New Hampshire Energy Plan

Governor's Office *of* Energy and Community Services

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Pursuant to
NH Chapter 121 (2001)

1. Executive Summary

1.1 Introduction

As New Hampshire continues to grow, so does our demand for energy. We need reliable, affordable energy to expand and strengthen our economy. We rely on consistent, plentiful energy for our homes, businesses, and our transportation needs. Energy is increasingly considered a critical component of our economic vitality and our environmental quality, both hallmarks of New Hampshire's high quality of life and rich natural environment.

New Hampshire's decision to undertake our first comprehensive state energy plan was motivated in large part by a recognition of energy's central role in fulfilling our priorities of economic growth, environmental quality, and a diverse energy supply. It is now widely recognized that in order to continue building upon our state's strengths, we should consider energy policies and programs that take advantage of new technologies, promote energy efficiency, encourage the development of cleaner, affordable alternative energy sources, utilize our plentiful renewable natural resources, and reduce our dependence on foreign oil.

New Hampshire has already made great progress on many of these important energy goals. Through restructuring of the electric industry, we have lowered electric rates up to 16% for families and businesses in the state. We are investing in state buildings to make them more energy efficient, an effort that will ultimately save taxpayers as much as $4 million a year. In addition, we have launched a comprehensive initiative with our electric utilities to help businesses and homeowners become more energy efficient, which will lower their electric bills and reduce pollution, and our gas utilities are following close behind.

New Hampshire is also continuing to diversify its energy supply in order to prevent energy shortages and reduce our dependence on foreign oil. By the end of 2002, two new natural gas-fired power plants will increase New Hampshire's electricity capacity, and the total resources in the New England power pool, by more than 1,200 megawatts, while producing only a fraction of the air pollution generated by older coal and oil-fired plants. The Governor's Office of Energy and Community Services and the Department of Resources and Economic Development are working together with other stakeholders to study the potential development of bio-oil, a new alternative fuel, made from the leftover scrap wood from our forest products industries. Bio-oil is both a potentially cleaner, affordable way to heat our homes and

businesses and power our cars and trucks, and also a potential market for the forest products industry in the North Country.

We have also enacted a first-in-the-nation Clean Power law, which requires New Hampshire's fossil fuel power plants to significantly reduce emissions of four pollutants – nitrogen oxides, sulfur dioxide, carbon dioxide and mercury. These steps will help ensure that New Hampshire citizens and businesses will have the clean, reliable and affordable energy that our state needs to continue to prosper, while maintaining a healthy environment for our families.

Our hope is that this first state energy plan is a resource for New Hampshire policymakers, state agencies, citizens and businesses. It provides a comprehensive look at our state's current and future energy needs and resources, considers how we fit in the New England region, and recommends policies that our state should consider in order to meet our future energy goals. It also represents an important step toward creating a framework to continue energy planning efforts in New Hampshire.

1.1.1 The Need for State Energy Planning

In the era of the restructuring of energy markets, many states are recognizing the value of energy planning. Fundamental changes in the energy marketplace, concerns about energy security, the need for clean and reliable power, and the increasingly regional nature of power markets have led several states to develop energy plans, many of which are updated regularly to ensure access to current information and to allow for the consideration of new policies to adapt to ever-changing energy issues.[1] Several other states have recently started the planning process in response to the current energy environment and energy security concerns.

Prior to the restructuring of New Hampshire's electric industry, individual utilities were responsible for energy planning within their service areas to ensure that they could meet their customers' energy needs in a safe, reliable manner. This was accomplished through "Integrated Resource Plans," developed through proceedings at the Public Utilities Commission, which usually did not include significant outreach to other stakeholders or the general public.

Following restructuring of most of New Hampshire's electricity market, the need for energy planning has actually increased. As a result of the recognition of the need for review and analysis of the state's energy use and future needs, Governor Shaheen and key legislators recognized the need for development of a state energy plan.

Another major impetus for the increase in energy planning around the country was the California energy crisis in 2000 – 2001. Following restructuring of California's electricity market, consumers

[1] Massachusetts, Vermont, Rhode Island, New York, Illinois, Iowa, Virginia, West Virginia, North Carolina, Pennsylvania, South Carolina, California, Hawaii, Montana, Nevada, Washington and Wisconsin are among the states that have an energy planning process.

experienced large and unanticipated increases in the price of electricity. This event helped policy makers around the country, including here in New Hampshire, to recognize the importance of careful planning for energy supply and demand in our state and in our region.

New Hampshire law provides general guidance for the state's energy policies. RSA 378:37 requires that we ensure the "lowest reasonable cost while providing for the reliability and diversity of energy sources; the protection of the safety and health of the citizens, the physical environment of the state, and the future supplies of nonrenewable resources." However, no single state agency has been charged with energy planning to help policymakers ensure that energy decisions are consistent with the state's energy policy goals.

New Hampshire's electric restructuring statute, RSA 374-F:3, also sets forth several broad public policy goals. These principles call for full and fair competition, benefits for all consumers, protection of low-income consumers, environmental improvement, increased commitment to renewable energy resources, and investments and incentives for energy efficiency.

In addition, after the tragic terrorist attacks on the United States on September 11, 2001, energy security has become a priority for both emergency planners and energy policymakers. Due to the importance of our state and national energy infrastructure to our economy, many consider it a potential target for future terrorist actions. While energy security is not the focus of this Energy Plan, recognizing the impacts of changes in energy production or consumption, and their impact on the state, helps inform the public and policymakers of the importance of energy reliability and security in New Hampshire. The State's efforts in the area of emergency preparedness planning are discussed in Section 1.1.3.

The generation and use of energy, whether for our homes, businesses, transportation, or other applications, has a very significant impact upon our environment. Emissions from energy use impact our health, our natural resources, and our quality of life. The infrastructure for energy use and delivery also impacts our land use decisions about where we live and work. As a result, by considering energy, environmental and economic policies and programs together, we can protect the air, water, and open space in our state, providing a cleaner and healthier environment for all citizens while continuing to have a strong and diverse economy.

Regional organizations are now playing an increasingly important role in energy planning as the electric industry undergoes restructuring. New Hampshire is not an energy island, and actions taken outside of New Hampshire affect energy security, the price and supply of energy, and our environment in New Hampshire. Our electric industry is closely linked to regional, as well as national, electricity markets. While we have been interdependent with the larger New England power pool for several decades, regional and national electricity market issues have become increasingly important in recent years as deregulation of the electric industry has evolved.

Having an energy planning process in place will help us represent the state at the regional and national levels, and allow us to put forth a well-reasoned and cohesive strategy in those venues that influence New Hampshire's energy and environmental future, including:

- Independent System Operator of New England (ISO-New England);
- New England Power Pool (NEPOOL);
- Coalition of Northeastern Governors (CONEG);
- New England Governors' Conference (NEGC);
- National Association of Regulatory Utility Commissioners (NARUC)
- National Council of State Legislators (NCSL);
- National Governor's Association (NGA);
- New England Conference of Public Utility Commissioners (NECPUC); and
- Federal Energy Regulatory Commission (FERC).

In an effort to ensure that New Hampshire is prepared to address the many complex energy issues facing our state in the next decade and beyond, to fulfill our public policy goals, and to facilitate open discussions on how best to address the changing energy landscape, the Legislature in 2001charged ECS with developing a ten-year energy plan for the state.

1.1.2 Goals of the New Hampshire Energy Plan

On June 27, 2001, Governor Shaheen signed House Bill 443 (Chapter 121) into law, charging ECS with preparing a 10-year state energy plan. The law required ECS to develop a comprehensive plan after holding at least four public hearings throughout the state, and soliciting input from state agencies and other interested stakeholders.

This energy planning effort had its origins in a study committee created by House Bill 1318 in the 2000 Session, which convened to consider several energy issues facing the state, including heating oil, kerosene and diesel fuel shortages and price spikes. The study committee recognized the need for a statewide energy planning effort to ensure that policymakers had access to accurate energy information, as well as tools to help them with energy policy decisions. The discussions of the small group of legislators resulted in the introduction of HB443.

The bill sets forth six major topic areas to be covered in the New Hampshire Energy Plan (NHEP): demand projections for electricity and natural gas; adequacy of generation, transmission and distribution for both electricity and natural gas in New Hampshire and regional issues that will impact the State; siting requirements for energy facilities; fuel diversity, including renewable and alternative energy resources; energy efficiency and conservation; and the impacts of regional issues on New Hampshire. In addition, the

NHEP includes issues related to energy security, and provides information on the State's efforts to manage its own energy use.

It is important to recognize that some important energy issues are not covered in this first comprehensive planning effort, despite a recognition that they are key issues that should be considered by the State. The energy issues covered in the legislation are largely those that are under the jurisdiction of the Public Utilities Commission, primarily electricity and natural gas, areas that are also under the purview of the House Science Technology and Energy Committee, which produced the legislation.

One of the important energy issues outside the scope of HB443 is transportation. The Base Case, or business-as-usual forecast, discussed in detail in Chapter 3, projects that our energy use in the transportation sector sees the most growth of any sector over the next decade, and over the next twenty years. The majority of this significant increase in demand for transportation fuels comes from the "residential" sector. Consequently, the cars, SUVs and trucks that we use for our own personal transportation represents the largest increase in overall demand for our state – even more than the growth in industrial and commercial transportation. This finding has energy, economic, and environmental implications for our State, and should be considered in our planning efforts relative to transportation.

A second area not covered in the NHEP is deliverable fuels, such as home heating oil, propane, and kerosene. These fuels are an important part of New Hampshire's fuel mix, especially in the residential sector. However, these important energy sectors were not included in the energy plan legislation. ECS works closely with the home heating industry and with the fuel delivery community, especially with respect to energy emergency planning and the federal low-income fuel assistance programs. These fuels are included in projections relative to overall fuel use in our State despite the fact that they are not included in the legislation. However, it is important to note that while they do play an important role in our energy landscape, we did not model or analyze these fuels and do not make any specific recommendations about their use. Our hope is that future updates of the NHEP can incorporate more of the important issues related to these fuels.

ECS worked with a group of consultants to prepare the NHEP: Systematic Solutions of Ohio, Policy Assessment Corporation of Colorado, and Sylvatica of Maine. The three groups have collaborated to provide energy planning services to several states and regional organizations, including Massachusetts, Vermont, Hawaii, the Canadian government, the New England Governor's Conference, ISO New England, and NEPOOL. These consultants provided the forecasting and analysis required for the Plan using a computer simulation model known as ENERGY2020, which is described in Section 1.2.2 below, and in more detail in Appendix 2. The consulting group also assisted with facilitating stakeholder involvement and testing policy options. Innovative Natural Resource Solutions of New Hampshire assisted with development of the final document.

The NHEP legislation called for four public hearings around the state to solicit public input on the energy plan. To facilitate a higher level of stakeholder and public involvement, ECS held eight public hearings and meetings throughout the state. The public hearings were initiated in Manchester on April 3, 2002. Subsequent meetings were held in Portsmouth, Keene, Belmont, Berlin, Littleton, Colebrook and Lebanon.

In addition to the public hearings called for in the legislation, ECS convened a group of stakeholder meetings in Concord to provide more information about the planning process and the ENERGY2020 model, and to solicit information and suggestions for the energy plan. The groups were organized around the various topics to be covered in the energy plan, including electricity, natural gas, fuel diversity, energy efficiency, siting, and regional issues. The first meeting was held in December 2001, and subsequent meetings were held throughout the spring and summer of 2002. In late August the groups were brought together to consider the outcomes of some policy testing, and to consider the overlapping nature of energy issues across the different groups. Participating stakeholders included energy companies, legislators, state agencies, businesses, environmental organizations, advocates for renewable energy and other interested parties. Stakeholder interest in the planning process was high, and the input of interested parties was critical to the development of an energy plan that accurately reflects the state's current energy picture, its future needs, and its policy priorities.

Stakeholders identified several key issues for consideration in the energy plan:

- Continuing our State's strong presence at the regional and national levels on energy issues such as transmission expansion, standard market design, and regional renewable and efficiency programs;
- Preservation of New Hampshire's diverse energy portfolio, including indigenous resources such as wood;
- Continued investments in energy efficiency at the state level, including ratepayer funded programs;
- Financial or tax incentives to promote energy efficiency and renewable energy opportunities in both the residential and commercial and industrial sectors;
- A commitment from the State to purchase a defined percentage of its energy from renewable sources in order to maintain energy security and reduce dependence on foreign oil; and
- A permanent process for energy planning at the state level, so that the dialogue created during this first comprehensive energy planning effort will continue.

Several stakeholders provided written comments. A complete listing can be found in Appendix 1, and documents are on file at the Governor's Office of Energy and Community Services, and are available at our website, www.nhecs.org. These comments include key issues such as energy security, investing in renewable energy, increasing energy efficiency, ensuring adequate transmission and distribution resources, and maintaining New Hampshire's strong role at the regional level.

1.1.3 Energy Emergency Planning and Preparedness

Although the topic of energy emergency planning is not a focus of this plan, it is clearly an aspect of energy planning that has come to the forefront as a result of the tragic events of September 11, 2001. Even before September 11th, however, New Hampshire had a well developed energy emergency planning effort in place, largely in response to the winter fuel shortages of 2000 and the regional electricity shortages that are now a common event in our region each summer. To ensure that the proper agencies were coordinating their preparations for possible energy emergencies, the Governor's Office of Energy & Community Services undertook the development of the State Energy Emergency Response Plan, or SEERP, in 2001.

The purpose of the SEERP is to provide timely and coordinated notification to state government, private sector entities, institutions, the media, and residents of the state in the event of an energy emergency, and to set forth appropriate actions that each sector should undertake. These activities range from calls for voluntary energy conservation measures, to the enactment of emergency regulations, rules, and laws, as well as other actions as deemed necessary by the State. The SEERP was revised and updated in late 2002.

The events of September 11, 2001 brought into sharper focus the importance of energy emergency planning. In response, Governor Shaheen convened an interagency task force known as the New Hampshire Commission on Preparedness and Security to reevaluate our state's security and emergency preparedness. The Commission worked to identify steps that New Hampshire could take to protect utilities, energy transmission systems, nuclear power plants and fuel storage facilities. ECS played an active role in this Commission and worked with representatives of the Public Utilities Commission, the Department of Safety, the Office of Emergency Management, and other state agencies to ensure better communication and coordination during energy emergencies and threats to our energy infrastructure. The Commission's final report, "Assessment of New Hampshire's Preparedness and Security," was issued on November 27, 2001, and is available at www.state.nh.us/governor/preparedness.pdf.

1.1.4 Energy and the Environment

Energy production – for electricity, manufacturing, transportation or other uses – is a major contributor to pollution in New Hampshire and around the world. Changes in fuel use, energy conservation and efficiency, and advances in technology all play a role in reducing pollution levels associated with energy production. However, these approaches alone will not protect New Hampshire's environment, so we need to take appropriate actions to ensure that the energy we need for our homes and businesses is produced in the cleanest, most efficient way practical.

To further these goals, Governor Shaheen signed the Clean Power Act into law in May 2001, making New Hampshire the first state in the nation to require fossil-fuel power plants to reduce emissions of four

major pollutants. The legislation requires reduction in emissions of sulfur dioxide, the chief cause of acid rain; nitrogen oxides, a contributor to ozone smog; and carbon dioxide, which contributes to climate change. It also requires that the NH Department of Environmental Services make a recommendation regarding regulation of mercury emissions from fossil-fuel power plants, which threaten the health of humans and wildlife. This legislation is seen as an important first step to addressing the environmental and public health impacts of our energy choices, and has been considered a model for other states and for the federal government.

In addition to cleaning up the production of energy, we also need to increase our understanding of the environmental and public health "costs" of producing and using various forms of energy. During the public hearing and stakeholder meeting process the issues of quantifying and "internalizing" the environmental costs of energy were raised as key issues in moving toward cleaner, more sustainable forms of energy. At this time, many of the public health and environmental impacts of energy production and use are not incorporated into the price we pay for most forms of energy, from gasoline to home heating oil to electricity. This issue is one that has received attention from both national and international experts, but data is still not widely used that accurately captures the true costs of energy.

Despite the lack of widely accepted information on environmental costs of energy, throughout the New Hampshire Energy Plan we have incorporated many of the environmental impacts of energy production and use. For example, emissions of greenhouse gasses, which contribute to climate change, are shown for each of the policy scenarios tested in ENERGY2020. However, we recognize that more study is needed to create information on environmental impacts and costs of energy that all parties can agree upon. This will help us make more informed choices about the energy that we use, and understand the true costs of those choices.

1.2 New Hampshire Energy Plan Overview

The following sections provide brief summaries of the data, research, and modeling found in the New Hampshire Energy Plan. Significantly greater detail on each issue can be found in the body of the NHEP in the relevant chapters.

1.2.1 New Hampshire's Energy Use Today

New Hampshire currently generates more electricity annually than it uses, making it a net exporter of electricity. However, we import the vast majority of the fuels used to generate the energy we use. New Hampshire generates a limited amount of renewable energy from native sources, primarily through wood-fired power and hydroelectric facilities. New Hampshire also has two trash-fired power plants, which burn municipal solid waste to produce electricity.

Petroleum-derived energy, whether for transportation or home heating, dominates the New Hampshire energy picture, constituting more than 54% of the energy we use in the state, and more than 85% of what we pay for energy.

Our consumption of gasoline is highest among all of the fuels used in the state, representing nearly half of the state's energy consumption costs. It is followed closely by petroleum distillate, which is used as both #2 heating oil and diesel fuel for transportation. Together, gasoline and distillates make up 70% of the cost and 40% of the Btus consumed in the state.

1.2.2 Data and Analysis for the New Hampshire Energy Plan

Two energy and economic forecasting models, ENERGY2020 and REMI (Regional Economic Models, Inc.), were used in the development of the New Hampshire Energy plan. These two models, which can be integrated to capture the economic impacts of energy policies, provided much of the forecasts and projections contained in this document.

ENERGY2020 is a multi-sector energy analysis system that simulates the supply, price and demand for all fuels. In the development of the New Hampshire Energy Plan, ENERGY2020 was used to provide information on energy use in the residential, commercial, industrial and transportation sectors of New Hampshire's economy. To determine the impact of energy policies on our economy, we worked with the state's Department of Employment Security, which has created a New Hampshire-specific REMI model. REMI is used by Employment Security to predict the economic and demographic effects that policy initiatives have on the state's economy. More detailed information on ENERGY2020 and REMI is provided in Appendices 2 and 3, respectively.

1.2.3 Base Case or "Business as Usual" Forecast

In order to understand energy use in New Hampshire, a "Base Case" forecast was developed to predict energy use in New Hampshire over the next decade and beyond based on current trends. The Base Case forecast is an attempt to project a most likely or "best guess" future trajectory of the energy and economic system in New Hampshire, for the purposes of stimulating ideas for potential policies, and testing for the expected impacts of potential policies.

Overall, the Base Case projects that total New Hampshire energy demand is expected to grow at an average rate of 2.2% annually between 2000 and 2020. Oil, the fuel with the highest demand, is forecasted to grow at only 2.0% per year, while electricity and natural gas grow at 3.1% and 3.2% respectively. It is important to note that this projection shows that the use of energy is forecast to grow at rates well above the growth in population (projected to be only 1%), meaning that we will see an increase in energy use per capita over the next 20 years.

The Base Case shows the greatest increase in demand in the transportation sector, which includes both business and government fleets, as well as personal automobile use. Increased demand for energy is also expected from all sectors of energy users, including industrial, commercial and residential consumers.

In addition to the "Base Case," the impact of a hypothetical "Price Shock" was also modeled, in order to measure the impacts on New Hampshire of a sudden and sustained rise in fossil fuel prices, as was seen in the late 1970's and early 1980's. This Price Shock scenario is not intended to be a prediction, but simply a tool to help New Hampshire understand the impacts such a rise in fossil fuel prices would have on the energy, economy and environment in New Hampshire. The full Base Case forecast is discussed in detail in Chapter 3.

1.2.4 Electricity Consumption in New Hampshire

One of the main realities for most states, including New Hampshire, is that its electricity market is part of a regional market. Changes in demand by New Hampshire energy users are responded to by changes in electric power production at the regional level, not necessary at the state level. These responses will in some cases influence generation from New Hampshire power plants, while in many cases they will not, as demand is met by plants outside the state. This is true both in the short term (in which existing electric power plants change their levels of generation) and in the long term (in which investors decide whether and when to construct new generating capacity). In the Base Case, electric generating capacity increases, with the addition of 1080 MW of gas combined cycle capacity and 280 MW of combustion turbines and the retirement 77.6 MW of biomass capacity. More details on the state's electricity use can be found in Chapters 3 and 6.

1.2.5 Natural Gas Consumption in New Hampshire

Natural gas arrives in New Hampshire via interstate pipelines, which are in turn supplied directly by wells or by specialized tanker ships. It is then delivered to industrial, commercial and residential customers through a series of supply distribution pipelines. In the Base Case scenario, consumption of natural gas is expected to increase dramatically over the next decades. Demand is predicted to grow from 86 trillion British Thermal Units (tBtu) in 2000 to over 200 tBtu in 2020. This growth, predicted at between 4% and 5% per year, is expected to occur at a fairly steady rate.

Absent the construction of a new commercial natural gas power plant beyond those expected to be online in 2002, existing capacity is sufficient to meet the anticipated needs of New Hampshire businesses and residents for the next decade. With the exception of facilities already permitted and under construction, no new large-scale users of natural gas are expected in the state, and the Energy2020 model does not show construction of any plants in New Hampshire for more than ten years. More details on the state's natural gas use can be found in Chapters 3 and 7.

1.2.6 Fuel Diversity in New Hampshire

The variety and proportions of energy sources used to power New Hampshire are referred to as "fuel diversity." By having a variety of energy sources available, the state can spread risk and opportunity across a wide variety of fuels, taking advantage of emerging technologies and in-state resources while buffering us from price swings for any one particular fuel type.

It is the energy policy of the State of New Hampshire that the needs of citizens and businesses be met while "…providing for the reliability and diversity of energy sources…" NH RSA 378:37. New Hampshire has long enjoyed a diverse mix of energy sources, and this has helped provide our consumers with some level of price stability over time.

Proponents of policies to increase fuel diversity note that having a variety of fuel sources available for energy needs – including electricity, transportation, heating and other uses – provides numerous benefits, including:

- Competition among different fuels to provide the least-cost energy to consumers, helping to lower overall prices;
- A hedge against significant price increases for any particular fuel type;
- An energy system that is less subject to exchange rate fluctuations and geopolitical uncertainties often associated with imported fuels;
- Encouraging emerging technologies to participate in the energy market, driving commercialization of renewable and more efficient fuel uses; and
- Encouraging the use of indigenous fuels as part of the energy mix, often with significant positive economic and environmental benefits for the local area as well as for the state as a whole.

New Hampshire currently produces electricity from a wide variety of fuel types, including natural gas, coal, oil, and nuclear. New Hampshire also produces electricity from alternative sources, including biomass, water (hydroelectric), and municipal solid waste. In order to understand some of the impacts of renewable energy upon the energy, environmental and economic future of New Hampshire, two scenarios were tested against the "Base Case":

- Retention of the wood-fired power plants after expiration of their rate orders; and
- Development of commercial scale wind farms in New Hampshire.

These two scenarios demonstrate the positive impacts that renewable power generation can have on New Hampshire, including significant benefits on local economies, a reduction in greenhouse gas (and other) emissions, and a stabilization of energy prices. However, renewable power often has difficulty competing directly in a competitive market, and the cost of public policies designed to support renewable power need to be carefully weighed against these benefits. More details on fuel diversity in the state can be found in Chapter 8.

1.2.7 Energy Efficiency and Conservation in New Hampshire

Energy efficiency has been widely recognized as the most cost-effective way to increase the reliability, safety, and security of our energy infrastructure. Lowering demand is the most economical way to avoid congestion problems, maintain stable prices, and minimize the environmental impacts of our energy use. It has been estimated that as much as 40-50% of the nation's anticipated load growth over the next two decades could be displaced through energy efficiency, pricing reforms, and load management programs. As a result, states around the country are investing in policies and programs to realize the energy, economic, and environmental benefits of energy efficiency.

New Hampshire, like most other states that have restructured their electric utilities, has recognized the value of energy efficiency and the role that it should play in a restructured marketplace. In response to state policy, New Hampshire electric utility customers can now take advantage of new statewide energy efficiency products and services. These "core" energy efficiency programs offered by utilities are a consistent set of innovative, statewide programs available to all New Hampshire ratepayers. The core programs will increase the availability of cost-effective energy-efficient measures and services, while providing economic and environmental benefits to the state. Similar energy efficiency programs are being established for users of natural gas.

One of the policy scenarios tested in the development of the New Hampshire Energy Plan is the continuation of these "core" programs for electricity users for three years after their current termination date of December 2003. The ENERGY 2020 model clearly demonstrates that extending the core energy efficiency programs would provide significant lasting benefits to New Hampshire's energy security, reliability, and economy, and environmental improvements for the state's residents and businesses. The economic benefits start immediately and persist for as long as the higher-efficiency devices and capital stocks are in place. The policy would also reduce the risk to residents and businesses posed by the possibility of a fuel price shock. More details on energy efficiency and conservation can be found in Chapter 9.

1.2.8 State of New Hampshire as an Energy Consumer

The government agencies of the State of New Hampshire constitute the largest energy user in the state. Because of this significant energy use, there are opportunities for the State to lower its energy costs, improve its efficiency, and serve as a leader in responsible energy use.

Recognizing this opportunity, the Legislature authorized funding for the position of State Energy Manager in 2001. The State modeled this position on the private sector, where most large corporate organizations have one individual that helps coordinate energy use throughout the company. The primary responsibility of the State Energy Manager is to serve as a "change agent" within state government, reformulating the way the state plans for, purchases, and consumes energy.

Under the leadership of Governor Shaheen, the State also instituted an innovative program to increase energy efficiency and cut energy costs at State buildings. The Building Energy Conservation Initiative (BECI) is a program to cut energy and water costs in more than 500 state buildings by up to $4 million annually through building upgrades and retrofits. BECI utilizes a "paid from savings" procedure known as "performance contracting" that allows current energy efficiency upgrades to be financed with future utility savings. This allows state agencies to perform energy retrofits and building upgrades that would otherwise not be funded through the capital appropriations process, using energy savings to pay back the cost. BECI requires that energy savings pay for a project within ten years. To date, two projects encompassing five buildings have delivered over $250,000 in annual energy savings to the state. BECI has been recognized by the U.S Environmental Protection Agency as a model for other states.

While a number of programs and activities have been developed to manage energy use by the State, there are opportunities to build upon these efforts and increase the effectiveness of this work. In addition to saving taxpayer money through better use of energy, the State can play a leadership role that will impact energy use by others. A detailed discussion of the State as Energy User can be found in Chapter 10.

1.3 Recommended Action Steps

The New Hampshire Energy Plan (NHEP) sets forth a number of recommendations for future action by the State of New Hampshire, based upon information developed through the energy planning process. Overall, these recommendations are designed to reduce energy costs, improve our energy infrastructure, increase the use of indigenous natural resources, enhance environmental quality and provide a process for future energy planning in New Hampshire. Each recommendation is summarized below; a complete discussion of each recommendation, as well as the background supporting this recommendation, can be found in the referenced chapters of the NHEP.

Some of these recommendations can be implemented immediately. Other recommendations may require more time or discussion in order to be fully implemented. In either case, we should begin the process of preparing to implement these action steps, which will enable the State to realize the benefits of these policy objectives as soon as practical.

1.3.1 Recommendations for Short-term Implementation

The following recommendations are opportunities that New Hampshire can and should implement within the next year. These recommendations build upon the work New Hampshire has already begun to improve its management of energy and energy policy.

1.3.1.1 Establish an Energy Planning Advisory Board

The energy planning process undertaken by the Governor's Office of Energy & Community Services engaged stakeholders in a productive dialogue about New Hampshire's energy future. The development of the NHEP provided opportunities for state agencies, legislators, energy users, energy companies, environmental organizations and concerned citizens to explore energy issues in a non-regulatory setting. The value of this dialogue was noted by many stakeholders and members of the public in meetings, public input sessions, and through written comments.

Building upon the foundation developed through the establishment of the NHEP, the State should continue to engage in public discussions, in neutral settings, on the state's energy future. The information and policies contained in the NHEP will need updating as more information becomes available, or as circumstances change.

The best way to accomplish this is to establish an on-going Energy Planning Advisory Board to meet on a regular basis to discuss energy policy and planning issues at the state level. The responsibilities of this committee should include strategic planning for New Hampshire's energy policies, including but not limited to:

- Supply and demand for energy resources,
- Transmission and distribution infrastructure for electricity and natural gas,
- Fuel diversity within the state and region,
- Supporting NH Department of Transportation's planning efforts,
- Deliverable fuels,
- Energy efficiency and conservation opportunities,
- The State's role as a major user of energy,
- The environmental impacts of energy generation, transmission and distribution,
- New Hampshire's role in regional energy issues.

The Board should regularly update the New Hampshire Energy Plan, in order to keep it a current and meaningful document. Revising the NHEP, or appropriate sections of the plan, every three years would allow for updates on a cycle appropriate for policy-making in New Hampshire.

The Energy Planning Advisory Board should be based upon the makeup of the current New Hampshire Energy Plan Executive Committee, which includes government leaders in the areas of energy policy, environmental protection, transportation, and economic development. While the Energy Planning Advisory Board should be comprised exclusively of representatives from state government, others should be encouraged to participate in the activities of the Board. Utilities, energy suppliers, energy users, environmental organizations, businesses, and others all have important perspectives on energy planning. The contributions

of these groups and individuals should be recognized in order to make the work of the Board most effective, and can be achieved through open public meetings, invited presentations on topics of interest to the committee, and public comment.

The Energy Planning Advisory Board should be supported by the Governor's Office of Energy and Community Services (ECS), to provide for appropriate professional and administrative assistance, as well as institutional memory. ECS has encouraged energy planning dialogue through the development of this Plan, and has the expertise necessary to continue this activity in a way that benefits the State and stakeholders. Increased involvement in energy planning is a logical next step for ECS, following successful restructuring agreements with the state's electrical utilities.

It should be noted that while ECS is the logical home for such a Board, there are factors that may make it a challenge for the office. As with other state agencies, resources at ECS are limited, and funding for the development of the NH Energy Plan was a one-time legislative allocation. While professional and administrative support can be provided by ECS, the Board may want to use modeling or other technical analysis, and there would be a cost associated with this. This is a challenge that any state agency would face in providing the important function of state energy planning.

1.3.1.2 Encourage Energy Efficiency in New Construction

As the State constructs new buildings or conducts substantial renovation of existing state government buildings, every effort should be made to fully account for the "life-cycle" cost of the building, and not simply the initial cost. Instead of considering only the cost of design and construction when costing a building, life-cycle accounting considers the long-term energy, maintenance, and other costs that are traditionally considered "operating expenses." It is often true that failure to make modest investments at the time of construction in order to keep a building's construction budget low results in inflated long-term expenses. This is particularly true of investments in energy efficiency, which may carry a higher initial cost but quickly pay for themselves through energy savings. By considering the "life-cycle" approach to building design, the State will position itself to reduce overall expenses associated with its new construction and reduce long-term energy use.

The State should also consider incorporating "performance contracting" (see discussion on BECI, section 10.2.2) into new building construction. Performance contracting is a mechanism by which an Energy Service Company (ESCO) implements energy cost saving building improvements. Unlike the traditional contracting process, the performance contractor assumes project performance risk to *guarantee* to the building owner (State) that energy savings will be sufficient to pay for the project costs. In basic terms, this means that efficiency upgrades are funded through energy savings, so that no increase in up-

front capital costs is required to implement energy cost saving measures in state buildings. More information on this recommendation can be found in Chapter 10.

1.3.1.3 Support Cost-Effective Statewide Energy Efficiency Programs

The electric energy efficiency programs funded through the Systems Benefit Charge (SBC) on electric bills can provide significant and ongoing benefits to the state. Investments in energy efficiency help reduce overall electric generation and associated emissions, reduce the state's reliance on imported fuel, lower long-term electricity prices, increase system reliability, and buffer the state from the effects of a potential fuel "price shock."

The least expensive energy plant is the one not built, and investments in energy efficiency help avoid the premature or unnecessary construction of new generating facilities. Programs that encourage investments in energy efficiency, such as the current "core programs," should continue to allow New Hampshire to realize their energy, economic and environmental benefits. The SBC has been widely recognized as the best approach to fund energy efficiency programs that will transform the market for these products, and fairly allocates expenses to ratepayers based upon their energy use.

However, in order to assure cost-effective use of money generated through the SBC, the state, utilities, consumers and other stakeholders should regularly evaluate the programs funded to ensure that they provide the necessary services to customers. While there may be ways to more efficiently deliver energy efficiency programs through a change in programmatic offerings or program administrators, there is no question that using the SBC to fund energy efficiency is a wise investment, and should be continued.

In addition, the state should continue to work with gas utilities to ensure that energy efficiency programs that they offer are cost effective and work with the electric core programs to the extent feasible to capture the efficiencies of collaboration. More information on this recommendation can be found in Chapter 9.

1.3.1.4 Purchase ENERGY STAR® Equipment for State Offices

To reduce energy costs and promote the importance of individual and corporate actions to reduce energy use, the State should commit to purchasing office equipment that achieves an ENERGY STAR® rating. ENERGY STAR® is a program that identifies products that meet or exceed premium levels of energy efficiency, making it easier for consumers to identify the most energy-efficient products in the marketplace. By purchasing and using products that meet the ENERGY STAR® standard, and assuring that the energy efficient features are utilized, the State can achieve meaningful energy savings. According to estimates prepared for the New England Governor's Conference, upgrading computers, copiers, printers, fax machines and scanners used by New Hampshire state agencies would result in annual energy savings of almost $70,000 and an annual reduction in carbon emissions of 1.2 million tons. This recommendation mirrors actions being taken

by New England governors and premiers in several Canadian provinces, coordinated in the United States by the New England Governor's Conference. More information is available in Chapter 10.

1.3.1.5 Convert to LED Traffic Lights

It is now widely recognized that simply changing traffic lights from incandescent bulbs to light emitting diode (LED) technology results in significant energy savings and pollution reductions, using 85% less energy than conventional traffic lights. As a result, the State should work to replace these lights, in cooperation with our neighboring states in the region, by 2007. It is estimated that making these changes will result in reductions totaling 1120.9 pounds of CO_2/yr. *per light* and would save roughly $58.40 in electricity costs *per light*, each year. More information on this recommendation can be found in Chapter 10.

1.3.2 Recommendations for Near-term Implementation

The following six recommendations can be implemented by the State of New Hampshire in the next two to three years. These recommendations provide new opportunities to improve the availability, efficiency and environmental impacts of energy in New Hampshire. However, in order for all of these recommendations to be implemented, the State of New Hampshire and key stakeholders need to begin discussions and planning aimed at implementing these policies and programs.

1.3.2.1 Establish a Renewable Portfolio Standard

A Renewable Portfolio Standard, or RPS, is a regulatory requirement that any supplier of electricity must derive a portion of that electricity from renewable resources. Renewable Portfolio Standards are currently used in several states to ensure that electricity generated from renewable sources is part of the state's energy mix. An RPS assures that all consumers of electricity contribute to the environmental and economic benefits provided by renewable energy generation, while providing a system that delivers renewable energy to consumers in a cost-efficient manner.

The establishment of an RPS guarantees some market for the generation of renewable power, and spreads the burden of "above-market" costs associated with renewable power to all ratepayers, based upon their energy consumption. By allowing different renewable generators and technologies to compete against one another, consumers have access to least-cost renewable power, encouraging renewable power generators to be as efficient as possible.

It is appropriate for the Legislature to fashion an RPS that meets all of our state's renewable energy goals: to help support our existing indigenous renewable generation such as wood and hydro; to encourage investments in new renewable power generation in the state; and allow us to benefit from the diversity,

reliability and economic benefits that come from clean power. Creating mechanisms that support renewable power also helps increase energy security and reduces our dependence on foreign oil. By enacting an RPS now, New Hampshire can help shape the environmental and energy future of the region, and recognize the benefits provided by renewable power. Before this is accomplished, however, a number of issues must be considered that will impact the implementation and success of such a program. These issues include:

- What is the appropriate definition of renewable power for purposes of an RPS, and how can this impact existing renewable generators and construction of new generation?
- What percentage of renewable power will each provider be required to purchase, and will this increase over time?
- What legal issues exist regarding electrical generation outside of New Hampshire participating in the state's RPS?
- What are the anticipated impacts on the retail price of electricity?

In a restructured electricity market, an RPS is the most efficient way to assure that existing renewable generation has the ability to compete, and that new renewable generation can be built. Allowing renewable generators the opportunity to compete against one another, with a guaranteed market for some fixed level of renewable generation, protects ratepayers while promoting environmental stewardship and energy security. More information on this recommendation can be found in Chapter 8.

1.3.2.2 Monitor and Develop Infrastructure for Natural Gas

As detailed in Chapter 6, natural gas will play an increasing role in New Hampshire's energy use. Both supply and demand for natural gas are predicted to rise steadily over the next decade and beyond. An increase in the use of gas, if it displaces the use of other fossil fuels, would reduce emissions in New Hampshire, and result in an even more diverse fuel supply than currently enjoyed by the state.

New Hampshire policy makers and regulators will need to carefully monitor the growth in natural gas use, and make certain that the infrastructure used to support natural gas delivery is sufficient to meet state needs. Current modeling shows that existing pipeline capacity is more than sufficient to meet demands over the next decade – the life of this energy plan. However, unforeseen events such as a new generation facility or a substantial increase in heavy manufacturing could cause demand in excess of the ability to provide natural gas.

New Hampshire should also consider ways to provide more customers with access to natural gas. Providing a choice for heating and other uses offers a more competitive marketplace, and enables more customers to make decisions based upon price, reliability, environmental impacts and other considerations. More information on this recommendation can be found in Chapter 7.

1.3.2.3 Enhance the Process for Siting Energy Facilities

When siting energy generation facilities, New Hampshire brings together several state agencies with overlapping jurisdiction to review and rule on applications. This approach, known as the Site Evaluation Committee (SEC), works well. However, the state needs to address how to approach projects that are not within the SEC's jurisdiction, including smaller projects, renewable generation, co-generation, and distributed generation. The SEC, working with the Energy Planning Advisory Board, should convene discussions with stakeholders to consider how to address the unique issues presented in the siting of new energy resources that are not typically within the jurisdiction of the Committee.

The SEC should also work to strengthen ties to the State's efforts to represent our interests at the regional and national level, perhaps by working with the PUC and the proposed Energy Planning Advisory Board to ensure that the State has the appropriate resources to participate regionally. The SEC should ensure that any regional siting committees, such as the NGA proposal for a Multistate Siting Entity discussed in Section 4.9, take into consideration the Committee's work. Similarly, the SEC should work to ensure that regional issues and planning are considered by the Committee in its deliberations on proposed projects. More information on this recommendation can be found in Chapter 4.

1.3.2.4 Strengthen State Energy Codes and Assist with Compliance

The adoption of modern building codes is one way the State can ensure that new construction meets certain levels of occupant safety and energy efficiency. As the State Building Codes Review Board moves forward, serious consideration should be given to adopting an energy code referred to as "ASHRAE 90.1 – 1999" for commercial and industrial buildings. This change would improve energy efficiency in new commercial and industrial construction, bring New Hampshire into compliance with pending changes to federal Department of Energy rules, and improve code enforcement due to clearer language in the new standard.

The State should also continue to pursue ways to help municipalities understand, value and enforce energy codes as part of building codes. Great strides are being made through a series of trainings offered statewide, which provide code officials an opportunity to learn about and discuss the energy code. More information on this recommendation can be found in Chapter 9.

1.3.2.5 Purchase "Green Cars" for the State Fleet

New Hampshire should strive for the most efficient, least polluting state vehicle fleet. One way to achieve this goal is to have the State purchase passenger vehicles that qualify for the New Hampshire Department of Environmental Service's "Green Label" designation. This designation, reserved for passenger vehicles that achieve 30 miles per gallon or better and meet a low-emission vehicle (LEV) standard, was

developed in partnership with the New Hampshire Auto Dealers Association to provide information to consumers. When such vehicles meet the needs of the agency purchasing the vehicle, the State should direct purchases toward these clean and efficient vehicles. The State should also expand its efforts to purchase "hybrid" vehicles, which combine traditional internal combustion engines with electric car technology to achieve great fuel efficiency. The purchase of passenger vehicles meeting the "green label" requirements will not only produce fuel cost savings over time, it will also reduce emissions and help support the market for efficient vehicles. More information on this recommendation can be found in Chapter 10.

1.3.2.6 Partner with Colleges and Universities for Energy Efficiency

New Hampshire is home to some of the top secondary educational institutions in the country, and the state university system is one of the largest users of energy in the state system. ECS currently works with the state universities to encourage investments in energy efficiency and renewable energy to allow these institutions to realize the economic, energy, environmental and educational benefits of these technologies. For example, the University of New Hampshire campus in Durham was recognized by the U.S. Department of Energy in 2002 for being among the top 5% of research universities nationally for its efficient use of energy. UNH is eager to share its successes and strategies with others seeking to reduce energy use, save money, and improve environmental quality.

In support of the recent Climate Change resolution approved by the New England Governors and Eastern Canadian Premiers, coordinated by the New England Governor's Conference, the State should take a leadership role in working with colleges and universities to promote energy efficiency and renewable energy technologies. This effort would serve three purposes: it would expand the number of entities starting to reduce their pollution through energy efficiency and renewables; it would serve as a tool for educating students about climate change issues; and it would focus student research on finding innovative and creative solutions for making these reductions. More information on this recommendation can be found in Chapter 10, and at the NEGC website, www.negc.org.

1.3.3 Recommendations for Long-term Implementation

The following recommendations provide New Hampshire with opportunities for continual improvement and even greater savings in the future. However, the Governor's Office of Energy & Community Services recognizes that these recommendations could take time to implement. These recommendations are offered to begin the dialogue to identify the action steps necessary to achieve these policy objectives.

1.3.3.1 Purchase Renewable Power for Use by the State

As a large user of electricity, the State of New Hampshire has the ability to significantly impact the electricity market through its purchasing decisions. In a restructured marketplace with customer choice, one way the State can encourage environmentally responsible power is to purchase electricity generated from renewable sources. By requiring that some percentage of the electricity that the State uses comes from renewable sources, the State can help create a market for renewable power.

New Hampshire should consider purchasing a percentage of its power from renewable generation. Doing so will demonstrate the commitment of state government to using its market power to encourage environmentally responsible electricity generation, and serve as an example for others. By assuring a market for some baseline level of renewable power, the state will encourage electricity suppliers to develop renewable power options available to other customers as well. The State could leverage its power in the marketplace through this method, and help create a market for renewable power at levels above what is generally offered.

It is expected that the purchase of renewable electricity will cost more than the purchase of fossil fuel power, and the State should obviously consider this increased cost when weighing what percentage of power to purchase from renewable generation. However, as a major consumer of electricity and the steward of our state's rich natural resources, the State should not miss this opportunity to use market-based, non-regulatory power to help shape New Hampshire's competitive electricity market. More information on this recommendation can be found in Chapter 10.

1.3.3.2 Use Biodiesel Fuel in the State Fleet

The State of New Hampshire owns roughly 1,500 trucks, many of them diesel. These diesel trucks are used by the State for a variety of functions, primarily public works and transportation. These vehicles use roughly 2.2 million gallons of diesel fuel annually. Particulate matter and other toxic pollutants from diesel emissions are among the most harmful of any transportation fuel, and contribute to public health problems including lung and heart disease, as well as cancer.

Some diesel emissions may be reduced through the use of biodiesel, allowing diesel engines to run on fuel wholly or partially derived from renewable, domestic feedstocks such as soybean oil. One of the great benefits of biodiesel is that it can be used in existing diesel vehicles, without any modifications to the diesel engine. This is in contrast to other emerging diesel technologies (often referred to as "clean diesel"), which require costly modifications to engines and emissions treatment systems, but yield even better emissions reduction.

New Hampshire can take a leadership role in the use of biodiesel in state vehicles. By doing so, the state will be helping to reduce emissions of sulfur, particulate matter and other harmful pollutants. Increased

use of biodiesel will also reduce dependency on imported fossil fuels, and support a market for agricultural products. If the pilot projects currently underway in New Hampshire provide positive results, the State should seriously consider transitioning to biodiesel in all of its diesel fleet, including passenger vehicles, trucks, and mobile generators. More information on this recommendation can be found in Chapter 10.

1.3.3.3 Use School Building Aid to Encourage Energy Efficiency

The State of New Hampshire invests between $25 and $30 million dollars each year in new school construction through direct aid to school districts. At present, school building aid requires that new construction or renovation comply with the state's energy code. School districts meet this standard by having their architect self-certify that the building meets the state's energy code. This code, while providing a minimum baseline for energy efficiency, does not incorporate some of the best practices and new design ideas that encourage truly energy efficient building design.

However, state aid for school construction provides an opportunity for the State to be a partner in new construction of schools, and to help local school districts go beyond the code and realize the many benefits of high performance schools, including lower operating costs, higher test scores, and better land use practices. "High performance school buildings" are schools that integrate healthy and productive learning space with energy efficiency, lower operating costs, and result in lower environmental impacts. High performance school buildings benefit students, teachers and taxpayers by providing an integrated approach to school design. Recent studies have shown a correlation between building design and learning success.

In order to ensure that New Hampshire students and taxpayers realize the many economic and environmental benefits of high performance schools, the State should continue to work with schools and municipalities to provide information and resources on the benefits, both educational and financial, of high performance building design. Part of this effort should focus on conducting and evaluating demonstration projects in New Hampshire, and sharing the results of these demonstration projects. In addition, the State should explore ways to use funding mechanisms available to it, including school building aid, to encourage the construction of high performance schools in New Hampshire. By utilizing this approach, the State can have more schools that are energy efficient, cheaper to operate, better places to learn, and have less impact on the environment. More information on this recommendation can be found in Chapter 10.