurisdictions would have varying success at meeting even the more achievable short term goals of that plan. However, the long-term goal of reducing greenhouse gas emissions 80% by 2050 is the being used by states and environmental organizations as the bench-mark for assessing whether a climate change action plan is putting in place the policies, market changes, technologies, and regulations necessary to adequately address climate change. Accordingly, the Task Force recommends that New Hampshire strive to achieve a long-term reduction of 80% below 1990 levels, consistent with the NEG-ECP resolutions and the consensus recommendations of the scientific community.

In contrast, short-term or mid-term goals should be consistent with specific actions that New Hampshire can take in the context of its energy profile, environmental priorities and resources, and its economic circumstances. The Climate Change Policy Task Force conducted a comprehensive evaluation of all the potential actions New Hampshire could take to reduce its greenhouses and move towards the long term goal of reducing its emissions an average of 80% by 2050. Based on the carbon reductions from the recommended actions described in Chapter 5, New Hampshire' short-term and mid-term goals are

#### *Process*

Governor Lynch established the Climate Change Policy Task Force (Task Force) through Executive Order 2007-3 on December 6, 2007 (Appendix #). The Governor charged the Task Force with developing greenhouse reduction goals and recommending specific regulatory, voluntary and policy actions that the state should consider to achieve its greenhouse gas reduction goals. The Task Force consisted of 29 Members (Appendix #) representing:

- State agency commissioners;
- House and Senate members;
- General commerce and industry;
- Environmental interests;
- Forestry sector;
- Science/academia;
- Public utilities;
- Municipal government; and
- Insurance industry.

In support of the Task Force, the following six policy working groups were formed to develop greenhouse gas reduction strategies, termed action reports:

- Electric Generation and Usage;
- Transportation and Land Use;
- Residential, Commercial and Industrial;
- Agriculture, Forestry and Waste;
- Government, Leadership and Action; and

Over 120 individuals representing a wide range of interests and expertise participated in these working groups (Appendix #). The working groups were initially provided with a list of nearly 220 actions that had been considered for inclusion in the climate change action plans of other states. The working groups independently developed additional potential reduction strategies and then identified the most promising actions before analyzing their respective impacts and prioritizing the actions.

Each reduction strategy, termed a Potential Action Report, was submitted to the Task Force’s technical consultants, UNH-based Carbon Solutions New England (CSNE) for analysis. CSNE evaluated each of the 100+ Potential Action Reports, which were developed by four of the six working groups<sup>7</sup>, to determine the potential carbon dioxide emission reductions, cost of implementation and cost savings associated with each of the actions. This analysis was conducted by CSNE as an iterative process over seven months in order to ensure that the reductions, costs, and savings projections for each of the analyzed actions were based on grounded assumptions. The working groups were routinely consulted to vet the approach and assumptions and when necessary, experts outside the processes were consulted in a similar iterative fashion. The CSNE analyses were presented to the Task Force on two occasions in order to solicit feedback from the Task Force.

A sixth policy working group was formed to address the issue of the current and projected impacts of climate change. This “Adaptation” working group was convened to identify potential actions that should be taken to adapt to a changing climate. While not typically incorporated into the Climate Change Action Plans of other states, the Task Force felt that “adaptation” was a critical issue to address since the state is already experiencing the impacts of a changing climate and these changes are projected to increase. Since carbon dioxide will remain in the atmosphere for nearly 100 years once it is emitted, the current level of climate change impacts will remain for some time even if all greenhouse gas emissions were to suddenly stop. Due to the size of the global climate system, there is also a delay in the climate’s response to increasing atmospheric concentrations of CO<sub>2</sub>. Even if emissions were to cease immediately, the climate would continue to change for decades to come. In recognition of this, the Adaptation Working Group looked at what actions should be considered to prepare for a changing climate even as the state addresses its emissions.

The Task Force developed and adopted the following principles to provide it with guidance in formulating its recommendations:

1. Maximize greenhouse gas emission reductions to move the state, steadily and as quickly as possible, toward the goal of reducing greenhouse gas emissions 80% below 1990 levels by 2050.
2. Select actions that provide the greatest net economic benefit over time as well as economic opportunity to citizens and state of NH, while considering the energy security, public health and environmental benefits as well.
3. Focus initial investments in a phased approach that first exploits the current most cost-effective technologies and incorporates more advanced technologies as they become more cost-effective.
4. Ensure that policies (i) do not further disadvantage already disadvantaged populations in the state and (ii) put mechanisms in place to mitigate impacts.
5. Reduce vulnerability from a changing climate by planning and taking adaptive measures to address existing and future impacts to natural resources, the built environment, and New Hampshire’s way of life.
6. Engage the public to take action at the individual, community, state, and national levels.

7. Create a plan that views climate change in a regional, national, and global context, is reviewed on a regular basis to determine progress, and whose actions can evolve and develop over time in response to changing technology, economics, and sociological circumstances.
8. *Sustain the state's resources, both cultural and natural, which provide opportunities for both mitigation and adaptation.*

### *Public Input*

An extensive public process was conducted in order to allow the public access to the Task Force's work, and also to aid the Task Force in better understanding the issues and opportunities connected to the climate change issue. An initial public listening session was held on February 19, 2008 to obtain input on the kinds of actions the Task Force should explore. After the working groups completed their work, over 105 action reports were issued for public comment. Five additional listening sessions were then held throughout the state to receive public comments. Two sessions were conducted using live interactive videoconferencing through the Granite State Distance Learning Network (GSLDN). These sessions were centered at the Seacoast Science Center in Rye and the North Country Education Services Center in Gorham and the GLSDN's technology enabled three and two additional locations to participate, respectively. Participants at each location could interact with all the other sites, asking questions and providing comments to the host site while and watching the real-time questions and comments provided by participants at the other video linked sites. Video conferencing is an example of how innovative technologies can help to reduce greenhouse gas emissions by reducing vehicular travel while at the same increasing public access.

Over 175 people attended the public listening sessions and provided over 75 oral comments. A summary of comments is provided in Appendix X. The comments received were summarized in detail and provided to the Task Force. All XXX of the written comments, including both letters and emails, were submitted to the Task Force directly. Finally, any new actions or approaches considered by the Task Force subsequent to the completion of the analysis done by the working groups were submitted for public comment.

There were four clear themes from all the comments received:

- The Task Force should be bold in its decision making and recognize the magnitude of the problem that needs to be addressed;
- Significant improvements in energy efficiency in every sector but particularly buildings should be a major recommendation and commitment of the state action plan;
- Transportation issues, including reducing the amount of gasoline we use, improving public transportation and encouraging consumers to select more fuel efficient cars are critical to any plan addressing climate change; and
- Comprehensive education is needed to inform the public of actions they can take to reduce energy use, train the energy services trades in new technologies, and to develop appropriate curriculum for our schools.

Many other comments were also received from promoting renewable energy, encouraging more bike paths, as well as ensuring that our forests are used sustain ably. Even the individuals (5 out of the 100+ individuals who provided comment) who questioned the scientific literature and analyses on which mainstream climate science is based, agreed with the recommendations of promoting energy efficiency and conservation and increasing the state's renewable sources of energy.

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The working groups and the Task Force also sought to include consideration of related and ongoing initiatives, including:

- Governor Lynch’s “25 x 25” initiative to obtain 25% of New Hampshire’s energy from renewable resources by 2025;
- The Thermal Renewable Portfolio Study (RPS) study being prepared by the Office of Energy and Planning as required by bill passing establishing an Electric Renewable Portfolio Standard;
- The State Development Plan, which has been prepared by the New Hampshire Office of Energy and Planning;
- Executive Order 2005-04 issued by Governor Lynch to reduce energy use in state operations by 10%; and
- Efforts of the New England Governors/Eastern Canadian Premiers Climate Change Steering Committee.

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## **Chapter 2: Recommended Actions: New Hampshire’s Emission Reduction Strategy**

In order to reduce New Hampshire’s annual greenhouse gas emissions and position the state to achieve long-term emissions reductions of 80% below 1990 levels by 2050, the Task Force identified 10 Recommendations that it deems essential to addressing the causes as well as the impacts of climate change in a comprehensive fashion.

Those Recommendations are to:

1. Maximize efficiency in buildings.
2. Increase renewable/low emitting resources in a long-term sustainable manner.
3. Support regional/ national actions to reduce vehicle emissions.
4. Reduce vehicle emissions through state actions.
5. Encourage appropriate land use patterns that enable fewer vehicle-miles traveled (VMT).
6. Reduce vehicle-miles traveled (VMT) through an integrated multi-modal transportation system.
7. Protect natural resources (e.g., land, water, wildlife) to maintain the amount of carbon fixed/sequestered.
8. Lead by example in government operations.
9. Develop plans to enable society to adapt to existing and potential climate change impacts.
10. Develop an integrated education, outreach and workforce training program.

In order to achieve these Recommendations, the Climate Change Policy Task Force has identified a suite of supporting Actions that can be implemented immediately or adopted through a phased-in approach that can begin immediately and increase as technology evolves and economic means become available. The identified Recommendations and their supporting Actions establish a plan that will enable New Hampshire to continue to do its part to address climate change -- actions that will in turn benefit the economy, increase state and regional energy security, improve environmental quality, as well as position the state and its citizens to implement even greater reductions in the future. Specifically, the New Hampshire Climate Action Plan identifies Actions that can be implemented by individuals, businesses and government through a combination of voluntary and regulatory approaches.

### *Recommendations for Change*

1. Maximize efficiency in buildings.

According to the Pew Center on Climate Change, the operation of buildings accounts for 48% of greenhouse gas emissions in the United States. In New Hampshire, the construction and operation of buildings represent 59% of all fossil fuel use in the state, making them a major contributor to the greenhouse gas emissions driving global warming. By maximizing the thermal and electrical efficiency of all future buildings and extensively retrofitting existing residential, commercial, industrial and municipal buildings, the state can realize substantial reductions in its energy consumption for heat and power, leading to direct reductions in greenhouse gas emissions and energy costs. Such action can begin immediately by targeting the most cost effective advances in energy efficiency and incorporate more advanced technologies when they become economically viable.

2. Increase renewable/low emitting resources in a long-term sustainable manner.

While energy efficiency will play a critical role in reducing the demand for energy at the site level, the need for energy for heat and power will remain. By developing renewable resources, New Hampshire can meet an increasing portion of its total energy demand from instate sources of

energy. This expanded capacity will reduce overall greenhouse gas emissions from emissions as well as lead to more dollars staying in New Hampshire and positively impacting non-energy sectors of the state economy.

3. Support regional/ national actions to reduce vehicle emissions.

While New Hampshire can take significant action to reduce its greenhouse gas emissions, there are measures that can be taken at the regional, national and international level to allow even greater emission reductions and compliment the instate efforts.

4. Reduce vehicle emissions through state actions.

The transportation sector is the most significant source of emissions in the state, and its relative contribution is projected to increase further absent any change in current trends. The state can address the emissions from this sector by taking actions that improve the fuel efficiency of all vehicles on the road. This can be achieved through technological requirements as well as policies and programs that influence vehicle purchase, operation and maintenance.

5. Encourage appropriate land use patterns that reduce vehicle-miles traveled (VMT).

New Hampshire is the fastest growing state in New Hampshire and much of its growth can be characterized as “sprawl”. This type of development leads to an increase in the per capita annual vehicle miles traveled as residential and commercial developments become increasingly dispersed across the landscape. By adopting strategies that promote denser, more traditional development patterns, that growth in annual travel can be slowed significantly. Through careful planning and development, growth can be concentrated in such a way that it reduces the miles that must be driven to work and shop. This has an additional advantage of retaining the traditional rural character of the state while also reducing the amount of carbon dioxide released through forest and agricultural land conversion. Additional benefits can be realized through the maintenance of ecosystem services that will mitigate some of the impacts of climate change such as flood mitigation.

6. Reduce vehicle-miles traveled (VMT) through an integrated multi-modal transportation system.

New Hampshire’s annual VMTs and the resulting transportation-based emissions can be further reduced by changing the manner in which people travel. By reducing the number of single-occupancy vehicles (SOV) on the road through the promotion and expansion of alternative modes of travel (e.g., bus, train) and carpooling the state can reduce VMTs while still moving people and freight around the state. The successful reduction of VMTs will require that an integrated transportation system be carefully planned to ensure that transportation hubs are strategically located relative to the residential, commercial and industrial centers that they serve.

7. Protect natural resources (e.g., land, water, wildlife) to maintain the amount of carbon fixed/sequestered.

New Hampshire is unique among the states in that more than 80% of its land is forested. These forested lands support the state’s vital natural resource based economy as well as provide essential ecosystem services in the form of soil stabilization; water cycle regulation; flood mitigation; wildlife habitat; and nutrient cycling. In addition, forested and agricultural lands play a critical role by storing carbon in their soils while forests sequester and store vast amounts of carbon in the standing timber. By managing these lands in a sustainable fashion and maintaining the ecological processes and natural communities that support them, the state can continue to benefit from the multiple economic benefits and ecosystem services of these lands while utilizing them as an important source of renewable energy. Such management includes not only the

regulation of timber harvest but also the policies and programs that protect the wildlife populations and communities that play a key role in maintaining long-term forest ecosystem health.

8. Lead by example in government operations.

The State of New Hampshire has a critical role to play in terms of modeling and supporting climate change action in New Hampshire. The State's agencies and activities can adopt strategies that reduce its greenhouse gas emissions associated with heating and cooling its building, the power used by equipment and the fuel consumed by its fleet. These actions can provide a model for municipalities and businesses to adopt while also developing some of the infrastructure that must exist in order for some technologies to be marketable.

9. Natural resource and infrastructure planning to respond to existing and potential climate change impacts

Since carbon dioxide remains in the atmosphere for nearly 100 years once it is emitted, the current level of climate change will continue for some time even if all anthropogenic greenhouse gas emissions were to immediately cease. These current changes include warmer winters, reduced snowfall, and increased incidence of extreme precipitation event. Due to the size of the global climate system, there is also a delay in the climate's response to increasing atmospheric concentrations of CO<sub>2</sub>. Therefore, in the event that emissions were to completely stop, the climate would continue to change for decades to come and will include increases in average annual temperatures and precipitation level as well as changes in species (e.g. plants, wildlife) type and distribution across the state. Therefore, some level of climate change adaptation is necessary to ensure that the current and future impacts of climate change do not significantly impact the health of our residents, the strength of our economy, or the character of our natural environment. By preparing for climate change early, the state can avoid significant costs, whether economic, social or ecological, in the future.

10. Develop an integrated education, outreach and workforce training program.

Critical to support all of the Recommendations and each of their supporting Actions will be a comprehensive education program for the state. This program would focus on raising the awareness of the climate change impacts in order to engage the public in actions to reduce GHG emissions in their personal and professional lives. It would further focus on developing a workforce capable of installing, operating and maintaining advanced technologies and designing and building residential, commercial and industrial building and facilities that incorporate the advances in energy efficiency and renewable energy. The education program would further affect the integration of climate change science into all academic levels and disciplines in an effort to empower future generations to take action in their own lives while developing the leaders in policy, engineering, science, and media.

**Supporting Actions**

In order to achieve these Recommendations, the Climate Change Policy Task Force has identified a suite of supporting Actions. These supporting Actions were selected by the Task Force from a list of over 100 Actions that were developed by the six technical and policy working groups to address the State of New Hampshire's previous climate change commitments, achieve the proposed emission reduction goals as well as to promote a comprehensive approach to early Adaptation to the impacts of climate change.

The following table contains those Recommendations and supporting Actions that were selected by Task Force and can be found in Appendix \_\_. Those Actions that were not selected by the Task Force as being

essential at this point in time have been retained for periodic consideration for incorporation into future Plan updates and can be found in Appendix \_\_\_\_\_. The table below also contains the original reference use by the technical/policy working group during the development of the full range of Actions.

- ADP                      Adaptation
- AFW                     Agriculture, Forestry and Waste
- EGU                     Electric Generation
- GLA                     Government Leadership and Action
- RCI                     Residential Commercial and Industrial
- TLU                     Transportation and Land Use

<b>List of Supporting Actions</b>	
<b>1. Maximize efficiency in buildings.</b>	
Maximize Efficiency in New Construction	RCI 1.1
Maximize Energy Efficiency in Existing Residential Buildings	RCI 1.2
Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings	RCI 1.3
Install Higher-Efficiency Equipment, Processes, and Systems	RCI 2.1
Increase the use of Combined Heat & Power	EGU 1.3
Consider Alternative Rate Structuring	EGU 1.1
Upgrade Building Energy Codes	RCI 1.4.a
Increase Building Energy Code Compliance	RCI 1.4.b
Establish an Energy Properties Section in Real Estate Property Listings	RCI 1.5

<b>2. Increase renewable/low emitting resources in a long-term sustainable manner.</b>	
Promote Renewable Energy through the Electric Portfolio Standard (RPS)	EGU 2.1
Implement Regional Greenhouse Gas Initiative (RGGI)	EGU 2.2
Increase Renewable and Low-CO <sub>2</sub> e Thermal Energy Systems	RCI 3.1
Promote Low- and Non-CO <sub>2</sub> -Emitting Generation	EGU 2.4
Enable Importation of Canadian Hydro and Wind Generation	EGU 2.6
Allow Regulated Utilities to Build Renewable Generation	EGU 2.7
Identify and Deploy the Next Generation of Electric Grid Technologies	EGU 2.8
Promote Low- and Non-CO <sub>2</sub> -Emitting Distributed Generation	EGU 2.9
Encourage the Use of Biogenic Waste Sources for Energy Generation	AFW 2.4

<b>3. Support regional/ national actions to reduce vehicle emissions.</b>	
Support Stricter Corporate Average Fuel Economy Standards	TLU 1.A.1
Support Fuel Economy Standards for Heavy-Duty Vehicles	TLU 1.A.2
Adopt a Low-Carbon Fuel Standard	TLU 1.C.1
Promote Advanced Technology Vehicles and Supporting Infrastructure	TLU 1.C.2

<b>4. Reduce vehicle emissions through state actions.</b>	
Adopt California Low Emission Vehicle (CALEV) Standards	TLU 1.A.3
Create a Point-of-Sale Financial Incentive for Efficiency Vehicles	TLU 1.B.1
Install Retrofits to Address Black Carbon Emissions	TLU 1.C.3
Implement Commuter Trip Reduction Initiative	TLU 2.A.1
Reduce and Enforce Highway Travel Speeds	TLU 1.D.1
Address Vehicle Idling	TLU 1.D.2
Improve Traffic Flow	TLU 1.D.3

<b>5. Encourage appropriate land use patterns that reduce vehicle-miles traveled (VMT).</b>	
Assess Greenhouse Gas Development Impact Fees	TLU 2.C.1.a
Streamline Approvals for Low- Greenhouse Gas Development Projects	TLU 2.C.1.b
Develop Model Zoning to Support Bus/Rail Transit	TLU 2.C.2
Develop Model Zoning for Higher-Density, Mixed-Use Development	TLU 2.C.3
Continue/Expand Funding, Education, and Technical Assistance to Municipalities	TLU 2.C.8

<b>6. Reduce vehicle-miles traveled (VMT) through an integrated multi-modal transportation system.</b>	
Expand Local/Intra-Regional Transit (Bus) Service	TLU 2.B.1.a
Maintain and Expand Freight Rail Service	TLU 2.B.2.b
Implement a Stable Funding Stream to Support Public Transportation	TLU 2.B.2.c
Improve Existing Inter-City Bus Service	TLU 2.B.2.h
Expand Park-and-Ride Infrastructure	TLU 2.B.2.e

<b>7. Protect natural resources to maintain the amount of carbon fixed/sequestered.</b>	
Avoid Net Forest Land Conversion	AFW 1.2
Maximize Availability of Biomass for Electricity and Heating within Sustainable Limits	AFW 2.2
Promote Durable Wood Products	AFW 1.3
Protect Agricultural Land	AFW 1.1.3
Maximize Source Reduction and Recycling	AFW 3.1

<b>8. Government should lead by example.</b>	
Establish an Energy Management Unit	GLA 1.1
Establish an Energy Consumption and Greenhouse Gas Emissions Baseline Inventory for State Government	GLA 1.2
Establish a Self-Sustaining Fund for Energy Efficiency Projects in State Government	GLA 1.3
Provide for the Establishment of Local Energy Commissions	GLA 1.4
Include Climate Change Adaptation and Mitigation in Programs and Planning	GLA 1.5

Increase Funding for High Performance Public Schools	GLA 2.6
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<b>9. Develop adaptive responses to current and future climate change impacts.</b>	
Develop a Climate Change Adaptation Plan for the State of New Hampshire	ADP 8
Develop and Distribute Critical Information on Climate Change	ADP 1
Promote Policies and Actions to Help Populations Most at Risk	ADP 2
Charge and Empower Public Health Officials to Prepare for Climate Change	ADP 3
Strengthen Protection of New Hampshire’s Natural Systems	ADP 4
Increase Resilience to Extreme Weather Events	ADP 5
Strengthen the Adaptability of New Hampshire’s Economy to Climate Change	ADP 6

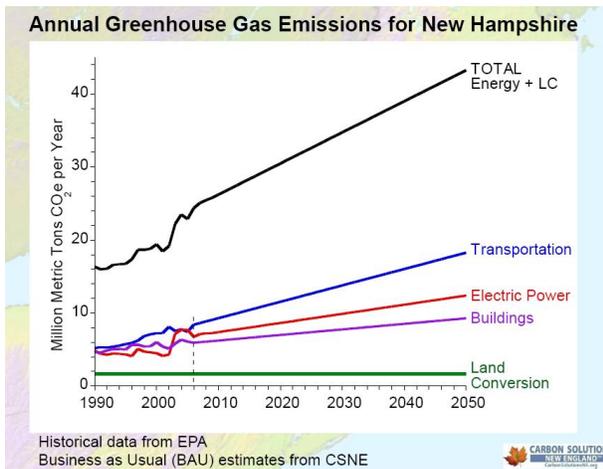
<b>10. Create an integrated education, outreach and workforce training program.</b>	
Develop and Overarching Education Plan	RCI 4.6
Include Energy Efficiency and Conservation in School Curriculum	RCI 4.1
Increase Energy Efficiency through Building Management Education Programs	RCI 4.2
Reduce Residential Energy Demand through Education and Outreach	RCI 4.3
Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program	RCI 4.4
Create an Energy Efficiency and Sustainable Energy Systems Web Portal	RCI 4.5

**New Hampshire’s Greenhouse Gas Emissions Inventory**

To understand New Hampshire’s contribution to climate change and be better positioned to identify and select the supporting Actions, a greenhouse gas emission inventory was conducted for 1990-2006 using the EPA’s State GHG Inventory Tool.

The inventory indicated that the vast majority of New Hampshire’s greenhouse gas emissions are in the form of carbon dioxide (CO<sub>2</sub>) primarily due to the combustion of fossil fuels for heat, power and transportation. Analysis of this inventory found that electric generation, transportation and buildings each contributed roughly 1/3 of the state’s total emissions in 1990. Emissions from all sources have been rising steadily since that time. Between 1990 and 2006 emissions of all GHG gases have increased by X% from 15.8 million metric tons of CO<sub>2</sub> equivalents (MMTCO<sub>2</sub>e) to 22.3 MMTCO<sub>2</sub>e in 2004/2006.

Figure 2.Xa Historical Emissions by Sector (Need version with projections removed)



As can be seen in Figure 2.Xa increases in New Hampshire’s GHG emissions have not been uniform but have been punctuated by peaks and valleys. Between 1990 and 1995, New Hampshire’s emissions remained similar to 1990 emission levels. This stable period may have been due to the recession in the early 1990s<sup>8</sup>. By 2004, New Hampshire’s greenhouse gas emissions had reached 23.37 million metric tons<sup>9</sup>, representing a 48% increase over 1990 gross emission levels.

The most significant increase can be seen between 2002 and 2003 when New Hampshire’s two newest natural gas plants, Granite Ridge Energy LLC and Newington Energy LLC, came online. The emissions from these two plants represent nearly 40% of the total increase in New Hampshire emissions from 1990 to 2006. This new capacity also accounted for roughly 65% of the total growth in the electric generation sector over that time, bringing electric generation’s contribution to the state’s total emissions to 34.2%. Emissions from the transportation and building sector grew steadily. Transportation emissions grew the most rapidly and presently contribute the most greenhouse gases annually, approximately 33.9% of the state’s emissions. The emissions originating from the building sector only includes direct energy consumption from residential, commercial and industrial space grew more slowly and only contributed 29% in 2006.

Table 2.X Table of Historical Emissions by Sector

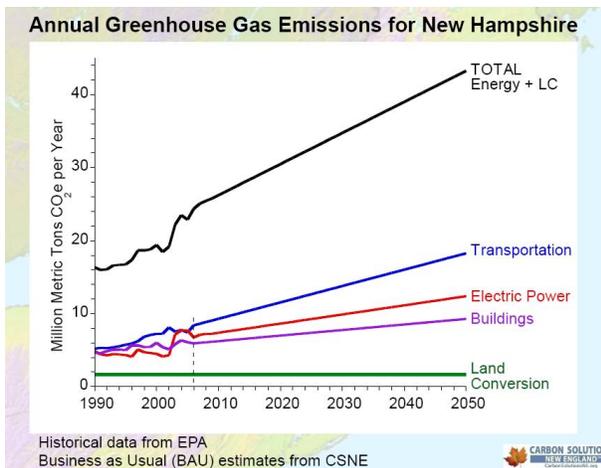
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The agriculture, forestry and waste sector contributed only 2.3% of the state emissions in 2006 following a 35% decline in direct emissions due to reduced methane gas being released from landfills. However, not addressed in the EPA inventory was the conversion of agricultural and forested lands. This conversion, resulting from development due to New Hampshire’s rapid rate of growth has provided a steady contribution of GHG by releasing large amounts of stored carbon dioxide from a natural carbon sink. New Hampshire is the fastest growing state in New England and the influx of new residents results in X acres of forested lands and Y acres of agricultural lands being cleared for residential, commercial and industrial development each year on average. This land use conversion has resulted in the release of an additional X MMTCO<sub>2</sub>e per year. A significant factor not addressed by these figures is the permanent loss of the sequestration potential of these natural lands as the capacity to store carbon in the soil and forests is lost.

**Future New Hampshire Emissions**

Projections of future greenhouse gas emissions indicate that if current trends prevail under “Business As Usual” (BAU) conditions then New Hampshire’s emissions will grow at approximately 2% per year, roughly doubling the current emissions levels by 2050. The leading contributor of this growth is anticipated to be the transportation sector due to the rising population and the current pattern of sprawl type growth that is occurring in the State. These two factors lead to more cars on the road, each of which is traveling a larger number of miles with each passing year resulting in a 2.8% annual increase in fuel consumption. The second largest growth factor is the anticipated annual load growth of nearly 1.5% in the electricity sector.

Figure 2.X Future Emissions by Sector



**Reduced Emissions from the Task Force Recommendations**

The projected impact of the 10 recommendations and their supporting Actions is expected to lead to a significant reduction in New Hampshire’s greenhouse gas emissions, principally through a reduction in total fossil fuel-based energy consumption through the expansion of renewable energy and an increase in energy efficiency. In an analysis of the impact of the supporting Actions, as shown, greenhouse gas emissions could be reduced to \_\_\_ MMTCO2e, a reduction of nearly X% below 1990 levels, and by 2025.

Table 2.X Emission Reduction Potential

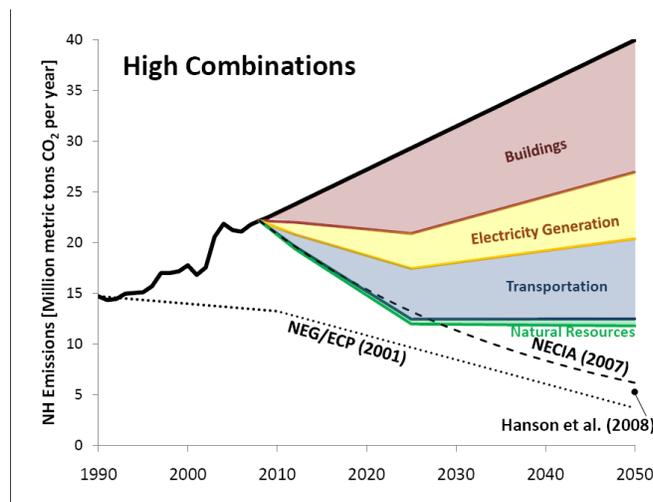
<b>Projected Emissions and Emission Reductions [MMTCO2e]</b>			
	<b>2012</b>	<b>2025</b>	<b>2050</b>
<b>Total Projected Emissions (BAU)</b>	23.76	29.30	39.95
<b>Potential Sector Reductions</b>			
Building Actions	1.78	8.43	13.02
Electric Generation Actions	1.19	3.44	6.57

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Transportation Actions	1.19	5.01	7.91
Natural Resource Actions	0.25	0.46	0.68
<b>Total Potential Emission Reductions</b>	<b>4.41</b>	<b>17.34</b>	<b>28.18</b>
<b>Total Projected Emissions (CCAP)</b>	19.35	11.96	11.77
<b>Percent Reduction from BAU</b>			
<b>Percent Reduction from 1990</b>	19.35	11.96	11.77

As shown in figure 2.Xb, the total impact of the potential emissions reductions could be sufficient to place New Hampshire on track to achieve its reduction targets in the near and mid-term and be well placed to achieve the more aggressive reductions over the long-term. By implementing the supporting Actions, New Hampshire would be able to reduce its emissions immediately using cost effective, available technology. The larger reductions over the long-term could be achieved once advanced technologies become commercially available.

Figure 2.Xb Emission Reduction Potential

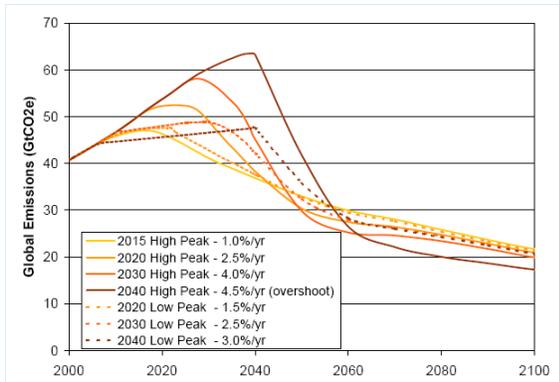


### Interim Emission Reduction Targets

The Climate Change Policy Task Force selected a long-term GHG reduction target of an 80% reduction below 1990 emission levels by 2050 for the State of New Hampshire. As can be seen in Figure 2.Xc, there are a variety of paths that New Hampshire can take to reach the necessary reductions by 2050. The sooner that New Hampshire begins to make the changes needed to achieve its long-term goal, the less costly it will be for the state and its residents. Delaying strong action will mean that greater reductions, at a higher cost, are needed in the future to achieve the same level of reduction. Therefore, the Task Force selected Actions and interim targets to get NH on the appropriate glide path as soon as possible. While the recommendations and their supporting Actions are not sufficient to achieve the Task Force’s recommended long-term reduction in off themselves, they contain critical steps that enable emission reductions to occur using a phased-in approach. As discussed earlier the phased-in approach, whether at the scale of individual Actions (e.g., RCI 1.2 - Maximize Energy Efficiency in Existing Residential

Buildings) or the entire Climate Change Action Plan, will allow New Hampshire to focus its resources early on those opportunities which are currently most cost effective and then direct future resources toward those opportunities as technology evolves and markets develop.

Figure 2.Xc Potential Emission Reduction Pathways<sup>10</sup>



In recognition of the need for early and phased-in emission reductions, the Task Force has identified Interim Reduction Targets considered essential to keep the state on the necessary reduction pathway and position it to capitalize on future technological opportunities over the long-term. These interim targets, as seen in table 2.X, establish declining limits on the total annual emissions for the state. The establishment of these maximum emission levels is felt to be critical to ensure that climate change action begins immediately.

Table 2.X New Hampshire Interim Reduction Targets

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### Getting to the Long-Term Goal

The Task Force recognizes that there are limitations to the impact that this Climate Change Action Plan can have on the state's long-term emissions. The reductions associated with the Actions recommended as part of this Action Plan are not sufficient to address all the reductions that need to be made over the next 4 decades. In fact many of the currently identified supporting Actions, such as those directed at building energy use will realize reductions very early and will not result in any new reductions much beyond 2025. This Action Plan contains those measures that the Climate Change Policy Task Force feels are critical to more rapidly address GHG emissions in the state while positioning the residents, businesses and

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industries in the state to achieve greater reductions in the future as technological, economic and social changes allow.

The Plan, therefore, will require periodic revision (a process documented in greater detail in Chapter 6) in order to take advantage of the most recent developments in technology as well as to adapt to shifts in culture and the changing climate. For this reason, the Actions that were developed by the 6 technical/policy working groups, but which were not included as part of this Action Plan have been retained (Appendix X). These Actions will be reviewed periodically in the future to ensure that the most appropriate climate change actions are being implemented at any given time. The Task Force recognizes that future opportunities may eventually lead to the adoption of all the Actions developed as part of this process as Actions that do not have a positive cost benefit now may in the future.

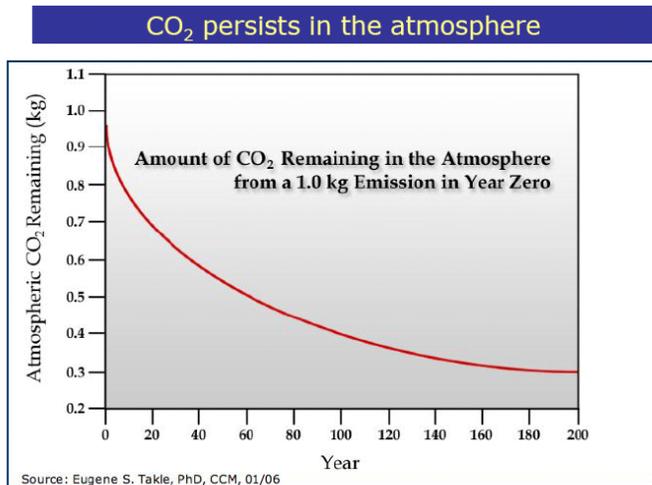
Going forward, the State of New Hampshire will also need to work within the larger northeast region and with the federal government to reduce its emissions. Being a relatively small state, its emissions from electricity generation and from the transportation sector are impacted by trends and actions taken at the regional and national level. By working to coordinate its actions with those of other states, New Hampshire can leverage greater reductions within its own borders and across state and even national boundaries as well.

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## Chapter 3: Adapting to a Changing Climate in New Hampshire

### Overview

Climate change will have significant effects on important economic, health and natural resource sectors throughout New Hampshire in the twenty first century. The state's climate will continue to change even if immediate steps are taken to reduce greenhouse gas emissions. Interdependent physical, chemical and biological processes in the oceans, atmosphere, and on land will respond slowly to changes in the atmospheric concentration of greenhouse gas emissions. Greenhouse gases will reside in the atmosphere for a century or more.



Reducing carbon emissions should not be the only preventive action in our state's response to climate change. Adaptation actions and responses should be evaluated and where necessary, implemented. The projections of impacts provided in this chapter provide a frame of reference to evaluate appropriate climate change response.

As a state, we face two types of risk:

- 1) Risk from climate change impacts; and
- 2) Risk of incorrect commitment of, and therefore, wasted resources.

The state must couple actions to reduce carbon emissions, the primary greenhouse gas, with adaptation.

### What is Climate Change Adaptation?

Climate change adaptation is any action to avoid or minimize the negative impact of, or take advantage of new opportunity created by an increasingly variable climate changing at an unprecedented rate. By contrast, emission reduction actions avoid or minimize climate change by limiting the accumulation of atmospheric greenhouse gases.

Adaptation actions fall into several categories. Actions may *INCREASE NATURAL RESILIENCE* in species and ecosystems to facilitate recovery from climate disturbances or adjust to new patterns of climate variability and climate extremes<sup>11</sup>. Actions may also entail proactive steps to *FACILITATE RESPONSES TO* climate change that help human communities and ecosystems persist under new conditions in place or elsewhere<sup>12</sup>. Finally adaptation actions could *BUILD RESISTANCE* to climate change by helping human communities and ecosystems resist impacts and maintain valued resources<sup>13</sup>. Different actions will make sense in different situations. In some cases, the best approach will be to employ multiple actions simultaneously.

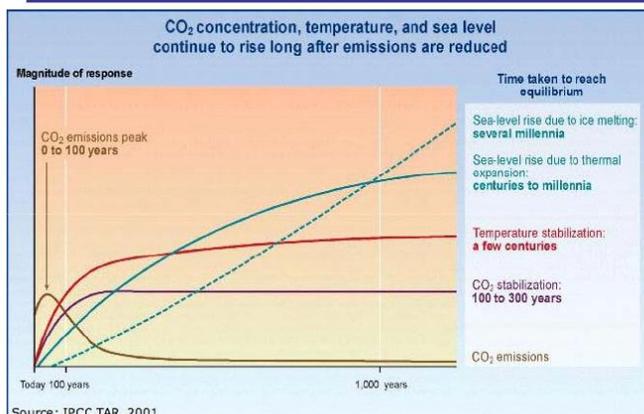
## Economic Impacts

Without adaptation actions climate change from increased greenhouse gas concentrations will impact agriculture, forestry, water resources, human health, coastal settlements, and natural ecosystems<sup>14</sup>. These impacts will have a significant affect on our economy. The cost of inaction is the equivalent to losing at least 5 percent of global gross domestic product each year, now and forever<sup>15</sup>.

Waiting to act can be more costly than taking actions that anticipate climate change. Hurricane Katrina illustrates the vulnerability of long-standing assets and infrastructure (e.g. dams, bridges, coastal and floodplain development) to extreme weather events predicted by climate change models. A “wait and see” approach would be especially inadequate in responding to:

- Irreversible impacts, such as species extinction or unrecoverable ecosystem changes;
- Unacceptably high costs and damages, such as inappropriate coastal zone development that exposes lives and property to intense storm damages; and
- Long-lived investments and infrastructure that may be costly (or prohibitive) to change in response to climate change after intense storms as opposed to better preparation before storms.

Significant impacts from global warming are now unavoidable



Scientific INT. DRAFT

To determine the extent of our potential impacts we need accurate information and a mechanism to educate decision makers and the public. Without accurate information decision making can be more challenging. We need to begin this process by:

- Investing in the assessment of existing sources of information, updating information and identifying gaps. (i.e. updated flood plain maps, LIDAR mapping of coastal and estuarine systems, built infrastructure risks, etc...); and
- Disseminating accurate and understandable information about the economic, environmental, and social impacts of climate change to decision makers and the general public.

See: Action Recommendation (ADP Action 1): *Invest in the Development and Distribution of Critical Information.*

As a state we need to create policies to support economic development which reduce/mitigate greenhouse gases, mainstream climate considerations into the economic growth model and attract climate friendly employers. We can do this by:

- Anticipating the effects of climate change on current industries (e.g. skiing, agriculture, tourism);
- Developing “green collar” training and education programs; and
- Attracting alternative energy and other “clean-tech” industries.

See: Action Recommendation (ADP Action 6): *Strengthen the NH Economy for Adaptability to Climate Change.*

## **Human Health Impacts**

Without action, climate change will increase the incidence of heat stress, respiratory illness, and infectious diseases. Moreover, climate change will increase the incidence of injury and death from severe weather events. Increasing our public health capacity and working with community planners will ensure access to health care and reliable havens from heat, air pollution, aeroallergens, and extreme weather.

**Thermal stress/heat waves** – Humans are susceptible to high temperatures, and heat waves are a major public health threat. Average temperatures across the northeast have risen more than 1.5 degrees Fahrenheit (°F) since 1970 and 4°F between 1970 and 2000. Under a higher-emissions scenario, the Concord/Manchester area could experience nearly 70 days of 90 degree weather each year<sup>16</sup>. The elderly, young children, pregnant women, the chronically ill, and essential service workers are particularly vulnerable to heat stress. Heat related risks and vulnerabilities in our population can be alleviated by increasing public health capacity in the state through actions such as community partnerships and increased access to health care.

**Air quality** - Air pollution in New Hampshire is related to climate, with the worst air pollution occurring on hot days. An increase in hot days is predicted under a climate change scenario. Air pollution is a significant health concern, especially for sensitive populations such as children, the elderly, and people with respiratory disease. Increased air pollution has been linked to the onset

of asthma, and to increased frequency of asthma symptoms. In addition, increased temperatures and CO<sub>2</sub> levels will lead to increased pollen production in several key allergenic species such as ragweed.

**Infectious Diseases** – An increase in hot weather will facilitate the spread of vector-borne infectious diseases such as Lyme disease, eastern equine encephalitis and West Nile virus. Intense public health monitoring programs have already been implemented for vector-borne disease. The role of climate change in the spread and incidence of other infectious diseases is poorly understood. In general, many of these diseases can be effectively avoided with prevention and control programs and adequate financial and public health resources, including training, surveillance and emergency response

**Storms and Flooding** – More frequent and extreme weather events predicted by climate change models will damage property and threaten public safety. Flooding will diminish public health by spreading toxins, contaminating water supplies, disabling local septic systems, waste water treatment systems and combined sewer overflows.

What is currently hard for at risk populations will get harder in a climate change scenario. As a state we need to focus policies and actions to help the most at risk populations (e.g., elderly, low income, chronically ill and children) as well as the general population, prepare for the impacts of climate change and related social impacts (e.g., cost and availability of: transportation, heating and cooling homes, ‘cool shelters’, food and potable water, health care and the potential need for relocation). To accomplish this we need:

- Public Health and Emergency Response Agencies to work with the Department of Environmental Services to develop effective public outreach;
- To create partnerships between these organizations to share relevant data and information; and
- To educate and empower people in New Hampshire to prepare for health related and social impacts resulting from climate change.

See: Action Recommendation (ADP Action 2):

*Focus Policies and Actions To Help At Risk Populations Prepare for Impacts of Climate Change.*

See: Action Recommendation (ADP Action 3):

*Charge and Empower Public Health Officials to Prepare for the Public Health Impacts of Climate Change.*

## **Natural Systems**



### **Agriculture and Forestry**

In FY02 New Hampshire’s agriculture industry generated \$930 million in direct spending, and supported almost 12,000 jobs.<sup>17</sup> New Hampshire’s forest products industry employs over 10,000 people in our state and produces \$1.5 billion

dollars in annual revenue<sup>8</sup>. Both industries will face significant challenges as the climate continues to change. Climate models project decreases in the number of frost days, where temperatures dip below freezing, and increases in the length of the frost-free growing seasons. Tree species composition is likely to change.

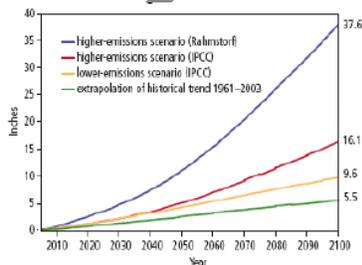
Sustaining New Hampshire’s agricultural and forestry industries requires evaluating strategies that:

- Alter the timing of planting dates in response to changing growing conditions;
- Maintain local agricultural lands;
- Alter crop mix and forest species to better match the changing climatic conditions;
- Breed new plant species and crops more tolerant of changed climate condition;
- Promote fire suppression practices in response to increased fire risk;
- Adopt forestry practices that enhance carbon storage; and
- Maintain forest reserves for species and genetic diversity.

### Coastal Areas and Sea Level Rise



Sea level rose at an average rate of 2.0 - 2.7 mm per year over the last century in New Hampshire, nearly a foot per century<sup>9</sup>. Sea-level rise is likely to accelerate. The United Nations Intergovernmental Panel on Climate Change (IPCC) projects that global sea levels will rise between 7 and 14 inches under a lower-emissions scenario and between 10 and 23 inches under a higher-emissions scenario in the twenty first century. The IPCC projects that coastal areas will experience the equivalent of today’s 100 year storm surge every 2 and 15 years.



This graph depicts the average or mid-range of a number of different sea-level rise (SLR) simulations: a continuation of recent observed SLR rates (green line), the mid-range of the most recent IPCC projections under the lower-emissions scenario (yellow line), the mid-range of the recent IPCC projections under the higher-emissions scenario (red line), and the midrange of a more recent set of projections under the higher-emissions scenario (blue line).

Source: Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. 2007.

Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS).

Protecting New Hampshire’s coastal areas requires actions that:

- Analyze the environmental consequences of shore protection;
- Promote shore protection techniques that do not destroy all habitat;
- Identify land use measures to ensure that wetlands migrate inland as sea level rises in some areas; and
- Engage state and local governments in defining responses to sea level rise.



### Ecosystems and Wildlife

The implications of climate change are dire for New Hampshire's natural systems. Many species are already stressed by land-use changes, pollution, invasive species, and habitat fragmentation. Coupled with rapid climate change, species' resilience and opportunity for successful adaptation will be challenged<sup>10</sup>. The variety of non-climatic stresses that affect natural systems interact synergistically with climate stresses and result in greater overall impacts<sup>11</sup>. For example, when rainbow trout are exposed to pesticides, their nervous and reproductive systems can be affected. Those impacts are greater as water temperature increases. Warmer water means less oxygen available to fish and can also result in less offspring being produced. The key to ensuring ecosystem and wildlife adaptation is to maintain overall ecosystem health and to conserve important areas. An intact ecosystem is a more resilient ecosystem. Multiple examples of each habitat type must be protected to guard against the risk that some sites may be irretrievably altered.

In addition, effective conservation in the face of a rapidly changing climate requires us to think about not only where plants, animals and natural communities are currently found, but where they might be found in the future. Today, fragmentation of natural systems by roads, infrastructure and other alterations has created obstacles to migration. Adding corridors between protected areas or stepping stones of reserve networks across latitudinal, longitudinal and altitudinal gradients will ensure that species can continue to move toward their optimal climatic zones.

Protecting New Hampshire's ecosystems and wildlife requires evaluating strategies that:

- Encourage development and growth in existing urban areas and avoid natural areas; and
- Develop a system of intact protected natural areas to foster resiliency, to allow for species movement and also to protect ground water.

See: Action Recommendation (ADP Action 4):

*Strengthen the Protection of New Hampshire's Natural Systems.*

### Infrastructure

New Hampshire's critical infrastructure includes roads, drinking water treatment and distribution systems, waste water systems, and electricity distribution. Storm damage poses the greatest threat to the state's infrastructure. Over the past three years, New Hampshire has experienced three 100 year flood events, with one event costing the state \$35 million.

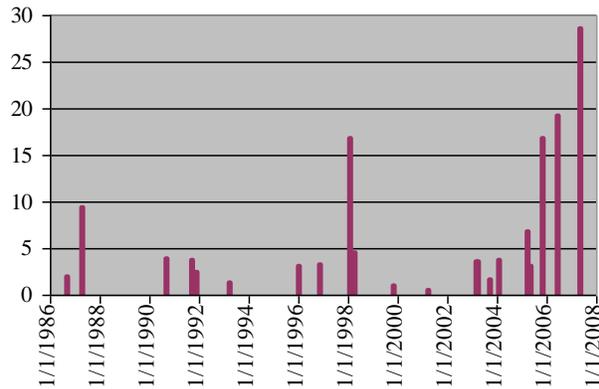
Riverine flooding is the most common disaster event in the State of New Hampshire<sup>12</sup>.

Figure 1 depicts the costs associated with Presidentially Declared Disasters since 1986. In total, New Hampshire has spent \$138 million repairing damages from severe storms and flooding.

Figure 1

**Individual Storm Event Damage**

(Cost in Millions of Dollars)

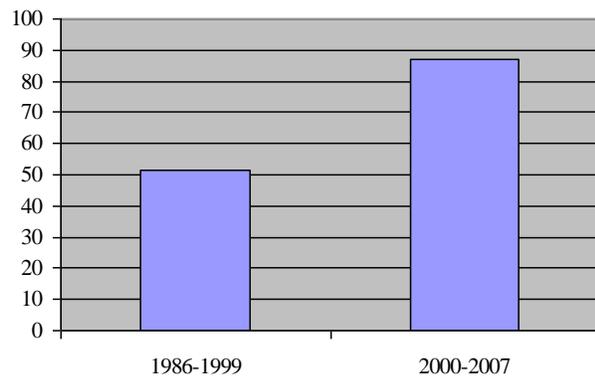


The state incurred more than half of these costs, \$87 million, in the last seven years (Figure 2). These data have been adjusted for inflation. In the last 7 years our storms are causing more damage and costing New Hampshire significantly more to recover from<sup>13</sup>.

Figure 2

**Total Storm Damage in New Hampshire**

(Cost in Millions of Dollars)



Climate change studies predict increased precipitation, more intense events, and more flooding. New Hampshire’s municipal water and waste water utilities are largely unprepared for increased flood frequency and volume. Even modest disruptions can have significant impacts on daily life. Potential disruptions include alteration to the hydrological regime resulting in pressure on waste water and stormwater systems in their ability to handle large volumes of water in short time.

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Protecting New Hampshire’s infrastructure requires evaluating strategies that:

- Create a retreat policy for coastal and floodplain properties (i.e. a policy that plans for residents and structures needing to relocate due to flooding or inundation);
- Guide future development away from flood prone areas and maintain adequate setbacks;
- Render the existing environment more resilient to weather related impacts; and
- Utilize municipal ordinances, building codes, land use practices, infrastructure planning, and incentives to protect against risks.

See: Action Recommendation (ADP Action 5):  
*Increase Resilience to Extreme Weather Events.*

### **Understanding the Risks**

Adaptation planning involves many uncertainties. State and local government must establish transparent planning procedures that are fully integrated with other aspects of their work. They must ensure that their short-term and long-term commitments allow for and encourage adaptive management in an effort to establish a “no regrets” strategy for New Hampshire to adapt to climate change.

See: Action Recommendation (ADP Action 7):  
*Permanently Establish a Climate Change Advisory Council.*

See: Action Recommendation (ADP Action 8):  
*Develop a Climate Change Adaptation Plan for New Hampshire*

## **Chapter 4: Economic Opportunities**

### **Economic Costs and Benefits of Implementation**

#### **Introduction**

New Hampshire's Climate Change Action Plan presents an opportunity for our state to balance the costs of investment in the Task Force's recommended actions against three vital economic benefits;

- economic growth related to redirection/reinvestment of avoided imported energy spending back into our own state' economy,
- job creation and economic growth related to development of in-state sources of energy from renewable resources and green technology development and deployment from New Hampshire businesses.
- Avoidance of the significant and well documented costs of unchecked global warming on the State's infrastructure and economy, health of our citizens

Additionally, our economic growth potential is increased by taking a leadership position both in the region and nationally, and benefiting from early actions exemplified by the state's adoption of an RPS, participation in RGGI, and the voluntary adoption of the 25 x '25 Renewable Energy Initiative. While New Hampshire cannot avoid disastrous climate change impacts simply by acting ourselves, our leadership actions can spur other states and the federal government to take the necessary complementary steps to mitigate climate impacts.

Our state's economic well being has long been heavily dependent on tourism businesses related to summer and winter outdoor recreation in the natural beauty of our mountains, lakes, and seacoast region. It has also been recognized for many years that economic vitality and environmental protection are inextricably linked, and there is no reason to believe that addressing climate change should be different, as well as interrelated with the added dimension of energy usage and cost. To the contrary, there is a significant body of literature to support the economic benefits of a "green economy". President-elect Obama has cited a new energy economy as being the "best potential driver for kick-starting the national economy"

The recommendations of the Climate Change Policy Task Force have been carefully considered for their potential to direct initial investment in those actions which will reduce emissions (or serve as a "lead-in" to additional actions) on the road to achieving the state's goals for necessary emissions reductions, while maintaining an overall economic benefit. These investments may be regarded as a down payment on the costs of actions, either via avoided direct costs, avoided energy cost reinvestment, or job creation/growth.

#### **Cost of Inaction**

The enormous costs to the state of the three recent hundred year floods (over an eighteen month period), both directly to affected citizens and municipalities and the state's highway system<sup>1</sup> are exemplary of the types of costs we face by failing to reduce climate related CO<sub>2</sub> emissions. In addition the state experienced huge costs related to emergency response, storm cleanup, and reduced productivity and economic activity due to lost work days.

The *Northeast Climate Impacts Assessment* (NECIA<sup>2</sup>), a recent analysis by more than 50 independent climate, ecosystem, and health scientists and economists of climate change and potential impacts that may result from the unchecked rise in greenhouse gas emissions, states

*“New state-of-the-art research shows that if global warming emissions continue to grow unabated, New Hampshire can expect dramatic changes in climate over the course of this century, with substantial impacts on vital aspects of the state’s economy and character. If the rate of emissions is lowered, however, projections show that many of the changes will be far less dramatic. Emissions choices we make today—in New Hampshire, the Northeast, and worldwide - will help determine the climate our children and grandchildren inherit, and shape the consequences for their economy, environment, and quality of life.”*

The NECIA projects the potential for rise in summer heat index (a measure of how hot it feels) under the current high emissions scenario may change New Hampshire's climate to more resemble that of North Carolina, which would completely change the seasonal character and economy of the state. Other projected high emissions scenario potential impacts may include;

- An increase in winter precipitation of 20 -30 % , with less snow and more falling as rain,
- most ski areas (a \$650 million annual industry in New Hampshire) would no longer be viable, and the snowmobiling economy (\$3 billion annually in the Northeast region) would be almost eliminated in the southern areas and reduced to less than 20 days in the northern part of the state,
- an increase in the frequency and severity of heavy, damaging rainfall events and the associated major economic impacts of cleanup, repair, and lost productivity and economic activity,
- an increase in short term (one to three month) summer droughts from the current every two to three years to annually, resulting in increased water costs, and agricultural and forestry stresses,
- increased coastal flooding, erosion, and property damage from potential estimated rise in sea level,

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<sup>1</sup> NH DOT reports state highway repairs from recent flooding disasters of \$28.1 MM (Oct. '05), \$5.3 MM (May '06), \$7 MM (April '07), \$2.5 MM (\$1 mm rail, Aug. '08) (11/7/08 phone call Bill Boynton, NHDOT)

<sup>2</sup> See [www.northeastclimatechoices.org](http://www.northeastclimatechoices.org) and [http://www.climatechoices.org/assets/documents/climatechoices/new-hampshire\\_necia.pdf](http://www.climatechoices.org/assets/documents/climatechoices/new-hampshire_necia.pdf)

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- significant increased human health impacts due to extreme heat (more than 20 days per year projected over 100°F), increased air pollution, and vector borne disease

In addition major impacts are projected in the forestry and agriculture sector, both significant contributors to the state's economy.

A May 2008 report, *The Cost of Climate Change*<sup>3</sup>, based on new research relying on the use historical impact data to “build up” future economic impacts, projects total global warming economic cost in the United States (under the “business as usual” emissions growth scenario) of 3.6 % of gross domestic product (GDP). Four impacts (hurricane damage, real estate losses, energy and water costs) will account for 1.8% of the GDP cost, or \$1.9 trillion annually by 2100.

The Climate Change Policy Task Force's Action Report recommendations are intended to guide the state in “doing our part” to reduce our carbon impact, while maintaining our economic vitality by developing a ‘green job’ approach to economic development.

UNH econ. model 1 para. (layman's) description here??? Matt/Ross to provide

**CSNE Economic Analysis Methodology** (note: this section is simply cut/paste from CSNE text now and is too long, we are looking for CSNE assistance in condensing this section)

The CSNE economic modeling team took an “efficient analysis” approach to estimating the economic impacts of different actions proposed by the working groups, given the many different policy options considered. The modeling assumptions used in estimating economic costs and benefits are provided below.

The objective of the economic analysis was to estimate approximate “levels of magnitude” of the economic impacts of each proposed action item. Given the short time frame of analysis and large number of action items under consideration, this economic analysis is not as detailed as previous UNH economic studies of RPS and RGGI. It is instead meant to provide economic context to assist in the decision making process for the task force.

The analysis provided for the task force is limited to direct New Hampshire costs/benefits and does not include assessment of society wide impacts. As much as possible, direct employment impacts are estimated along with costs and benefits. The analysis does not consider potential benefits associated with actions such as reduced health costs due to reduced air pollution emissions and also does not include avoided costs in calculating economic impacts.

However where appropriate, an economic multiplier was used to estimate the broader state-wide economic impacts of cost savings, such as for reduced fuel consumption. An economic multiplier is used to estimate economy-wide impacts of specific economic changes. The UNH

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<sup>3</sup> *The Cost of Climate Change*, Authors Frank Ackerman and Elizabeth A. Stanton, *Global Development and Environment Institute and Stockholm Environment Institute-US Center, Tufts University*, produced for Natural Resources Defense Council

Economic team—based on its significant knowledge of the NH economy and to be conservative—chose a \$1 economic multiplier for each \$1 of savings attributed to an action. The assumptions section discusses whether the economic multiplier was applied to any given action. The 1:1 multiplier is considered conservative.<sup>4</sup>

The economic analysis does not discount costs and benefits of climate change policies to reflect timing or uncertainty. This is consistent with the approach used for NH RGGI and RPS analysis and used in the Stern Report. Ken Arrow, Nobel Laureate Economist, reviewed the Stern Report<sup>5</sup> and concluded that discounting for time and uncertainty did not change conclusions.<sup>6</sup>

In the analysis spreadsheet summarizing the carbon and economic impacts of each action item, levels of magnitude and qualitative information are provided, not precise figures for costs and benefits or the exact timing of those costs and benefits. The economic analysis section below provides an overview of the approach and assumptions use to model the economic costs and benefits of each action.

To help provide some context for the expected costs and benefits, the New England Economic Partnership forecasts that New Hampshire's Gross Domestic Product (GDP) will be \$58 billion dollars in 2012. The NH GDP is the most comprehensive measure of NH economic activity and is calculated for all states by the U.S. Bureau of Economic Analysis.

#### Implementation Costs

- Low 0-\$2.5 million
- Moderately Low \$2.5 million to \$25
- Moderate \$25 million to \$125 million
- Moderately high \$125 million to \$500 million
- High \$500 million to \$1 billion
- Very high Greater than \$1 billion
  
- Uncertain: Economic implementation costs were not easily determined without significant research beyond the scope of this part of the analysis.
- Study: Means that the action proposed by the working group is a study to further look at issue, this is meant to avoid confusion in comparison of the costs of different actions.

#### Potential economic benefits

- Low 0-\$2.5 million
- Moderately Low \$2.5 million to \$25
- Moderate \$25 million to \$125 million
- Moderately high \$125 million to \$500 million
- High \$500 million to \$1 billion

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<sup>4</sup> Federal Reserve Bank, 2002.

<sup>5</sup> Stern Review on the economics of climate change. 2006.

[http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm)

<sup>6</sup> “The case for cutting emissions,” Ken Arrow, 2007.

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- Very high                      Greater than \$1 billion
  
- Uncertain: Economic implementation costs were not easily determined without significant research beyond the scope of this part of the analysis.

Timing of Costs

- Immediate/higher upfront: The majority of economic cost is experienced in the relative short term with the longer term economic cost being less significant
- Constant/even: The economic cost tends to be relatively constant on an annual basis
- Low short-term/Mostly long-term: The majority of economic cost is experienced in the relative long term with the shorter term economic cost being less significant
- Uncertain: Economic implementation costs were not easily determined without significant research beyond the scope of this part of the analysis

Timing of Economic Benefits

- Immediate/higher upfront: The majority of economic benefit is experienced in the relative short term with the longer term economic benefit being less significant
- Constant/even: The economic benefit tends to be relatively constant on an annual basis
- Low short-term/Mostly long-term: The majority of economic benefit is experienced in the relative long term with the shorter term economic benefit being less significant
- Uncertain: Economic benefits were not easily determined without significant research beyond the scope of this part of the analysis

Who Experiences the Significant Portion of the Costs

- Consumer (Evenly Distributed, Concentrated on particular groups)
- Government (State, Local)
- Business (Evenly Distributed, Concentrated on particular groups)

Who Experiences the Significant Portion of the Benefits

- Consumer (Evenly Distributed, Concentrated on particular groups)
- Government (State, Local)
- Business (Evenly Distributed, Small, Medium, Large)

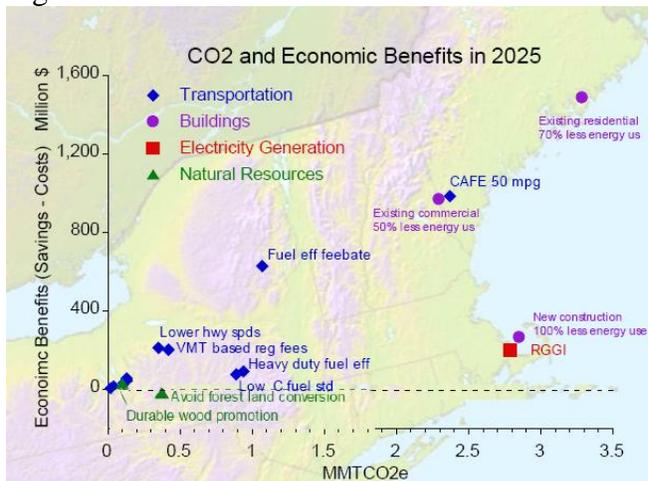
In the above, “Evenly distributed” means that costs and/or benefits are shared relatively equally across the respective group. “Concentrated on particular groups” means that costs and/or benefits are disproportionately borne by, for example, upper or lower income groups.

Economic analysis uses latest (2008) US-DOE EIA (Energy Information Administration) Energy Outlook in constant \$2008. The EIA fuel forecast only goes out to 2030, the assumption was made that the 2030 price continues through 2050 in constant dollars. The only exception is the electricity price which was taken from the Independent Service Operator New England (ISO-NE) CELT (Capacity, Energy, Loads, and Transmission) forecast. The report projects prices specifically for NH out to 2017. The 2017 price was assumed to continue through 2050 in constant dollars

**Discussion of CSNE Analysis** – (limited generalized review economic of cost/benefit of Plan recommendations and context for cost/benefit scatter plot)

The CSNE analysis generally determined most recommendations to have a net overall positive economic benefit in 2025, over a fairly wide range of potential CO<sub>2</sub> reductions. Figure? below shows economic benefit and CO<sub>2</sub> reductions for a selected sample of representative actions.

Figure no. ?



Recommendation 1. Maximize efficiency in buildings – due to incurring actual construction costs, either for retrofitting existing buildings, or new more energy efficient buildings, costs were generally high to very high, with timing generally immediate/upfront. Since energy efficiency measures continue to recoup costs after initial payback period most benefits were also high to very high, with timing generally longer term. Exemplary of this category, as shown in Figure no. ?, is making existing residential buildings 70% more efficient, which exhibits both very high reductions and very high overall cost benefit.

Recommendation 2. Increase renewable low emitting resources – costs tended to be on the moderate to low end of the scale, while benefits on the moderate to high end. All timing was constant. RGGI, for example, is shown to have very high CO<sub>2</sub> reductions, with a moderately high benefit. Costs and benefits are evenly distributed across all sectors.

Recommendation 3. Support regional/national actions to reduce vehicle emissions – most costs were moderately high, while potential benefit ranged from moderate to very high. Several vehicle related actions are plotted on Figure ?, with CAFÉ and fuel efficiency feebates ranking higher in both reductions and benefit.

Recommendation 4. Reduce vehicle emissions through state actions – All costs are low to moderate. Most potential benefits were low or moderately low.

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Recommendation 5. Encourage appropriate land use patterns that reduce VMT – all costs are low and are incurred by government, while potential benefits

Recommendation 6. Reduce VMT through an integrated multimodal transportation system – Cost were low or moderately low and are incurred by the consumer (except for public funding) while benefits were evenly distributed and somewhat higher (moderately low and moderate)

Recommendation 7.

Recommendation 8.

Recommendation 9.

Recommendation 10.

### **Economic Growth Potential Benefit**

Review PERI and CARB reports - The report can be accessed at:

For complete PERI study findings visit: [http://www.peri.umass.edu/green\\_recovery](http://www.peri.umass.edu/green_recovery)

Specific New Hampshire study findings are located at:

[http://www.peri.umass.edu/fileadmin/pdf/other\\_publication\\_types/green\\_economics/new\\_hampshire.pdf](http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/new_hampshire.pdf)

Discuss UNH RGGI/RPS reports as examples

A Splash of Green for the Rust Belt (condense, refer to article)

By PETER S. GOODMAN

Published: November 1, 2008

([http://www.nytimes.com/2008/11/02/business/02wind.html?\\_r=1&th&emc=th&oref=slogin](http://www.nytimes.com/2008/11/02/business/02wind.html?_r=1&th&emc=th&oref=slogin))

“No one believes that renewable energy can fully replace what has been lost on the American factory floor, where people with no college education have traditionally been able to finance middle-class lives. Many at Maytag earned \$20 an hour in addition to health benefits. Mr. Versendaal now earns about \$13 an hour.

Still, it’s a beginning in a sector of the economy that has been marked by wrenching endings, potentially a second chance for factory workers accustomed to layoffs and diminished aspirations.

In West Branch, Iowa, a town of 2,000 people east of Iowa City, workers now assemble wind turbines in a former pump factory. In northwestern Ohio, glass factories suffering because of the downturn in the auto industry are retooling to make [solar energy](#) panels.

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“The green we’re interested in is cash,” says Norman W. Johnston, who started a solar cell factory called Solar Fields in Toledo in 2003.

The market is potentially enormous. In a report last year, the Energy Department concluded that the United States could make wind energy the source of one-fifth of its electricity by 2030, up from about 2 percent today. That would require nearly \$500 billion in new construction and add more than three million jobs, the report said. Much of the growth would be around the Great Lakes, the hardest-hit region in a country that has lost four million manufacturing jobs over the last decade.

Throw in solar energy along with generating power from crops, and the continued embrace of renewable energy would create as many as five million jobs by 2030, asserts Daniel M. Kammen, director of the Renewable and Appropriate Energy Laboratory at the University of California, Berkeley, and an adviser to the presidential campaign of Senator Barack Obama.”

## References

### Green Recovery

A Program to Create Good Jobs and Start Building a Low-Carbon Economy (see [http://www.peri.umass.edu/green\\_recovery/](http://www.peri.umass.edu/green_recovery/) )

### Green Economic Recovery Program

Impact on New Hampshire (see

[http://www.peri.umass.edu/fileadmin/pdf/other\\_publication\\_types/green\\_economics/new\\_hamps\\_hire.pdf](http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/new_hamps_hire.pdf) )

ARB AB32 scoping report (see

<http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm> )

Summary of the Vehicle Policy Positions of the President-Elect (11/5/08 email Barbara Bernstein/Mike Scarpino)



Summary of Vehicle Policy Positions and E

11/5/08 phone conversation w/ Bill Boynton, NH DOT

NECIA - [www.northeastclimatechoices.org](http://www.northeastclimatechoices.org) and

[http://www.climatechoices.org/assets/documents/climatechoices/new-hampshire\\_necia.pdf](http://www.climatechoices.org/assets/documents/climatechoices/new-hampshire_necia.pdf)

## **Chapter 5: Next Steps**

Each Action selected by the Task Force to support its recommendations is summarized below including an overview of short-term and mid-term implementation. It is clear from these summaries that a significant amount of resources will be needed to develop these actions and coordinate the various parties potentially involved in implementation. The first step in implementing this Action Plan will be to obtain the resources necessary to oversee this process. Implementation by any state agency will be contingent upon securing the necessary funding.

### **Recommendation 1:**

### **Maximize Efficiency in Buildings**

#### ► *Maximize Efficiency in New Construction (RCI Action 1.1)*

Develop a program to maximize energy efficiency and minimize net CO<sub>2</sub>e output in new residential, commercial, institutional, and industrial building construction with a phased-in goal for new buildings to use no net energy. To new construction should incorporate state-of-the-art energy efficiency and renewable energy systems into the design of the building envelope, operating systems (HVAC in particular), and energy consuming appliances and devices.

#### Overall Implementation:

- Legislation likely needed Develop probable legislation for building codes, zoning regulations, and possible tax code incentives.
- Develop program details, create financial incentives, and begin state outreach and education.
- Develop sustainable funding mechanisms.

#### Potential Responsible Parties:

- The NH Public Utilities Commission
- The NH Energy Efficiency and Sustainable Energy Board
- The NH Department of Environmental Services and the NH Office of Energy and Planning (with input from the business community)

#### Timeframe:

- Implementation can begin immediately.
- Scaling up will continue into the future.

#### ► *Maximize Energy Efficiency in Existing Residential Buildings (RCI Action 1.2)*

Develop a program to retrofit existing New Hampshire housing stock to minimize or eliminate net CO<sub>2</sub>e output, and further, to ensure that current and future investments minimize embedded CO<sub>2</sub>e output with a phased-in goal to retrofit 30,000 homes annually in order to reduce their net energy consumption by 60%. Program elements should include: 1) building shell and window upgrades, including instrumented air sealing, and thermographic inspections; 2) space conditioning equipment upgrades/replacements, including ductwork and duct sealing; 3) domestic hot water system upgrades; 4) ENERGY STAR lighting; 5) water saving measures; 6) ENERGY STAR appliances; and 7) use of renewable energy systems.

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Overall Implementation:

- Develop program details, create financial incentives, and begin state outreach and education.
- Develop sustainable funding mechanisms.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Public Utilities Commission
- The NH Energy Efficiency and Sustainable Energy Board
- The NH Department of Environmental Services and the Office of Energy and Planning  
(with input from the business community)

Timeframe:

- Implementation can begin immediately.
- Scaling up will continue into the future.

► *Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings (RCI Action 1.3)*

Develop a program to retrofit existing New Hampshire commercial, industrial, and municipal buildings to minimize or eliminate net CO<sub>2</sub>e output, and further, to ensure that current and future investments minimize embedded CO<sub>2</sub>e output with a phased-in goal to reduce existing buildings net energy consumption by 50%. Program elements should cover the following: 1) lighting; 2) heating, ventilating and air conditioning (HVAC) systems; 3) processes (e.g., air compressor equipment and variable frequency drives; 4) control equipment and technologies to ensure efficient operation of all systems; 5) refrigeration equipment; 6) building shell and window upgrades; 7) hot water system upgrades; 8) reduced water usage; and 9) use of renewable energy systems.

Overall Implementation:

- Develop program details, create financial incentives, and begin state outreach and education.
- Develop sustainable funding mechanisms.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Public Utilities Commission
- The NH Energy Efficiency and Sustainable Energy Board
- The NH Department of Environmental Services and the NH Office of Energy and Planning  
(with input from the business community)

Timeframe:

- Implementation can begin immediately.
- Scaling up will continue into the future.

► *Install Higher-Efficiency Equipment, Processes, and Systems (RCI Action 2.1)*

Create incentives to increase the installation of higher-efficiency equipment and the adoption of higher-efficiency processes. Commercial, industrial, and municipal processes can reduce net CO<sub>2</sub>e output by properly designing process lines and using high-efficiency lighting and equipment. Currently, the CORE Programs offered by the electric utilities provide these services for electricity-saving measures, and the gas utilities have comparable services for reducing natural gas consumption. Programming should be expanded to cover all cost-effective measures that reduce CO<sub>2</sub> emissions regardless of fuel type, including the use of renewable generation and use of combined heat & power (cogeneration). A combination of targeted and comprehensive energy audits could be used to identify efficiency improvements and opportunities to reduce CO<sub>2</sub> emissions from manufacturing processes. Incentives could be offered to retrofit inefficient processes and equipment and to help offset the additional costs of premium efficiency equipment in new construction.

Overall Implementation:

- Develop program details, create financial incentives, and begin state outreach and education.
- Develop sustainable funding mechanisms.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Public Utilities Commission
- The NH Energy Efficiency and Sustainable Energy Board
- The NH Department of Environmental Services and the NH Office of Energy and Planning (with input from the business community)

Timeframe:

- Implementation can begin immediately.
- Scaling up will continue into the future.

► *Increase the Use of Combined Heat & Power (EGU Action 1.3)*

Develop the necessary mechanisms to increase the use of combined heat & power (also known as cogeneration) systems at on-site power plants and boilers to generate both electricity and useful heat simultaneously. On-site generation of electricity reduces or eliminates electrical transmission needs, and any excess electricity produced by combined heat & power can be delivered into the grid. This technology may be applicable where a thermal load (e.g., for space heating or industrial process heat) already exists or is planned. Combined heat & power would be appropriate for new boilers and for retrofits of existing boilers using cleaner-burning fuels that are not already cogenerating electricity. For consistency with the goal of reducing overall emissions, any program designed around combined heat & power would need to define the allowable emission limits and might also specify allowable fuels for program eligibility. Mechanisms to advance the use combined heat & power could include regulatory changes, incentives, and portfolio standards.

Overall Implementation:

- Consider incentives to promote voluntary development of combined heat & power installations.
- Consider implementing a renewable portfolio for combined heat & power (separate from the existing RPS – see EGU Action 2.1) requiring utilities to obtain a fraction of their energy supply from this technology, with flexibility to meet requirements through a market-based trading program.

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- Determine eligibility requirements and necessary emission limits to ensure that the desired emission reductions would be achieved.
- Provide funding to establish and administer the program.

Potential Responsible Parties:

- The NH legislature
- The NH Public Utilities Commission
- Regulated electric and natural gas utilities

Timeframe:

- Enactment could be as early as 2009 with implementation in 2010.

► *Consider Alternative Rate Structuring* (EGU Action 1.1)

Overall Implementation:

Potential Responsible Parties:

Timeframe:

► *Upgrade Building Energy Codes* (RCI Action 1.4A)

Update New Hampshire's building energy code to require improved energy efficiency in new construction and building renovations. Building energy codes represent one of the more cost-effective ways to reduce energy use and related carbon emissions. The state should participate in the International Energy Conservation Code™ (IECC) update process, either on its own or by providing input through other regional partners that do participate, such as Northeast Energy Efficiency Partnerships (NEEP). There is considerable evidence that if New Hampshire is to achieve deeper greenhouse gas emission reductions, the state's building energy code should be more stringent than the current IECC. In addition to updating its mandatory building energy code, the state could define a preferred "stretch code" that sets even higher, but voluntary, "green" building energy performance standards to advance the state's policy objectives.

Overall Implementation:

- Adopt latest revision to IECC.
- Begin consideration of higher performance standards in the near term for either mandatory or "stretch" codes.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Buildings Code Review Board  
(with input from the business community)

Timeframe:

- The latest revision to the IECC may be available for adoption in January 2009.
- The code development community appears to have adopted a three-year cycle as reasonable for code updates.

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► *Increase Building Energy Code Compliance (RCI Action 1.4B)*

Consider mechanisms that would result in stricter enforcement of energy codes. Building energy codes – either mandatory or voluntary – are among the more cost-effective ways to reduce energy use and related carbon emissions. Mandatory energy codes can be used to set minimum requirements for energy use in both new construction and major building renovations. However, any effort to capture savings from mandatory energy codes is only as good as compliance with the codes. Consideration should be given to creating a system to promote stricter enforcement of the state’s building energy code to ensure compliance in all affected structures, including those in rural communities where resources are often lacking. The state might consider a formal certification process for inspectors beyond the current voluntary process offered through the ICC.

Overall Implementation:

- Evaluate current barriers to effective building energy code enforcement; begin state outreach to municipalities to improve code compliance rates.
- Legislation likely needed to require mandatory training and certification of all municipal building inspectors on the state building energy code.
- Consider revenue sources to support the inspector certification program and local enforcement of the state’s energy code.

Potential Responsible Parties:

- The NH Buildings Code Review Board
- Individual cities and towns

Timeframe:

- Initiatives to enhance energy code compliance can begin immediately.

► *Establish an Energy Properties Section in Real Estate Property Listings (RCI Action 1.5)*

Establish an energy section in the Multiple Listing Service (MLS) real estate listings. This measure would create a specific, defined set of energy-related criteria/ratings for properties presented in the MLS listings. The concept behind an MLS energy section is to reinforce the fact that energy is a major factor in home buying and to provide the consumer with a means for comparing energy usage between homes. Presumably, properties that are energy-efficient would be favored, and market pricing would reflect this advantage.

Overall Implementation:

- Design and implement an energy section for MLS listings of New Hampshire properties.
- Perform outreach to build awareness of this new feature available to buyers and sellers.

Potential Responsible Parties:

- The NH Department of Environmental Services
- The NH Real Estate Board.
- The NH Energy Efficiency and Sustainable Energy Board
- The New Hampshire Association of Realtors

Timeframe:

- Design and implementation of an energy section for MLS listings can begin immediately.

► *Conserve Embodied Energy in Existing Building Stock (RCI Action 1.8)*

Develop state-wide policies and programs that recognize, quantify, and encourage the conservation of the energy embodied in the New Hampshire’s older building stock. “Embodied energy is the total expenditure of energy involved in the creation of the building and its constituent materials<sup>7</sup>,” and the energy invested in it throughout its use. Embodied energy is a key component of life-cycle analysis, which examines the environmental impact of building materials and systems from raw materials, through use within a building, to demolition and disposal. A typical house in New Hampshire contains about 1.5 billion Btus of embodied energy, enough to power the family vehicle for about 25 years. When older buildings are preserved or reused their embodied energy is conserved, new materials needs are minimal, and massive carbon emissions from new construction are avoided (in addition to the unspecified historical value that is retained). The concept of embodied energy is not widely recognized – even among professionals in the building and construction industries. If the potential energy savings and reductions in carbon emissions are to be realized, the proposed action will require education, research, and incentive programs.

Overall Implementation:

- Establish a technical committee to conduct research and quantify potential energy savings and emission reductions associated with the conservation of embodied energy in New Hampshire’s building stock.
- Develop outreach and education to promote the concept of embodied energy conservation and to dispel myths about the use and reuse of materials.
- Prepare a list of best practices and implement demonstration projects.
- Consider creation of incentives at the state and local levels to preserve/reuse existing building stock.
- Provide funding to establish and administer the program.

Potential Responsible Parties:

- The NH legislature
- The NH Governor’s Office
- The NH Executive Council
- State agencies
- Individual municipalities
- Educational organizations
- Professional and building trade organizations

Timeframe:

- A study commission could be created in the current legislative session.
- Research and education programs could be initiated at the same time.

**Recommendation 2:**

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<sup>7</sup> Donovan Rypkema, “Economics, Sustainability, and Historic Preservation,” keynote address at the National Trust Conference, Portland, Oregon, 1 October 2005.

## **Increase Renewable/Low-Emitting Resources in a Long-Term Sustainable Manner**

### ► *Increase Renewable Energy and Low-Carbon-Emitting Thermal Energy Systems (RCI Action 3.1)*

Create an incentive program to promote the expanded use of renewable and low-CO<sub>2</sub>-emitting thermal energy systems to reduce fossil fuel use and greenhouse gas emissions. In New Hampshire, the energy used for space heating, hot water, and process conditioning makes up about one-third of total energy consumption. This proposal would provide incentives and attractive financing for the use of cost-effective, renewable energy resources and high-efficiency/low-carbon-emitting thermal systems. The incentive levels and financing would be directly tied to the magnitude of the efficiency improvements and energy savings. Other considerations would include the potential of particular new systems for market transformation and peak demand reduction.

#### Overall Implementation:

- Evaluate potential current and new funding sources to support incentives and project financing.
- Identify new thermal energy systems worthy of special consideration in this program.
- Legislation likely needed.

#### Potential Responsible Parties:

- The NH Public Utilities Commission
- The NH Office of Energy and Planning
- The fossil fuel industry

#### Timeframe:

- Program could start ramping up in 2009.
- Incentives and financing could continue until maximum penetration of thermal renewable systems is achieved.

### ► *Promote Renewable Energy through the Electric Portfolio Standard (RPS) (EGU Action 2.1)*

Implement New Hampshire's Renewable Portfolio Standard, enacted in 2007, which mandates that 23.8 percent of retail electricity sales to in-state customers be provided by renewable energy sources by 2025. The potential renewable generation capacity, in New Hampshire alone, is 4,447 MW and 12,819,000 MWh by that date. The Renewable Portfolio Standard would capture nearly 3.5 million megawatt-hours of this potential with the following mix of renewable sources: existing small hydro, 1%; existing biomass and landfill methane, 6.5%; new solar, 0.3%; and new other (wind, geothermal, tidal, etc.), 16% of in-state retail electricity sales.

#### Overall Implementation:

- Complete final rulemaking.
- Establish financing to support program administration.
- Legislation likely needed.

#### Potential Responsible Parties:

- The NH Public Utilities Commission

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- Electric utilities

Timeframe:

- Interim rule is already in place.
- Program has commenced and will run through 2025.

► *Encourage the Use of Biogenic Waste Sources for Energy Generation (AFW Action 2.4)*

Create incentives for the development of facilities and processes that utilize biogenic waste streams as energy sources to reduce New Hampshire’s reliance on fossil fuels. These wastes, which may be generated in municipal, residential, agricultural, institutional, or industrial settings, can provide heat, power, and fuel through any number of applications. Examples include anaerobic digesters, microbial fuel cells, and direct conversion of organic wastes to fuel. Among the possible energy sources are sludge, septage, municipal and industrial wastewater, brown grease, residential and institutional food waste, leaf and yard waste, and manure. Development incentives could be provided by means of 1) a loan program to assist livestock and industrial operations, and 2) modification of existing municipal funding mechanisms to cover the higher initial costs of these projects, to be offset by long-term reductions in operating costs and fossil fuel consumption.

Overall Implementation:

- Assess the viability of a regional approach to biogenic waste-to-energy projects and the attendant economies of scale.
- Develop incentive program details and create sustainable funding mechanisms.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Public Utilities Commission
- The University System of New Hampshire
- Electric utilities

Timeframe:

- Program development can begin immediately.
- Implementation could begin as early as 2010.

► *Promote Low- and Non-CO<sub>2</sub>-Emitting Generation (EGU Action 2.4)*

Overall Implementation:

Potential Responsible Parties:

Timeframe:

► *Implement Regional Greenhouse Gas Initiative (RGGI) (EGU Action 2.2)*

Implement the Regional Greenhouse Gas Initiative, beginning in 2009, to stabilize carbon dioxide emissions (CO<sub>2</sub>) emissions from power plants at 188,076,976 tons (regional 3-year average) through 2014. Reduce CO<sub>2</sub> emissions by an additional 2.5 percent per year for 4 years (10 percent total) through 2018. In 2012, evaluate the feasibility of further reductions after 2018.

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Overall Implementation:

Potential Responsible Parties:

Timeframe:

► *Enable Importation of Canadian Hydro and Wind Generation (EGU Action 2.6)*

Build high-voltage transmission lines to import power generated from Canadian hydro and wind resources to the extent that project costs do not raise electricity rates to the consumer. This action stands as a complementary policy to the development of low- or non-carbon-emitting generation in New Hampshire. Canada is developing vast new hydro and wind generation resources that surpass their local needs, presenting an opportunity for the entire Northeast to obtain clean power. These resources could meet the electric supply needs of future local and regional growth and could facilitate the curtailment or retirement of existing operations at fossil-fuel-fired plants in New England. The concept of importing Canadian power is not new. In the 1980s, a high-voltage transmission line was built from Canada to provide lower-cost energy to New England. The new clean power supplies exceed the capacity of the existing system, making new transmission lines necessary. Binding commitments with Canadian power companies or brokers would be required to implement this action. The costs of construction and transmission would be borne by electricity customers.

Overall Implementation:

- Begin administrative and legislative procedures to clarify issues and enable construction of a new transmission system.
- Identify program developers to find and align potential sellers and buyers for clean Canadian power. A positive regulatory or legislative signal would be essential.

Potential Responsible Parties:

- The NH legislature
- The NH Public Utilities Commission
- The Federal Energy Regulatory Commission
- ISO-New England Inc.
- Electric utility companies

Timeframe: This action could be implemented soon after 2012, following necessary review and approval.

► *Allow Regulated Utilities to Build Renewable Generation (EGU Action 2.7)*

Provide regulated utilities with the authority to construct and/or acquire renewable generating assets to increase New Hampshire's renewable energy capacity and the rate at which renewable resources are brought online. The only regulated electric utility that currently owns generation is Public Service of New Hampshire (PSNH). Under existing law, PSNH and other utilities (excluding the New Hampshire Electric Cooperative and municipal electric utilities) electric utilities are designed to be primarily transmission and distribution companies. As such, they are authorized to own or invest in new generation only from small-scale distributed resources. This issue has been a subject of intense debate within the New Hampshire legislature, and there is a wide range of opinions among the various stakeholders. One concern is that, within present constraints, the state may fall short of its goals for renewable generation. Some interests hold that giving regulated utilities the requested authority would be an effective means of reducing the state's greenhouse gas emissions and its vulnerability to global energy price volatility – that

the considerable resources and experience of these utilities could be deployed to aggressively pursue new low-carbon generation sources. Allowing regulated utilities to own or invest in major new generation facilities would require legislative action.

Overall Implementation:

- Establish clear legislation authorizing regulated utilities to construct or acquire generation facilities that are based exclusively on renewable energy resources.
- Address obstacles to speedy and efficient project review at the state and local levels:
  - Consider an expedited permit process for smaller generation facilities using renewable resources.
  - Provide for an expedited PUC proceeding schedule so that project review may begin prior to project commencement.
- Address transmission infrastructure limitations, including the Coos County loop in northern New Hampshire.

Potential Responsible Parties:

- The NH legislature
- The NH Public Utilities Commission
- The NH Department of Environmental Services
- The New Hampshire Site Evaluation Committee
- Regulated electric utilities

Timeframe: This action can be implemented during the 2008-2009 legislative session.

► *Identify and Deploy the Next Generation of Electric Grid Technologies (EGU Action 2.8)*

Make the transition to the next generation of electric grid standards to increase grid efficiency and hasten integration of renewable distributed power generation, with the goal of reducing total greenhouse gas emissions from the electric generation sector. The objective is to modernize the electric transmission and distribution system by incorporating digital information and control technologies, deploying energy storage devices, sharing real-time pricing information with electricity customers, and using “smart” technologies in homes and businesses. These changes will occur across New Hampshire and the entire ISO-New England grid to the point of general adoption and full-fledged market support. System improvements will be phased in: Initial investments will exploit the most cost-effective available technologies; more advanced technologies would be added later on the basis of cost-effectiveness. The end result will be a self-monitoring, adaptive system capable of semi-automated restoration and higher energy efficiency through reduced line losses and better integration of renewable resources. The latter will occur with the use of integrated energy storage and technologies that can shift electric demand to times when renewable generation is greatest.

Overall Implementation:

- Coordinate efforts at the state and regional levels to facilitate the adoption of smart grid standards, technologies, and practices.
- Assess the current state of smart grid technology market penetration and any obstacles to smart grid development.
- Identify needed legislation, NH Public Utilities Commission orders, and incentives to initiate smart grid development.
- Identify sustainable funding mechanisms.

- Require that electric utility rates be aligned with incentives for the delivery of cost-effective energy efficiency (i.e., consider rate decoupling to promote energy efficiency)
- Require electric utilities, before investing in conventional grid technologies, to demonstrate that investments in advanced grid technologies have been considered.
- Require electric utilities to provide customers with direct access to daily information regarding prices, usage, intervals and projections, and sources.
- Perform demonstration projects using advanced technologies for the power grid, including integration of demand-side resources into grid management.
- Address transmission infrastructure limitations.

Potential Responsible Parties:

- The NH legislature
- The NH Office of Energy and Planning
- The NH Public Utilities Commission
- The NH Department of Environmental Services
- The Energy Efficiency and Sustainable Energy Board
- Regulated electric utilities

Timeframe:

- The required technology already exists and could be deployed within a year.

► *Promote Low- and Non- CO<sub>2</sub>-Emitting Distributed Generation (EGU Action 2.9)*

Encourage the development of customer-sited low- and non-CO<sub>2</sub>-emitting distributed generation resources through a combination of regulatory changes and incentives. Desirable distributed generation resources include 1) renewables such as solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, systems fueled with biomass; and 2) non-renewable but very highly efficient fossil-fuel-fired cogeneration systems (combined heat & power). Systems like these reduce overall capital investment, avoid transmission and distribution losses, and displace high-emitting fossil-fueled-fired generation. The state can encourage and accelerate implementation of these systems by adopting policies that include goals or directives, provisions for outreach and education, creation of pilot or demonstration projects, favorable rules for interconnecting with the electric grid, technical assistance in facility planning and siting, direct financial incentives for system purchases, and market-based incentives such as net metering standards.

Overall Implementation:

- Assess the current state of renewable distributed generation in New Hampshire.
- Identify regulatory and institutional opportunities and obstacles affecting expansion of this network.
- Develop appropriate legislation and rules to expand the use of renewable distributed generation.
- Develop an outreach and education program with provisions for technical assistance.
- Develop a financial incentive program.
- Provide sustainable funding mechanisms.

Potential Responsible Parties:

- The NH legislature
- The NH Office of Energy and Planning

- The NH Public Utilities Commission
- The NH Department of Environmental Services
- The Energy Efficiency and Sustainable Energy Board
- Regulated electric utilities

Timeframe:

- The required technology already exists and is being implemented. More widespread implementation would occur once the necessary regulations, programs, and incentives have been put into place.

**Recommendation 3:**

**Support Regional/National Actions to Reduce Vehicle Emissions**

► *Support Stricter Corporate Average Fuel Economy Standards (TLU Action 1.A.1)*

Support more stringent, near-term Corporate Average Fuel Economy (CAFE) standards for passenger vehicles up to 10,000 lbs gross vehicle weight rating (GVWR). Current standards apply to vehicles manufactured for sale in the United States with a GVWR of 8,500 lbs. or less. The higher limit would allow for inclusion of large sport utility vehicles and pick up trucks in these standards. In addition, the state should support the adoption of CAFE standards for vehicles greater than 10,000 GVWR within \_\_\_ years. CAFE is the sales-weighted average fuel economy, in miles per gallon, of a manufacturer's light-duty vehicles and light-duty trucks. New standards recently proposed by the National Highway Traffic Safety Administration (NHTSA)<sup>8</sup> would raise the required corporate average to 35 mpg by 2020 (up from the current 27.5 mpg for light cars and 22.2 mpg for light trucks). Existing analyses indicate that higher fuel economy is achievable with currently available technology and that significant improvements could be made by 2015.

Overall Implementation:

- Support more stringent fuel efficiency standards through New Hampshire's Congressional Delegation (Fuel economy standards may be established only by the federal government.)
- Continue public outreach and education to build public support for more fuel-efficient vehicles.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Environmental Services
- The National Highway Traffic Safety Administration
- Automobile manufacturers

Timeframe:

- Immediate efforts are needed: Under current rules, manufacturers would be required to meet the new standards within 3 years after their adoption.
- NHTSA is required to review the existing standards periodically. As new technology is developed, the standards should be made increasingly stringent.

► *Support Fuel Economy Standards for Heavy-Duty Vehicles (TLU Action 1.A.2)*

<sup>8</sup> <http://www.nhtsa.dot.gov/CARS/rules/CAFE/overview.htm>

Support fuel economy standards for all new vehicles greater than 8,500 pounds gross vehicle weight rating (GVWR) to achieve greater CO<sub>2</sub> reductions from future vehicles. Also, support programs such as EPA’s SmartWay Transport Partnership program to increase the fuel economy of existing heavy-duty vehicles. Tractor-trailers consume about two-thirds of all truck fuel consumed in the U.S. today. Tougher fuel economy standards for new trucks would have a significant impact on fuel consumption, but those standards are probably 10 or more years away from implementation. On the other hand, using available technology to improve the fuel economy of existing trucks would have an immediate impact. The current truck fleet can be made more fuel-efficient through aerodynamic retrofits, low-rolling-resistance tires, and idling reduction technology. Actions taken to improve the fuel economy of existing and future trucks would provide both short- and long-term CO<sub>2</sub> emission reductions.

Overall Implementation:

- Support more stringent fuel efficiency standards through New Hampshire’s Congressional Delegation (Fuel economy standards may be established only by the federal government.)
- Consider legislative action to initiate an EPA partnership/financing program.
- Identify potential funding sources and staffing requirements for such a program.
- Legislation likely needed.

Potential Responsible Parties:

- The US Environmental Protection Agency
- Fleet managers and vehicle owner-operators.

Timeframe:

- Retrofit improvements to the existing fleet can begin immediately.
- Federal Fuel Economy Standards would require 10 or more years to implement.

► *Adopt a Low-Carbon Fuel Standard (TLU Action 1.C.1)*

Adopt a Low-Carbon Fuel Standard (LCFS) to reduce vehicular greenhouse gas emissions. This action would establish an emission standard measured in CO<sub>2</sub>-equivalent mass per unit of fuel energy sold. The standard would be based on lifecycle analysis to account for all emissions deriving from fuel production, distribution, and consumption. This approach recognizes that the “upstream” emissions associated with production and distribution – not just those from fuel combustion – are significant contributors to the overall climate impact of transportation fuels.

Overall Implementation:

- Work with Northeast states and eastern Canadian provinces to develop a regional standard.
- Adopt the regional standard by legislation or executive order.
- Identify potential funding sources and staffing requirements to enable participation in planning, administration, and enforcement of the fuel standard.

Potential Responsible Parties:

- NH state government
- NESCAUM (Northeast States for Coordinated Air Use Management)
- Eastern Canadian provinces
- Fuel suppliers

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- Vehicle manufacturers

Timeframe:

- Work should begin now to ensure that a standard is available for adoption by the region in the next 3 to 5 years.
- Phase-in of the standard would occur over the next 10 to 15 years.

► *Promote Advanced Technology Vehicles and Supporting Infrastructure (TLU Action 1.C.2)*

Promote the development and deployment of alternative fuel vehicles and advanced technology vehicles along with the necessary refueling infrastructure, including:

- alternative fuel vehicles (AFVs) running on natural gas, propane, ethanol, biodiesel, etc.
- advanced technology vehicles:
  - hybrid electric vehicles (HEVs)
  - plug-in hybrids (PHEVs)
  - advanced electric vehicles,
  - fuel cell vehicles (FCVs), and
  - supporting infrastructure (e.g., electric plug-in ports, pricing and load signals from the grid).

Planning across energy sectors will be needed to ensure that emission reductions in the transportation sector are not offset by increases elsewhere. For example, plug-in hybrid vehicles could increase peak electrical loads that draw from high-emitting generators. Use of “Smart Grid” technology would allow plug-in hybrids to be recharged at optimal times. Although government is well positioned to promote the use of alternative fuel and advanced technology vehicles, the demand for these vehicles will continue to be driven at least in part by the economy. New Hampshire can hasten their deployment by investing in research and development where needed, seeking early adoption for state vehicle fleets, and providing financial resources and incentives to develop the required refueling infrastructure.

Overall Implementation:

**TBD**

Potential Responsible Parties:

- State and federal government
- Automobile manufacturers
- Fuel providers
- Utilities and energy companies
- The Granite State Clean Cities Program
- Environmental groups

Timeframe:

- The Granite State Clean Cities Program has been promoting these vehicles and fuels since 2002, with growing interest each year.
- The timing of public acceptance and demand will be affected by market forces.
- PHEVs are expected to be on the market in 2010 to 2012.
- The timing for FCVs is unknown and would occur against stiff competition from PHEVs.

**Recommendation 4:**

## **Reduce Vehicle Emissions through State Actions**

### ► *Adopt California Low Emission Vehicle (CALEV) Standards (TLU Action 1.A.3)*

Adopt California Low-Emission Vehicle (CALEV) standards, including the tailpipe greenhouse gas emissions standards. Under the Clean Air Act, Section 209, states may not develop their own vehicle emission standards. The exception to that rule is the State of California, which may set its own standards provided they are at least as stringent as federal standards. California standards are typically more stringent than federal standards. The remaining 49 states have the option of either following federal emission standards or adopting the CALEV standards. The CALEV requirements include a tailpipe greenhouse gas standard that does not exist for federal emission standards. CALEV also includes a zero-emission-vehicle requirement (i.e., electric vehicles). States that adopt CALEV standards may choose to include the greenhouse gas and zero-emission-vehicle requirements or not. CALEV states allow only the sale of vehicles certified to CALEV standards. Unlike states that operate under federal vehicle emission standards, where the standards are enforced by EPA, any state that adopts CALEV is responsible for enforcing the program provisions by itself.

#### Overall Implementation:

- Draft and pass legislation to adopt CALEV standards.
- Provide funding for economic and air quality analyses to support legislative action.
- Allocate staffing and financial resources to develop, implement, and administer the program.

#### Potential Responsible Parties:

- NH state government

#### Timeframe:

- Approximately 3 years would be required to pass legislation and an additional 1 to 2 years to develop and implement the state program.
- Fleet saturation with CALEV vehicles would occur in about 10 years.

### ► *Create a Point-of-Sale Financial Incentive for High-Efficiency Vehicles (TLU Action 1.B.1)*

Create a new vehicle point-of-sale “feebate,” which would provide financial incentives to purchase vehicles that are high in fuel-efficiency and low in greenhouse gases emissions, accompanied by financial disincentives to purchase low-efficiency, high-emitting vehicles. A buyer of a new high-efficiency vehicle would be rewarded with a rebate, but a buyer of a low-efficiency vehicle would have to pay a fee or surcharge (hence the name “feebate”). An effective feebate would be about 5 percent of the vehicle price. The feebate could be administered in either of two ways: 1) at the point of sale (i.e., at the automobile retailer), or 2) at the initial vehicle registration. The program could be made virtually revenue-neutral by using the surcharges paid on low-efficiency vehicles to cover the rebates on high-efficiency vehicles.

#### Overall Implementation:

- Pass legislative amendment to RSA 261 (Registration of Vehicles).
- Revise NH Department of Safety Rules pertaining to registration (Chapter Saf-C 500 Vehicle Registration Rules).

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- Provide resources to support program administration.
- Provide outreach and education before and during program rollout.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Safety, Division of Motor Vehicles
- The NH Department of Environmental Services
- Municipal clerks (if the feebate is charged at initial registration)
- Automobile dealers (if the feebate is charged at the point of sale)

Timeframe:

- The feebate program would require one year to pass legislation, followed by 6 to 12 months to begin program implementation.
- Full benefits of emission reductions would be realized in about 10 years.

► *Install Retrofits to Address Black Carbon Emissions ( TLU Action 1.C.3)*

Install retrofit technologies on diesel trucks with a model year of 2006 and older, or retire diesel trucks and replace them with new technology and cleaner operating engines for the purpose of reducing black carbon particulate matter. Similarly, install retrofit technologies on diesel non-road equipment, including construction equipment, diesel generators, and the like. Black carbon is formed through the incomplete combustion of organic fuels and is a major component of particulate matter (PM), or soot, produced by diesel engines. This substance has been identified as having a large and fast-acting warming effect on the atmosphere. Diesel trucks built after model year 2006 include technology that dramatically reduces PM emissions and do not need retrofitting.

Overall Implementation:

- Establish executive order to require retrofits for all state vehicles and for all equipment working on state contracts, as feasible.
- Provide outreach and education to promote voluntary retirement or retrofits of other pre-2007 diesel trucks and non-road equipment.
- Provide funding to implement program.

Potential Responsible Parties:

- NH state government
- Diesel equipment owners

Timeframe:

- This action can begin immediately using available diesel retrofit technologies.
- Emission reduction benefits will accrue through 2025, by which time most of the pre-2007 diesel truck fleet will have been retired.

► *Address Highway Travel Speeds (TLU Action 1.D.1)*

Overall Implementation:

Potential Responsible Parties:

Timeframe:

► *Address Vehicle Idling (TLU Action 1.D.2)*

Implement a robust idling reduction program for all motor vehicles. Vehicle idling wastes fuel, damages engines, and results in excessive emissions. The program would set an overall idling reduction target of 80 percent by 2010 for all vehicle classes, but a specific idling reduction target of 100 percent by 2020 for heavy trucks. Anti-idling program options for cars and light-duty vehicles include public education, fines for unnecessary idling, and targeted enforcement in designated areas or locations. Program options for freight haulers and other heavy-duty vehicles include outreach, technology retrofits to the existing fleet, and fines based on vehicle type. Special consideration would be given to truckers who sometimes need to run their engines to maintain comfortable cabin conditions during work breaks or to keep refrigerated cargo cold.

Overall Implementation:

- Pass legislation to establish an anti-idling program.
- Develop program details and issue anti-idling program regulations.
- Provide outreach and education to promote the program.
- Provide staff and financial resources to implement the program, including funds for enforcement and possible loans or incentives to assist with the necessary vehicle retrofits.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Environmental Services.
- State and local enforcement agencies.
- Diesel equipment owners

Timeframe:

- An anti-idling program can be implemented immediately for light-duty vehicles.
- A reasonable time limit should be imposed for heavy-duty trucks requiring retrofit technology to reduce idling.

► *Improve Traffic Flow (TLU Action 1.D.3)*

Revise state guidance and policies to promote the use of appropriate measures to reduce congestion, improve traffic flow, and reduce greenhouse gas emissions associated with motor vehicle travel. Although the New Hampshire Department of Transportation and local municipalities have control of intersection design and coordination, the public maintains a vital role in the development of traffic management solutions. Practical measures could include modern roundabouts at intersections, coordination of signalized intersections, and reduction of access points through improved access management. Policy options available to the state to promote improved traffic flow include outreach and education, issuance of technical guidance documents, and provision of funding assistance for the best examples of publicly supported projects. Selected actions would be developed with input from the professional planning/design community.

Overall Implementation:

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- Provide outreach and education to the general public to explain modern design concepts for improved traffic flow and to foster community involvement in project planning.
- Revise state guidance on best traffic management and design practices; disseminate this information to planning/design professionals and municipal officials.
- Provide staff and financial resources to implement outreach, education, and technical support.
- Consider funding assistance for qualified traffic flow improvement projects.

Potential Responsible Parties:

- The NH Department of Transportation
- Regional planning agencies
- Individual municipalities
- Project developers and design professionals

Timeframe:

- On average, intersection/signal coordination projects require 2 to 3 years to design, approve, and construct.
- On average, 4 to 5 traffic signalization projects on state roads are constructed each year. Most new signalized intersections are the result of new commercial development projects.

► *Implement Commuter Trip Reduction Initiative (TLU Action 2.A.1)*

Establish a state-supported initiative to increase the number of employers implementing commuter trip reduction programs. These programs use a variety of strategies to promote commuting and work options that reduce greenhouse gas emissions in comparison with single-occupancy-vehicle travel. Possible strategies include parking “cash-out,” car/van pooling, flex time, and telecommuting. The proposed state initiative would use mechanisms such as targeted education and outreach, awards and recognition, and business tax incentives to promote more widespread availability of commuter trip reduction programs.

Overall Implementation:

- Provide resources to develop informational materials and market the program.
- Evaluate obstacles to implementation, especially lack of alternative travel options.
- Consider possible tax credits for participating businesses.

Potential Responsible Parties:

- The NH Department of Environmental Services.
- Employers and employees

Timeframe:

- Commuter trip reduction programs could be implemented immediately.

**Recommendation 5:**

**Encourage Appropriate Land Use Patterns That Reduce Vehicle Miles Traveled**

► *Assess Greenhouse Gas Emission Impact Fees (TLU Action 2.C.1.a)*

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For any new development project seeking a state permit, assess a state impact fee based on the estimated greenhouse gas impact of the project, and/or enable municipalities to adopt similar programs. The size of the impact fee would be determined from the estimated transportation demand generated by the project and would be administered through a statewide permit program. The new impact fees would encourage development that has lower greenhouse gas impacts, e.g., projects designed around compact, mixed-use, walkable environments in existing community centers. Funds raised through impact fees could be used to support public transit or promote other greenhouse offsets with the goal of achieving “carbon neutrality” or, at the very least, reduced carbon footprints for new state-permitted development projects.

Overall Implementation:

- *(Conduct Feasibility Study)*
- Pass enabling legislation to require a transportation-based greenhouse gas emission permit for projects that will generate above a certain vehicle-miles-traveled threshold.
- Develop rules to establish greenhouse gas emission impact fees and to determine how the revenues may be used.
- Make appropriate revision to RSA 674:21 if impact fees are to be reduced or waived for developments within existing community centers.
- Provide funding for development and initial implementation of the program. (After setup, the program would be self-funded through permit fees.)
- Legislation likely needed.

Potential Responsible Parties:

- Various state agencies
- Individual municipalities
- Project developers

Timeframe:

- Appropriate legislation could be introduced in the next legislative session.
- Rulemaking, permit program setup, and project implementation could begin by 2010.
- Municipalities would be expected to take appropriate actions within 2 to 5 years thereafter.

- *Streamline Approvals for Low-Greenhouse-Gas Development Projects* (TLU Action 2.C.1.b)

Adopt new policies to streamline permit review processes, apply alternative requirements, or otherwise reduce barriers for development projects in *existing* community centers with low-greenhouse-gas footprints. Conduct a broad evaluation of state permit processes and requirements to identify barriers that now deter development from locating in low-greenhouse-gas impact areas – including existing downtowns and community centers – and develop practical solutions to removing such barriers. Encourage municipalities to adopt similar strategies in their development ordinances and permit processes.

Overall Implementation:

- Pass legislation to establish a greenhouse gas program within the NH Office of Energy and Planning or the NH Department of Environmental Services to coordinate with existing permit programs and create rules for the new permit review process.
- Revise applicable state agency administrative rules to allow expedited permit review under the new program.
- Provide funding for development and initial implementation of the program. (After setup, the program would be self-funded through permit fees.)
- Legislation likely needed.

Potential Responsible Parties:

- Various state agencies
- Individual municipalities

Timeframe:

- Appropriate legislation could be introduced in the next legislative session.
- Rulemaking, permit program setup, and project implementation could begin by 2010.
- Municipalities would be expected to take appropriate actions within 2 to 5 years thereafter.

► *Develop Model Zoning to Support Bus/Rail Transit (TLU Action 2.C.2)*

Develop a model zoning ordinance governing land use around bus/rail service access points to promote ridership and reduce greenhouse gas emissions. Encourage, assist, or require municipalities to adopt and implement this zoning around bus/rail stations. The model language would define criteria for minimum development density; mix of land uses; and interconnected, walkable street patterns. Grants for specific technical assistance to support implementation of the model zoning ordinance could be awarded to communities, and/or incentives could be provided to encourage adoption.

Overall Implementation:

- Prepare a model zoning ordinance under the direction of the NH Office of Energy and Planning or the NH Department of Environmental Services, with input from other entities.
- For a voluntary program: Begin outreach and education to promote the model ordinance; consider grants and financial incentives.
- For a mandatory program: Issue an executive order or pass legislation requiring adoption of the model ordinance; this action would be tied to investment in rail and bus service extensions.
- Provide resources to develop the model zoning ordinance and implement the program.
- Legislation likely needed.

(Note: The mandatory program would also require capital and operating funds to implement an expanded rail and bus system as a separate action.)

Potential Responsible Parties:

- The NH Office of Energy and Planning
- Various state agencies
- Regional planning commissions
- Individual municipalities

Timeframe:

- A model zoning ordinance could be developed within one year.

► *Develop Model Zoning for Higher-Density, Mixed-Use Development (TLU Action 2.C.3)*

Develop a model zoning ordinance to promote and facilitate higher-density, mixed-use, walkable development (including affordable housing) in designated areas of a community. Encourage, assist, or require municipalities to adapt and implement the model zoning. The model ordinance would specify what “smart growth” means to the state and would provide for the designation of compact “growth centers,” which have lower greenhouse gas impacts than other forms of development. A growth center program could be either 1) a voluntary program with incentives to encourage designation of municipal growth centers at locations deemed to be desirable, or 2) a mandatory state-legislated process requiring that communities (perhaps of a certain minimum size) designate municipal growth centers. Grants for specific technical assistance to support implementation of the model zoning ordinance could be awarded to communities, and/or incentives could be provided to encourage adoption.

Overall Implementation:

- Prepare a model zoning ordinance under the direction of the NH Office of Energy and Planning or the NH Department of Environmental Services, with input from other entities.
- For a voluntary program: Begin outreach and education to promote the model ordinance; consider grants and financial incentives.
- For a mandatory program: Issue an executive order or pass legislation requiring adoption of the model ordinance.
- Provide resources to develop the model zoning ordinance and implement the program.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Office of Energy and Planning
- Various state agencies
- Regional planning commissions
- Individual municipalities

Timeframe:

- A model zoning ordinance could be developed within one year.
- For a mandatory program, the necessary legislation, associated rulemaking, and initial program implementation would take 2 to 3 years.

► *Continue/Expand Funding, Education, and Technical Assistance to Municipalities (TLU Action 2.C.8)*

Support/expand technical assistance and funding made available through existing programs to promote: 1) coordinated local planning for land use, transportation, and the environment; and 2) associated policy changes that result in reduced greenhouse gas impacts. This action would include updating existing publications to incorporate greenhouse gas considerations and preparation of new materials as appropriate. This action would also provide increased coordination among, and expansion of, existing programs now implemented by various government agencies such as the NH Office of Energy and Planning, the NH Department of Environmental Services, the University of New Hampshire Cooperative

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Extension, the Regional Planning Organizations, and other organizations such as the New Hampshire Planners Association, the Local Government Center, and Clean Air Cool Planet.

Overall Implementation:

- Establish a clearinghouse of available resources: publications, fact sheets, planning tools, model ordinances, geographic information system (GIS) data, grant programs, educational programs, etc.
- Develop a system to facilitate easy access to this information.
- Continue/expand outreach and education on the connections among land use, transportation, and environmental planning; begin targeted outreach designed to jump start local greenhouse gas planning initiatives.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Office of Energy and Planning
- The NH Department of Environmental Services
- Other state agencies
- Regional planning agencies
- Individual municipalities
- Various private organizations

Timeframe:

- It will take 1 to 2 years to evaluate existing resource materials, educational opportunities, and grant programs; identify needed changes; and implement those changes.

**Recommendation 6:**

### **Reduce Vehicle Miles Traveled through an Integrated Multi-Modal Transportation System**

► *Expand Local/Intra-Regional Transit (Bus) Service (TLU Action 2.B.1.a)*

Expand the service areas of existing local and intra-regional transit (bus) systems and create new systems to: 1) provide service for all communities with 20,000 or more population; 2) provide service connections for all communities having 10,000 or more population *and* a defined, walkable, mixed-use central area (of at least 100 acres); 3) provide connections to smaller satellite communities by extending existing local/intra-regional transit systems serving New Hampshire's largest cities and population centers (Manchester, Nashua, Concord, and Seacoast); and 4) identify and implement additional local transit options over time.

Overall Implementation:

- Create a task force, under the guidance of the NH Department of Transportation, to investigate opportunities and develop recommendations for expanded local and intra-regional bus service.
- Quantify potential capital and operating costs of expanded service and identify sustainable funding mechanisms (with the realization that any system is likely to require public subsidies).
- Provide resources for initial planning studies and technical assistance to local communities.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Transportation
- Metropolitan Planning Organizations (MPOs) and Regional Planning Organizations (RPOs).
- Regional planning agencies
- Individual municipalities
- Local/regional transit providers

Timeframe:

- Expanded service could be phased in, starting in 2010-2012, as funding becomes available; initial focus would be directed toward higher-population areas that currently lack fixed-route transit (especially the Salem-Derry area and the regions surrounding Manchester and Nashua).

► *Improve Existing Inter-City Bus Service (TLU Action 2.B.2.h)*

Improve the quality of facilities and increase the frequency of service on current inter-city bus routes in New Hampshire to increase ridership levels and reduce vehicle-related carbon emissions. Enhancements would include 1) higher-quality bus stops and terminals with additional services and amenities; 2) improved and additional public intermodal facilities, shared by local and inter-city transit providers to facilitate connections; 3) increased frequency of service; and (4) better connections to surrounding areas through improved walkability and easier access to local transit.

Overall Implementation:

- In a collaborative effort of the NH Department of Transportation and commercial bus companies, investigate opportunities and develop recommendations for expanded local and inter-city bus service. (This investigation could be efficiently combined with the work of the task force on intra-regional transit.)
- Quantify potential capital and operating costs of expanded service and identify sustainable funding mechanisms (with the realization that any system is likely to require public subsidies).
- Provide resources for initial planning studies.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Transportation
- Inter-city transit providers

Timeframe:

- Expanded service could be phased in, starting in 2010-2012, as funding becomes available; initial focus would be directed toward higher-population areas that currently lack fixed-route transit (especially the Salem-Derry area and the regions surrounding Manchester and Nashua).

► *Maintain and Expand Freight Rail Service (TLU Action 2.B.2.b)*

Maintain and expand freight rail service within New Hampshire as part of a balanced, state-wide, multi-modal transportation system that keeps the state competitive with and accessible to the rest of the region. Initial actions would focus on sustaining and improving existing freight rail service. Near- to mid-term actions would include strategic improvements and expansions to increase freight rail usage – for example, track upgrades and restoration of lost rail connections to Canada, New Hampshire’s major trading partner.

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Long-term actions would address the goal of expanding freight rail service throughout the state. Because any substantial improvements to rail service will almost certainly require expenditure of public monies, attention to sustainable funding sources will be a priority.

Overall Implementation:

- Protect active/inactive rail corridors.
- Conduct an economic study for expanded rail service (consider a 10-year rail investment plan).
- Make strategic improvements to existing service, e.g., increase tunnel clearances for freight passage, improve intermodal facilities, and make track upgrades to support higher speeds.
- Provide resources for initial planning studies and consider options for long-term financial support.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Transportation
- The NH Rail Authority
- A collaboration of federal, state and local government; regional planning agencies; the business community; advocacy groups; media organizations; and the general public.

Timeframe:

- Improvements to freight rail service could begin immediately and be expanded over time.

► *Implement a Stable Funding Stream to Support Public Transportation* (TLU Action 2.B.2.c)

Identify and implement a stable funding stream to support significant expansion of public transportation in New Hampshire. Public transportation is essential to establishing a balanced, less carbon-intensive transportation system within the state. Public transportation also complements, promotes, and supports low-greenhouse-gas-impact development. However, the current lack of adequate funding is a major impediment to the expansion and operation of public transportation. A dedicated funding stream to support this purpose could be established by implementing or enabling one or more of several possible funding mechanisms. Options include an increase in the state gasoline tax, local gasoline taxes dedicated to public transportation, increases in vehicle registration fees, and revenues from a statewide feebate program or a carbon fuel surcharge. Any of these actions would require legislative action. An amendment to Article 6-a of the New Hampshire Constitution would be required to remove current restrictions on the use of gas tax revenues for public transportation.

Overall Implementation:

- Conduct a study to identify and evaluate possible mechanisms for dedicated funding.
- Initiate legislative action, if indicated, to establish a dedicated funding stream or to amend Article 6-a.
- Provide resources to support the required studies and legislative action.
- Legislation likely needed.

Potential Responsible Parties:

- Various state agencies
- (with input from non-governmental entities and the general public)

Timeframe:

- The timeframe for implementation will be tied to the legislative process.

► *Expand Park-and-Ride Infrastructure* (TLU Action 2.B.2.e)

Expand and improve New Hampshire's park-and-ride infrastructure to support public bus transit and carpooling. In our rural/suburban state, park-and-ride lots are essential to providing effective inter-city bus service and increasing the incidence of car/van pooling to reduce the number of single-occupancy vehicle trips. The proposed action would 1) create park-and-ride lots in new locations, 2) expand existing facilities nearing capacity, 3) improve the services provided at these facilities (e.g., better shelters and restroom facilities, greater security, walkable connections to adjoining developed land uses), and 4) strengthen promotional efforts to increase the use of park-and-ride facilities.

Overall Implementation:

- Expand promotional activities to increase the use of underutilized park-and-ride lots.
- Conduct a study to identify and evaluate locations for new and expanded park-and-ride facilities.
- Provide funding to support the site studies and promotional efforts.
- Consider potential funding sources for an expanded park-and-ride program.
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Transportation
- The NH Department of Environmental Services
- Regional planning agencies
- Local municipalities.

Timeframe:

- Promotional activities can commence immediately.
- Improvements to existing park-and-ride facilities and the addition of new park-and-ride lots could begin in 2010-2012 as funding becomes available.

**Recommendation 7:**

**Protect Natural Resources (e.g., Land, Water, and Wildlife) to Maintain the Amount of Carbon Fixed/Sequestered**

► *Protect Agricultural Land* (AFW Action 1.1.3)

Promote policies and practices that preserve existing agricultural land. The conversion of agricultural land to developed land affects its carbon absorption capacity. New Hampshire should place greater emphasis on applying policies and practices that avoid releases of carbon stored in soils, preserve the carbon absorption capacity of existing agricultural lands, and enable continued carbon sequestration from the atmosphere. Available measures include acquiring and preserving open space, reducing sprawl through smart growth measures, and encouraging the reuse of existing infrastructure.

Overall Implementation:

- Continue to fund the New Hampshire Land and Community Heritage Investment Program (LCHIP) and consider increasing the acreage of agricultural land protected biannually through this program.

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- Provide education and outreach directed toward reducing sprawl, encouraging smart growth, and reusing infrastructure.
- Develop sustainable funding sources for these efforts.

Potential Responsible Parties:

- State government
- Regional planning commissions
- Local municipalities
- Non-profit organizations
- Land owners

Timeframe:

- Promotional activities and LCHIP expansion can commence immediately as funding allows.

► *Avoid Net Forest Land Conversion* (AFW Action 1.2)

Sustain the natural carbon sink provided by forests and their capacity to remove CO<sub>2</sub> from the atmosphere. Through photosynthesis, New Hampshire's forests take up the equivalent of 25 percent (EPA estimate) of the state's manmade CO<sub>2</sub> emissions annually. Minimizing forest land conversion to non-forested uses will be a key component of any successful emission reduction strategy. (Note that 20 percent of global manmade CO<sub>2</sub> emissions are caused by conversion of forest land to non-forested uses). Public policy objectives should include encouraging forest land owners to manage their forests sustainably for the dual purposes of producing forest products and maximizing carbon storage. Available tools include conservation easements, carbon easements and leases, new forest management strategies, and land use regulation. New Hampshire has had considerable success in conserving large blocks of unfragmented forest land through perpetual easements – an important tool in maintaining the carbon sink that New Hampshire's forests presently provide and one which should be aggressively promoted in the presence of growing, competing land use pressures.

Overall Implementation:

- Create a new state initiative through LCHIP to encourage large forest land owners to protect forest land with perpetual conservation easements.
- Create a unit within LCHIP to test the marketability of large forest land leases and conservation easements with the primary objective of storing carbon.
- Begin promoting new forest management strategies among land owners.
- Develop a carbon-friendly model zoning ordinance and provide municipalities with statutory incentives to adopt this ordinance.
- Develop sustainable funding sources for these efforts.

Potential Responsible Parties:

- State government
- Regional planning commissions
- Local municipalities
- Non-profit organizations
- Land owners

Timeframe:

- All program aspects can commence immediately, would be continuous, and could be expanded as funding allows.

► *Promote Durable Wood Products* (AFW Action 1.3)

Create a program to develop a market for durable wood products. When wood is used to make products that have lasting value and are held for long periods of time, carbon is stored and not released into the atmosphere. Consumers often have a choice between a product made from petroleum or mineral base and one made from wood. The purchase decision is often formed around price and a short-term, throw-away mentality. An effective education campaign could be mounted to change consumer thinking that favors durable wood products over other materials when buying homes, building materials, furniture, and other accoutrements of modern living. Durable wood products are often more economical in the long run – if not initially – and, unlike petroleum- or mineral-based products, are environmentally sustainable. The proposed program would provide additional benefits to New Hampshire’s economy while improving product manufacturing and transportation efficiency.

Overall Implementation:

- Design a well-researched program to promote the use of locally made wood products.
- Initiate a promotional campaign led by a collaboration of state government and private interests.
- Provide funding for program development and promotional activities.

Potential Responsible Parties:

- State government agencies
- UNH Cooperative Extension
- Industry and landowner associations

Timeframe:

- This action can be implemented immediately.

► *Maximize Availability of Biomass for Electricity and Heating within Sustainable Limits* (AFW Action 2.2)

New Hampshire should develop and maintain the policies and infrastructure necessary to sustainably manage the state’s forests as an essential carbon sink, for energy and timber supply, for its recreational value, and for the provision of irreplaceable ecosystem services. The forest industry has long been one of the cornerstones of New Hampshire’s economy. Relatively new end-uses, such as the production of electricity from wood chips and the production of wood pellets for heating residential and public buildings, are providing the need for low-grade wood and improved logging infrastructure. It is important to note, the biomass stock necessary to support a growing demand is not unlimited and intact tracts of forest are better able to sustain biological diversity and play a role in the provision of ecosystem goods and services such as water supply. Planners, loggers, timber owners, investors, government officials and regulators, and consumers need a strong understanding of sustainable forest management principles as well as the underlying state of the forests, including growing conditions, soil productivity, tree species composition, and forest age, to make good decisions about the efficient use of the available resource for

traditional and new forest products in order to sustainably manage this critical economic and ecological resource.

Overall Implementation:

Potential Responsible Parties:

Timeframe:

► *Maximize Source Reduction and Recycling (AFW Action 3.1)*

Establish a state-operated revolving loan fund to increase commercial and residential source reduction and recycling programs in New Hampshire municipalities. Source reduction and recycling reduce greenhouse gas emissions by recapturing a high percentage of the embodied energy<sup>9</sup> content of the solid waste stream. A net reduction in emissions occurs when reused or recycled materials displace virgin raw materials in the manufacturing process and when solid waste is diverted from disposal. The current recycling rate in New Hampshire is less than 21 percent, well below the national average of 32 percent. However, for most households, the amount of waste that can't be reduced, reused, recycled, or composted is a minor portion of the original total waste volume. The revolving loan fund would help to rectify the current imbalance in solid waste practices by providing financing for the initial capital costs of public source reduction and recycling programs. Mechanisms available to communities wishing to increase their reuse/recycling rates include pay-as-you throw (PAYT) programs, resource management contracting with waste haulers, joint municipal ventures for transfer and recycling centers, salvage of reusable building materials, and commercial/municipal composting.

Overall Implementation:

- Conduct outreach and education to promote source reduction and recycling programs in New Hampshire.
- Provide technical assistance to municipalities to establish or expand their own programs. (Some programs and funding arrangements could be established through local ordinances while others would require state-level involvement and legislative action.)
- Create and pass legislation to establish a revolving loan fund for municipal source reduction and recycling programs.
- Provide funding for the revolving loan program, e.g., a one-cent fee on all bottles sold in the state.
- Provide staffing and financial support for outreach/education and technical assistance.

Potential Responsible Parties:

- The NH legislature
- The NH Department of Environmental Services, Waste Management Division
- Individual municipalities
- The solid waste industry and trade associations
- Commercial businesses
- Consumers

Timeframe:

- Education, outreach, and technical assistance can begin immediately.

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<sup>9</sup> Embodied energy refers to the energy that is required to extract, process, package, transport, install, and recycle or dispose of materials and products.

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- The revolving loan fund and source of monies can be established in the next legislative session.
- Municipalities would follow their own timetables for adopting ordinances and setting up local programs.

**Recommendation 8:**

**Government Should Lead by Example**

► *Establish an Energy Management Unit (GLA Action 1.1)*

Form an Energy Management Unit within state government to implement and oversee the recommendations of the Climate Change Policy Task Force as well as the Governor's Energy Efficiency Initiative. This entity would be responsible for tracking state government efforts to reduce energy use and costs, reduce greenhouse gas emissions, achieve state energy reduction/climate change goals, and provide assistance on energy efficiency matters to local and regional government entities. The proposed Energy Management Unit would consist of four new positions: a project manager, a data manager, a fleet manager, and an energy education and outreach specialist. This action would also require that the state adopt and implement consistent document and reporting procedures for energy purchases, equipment purchases, and energy usage.

Overall Implementation:

- Establish a project manager position as the highest priority; phase in other positions as resources allow.
- Develop consistent procedures for documentation and reporting of energy purchases, equipment purchases, and energy usage.
- Work plan to include remainder of GLA Actions not specifically included in the Action Plan
- Legislation likely needed.

Potential Responsible Parties:

- The NH Department of Administrative Services
- The NH Office of Energy and Planning

Timeframe:

- This action can be implemented during the 2008-2009 Legislative Session.

► *Establish an Energy Consumption and Greenhouse Gas Emissions Baseline Inventory for State Government (GLA Action 1.2)*

Establish a baseline inventory of energy consumption and greenhouse gas emissions for state government for the year 2005. The inventory would profile the specific types and sources of energy used and would quantify the amounts of energy consumed and emissions released on a quarterly and annual basis. This baseline inventory would assist in identifying opportunities having the greatest potential to reduce state government's energy consumption and greenhouse gas emissions and would serve as a benchmark by which to track progress in specific energy efficiency and renewable energy projects. The baseline inventory and subsequent updates would be the responsibility of the new Energy Management Unit.

Overall Implementation:

- Design a uniform data collection and reporting protocol for all state agencies to use in tracking energy consumption.

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- Provide staffing and financial resources to collect the data, perform quality assurance, undertake the necessary analyses, and generate regular reports.

Potential Responsible Parties:

- The NH Department of Administrative Services
- The NH Office of Energy and Planning
- The NH Department of Environmental Services

Timeframe:

- This action can be implemented immediately.

► *Establish a Self-Sustaining Fund for Energy Efficiency Projects in State Government (GLA Action 1.3)*

Create a non-lapsing Energy Efficiency Fund, overseen by the Director of Plant & Property Management or the State Energy Manager (unless or until an Energy Management Unit is formed and becomes operational). State agencies could request monies from this fund to cover the costs of their energy efficiency projects. The fund would be financed and replenished with monies equal to 2 percent of each agency's utility budget from the previous year. Monies would be distributed to subsidize requested energy efficiency projects using technologies shown to reduce energy consumption. The Energy Efficiency Fund would boost the efforts of state agencies to find ways to conserve energy and lower their utility bills. By charging a single entity to administer the distribution of these funds, consistent procedures could be maintained for the benefit of small and large agencies alike.

Overall Implementation:

- Prepare and adopt legislation for the Energy Efficiency Fund.
- Develop criteria for allocation and application of funds.
- Prepare administrative and technical guidelines (e.g., calculation of emission reductions and project payback) for fund applications.
- Provide staffing and financial resources to develop and administer the funding program.

Potential Responsible Parties:

- The NH Department of Administrative Services
- The NH Office of Energy and Planning

Timeframe:

- This action can be implemented during the 2008-2009 Legislative Session.

► *Provide for the Establishment of Local Energy Commissions (GLA Action 1.4)*

Support the newly forming Local Energy Committees by providing the statutory and programmatic resources needed to make these committees a working part of municipal governance. In March 2007, 164 New Hampshire municipalities passed a historic Climate Resolution that called on state and federal elected officials to address climate change. The resolution also called for the establishment of Local Energy Committees to address greenhouse gas emissions associated with municipalities' activities. Since then, nearly 100 cities and towns have established Local Energy Committees. New Hampshire can support this groundswell of civic action by 1) passing legislation that authorizes municipalities to establish Local Energy Commissions with specific powers, thus formalizing their role and mission; and 2)

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providing resources to regional planning commissions and state agencies to assist municipalities in setting up Local Energy Commissions.

Overall Implementation:

- Pass legislation to amend (RSA 672???) and) RSA 674 to grant New Hampshire towns the authority to establish formal energy committees with specific authority.
- Provide staffing and financial resources to regional planning commissions and designated state agency(ies) to assist municipalities in forming Local Energy Commissions.

Potential Responsible Parties:

- Individual municipalities
- Regional planning commissions

Timeframe:

- This action can be implemented during the 2008-2009 Legislative Session.

- ▶ *Include Climate Change Adaptation and Mitigation in Programs and Planning* (GLA Action 1.5)

Establish a policy requiring that climate change adaptation and mitigation be considered in all planning and programmatic activities of state government agencies. Climate change has impacts that could affect the entire spectrum of activities (economic, recreational, agricultural, etc.) within the state. At the same time, the vast majority of activities are contributing to climate change in large and small ways. Because New Hampshire state government has the capacity to influence these activities regardless of origin – governmental, residential, commercial, or industrial – all state agencies should take the initiative in seeking solutions to climate change. A logical starting point is to incorporate consideration of climate change into all state planning and programming functions. The state’s proactive response to climate change will help to engender climate change action as a necessary and normal part of life in New Hampshire.

Overall Implementation:

- Issue an executive order to require consideration of climate change in all government planning and programs.
- Begin outreach/education activities to build greater understanding of the science of climate change within the ranks of state government and to assist state employees in shaping an effective response to climate change.
- Provide resources to support internal outreach/education efforts.
- Publicize the state initiative to the population at large.

Potential Responsible Parties:

- The NH Governor’s Office
- All state agencies

Timeframe:

- This action can be implemented immediately.

- ▶ *Increase Funding for High Performance Public Schools* (GLA Action 2.6)

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Increase the state's Collaborative for High Performance Schools (CHPS) funding bonus by 2 percent (resulting in a total bonus of 5 percent) to entice school districts into pursuing energy efficiency improvements in their new construction and major renovation projects. The Collaborative for High Performance Schools (CHPS) is an organization whose mission is to facilitate the design, construction, and operation of high-performance schools. Such spaces employ cost-effective, integrated design and operational strategies/technologies to create healthful, energy-efficient environments that are more conducive to learning throughout the school year than are traditional school construction methods. Under New Hampshire's School Building Aid Program, the state provides up to 60 percent reimbursement to municipalities for the cost of construction or substantial renovation of school buildings. The program currently offers 3 percent additional reimbursement for schools meeting CHPS criteria.

Overall Implementation:

- Establish an executive order to increase the CHPS funding bonus.
- Develop a sustainable funding mechanism to support this change.

Potential Responsible Parties:

- The NH Governor's Office
- The NH Department of Education
- The Jordan Institute and/or other technical assistance groups

Timeframe:

- This action can be implemented immediately.

**Recommendation 9:**

### **Natural Resource and Infrastructure Planning to Respond to Existing and Potential Climate Change Impacts**

► *Develop a Climate Change Adaptation Plan for the State of New Hampshire (ADP Action 8)*

The State should develop a Climate Change Action Plan to support public and private partners and state agencies in the planning and preparation for the episodic and chronic events in New Hampshire that are projected to result from climate change. This Plan should identify actions that proactively prepare for these incidents and minimize their impacts on human health, the natural environment and the built environment (e.g., homes, businesses, roads, bridges, dams). The Plan will include the methodologies for making sure all necessary data are available to decision makers. There is a general lack of urgency for planning for adaptation to climate change. This Plan can provide the necessary education and information to keep New Hampshire moving in a proactive manner as we continue to face developing climate change impacts. The Plan will help our state and our decision makers identify and implement additional critical adaptation strategies.

Overall Implementation:

- Executive Order to establish the necessary body and define the scope of their responsibilities.
- Assemble the necessary bodies to develop the Adaptation Plan including members from various interests including, but not limited to, environmental, natural resources, public health, municipal and regional governance, built infrastructure (e.g., roads, dams, buildings), academia (UNH) as well as groups gathering data necessary for decision makers (e.g., coastal and flood plain LIDAR data).
- Identify data gaps and explore ways to fill those gaps

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- Ensure that the plan is a living document that can change as needed.

Potential Responsible Parties:

- The Governor's Office
- Department of Environmental Services

Timeframe:

- Development of the Adaptation Action Plan can begin immediately.
- Allow 6 months for the Plan's development.
- Once completed implementation can occur in a phased-in approach.

► *Develop and Distribute Critical Information on Climate Change (ADP Action 1)*

Invest in the analysis and dissemination of accurate and understandable information about the economic, environmental, and social impacts of climate change to policy makers and decision makers in the public and private sectors. Desired outcomes are policies and decisions that are fact-based, easy to achieve, and effective. This action is critical because of the complexity and volume of the information involved and the need to synthesize and graphically illustrate key concepts and facts to make them understandable and relevant. The action would be implemented through a broadly representative collaboration of public and private entities. Their charge would be to assess existing sources of information to identify data gaps and develop a strategic plan to address those gaps, with a focus on getting the information into the hands of persons responsible for protecting public safety and environmental integrity. Outputs would include maps, reports, modeling tools, data sets, fact sheets, and other information useful to planners, decision makers, and the public.

Overall Implementation:

- Develop a memorandum of understanding among affected interests within and outside government. (The governor could issue an executive order relative to participation of state officials.)
- Identify and make available financial and staff resources to support initial efforts.
- Develop and obtain commitments for a sustained program.

Potential Responsible Parties:

- The NH Department of Environmental Services
- Other state agencies
- The University of New Hampshire
- The New Hampshire Center for Public Policy Studies
- Elected officials
- The business community
- Nonprofit organizations

Timeframe:

- This action can be implemented over the next 1 to 2 years.

► *Promote Policies and Actions to Help Populations Most at Risk (ADP Action 2)*

Target policies and actions to help prepare populations that are most at-risk from the adverse impacts of climate change and related social effects – especially the elderly, low-income, chronically ill, and families with small children. What is currently difficult for at-risk populations is likely to become even more

difficult under climate change conditions. Many of these people live in the most vulnerable areas; some will have limited access to communications networks or will be non-English-speaking. Impacts may be associated with the costs and availability of commuting/transportation, energy for heating and cooling homes, “cool shelters,” food and potable water, health care, and the need for relocation. The NH Division of Public Health Services and NH Homeland Security and Emergency Management should work together and participate in climate change discussions. The NH Department of Environmental Services should continue its work in the areas of public health outreach and health-related impacts deriving from changes in air quality. Public health agencies at all levels should continue to identify individuals at risk and coordinate their efforts.

**Overall Implementation:**

- Develop partnership agreements among state and local public health officials, environmental officials, emergency planning officials, and organizations that work with at-risk populations.
- Develop a comprehensive public outreach and education program for at-risk populations.
- Assess the strength of state and local emergency response, recovery plans, and mitigation plans.
- Assess the capacity of the public/private health system to respond to the effects of climate change.
- Assess the mental health consequences and sociological effects of climate change.
- Provide financial and staff resources to support initial efforts.

**Potential Responsible Parties:**

- The NH legislature
- The NH Department of Safety, Homeland Security and Emergency Management
- The NH Division of Public Health Services
- The NH Department of Environmental Services
- Local public health officials
- The NH Minority Health Coalition
- Other organizations that work with at-risk populations

**Timeframe:**

- This action can be implemented over the next 1 to 2 years.

► *Charge and Empower Public Health Officials to Prepare for Climate Change (ADP Action 3)*

Provide direction and authority to public health officials to increase the state’s preparedness against existing and emerging infectious diseases and other health-related conditions as climate change advances. Scientists predict a higher incidence of certain diseases and other health affects associated with global warming in the decades ahead. Topics requiring public health action include 1) vector borne infectious diseases, 2) heat-related injuries, and 3) respiratory illnesses. In particular, public health officials need better data/analysis for vector-borne infectious disease forecasting and an understanding of what indicators to track (e.g., weather patterns, mosquito pools, tick populations).

**Overall Implementation:**

- Create a coalition of state agencies to develop, update, consolidate, and/or integrate, data collection systems for health facts and indicators, health and disease surveillance, demographics, population vulnerability, and resilience.

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- Strengthen the ability of local emergency services to respond to heat waves, temperature extremes, and air quality action days.
- Develop an outreach/education program via mass media to prepare the public for climate-related events and provide information on response options.
- Provide financial and staff resources to support initial efforts.

Potential Responsible Parties:

- The NH Department of Health and Human Services
- The NH Department of Safety, Homeland Security and Emergency Management
- The NH Department of Safety, Bureau of Emergency Medical Services
- The NH Department of Environmental Services
- The NH Board of Nursing
- The NH Board of Medicine

Timeframe:

- This action can be implemented over the next 1 to 2 years.

► *Strengthen Protection of New Hampshire's Natural Systems (ADP Action 4)*

Strengthen state and local protection of New Hampshire's natural resources to improve resilience to climate change, with particular attention to preservation of agricultural soils, floodplains, wetlands, drinking water supplies, and wildlife habitat connectivity. To help achieve this goal, new development should be directed toward already-built areas, at possibly higher densities, so as to avoid stresses on undisturbed natural areas. Actions items include 1) identification of ecological hubs and corridors, 2) prioritization of places to protect or restore, 3) region-wide examination of the fragmentation of aquatic systems, 4) improved management of groundwater resources and potable water supplies, 5) more comprehensive monitoring to detect environmental responses to climate change, and 6) specific measures to reduce environmental stressors. Implementation of this action would necessitate a greater emphasis on regional planning and development strategies than currently exists.

Overall Implementation:

- Assemble a statewide database inventory of natural systems and resources; develop a method for prioritizing which systems and resources to protect or restore.
- Consider legislation to allow or require changes in environmental and land use regulations as necessary.
- Require climate change impacts to be considered in all state and local planning, zoning, and facility siting.
- Identify and allocate resources to support planning and monitoring activities.

Potential Responsible Parties:

- The NH Department of Environmental Services
- The NH Department of Resources and Economic Development
- The NH Geological Survey
- The U.S. Geological Survey
- The U.S. Army Corps of Engineers
- The National Oceanic and Atmospheric Administration

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- The University System of New Hampshire
- Regional planning commissions
- Individual municipalities
- Public and private organizations

Timeframe:

- This action can be implemented within 1 to 4 years.

► *Increase Resilience to Extreme Weather Events (ADP Action 5)*

Begin measures to increase the state’s resilience to extreme weather events. Because climate change forecasts include more frequent drought punctuated by more intense precipitation events and rising sea level, our built environment may be at increased risk of inland and coastal flooding. More succinctly, today’s weather-related problems will be made worse by a changing climate. Future development could put more people and property at risk and could exacerbate the problem if sited in the wrong locations. Consequently, adaptation policies should be established that 1) steer future development away from the most vulnerable flood-prone areas, 2) render the existing built environment more resilient to weather-related impacts, and 3) move existing development out of harm’s way where feasible. Mechanisms to accomplish these outcomes focus on municipal ordinances, building codes, land use practices, infrastructure planning, and incentives. Costs of inaction are potential loss of life, property, and economic activity – especially in flood-prone inland and coastal areas.

Overall Implementation:

- Create a legislative commission to study the issue of resilience to climate change and make recommendations.
- Prepare and pass legislation, as necessary, to
  - prohibit development in vulnerable areas,
  - improve existing flood plain maps,
  - tighten existing regulations regarding floodplains, and
  - assist communities in creating and enforcing tougher land use requirements and building codes.
- Provide financial and staff resources to support initial efforts.

Potential Responsible Parties:

- The NH legislature
- The NH Department of Environmental Services
- The National Flood Insurance Program
- Regional planning commissions
- Individual municipalities
- The development community

Timeframe:

- This action can be implemented over the next 1 to 2 years.

► *Strengthen the Adaptability of New Hampshire’s Economy to Climate Change (ADP Action 6)*

Create policies to support economic development that will reduce or mitigate greenhouse gas emissions, introduce climate considerations into the economic growth model, and attract environmentally responsible employers. The proposed action would help businesses and agricultural interests prepare for and adapt to the impacts of climate change and the potential impacts of its solutions. Sample measures include anticipating the effects of climate change on important current industries (e.g., skiing, tourism, agricultural); assisting businesses with reducing their energy costs, developing “green collar” training and education programs; and attracting alternative energy and other “clean-tech” industries. New Hampshire should embrace this task proactively by taking advantage of any new economic opportunities where the state might create a niche for itself in sustainable economic development. Implementation may require improvements to infrastructure and creation of appropriate tax incentives to support businesses adapting to climate change. Additionally, New Hampshire may need to develop disaster recovery plans in advance of anticipated climate-related events to ensure that assistance will be available throughout the recovery phases of increasingly frequent extreme-weather events.

**Overall Implementation:**

- Consider tax incentives to businesses for installation of energy reducing features.
- Consider tax incentives to attract “green” industry involved in the production of environmentally friendly products and climate-change-related goods and services.
- Provide technical assistance to help existing businesses adapt to climate change.
- Provide technical assistance to businesses implementing proven technologies that reduce energy use and greenhouse gas emissions (free energy audits, training, etc.).
- Expand higher education curricula on sustainable development and green energy technologies.
- Provide financial and staff resources to support initial efforts.

**Potential Responsible Parties:**

- State and local governments
- Higher education
- The business community
- Affinity groups

**Timeframe:**

- This action can be implemented over the next 2 to 4 years.

**Recommendation 10:**

**Create an Integrated Education, Outreach, and Workforce Training Program**

- ▶ *Develop and Overarching Education Plan (RCI Action 4.6)*

**Overall Implementation:**

**Potential Responsible Parties:**

**Timeframe:**

- ▶ *Include Energy Efficiency and Conservation in School Curricula (RCI Action 4.1)*

Revise New Hampshire’s K-12 school curriculum standards to promote development of a citizenry that has a comprehensive understanding of climate change and the opportunities to engage in energy

efficiency and conservation measures. Goals would be developed from a multi-disciplinary perspective, including topics in science, mathematics, and social studies. As a short-term goal, partnerships between educators and experts on energy and the environment would be created to develop educator workshops to train New Hampshire teachers in the nuances of climate change and energy efficiency. The long-term goal would be to amend the New Hampshire Curriculum Frameworks at all grade levels with particular emphasis on curricula for grades 9 through 12, including both open enrollment and advanced studies. Greenhouse gas emission reductions would be achieved as students carry their growing knowledge of climate change and sustainable behaviors back to their families and communities. Sustainable behaviors can happen as part of daily habits, life-long decisions, individual advocacy, and community involvement.

**Overall Implementation:**

- Provide resources to support internal outreach/education efforts.
- Establish partnerships, assemble resource materials, and develop educator training program. Look to existing programs in other states for guidance in the design of multi-disciplinary teaching modules/workshops on climate change and energy efficiency.
- Begin educator workshops in targeted communities/school districts and extend these workshops to different communities each year. Provide continuing professional development credits to teachers who complete the workshops.
- Create a diverse committee of educators to begin the task of revising the K-12 curricula.
- Provide resources to support program development and curriculum revision.

**Potential Responsible Parties:**

- The New Hampshire Department of Environmental Services
- The Energy Efficiency and Sustainable Energy Board
- The NH Board of Education
- NH public school districts

**Timeframe:**

- Teaching modules/workshops for educators could be developed by a suggested target date of June 2010. Training in targeted communities/school districts would begin thereafter.
- Amendment of the New Hampshire Curriculum Frameworks and new teacher certification requirements would be longer-term, with a suggested target date of 2020.

► *Reduce Residential Energy Demand through Education and Outreach (RCI Action 4.3)*

Develop a community-based outreach and education program aimed at reducing greenhouse gas emissions in the residential sector. Because residential greenhouse gas emissions account for roughly half of all such emissions (when personal vehicles are included), an organized effort to engage residents in voluntary reductions of their household energy use would be effective. This program would provide the needed information, tools, and support to help residents understand how they use energy and how to map out strategies that would reduce their household energy consumption and energy costs. The program should make use of existing networks and communities (towns, neighborhoods, civic groups, faith-based organizations, businesses, etc.) to maximize participation. Research-based behavioral change strategies targeting the root causes of climate change inaction should be employed through outreach activities that strengthen communities and do not rely solely on information-based campaigns.

**Overall Implementation:**

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- Develop program details; consider adopting the New Hampshire Carbon Challenge™ (<http://nhcarbonchallenge.org>) as a platform to reduce residential energy consumption.
- Consider an executive order to encourage all state employees and all New Hampshire citizens to take the challenge.
- Create a database to quantify emission reductions and chart participation rates and progress toward emission reduction goals.
- Publicize progress at the community and state levels.
- Provide resources to support the program.

Potential Responsible Parties:

- The NH Department of Environmental Services
- The NH Office of Energy and Planning
- The New Hampshire Carbon Challenge.

Timeframe:

- This action can be implemented immediately and would be ongoing.

► *Create an Energy Efficiency and Sustainable Energy Systems Web Portal (RCI Action 4.5)*

Develop a searchable, web-based clearinghouse to hasten the adoption of energy efficiency and sustainable energy products and technologies. The portal would serve a range of specific New Hampshire audiences, including local energy committees, city and town managers, business owners, industrial and commercial facility managers, and residents. The portal would provide each specific target audience with the resources needed to make informed decisions concerning the available options to reduce their greenhouse gas emissions (e.g., currently available products/services/technologies, costs, projected savings, installers or contractors, online calculators, and tax and/or rebate incentives). Although numerous websites give information of this sort, there is currently no web-based clearinghouse for those who are evaluating purchasing sustainable energy products and technologies or have decided to buy products or services and need additional information.

Overall Implementation:

- Designate a state agency and a program coordinator within the agency to lead this action. The program coordinator would be responsible for development and maintenance of the portal with assistance from internal and external experts in energy efficiency and sustainable energy systems.
- Issue a request for proposals to create a searchable, web-based clearinghouse for energy-efficient and renewable products and services.
- Publicize the existence of the web portal when ready.
- Provide resources to support development and maintenance of the web portal.

Potential Responsible Parties:

- The NH Department of Environmental Services, or
- The NH Office of Energy and Planning
- Expert groups

Timeframe:

- This action can be implemented immediately.

► *Increase Energy Efficiency through Building Management Education Programs (RCI Action 4.2)*

Continue and expand energy efficiency education for building maintenance and energy management staff. The industrial, commercial, and government sectors should make use of the many training opportunities provided by utilities, energy companies (e.g., oil and propane distributors), and private consulting firms. Training should focus on energy audits as a proven method for identifying energy efficiency opportunities to minimize or eliminate net CO<sub>2</sub>e output in existing buildings. For new construction, “beyond code” certification would assure that buildings produce the lowest possible environmental impacts.

In addition, encourage the creation of building manager positions within organizations that are still without these positions. The concept of placing one person in charge of energy efficiency within an organization should be promoted even for small businesses. This action would result in regular reviews of energy use and identification of energy saving opportunities. Building energy managers should be given the responsibility and budgetary tools to implement energy saving measures as they are identified.

Overall Implementation:

- Direct the NH Office of Energy and Planning (or other state agency) to create, perhaps in conjunction with the energy utilities, an initiative to promote energy efficiency education and the concept of building energy managers in government and business.
- Coordinate efforts with the NH Public Utilities Commission and the NH Energy Efficiency and Sustainable Energy Board to investigate funding opportunities to support the program.

Potential Responsible Parties:

- The NH Department of Environmental Services
- The NH Office of Energy and Planning
- The NH Public Utilities Commission
- The NH Energy Efficiency and Sustainable Energy Board
- The Community College System of New Hampshire
- Utilities and energy companies
- The NH Business and Industry Association
- Local Chambers of Commerce
- Other non-governmental organizations

Timeframe:

- This action can be implemented immediately and would be ongoing.

► *Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program (RCI Action 4.4)*

Establish a comprehensive education program on energy efficiency and renewable energy to help close the tremendous gap that exists between knowledge and practice. It is estimated that just by using current technology correctly and efficiently we could cut building energy consumption and associated greenhouse gas emissions by 30 percent. In the proposed action, state government, utility companies, colleges, professional and building trade organizations, etc. would sponsor ongoing training and offer demonstration sites for energy-efficient and renewable energy practices. The program would provide accessible resources and educational opportunities to any individuals and organizations that design, build, evaluate/rate, maintain, sell, own, and occupy buildings. It would be of particular value to contractors, code officials, and energy raters, and would establish working groups

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for building managers and real estate agents. The program would be established and administered at various settings throughout the state, including demonstration centers, community colleges, training seminars, etc.

Overall Implementation:

- Create partnership agreements to develop and administer the education program.
- Evaluate existing resources and possible training locations.
- Design the program by building upon existing training programs and/or using successful programs as models. (Experience with the CORE Efficiency Programs could prove useful.)
- Publicize and roll out the program at a limited number of settings; expand and adjust the program as resources become available and experience is gained.
- Develop a sustainable funding mechanism.

Potential Responsible Parties:

- The NH legislature
- The NH Office of Energy and Planning
- The NH Department of Environmental Services
- The NH Public Utilities Commission
- The Community College System of New Hampshire
- Utilities and energy companies
- The NH Business and Industry Association
- The Associated General Contractors` of New Hampshire
- The New Hampshire Association of Realtors
- Other non-governmental organizations

Timeframe:

- This action can be implemented immediately and would be ongoing.

## **Chapter 6: Going Forward**

Implementation of the New Hampshire Climate Change Action Plan needs to occur at multiple levels in an ongoing fashion and will require a high degree of coordination, integration and advanced planning. Task Force members as well as members of the public have emphasized that a robust implementation process is needed to move forward the recommendations of the Plan. Such a process should allow for flexibility, accountability, transparency, ongoing progress assessment and reporting, and routine re-evaluation of existing and potential actions.

The goal is to implement a dynamic process that will facilitate the implementation of the most highly prioritized elements of the Action Plan while leaving room for the inclusion of actions that were previously omitted and the development of new actions as time, resources and new developments/innovations/technology permit.

It is clear that a significant amount of resources will be needed to carry out the recommendations of the Task Force and coordinate the various parties potentially involved in implementation. The first step in implementing this Action Plan will be to obtain the resources necessary to oversee this process. Implementation by any state agency will be contingent upon securing the necessary funding.

### *NH Energy and Climate Solutions Collaborative*

The Task Force recommends formation of the NH Energy and Climate Solutions Collaborative (Collaborative), in function and representation similar to the Task Force, to oversee and guide implementation of the NH Climate Change Action Plan. In addition, the Task Force recommends that the technical/policy working groups continue as advisors on the development and implementation of existing actions, identification of new opportunities as well as re-evaluation of low-priority actions. The Collaborative would:

- Develop a yearly priority list of implementation steps to pursue for lead agencies and other interested parties
- Provide guidance and approval for agency level work products and identify potential areas of research and economic development
- Report on progress against goals of the Plan
- Revisit old actions and consider new actions as appropriate
- Hold an annual meeting to report on progress and provide opportunity for public input

### *Potential Agency Support*

As recognized in the composition of the Task Force, many of the recommendations in NH's Climate Change Action Plan would benefit from a coordinated effort among state agencies. Implementation by any state agency will be contingent upon securing the necessary funding or resources. Areas of contribution could include the following:

- *Department of Environmental Services*- coordination and technical assistance in energy efficiency and transportation and land use actions

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- *Department of Administrative Services*- coordination of government leading by example actions
- *Office of Energy and Planning* – coordination of communication and education recommendations.
- *Public Utilities Commission* -assistance in the development of actions that will require regulations regarding energy
- *Department of Transportation* - assistance in the development of planning for the transportation system
- *Department of Resource and Economic Development* – coordination of Business Council and on actions relative to forestry

A lead agency or organization could facilitate implementation by:

- Preparing periodic inventories of existing climate and energy efforts,
- Determining how best amend or complement actions or coordinate with relevant entities,
- Identifying work plans for specific actions,
- Submitting work plans to the Collaborative for review and approval,
- Implementing actions through relevant parties,
- Conducting routine greenhouse gas inventories of state-wide emissions,
- Tracking the progress of specific actions that have been implemented,
- Drafting and release routine progress reports,
- Developing additional new actions as appropriate,
- Revisiting and re-evaluating actions developed during the Climate Change Action Plan process, and
- Working with stakeholders to identify new opportunities

#### *Technical Support*

In support of this work, on-going technical analyses of carbon reductions, costs, and economic impacts will be necessary for continued evaluation of progress as well as consideration of new carbon reduction strategies. The Task Force recommends that funding be developed to continue the research provided by the University of New Hampshire through Carbon Solutions New England. This funding should include opportunities for New Hampshire's academic institutions to evaluate new opportunities for carbon reductions and conduct specific economic analyses of large projects such as the evaluation of freight rail expansion.

#### *Partners*

Implementation of the NH Climate Change Action Plan will require efforts by individuals, community organizations, local government and regional organizations. It is critical that a focus be placed on coordinating efforts with key partners including:

- *Business Council(s)* - to help direct the implementation of the plan towards maximizing economic development
- *Regional Planning Commissions* - to assist in the development of actions that will be implemented at the regional and local level
- *Local Energy Committee Working Group and Regional Coalitions* – to assist in implementation at the community level

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- *Energy Efficiency and Sustainable Energy Board* - to ensure the coordination of energy efficiency, demand response, and sustainable energy programs in the state

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<sup>1</sup> [http://www.climatechoices.org/assets/documents/climatechoices/NECIA\\_climate\\_report\\_final.pdf](http://www.climatechoices.org/assets/documents/climatechoices/NECIA_climate_report_final.pdf)

<sup>2</sup> Ibid.

<sup>3</sup> Stern, Nicholas Herbert (2007), *The Economics of Climate Change: The Stern Review*, Great Britain Treasury, Cambridge University Press, 2007 pp. 692

<sup>4</sup> Hamilton, L.C., D.E. Rohall, C. Brown, G. Hayward, and B.D. Keim. 2003. Warming winters and New Hampshire's lost ski areas: An Integrated Case Study. *International Journal of Sociology and Social Policy* 23: 52-73.

<sup>5</sup> NECIA

<sup>6</sup> Equivalent is a measurement that expresses the concentration of all heat-trapping gases in terms of CO<sub>2</sub> and is frequently noted as CO<sub>2</sub>e.

<sup>7</sup> The Potential Action Reports for Government Leadership and Adaptation were not analyzed by CSNE while those for prepared for the Electric Generation, Residential/Commercial/Industrial, Transportation & Land Use, and Agriculture, Forestry & Waste working groups were analyzed by CSNE for carbon reductions and economic impacts.

<sup>8</sup> Robert G. Strom, a professor emeritus at the University of Arizona's Lunar and Planetary Laboratory, was quoted as saying, "Whenever you have a world recession, the greenhouse-gas emissions go down. They start going down first, even before you know you have a recession. When it starts going down, sell your stock."

<sup>9</sup> In 2004, the EPA inventory tool calculated the total NH GHG emissions to be 23.09 MMTCO<sub>2</sub>e. The difference between the EPA's value and the value reported above are due to the use of emissions data for the electrical generation sector (1995-2005) that was deemed to be more accurate.

<sup>10</sup> Stern 2007

<sup>11</sup> IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22

<sup>12</sup> Id.

<sup>13</sup> Millar, C., 2007. Climate Change and Forests of the Future: Managing in the Face of Uncertainty. *Ecological Applications*. 17(8).

<sup>14</sup> "Coping with Climate Change: The Role of Adaptation in the United States," Pew Center on Global Climate Change, June 2004.

<sup>15</sup> Stern Review July 2005

<sup>16</sup> *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* (NECIA, 2007).

<sup>17</sup> New Hampshire Department of Agriculture.

<sup>8</sup> New Hampshire Timberland Owner's Association

<sup>9</sup> New Hampshire Hazard Mitigation Plan, 2007

<sup>10</sup> "Coping with Climate Change: The Role of Adaptation in the United States," Pew Center on Global Climate Change, June 2004, p. 8

<sup>11</sup> *Increasing Resistance and Resilience of Tropical Marine Ecosystems to Climate Change*. From: Hansen, L.; L. Biringer; and J. Hoffman, 2003. *Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems*. World Wildlife Fund, Washington, DC.

<sup>12</sup> New Hampshire Hazard Mitigation Plan, 2007

<sup>13</sup> New Hampshire Hazard Mitigation Plan, 2007