

Overview: *A Call to Action*



THE ENERGY AND CLIMATE CHALLENGE

Over the course of a year, through a process that engaged over 125 stakeholders and received input from over 200 citizens, the 29 members of Governor John Lynch's Climate Change Policy Task Force developed this Climate Action Plan. It is aimed at achieving the greatest feasible reductions in greenhouse gas emissions while also providing the greatest possible long-term economic benefits to the citizens of New Hampshire. The most significant reductions in both emissions and costs will come from substantially increasing energy efficiency in all sectors of our economy, continuing to increase sources of renewable energy, and designing our communities to reduce our reliance on automobiles for transportation. Our response to climate change and our economic future are inextricably linked and should focus on how we produce our energy and how much energy we use. Future economic growth in New Hampshire as well as mitigation of and adaptation to a changing climate will depend on how quickly we transition to a new way of living that's based on a

far more diversified energy mix, more efficient use of energy and development of our communities in ways that strengthen neighborhoods and urban centers, preserve rural areas, and retain New Hampshire's quality of life.

There is a significant economic development potential for New Hampshire and our nation if we recognize the climate change challenge as an opportunity and approach it with resourcefulness, ingenuity, inventiveness and an entrepreneurial spirit. Energy, environment, and economic development are interrelated, just as our ecological systems consist of many interrelated and interdependent elements. Well-crafted solutions to these issues should be interrelated and will create benefits in all of these arenas, across the state and for all of our citizens.

The potential to reduce our energy consumption with existing technologies is significant. For example, every day New Hampshire citizens travel a total of 43 million miles by car, truck and bus, resulting in the consumption of 700 million gallons of gas and 200 million gallons of diesel fuel annually, and leading

to approximately 15.7 billion miles of wear on the state's roads and bridges per year. To a large extent, the billions of dollars spent each year on transportation fuel and road maintenance doesn't stay here in New Hampshire's economy, but instead goes out of the state or out of the country. Similarly, the 11 million megawatt hours of electricity, which New Hampshire citizens consume to light, heat, cool and operate our homes, offices, factories and schools each year, include significant costs for fuels that are imported from out of the state or out of the country.

NEW ENGLAND'S CHANGING CLIMATE

The greenhouse gas emissions that result from the generation of energy are also contributing to New England's changing climate. These changes include: warmer winters, reduced snowfall and snow-on-ground days, earlier spring runoff, sea-level rise, increased total rainfall, and more severe weather events that result in increased risk of flooding^{1,2,3}. These changes in New England's climate are projected to increase in severity in the future and, if left unchecked, have the potential to significantly change our economy and way of life by the end of this century by:

- Affecting the viability of most ski areas (a \$650 million annual industry in New Hampshire) and the snowmobiling economy (a \$3 billion annual industry in the Northeast region) by almost eliminating these industries in the southern areas and reducing their operations to fewer than 20 days per year in the northern part of the state by end of the century.
- Increasing the frequency and severity of heavy, damaging precipitation events and the associated major economic impacts of cleanup, repair, and lost productivity and economic activity.
- Increasing the frequency of short-term (i.e., one to three month) summer droughts from every two to three years to annually, resulting in increased water costs, and agricultural and forestry stress.
- Increasing coastal flooding, erosion, and property damage due to rising sea levels.
- Significantly increasing human health impacts due to extreme heat (e.g., more than 20 days per year projected over 100°F), increased air pollution, and vector borne disease.
- Changing the quality and productivity of the forestry

and agricultural sectors, both of which are significant contributors to the state's economy and quality of life.

THE OPPORTUNITY

New Hampshire's Climate Action Plan presents an opportunity to:

- Spur economic growth through investment in our state's economy of monies currently spent on energy imports.
- Create jobs and economic growth through development of in-state sources of energy from renewable and low-emitting resources, and green technology development and deployment by New Hampshire businesses.
- Avoid the significant costs of responding to a changing climate to the state's infrastructure, economy, and the health of our citizens.
- Preserve the unique quality of life that makes New Hampshire an outstanding place to live, work, and raise a family.

New Hampshire'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, rivers and seacoast region. These natural resources also attract and retain a skilled workforce. 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 any different. In fact, there is a significant body of literature to support the economic benefits of a "green economy"⁴. President Obama has stated that, "there is no better potential driver that pervades all aspects of our economy than a new energy economy"⁵.

One area of the "green economy" upon which New Hampshire has already concentrated is the development of in-state renewable sources of energy. In 2006, the state enacted a renewable portfolio standard (RPS) that requires a substantial portion of our electricity to come from renewable sources such as hydro, wind, solar, or biomass. In addition, New Hampshire's participation in the Regional Greenhouse Gas Initiative (also known as "Reggie" or RGGI) will provide further impetus for investment in renewable energy sources. Of equal importance, the sale of RGGI allowances for emissions of carbon dioxide (CO₂) from large power plants will also generate funds that will be used to improve energy efficiency across all sectors of the economy, including to help weatherize homes for low income

families. Economic studies performed by the University of New Hampshire on both the RPS and RGGI programs demonstrated that over time, these programs will create jobs and, through increased fuel diversity and investment in energy efficiency, will help to reduce electricity costs^{6,7}.

There is no compelling reason why New Hampshire could not and should not take a lead in the important and growing markets for such technologies as solar, photovoltaics, geothermal heating systems, components of electric powered vehicles, or wastewater treatment plants that actually generate energy. In contrast to other countries like Denmark, which now produces one third of the world's terrestrial wind turbines, and whose annual energy technology exports are over \$10.5 billion and growing, the United States is not a significant exporter of wind technology. According to an opinion piece by Thomas L. Friedman in the *New York Times* on August 8, 2008, there have been 35 new wind turbine companies in China over the past 18 months, but not a single one in the United States⁸. Due to this national vacuum, New Hampshire has an opportunity to take a leadership role in these new markets. Examples of early renewable energy innovators in New Hampshire include GT Solar and New England Wood Pellet. These industries provide "green collar" jobs that pay well, require people who have both blue collar and white collar skills and knowledge, and are a great fit for the excellent pool of skilled workers in New Hampshire.

Today, we already have a set of technologies and techniques that can save us money by reducing our energy use, substantially cutting our greenhouse gas emissions, and creating new economic opportunities. In the future, our fuel mix for electricity, transportation, heating and cooling will need to be more diversified. It will also likely involve more small power generators – what is being called "distributed generation" – and working with a more sophisticated electric grid to more efficiently meet all of our electric needs. All of this change will continuously create opportunities for new jobs and economic growth.

If we design our new technologies and policies carefully, we can use less energy and greatly reduce our environmental impact. Creative people are discovering ways to make old engines work better, inventing new engines, creating greener fuels, and discovering ways to build and run equipment that needs only a fraction of the energy it uses today. While technology is not the only answer to the twin challenges of climate change and reducing energy use, it will be a powerful tool, and it will bring

to New Hampshire and the wider world substantial economic growth and benefits.

TASK FORCE GOALS & RECOMMENDATIONS

The Task Force recommends that New Hampshire strive to achieve a long-term reduction in greenhouse gas emissions of 80 percent below 1990 levels by 2050, consistent with the New England Governors – Eastern Canadian Premiers resolutions and the consensus recommendations of the scientific community. The goal of reducing greenhouse gas emissions 80 percent by 2050 has been adopted by numerous states, cities and organizations⁹. This goal is based on the reductions that climate scientists believe are necessary to stabilize greenhouse gases in the atmosphere at or below 450 parts per million CO₂. It has been projected by scientists that stabilizing greenhouse gas emissions at this level will avoid the most severe and catastrophic potential impacts of climate change¹⁰.

In order to move toward this long-term goal and provide the greatest economic opportunity to the state of New Hampshire, the Task Force recommended 67 actions to:

- Reduce emissions from buildings, electric generation, and transportation.
- Protect our natural resources to maintain the amount of carbon sequestered.
- Support regional and national initiatives to reduce greenhouse gases.
- Develop an integrated education, outreach and workforce training program.
- Adapt to existing and potential climate change impacts.

Based on the greenhouse gas emission reductions projected for the recommended actions, the Task Force has chosen a mid-term goal of reducing greenhouse gas emissions 20 percent below 1990 by 2025. The 67 recommended actions are organized into the following 10 overarching strategies:

1. Maximize energy efficiency in buildings.
2. Increase renewable and low-CO₂-emitting sources of energy in a long-term sustainable manner.
3. Support regional and national actions to reduce greenhouse gas emissions.
4. Reduce vehicle emissions through state actions.
5. Encourage appropriate land use patterns that reduce vehicle-miles traveled.

6. Reduce vehicle-miles traveled through an integrated multi-modal transportation system.
7. Protect natural resources (land, water and wildlife) to maintain the amount of carbon fixed or sequestered.
8. Lead by example in government operations.
9. Plan for how to address existing and potential climate change impacts.
10. Develop an integrated education, outreach and workforce training program.

The recommended 67 actions that support these 10 overarching strategies will enable New Hampshire to continue to do its part to address climate change immediately as well as position the state and its citizens to implement even greater reductions in the future. These actions will benefit the economy, increase state and regional energy security, and improve environmental quality.

THE BENEFITS OF ENERGY EFFICIENCY

A significant focus of the Task Force recommendations is to maximize energy efficiency across all sectors of New Hampshire’s economy. For example, if we started promptly to

make a substantial portion of existing homes 60 percent more efficient (i.e., reducing their energy usage by 60 percent), in the year 2025 alone, we would achieve very substantial reductions in greenhouse gases emissions as well as significant cost savings (nearly 3.5 million metric tons of CO₂ equivalents (MMT_{CO₂e}) at a net savings of nearly \$1.6 billion annually) to New Hampshire homeowners. Savings of a similar magnitude could be expected in every year, and would likely increase over time as energy becomes more costly.

The technology, equipment and expertise exist today to substantially reduce the amount of energy required to heat and cool the average existing home, as well as to make new homes highly efficient from the outset. Studies have shown that existing homes can be made anywhere from 15 to 60 percent more energy efficient by the use of improved air sealing, insulation, and equipment. Typically, the initial capital costs are rapidly offset by the savings in heating costs. While many of these measures can be undertaken by the average homeowner, there is also a significant and growing market for building contractors and others to provide these services. The current New Hampshire housing stock of approximately 500,000 homes provides a substantial energy efficiency services market opportunity for heating and cooling, as well as lighting and other electrical usage, that could result in thousands of new long-term jobs in construction and related trades over the next several years. New Hampshire has the technology to do this today and we simply must act now.

THE IMPORTANCE OF OUR FORESTS

Preserving our working forests and avoiding conversion of our forest lands to other purposes will be critical to the successful implementation of New Hampshire’s Climate Action Plan. New Hampshire is currently 84 percent forested and these forest lands possess the ability to absorb and store large amounts of carbon, offsetting some of the CO₂ emissions resulting from human activities.

In addition to playing a role mitigating climate change, this extensive natural resource provides a broad range of benefits¹² including:

- Renewable supply of wood for heating, lumber, and a variety of forest products.
- Water cycle regulation.
- Groundwater recharge and water quality protection.
- Wildlife habitat.

PUBLIC INPUT

Over 175 people attended five public listening sessions and provided over 75 oral comments. Four major themes were evident at all the public listening sessions:

- 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.
- Comprehensive education is needed to inform the public of actions that can reduce energy use, to train the energy services trades in new technologies, and to develop appropriate curricula for our schools.

CLIMATE SCIENCE

The variation of greenhouse gases in the atmosphere has contributed to the earth's changing climate throughout its geologic history and helped create an environment conducive to life. In fact, without pre-industrial levels of greenhouse gases, the average temperature of the planet would be some 50 degrees F lower. However, levels of carbon dioxide and other so-called greenhouse gases in the atmosphere are currently accumulating rapidly and these levels are causing air and ocean temperatures to rise at a substantial rate. In its fourth assessment report, the Intergovernmental Panel on Climate Change (IPCC) found the evidence for the warming of the Earth to be "unequivocal."¹³ The IPCC concluded that most of the observed temperature increase since the middle of the 20th century is very likely due to the observed increase in greenhouse gases and a significant portion of these concentrations of carbon dioxide are from emissions of fossil fuels from human activities.

Scientists also predict that the impacts of this warming will cause significant changes to our climate affecting our health, economy, and quality of life. Regardless of the causes, the most viable solutions to climate change involve reducing energy usage in ways that save money for our citizens and businesses and create new economic opportunities. Simply put, we must cut energy use and develop more renewable energy sources. Doing so will save us money and will have wide-ranging economic and environmental benefits.

There is still much to learn about the mechanics of climate change, and work continues on improving climate models. However, if we fail to take action, the consequences to human populations are potentially severe. If we are wrong about the causes, but we take the actions that have been recommended, man and the environment will certainly be no worse off and arguably better off than under a business-as-usual scenario.

- Recreational opportunities.

New Hampshire's forest lands, therefore, play a critical role in maintaining the quality of life in our state. The forest products industry has been and will continue to be a key component of our state's economy. In addition, our tourism and outdoor recreation economies are also heavily dependent on the existence of healthy forests. In 2005, forest-based manufacturing and forest-related recreation and tourism in the state contributed over \$2.3 billion to the state economy¹³.

New Hampshire could be heating a significant percentage of its homes and buildings with wood from New Hampshire forests in the form of firewood, wood chips and wood pellets, and still have wood available to generate some electricity and to create durable wood products such as construction materials and furniture. Today, the state benefits from having wood pellet manufacturing plants, and more may be on the way, along with related businesses such as those that manufacture wood pellet furnaces and stoves. In addition, some of New Hampshire's top scientists are also on the cutting edge in developing technologies for deriving cellulosic ethanol fuel for transportation from tree fiber and other plant materials. These technologies are spurring investments, which are leading to new businesses and new jobs.

However, this homegrown natural resource is also at risk. Currently, about 17,500 acres of New Hampshire's forest are

being developed each year for such things as new housing, shopping malls and businesses, and about 5,000 of those acres are totally cleared of trees. By recognizing the value of our forests (e.g., as a source of energy, as a source of ecosystem services, as a wonderful playground), New Hampshire may be able to slow, if not reverse, this trend, and ensure that we will retain our healthy forests and the services they provide for the long term. Sustainable management of this resource will not only provide a CO₂ emission benefit but also contribute to the long-term economic health of the state's rural economies.

ADAPTING TO A CHANGING CLIMATE

Climate change will have significant economic, health, and natural resource impacts throughout New Hampshire in the twenty-first century. Unfortunately, because of the levels of greenhouse gases already in the atmosphere, the state's climate will continue to change even if immediate steps are taken to reduce greenhouse gas emissions significantly. This is because greenhouse gases reside in the atmosphere for a century or more, and interdependent physical, chemical and biological processes in the oceans, atmosphere, and on land respond slowly to changes in the atmospheric concentration of greenhouse gas emissions. Therefore, in addition to actions that reduce or mitigate greenhouse gas emissions, New Hampshire must also plan to adapt to changes that are occurring now and more that are anticipated to occur in the future.

THE PROCESS

Development of the New Hampshire Climate Action Plan was initiated in December of 2007 following an executive order issued by Governor John H. Lynch. The order established a Climate Change Policy Task Force, whose 29 members represent a diverse group of regulators, scientists, business leaders, utility representatives, and environmental leaders from around the state. In addition, over 125 stakeholders participated on six technical and policy Working Groups; *Adaptation, Agriculture, Forestry and Waste; Electric Generation and Usage; Government Leadership and Action; Residential, Commercial and Industrial; and Transportation and Land Use*. Having enthusiastically embraced their charge, the working groups submitted over 100 separate potential actions for the Task Force's consideration. These potential actions were designed to address the causes as well as the impacts of climate change through a range of mechanisms that take advantage of specific opportunities in New Hampshire to sequester and store carbon dioxide, reduce the fossil fuel-based emissions associated with activities in the state, and reduce New Hampshire's vulnerability to a changing climate. The Task Force also developed several additional potential actions following its review of the potential actions developed by the working groups. The University of New Hampshire, through Carbon Solutions New England (CSNE), analyzed the carbon reductions, cost of implementation, and cost savings for most of the potential mitigation actions. The Task Force selected 67 recommended actions that will:

- Reduce the cost of energy to our citizens, businesses and government.
- Promote the growth of new jobs in energy services, the building trades, and renewable energy.
- Encourage growth of our communities in a way that retains our rural character and quality of life.

One of the most significant recommended actions of the Task Force is to develop a climate change adaptation plan for New Hampshire. The plan should address impacts affecting the state's infrastructure, agricultural and forestry sectors, coastal areas, sensitive ecosystems, wildlife populations, and human health.

The New Hampshire adaptation plan should address these issues by including actions that:

- Increase natural *resilience* in species and ecosystems to facilitate recovery from climate disturbances or adjust to new patterns of climate variability and climate extremes.
- Facilitate *responses* to climate change that help human communities and ecosystems to continue to exist under new conditions.
- Build *resistance* to climate change by helping human communities and ecosystems resist impacts and maintain their valued resources.

In addition to recommending the development of a detailed adaptation plan, the Task Force selected the following initial actions, which are further described in Chapter 5, to begin building the programs and infrastructure needed to address these issues:

- Develop and distribute critical information on climate change.
- Promote policies and actions to help populations most at risk.
- Charge and empower public health officials to prepare for climate change.
- Strengthen protection of New Hampshire's natural systems.
- Increase resilience to extreme weather events.
- Strengthen the adaptability of New Hampshire's economy to climate change.

REPORT OVERVIEW

Chapter 1: Introduction – Provides an overview of climate science, the existing and future potential impacts of climate change on New Hampshire, the inventory of New Hampshire's greenhouse gas emissions, and projected emissions of greenhouse gases. It also provides a detailed description of the process, including public input that the Task Force followed to develop the Climate Action Plan.

Chapter 2: Task Force Recommendations – Describes the 10 overarching strategies identified by the Task Force and lists the 67 recommended actions selected to achieve these strategies. It presents the calculations of the emission reductions that will be achieved by the selected actions and discusses recommended mid-term and long-term emission reduction goals.

Chapter 3: Adapting to a Changing Climate – Describes the estimated risks from an already changing climate and the ac-

tions needed to plan for unavoidable impacts from existing concentrations of greenhouse gases in the atmosphere.

Chapter 4: Economic Opportunities – Summarizes the economic costs and benefits, as quantified by Climate Solutions New England, for the selected actions.

Chapter 5: Summary of Actions and Implementation – Provides brief summaries of, and the short-term to mid-term implementation strategies for, each of the recommended actions.

Chapter 6: Moving the Plan Forward – Describes the organizational structure, stakeholders, and potential implementing parties of a new public/private partnership – the New Hampshire Energy and Climate Collaborative – which will oversee and guide the implementation of the NH Climate Action Plan. Effectively, the Collaborative will be “the keeper of the Plan.”

EARLY ACTION IS IMPORTANT

We have an opportunity now, if not an obligation, to move as quickly as we can to address the challenge of climate change in a manner that recognizes the role that energy production and use plays in contributing to climate change. We can

derive substantial economic and environmental benefits by developing and using homegrown, renewable energy sources as well as technologies that save energy. In so doing, we will create many new jobs and economic opportunities for New Hampshire’s people and businesses. We can insulate ourselves from the volatility of world energy prices and at the same time enhance New Hampshire’s quality of life.

The Climate Change Policy Task Force has identified a suite of actions that can be implemented immediately or through a phased-in approach that can increase as technology evolves and economic means become available. The sooner reductions are accomplished, the greater the economic benefit. There are a number of reduction pathways New Hampshire and other states can take to reduce their greenhouse gas emissions 80 percent by 2050. Actions could either begin more quickly to provide a fairly steady rate of greenhouse gas emission reductions or they could be delayed, thus requiring larger reductions at a later time. **Delays in achieving reductions would result in increased implementation costs, thus reducing the economic benefits and making it more difficult to reach the long-term goal.**