

**New Hampshire Climate Change Policy Task Force  
Draft Action Reports under Development**

**Government Leadership and Action (GLA)  
Working Group**

**Updated by NHDES  
September 8, 2008**

## Table of Contents

### **Government Leadership and Action (GLA)**

#### **GLA Goal 1 – Position State Government to Lead-by-Example**

- GLA Action 1.1 – Establish an Energy Management Unit
- GLA Action 1.2 – Establish an Energy Consumption and GHG Emissions Baseline Inventory for State Government
- GLA Action 1.3 – Establish a Self-Sustaining Fund for Energy Efficiency Projects in State Government
- GLA Action 1.4 – Provide for the Establishment of Local Energy Commissions
- GLA Action 1.5 – Include Climate Change Adaptation and Mitigation in Programs and Planning

#### **GLA Goal 2 – Reduce Energy Use in Government Buildings**

- GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
- GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
- GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
- GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
- GLA Action 2.5 – Implement Energy Reduction Measures for State Facilities
- GLA Action 2.6 – Increase CHPS Funding for Public Schools

#### **GLA Goal 3 – Increase Use of Renewable Energy Resources and Energy-Efficient Technologies**

- GLA Action 3.1 – Encourage Renewable Energy and Energy Efficiency Projects for Existing State-Owned Buildings and Facilities
- GLA Action 3.2 – Use Renewables for Building Heat and Hot Water

#### **GLA- Goal 4 – Reduce Emissions through Vehicle Choice and Technology**

- GLA Action 4.1 – Revise State Vehicle Procurement Policy
  - GLA Action 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet
  - GLA Action 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies
- GLA Action 4.2 – Reduce Emissions from Existing Vehicles during State Activities
  - GLA Action 4.2.1 – Reduce Diesel Particulate Emissions through Use of Retrofit Devices
  - GLA Action 4.2.2 – Increase Fuel Economy through Improved Vehicle Maintenance and Technology

#### **GLA Goal 5 – Reduce Fuel Consumption by State Fleet**

- GLA Action 5.1 – Modify Driver Behavior in State Vehicles
  - GLA Action 5.1.1 – Implement a State Vehicle Idling Policy
  - GLA Action 5.1.2 – Promote Improved Driver Habits
- GLA Action 5.2 – Reduce State Business-Related Travel
- GLA Action 5.3 – Apply Smart Growth Principles to State Office Locations

#### **GLA Goal 6 – Reduce Fuel Consumption by State Employee Vehicles**

- GLA Action 6.1 – Promote Employee Travel Reductions

## GLA Action 1.1 – Establish an Energy Management Unit

### Summary

New Hampshire state government should establish an Energy Management Unit (EMU) charged with implementing and overseeing the recommendations of the Climate Change Policy Task Force as well as the Governor's Energy Efficiency Initiative. This unit would be responsible for tracking state government efforts to reduce energy use and costs, reduce greenhouse gases, 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.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): This entity would provide a new or strengthened organizational capacity which may be required to efficiently and broadly implement the energy and cost saving recommendations throughout state government as identified by the Climate Change Policy Task Force and the Governor's Energy Efficiency Initiative<sup>1</sup>.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: Requires establishment of new positions or adding new responsibilities and strengthened authorities to existing positions. This will require legislative implementation. The positions could be phased in as resources become available. Establishing a project manager for the state is the highest priority.
  - b. *Resources*: Requires four new positions or restructuring of existing positions. It also requires that State agencies adopt and implement consistent document and reporting procedures for energy purchases and consumption, and equipment purchases and usage.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Hiring freeze – state budget implications, shifting staff resources from existing programs.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties responsible for implementation*: Department of Administrative Services, the Office of Energy and Planning or other state agencies as well as the legislature.
  - b. *Parties paying for implementation*: Taxpayers
  - c. *Parties benefiting from implementation*: Taxpayers
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): State energy manager and energy coordinators; State purchasing agent: In November 2002, The New Hampshire Energy Plan was issued by the ECS, which was commissioned by the state legislature and was intended to provide policymakers with guidance on key energy issues the state would face over the course of ten years. In an update by DES and OEP in 2005, the status of the recommended actions was reviewed and further recommendations for short, mid, and long-term implementation were posed. The NH General Court had enacted SB 443 into law to create a temporary Energy Planning Advisory Board in 2004.

i. \_\_\_\_\_  
<sup>1</sup> In July 2005, Governor Lynch issued an Executive Order calling upon all state agencies to reduce energy use in state facilities and in state vehicles. The initiative has led to a database to track energy consumption and expenditures for all state facilities, and staff are actively exploring opportunities to reduce costs by pooling demand for electricity, natural gas, heating oil and other fuels (<http://www.sunspot.admin.state.nh.us/Energysystem/>).

5. Complimentary Policies:

- a. *Existing*: See above.
- b. *Proposed*:
  - HB 1412, establishing a commission to study contracting with a state fleet manager;
  - SB 419, HB 1561 establishing new Energy Boards.

6. Time frame for Implementation: 2008-2009 Legislative Session

7. Anticipated Timeframe of Outcome: Short-term (2012)

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term: Unknown
- b. Mid-term: Unknown
- c. Long-term: Unknown

2. Economic Effects

- a. Costs:
  - i. Short term: Creating four new positions at labor grade 20 would cost approximately \$200,000-250,000; funding a project manager with an engineering degree would require greater resources.
  - ii. Mid-term:
  - iii. Long term: Salary and benefit costs would be expected to increase
- b. Savings: Program savings are unknown at this time. Demonstrated savings and cost performance measures would be key to implementing a new energy management unit.

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: Supporting renewables and conservation lowers the amount of greenhouse gases emitted into the atmosphere, reduces the load on our aging and maximized infrastructure, and creates a demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
  - a. *Technical*: Significant implementation challenge in creating meaningful performance goals and tracking measures. However, meaningful implementation of CCTF recommendations, and resulting energy and cost savings, require a more robust management and oversight effort that currently exists in state government.
  - b. *Economic*: There may be significant challenges in the state budget process.
  - c. *Statutory/regulatory*: Not difficult
  - d. *Social*:
5. Other Factors of Note:
6. Level of Group Interest:
7. References:

DRAFT

## GLA Action 1.2 – Establish an Energy Consumption and GHG Baseline Inventory for State Government

### Summary

New Hampshire should establish a baseline inventory of energy consumption and greenhouse gas (GHG) emissions for state government for the year 2005. This baseline inventory would assist in identifying opportunities having the greatest potential to reduce state government's energy consumption and greenhouse gas emissions. The baseline inventory would also provide a benchmark which the state could use to track progress in specific energy efficiency and renewable energy projects.

### Program Description

1. Mechanism (i.e., how the policy or program achieves the desired result): The baseline inventory would facilitate understanding of the types and amounts of energy used by state government activities. The inventory would include a profile of the specific types and sources of energy as well as the amounts consumed on a quarterly and annual basis. The baseline data could be analyzed to identify the opportunities within each agency or across all of state government to achieve rapid increases in energy efficiency and reductions in GHG emissions as well as to guide the development of programs and policies to achieve larger reductions over the long term. This baseline could also be used as a benchmark to which the state's goals are pegged and would enable progress to be measured in the years ahead.
2. Implementation Plan (i.e., how to implement the specific policy or program)
  - a. *Method of Establishment (e.g., legislation, executive order)*: This would be a work product of the Energy Management Unit
  - b. *Resources*: Staff/personnel to collect the data and perform QA/QC, perform necessary analyses and generate regular reports.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: There may be a need to establish a uniform data collection and reporting protocol for all State agencies in order to enable rapid integration of all data into the database.
3. Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.)
  - a. *Parties Responsible for Implementation*: Department of Administrative Services, the Office of Energy and Planning and the Department of Environmental Services.
  - b. *Parties Paying for Implementation*: All State Agencies and Departments
  - c. *Parties Benefiting from Implementation*: Tax Payers and all residents.
4. Related Existing Policies and Programs (i.e., those that address similar issues without interacting):
5. Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):
  - a. *Existing*:
  - b. *Proposed*: All other GLA actions.
6. Timeframe for Implementation: Immediate
7. Anticipated Timeframe of Outcome: Immediate

## Program Evaluation

### 1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012): Zero
- b. Mid-term (2025): As measured by implementation/actions
- c. Long-term (2050): Sustained reductions from energy efficiency measures

### 2. Economic Effects

#### a. Costs:

- i. Short-term (2012): Staff time to gather data and calculate emissions
- ii. Mid-term (2025): Staff time for annual emissions calculations
- iii. Long-term (2050): Same as mid-term

#### b. Savings:

- i. Short-term (2012):
- ii. Mid-term (2025):
- iii. Long-term (2050):

### 3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.  
*Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

### 4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

- a. *Technical*: The measure should be easily implemented as the necessary tools and resources exist and can be accessed. However, there may be different tracking and recording methodologies and storage formats that would have to be addressed.
- b. *Economic*: Most cost is related to staff time with some equipment and software costs. This Action will support the reduction in energy consumption and GHG emissions and there may be a net cost savings associated with many of the actions that result.
- c. *Statutory/Regulatory*: Once the EMU is established there should be no barriers.
- d. *Social*:

### 5. Other Factors of Note:

6. Level of Group Interest: High

### 7. References:

## GLA Action 1.3 – Establish a Self-Sustaining Fund for Energy Efficiency Projects in State Government

### Summary

New Hampshire should create a non-lapsing Energy Efficiency Fund, overseen by the Director of Plant & Property Management and State Energy Manager. 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 allocated proportionally 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, Plant & Property, to administer the distribution of these funds, consistent procedures could be maintained for the benefit of small and large agencies alike.

### Program Description

1. Mechanism (i.e., how the policy or program achieves the desired result): A non-lapsing Energy Efficiency Fund supported by monies equal to 2 percent of each agency's prior-year utility budget. The State Energy Manager would provide oversight of the distribution of funds and would limit agencies to their allowed shares. Funds would be applied to offset the costs of the agencies' energy conservation efforts. Guidelines would be established for analyzing expected financial impacts, including payback calculations, prior to distribution of funds.
2. Implementation Plan (i.e., how to implement the specific policy or program)
  - a. *Method of Establishment (e.g., legislation, executive order)*: Legislation, January 2009
  - b. *Resources Required*: Present approximation is \$420,000 (2 percent of \$21 million)
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: The current fiscal environment may make setting aside monies for a new fund difficult at a time when department heads are being asked to make budget cuts.
3. Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.)
  - a. *Parties Responsible for Implementation*: Director of Plant & Property and State Energy Manager, unless or until a State Energy Management Unit (EMU) is formed and becomes operational.
  - b. *Parties Paying for Implementation*: New Hampshire taxpayers
  - c. *Parties Benefiting from Implementation*: Any state agency that wants to invest in energy efficiency projects; NH taxpayers.
4. Related Existing Policies and Programs (i.e., those that address similar issues without interacting): RSA 21-I: 19, allowing for participation in energy-saving performance contracts.
5. Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):
  - a. *Existing*: RSA 21-I: 19, allowing for participation in energy-saving performance contracts.
  - b. *Proposed*:
    - GLA Action 1.1 – Establish an Energy Management Unit.
    - HB 1647 proposes the establishment of an Energy Efficiency Fund with monies received for the participation of state agencies in demand response programs advocated by ISO-New England. State facilities that sign up will agree to a certain reduction of power use during power emergency days called by ISO-NE. This effort helps the stability of the electrical grid during those peak summer days and lessens the need for emergency use of generators. Participating agencies are paid whether emergencies are called or not. In lieu of these payments going to the

General Fund, this bill would direct the payments to this new Energy Efficiency Fund with oversight by the Dir. of Plant & Property and State Energy Manager. If the bill passes, monies from this fund could then be requested by participating agencies to pay for energy efficiency projects/contracts and for reimbursement for expenses accrued for demand response program expenses. The GLA working group would expand this fund as described in Program Description Mechanism.

6. Timeframe for Implementation: July 2009
7. Anticipated Timeframe of Outcome: Short-term and ongoing.

#### Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions
  - a. Short-term (2012)
  - b. Mid-term (2025)
  - c. Long-term (2050)
2. Economic Effects
  - a. Costs:
    - i. Short-term (2012)
    - ii. Mid-term (2025)
    - iii. Long-term (2050)
  - b. Savings:
    - i. Short-term (2012)
    - ii. Mid-term (2025)
    - iii. Long-term (2050)
3. Other Benefits/Impacts:
  - a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
  - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
  - c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
  - d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
  - a. *Technical*: There should be no technical barriers to implementing this action.

- b. *Economic:* Due to the current fiscal limitations the funding to establish and maintain the fund may be difficult to set aside, even with the short-term payback associated with much energy efficiency actions.
- c. *Statutory/Regulatory:* Once the EMU is established there should be no barriers.
- d. *Social:*

5. Other Factors of Note: By not implementing such a program, State agencies will continue to consume energy at the present levels and at a cost affected by inflation at a rate greater than 2% each year.

6. Level of Group Interest: High

7. References:

Draft

## GLA Action 1.4 – Provide for the Establishment of Local Energy Commissions

### Summary

New Hampshire should support the newly forming Local Energy Committees (LECs) in municipalities around the state by providing the statutory and programmatic resources needed to make these committees a working part of town governance. In March 2007, 164 New Hampshire municipalities passed a historic Climate Resolution that called on state legislators, the New Hampshire congressional delegation, and presidential candidates to address climate change. The resolution also called for the establishment of LECs to address the greenhouse gas emissions associated with the municipalities' activities. Since that time, nearly 100 cities and towns have established Local Energy Committees. The State of New Hampshire can support this groundswell of civic action by:

- Pass legislation that authorizes municipalities to establish Energy Commissions and grants specific authority to them. The legislation would serve to formalize the role of those commissions in municipal government and set up a standard framework outlining their power and the goals to achieve; and
- Supporting the capabilities of regional planning commissions and state agencies to assist towns in inventorying their energy use and GHG emissions and implementing GHG reduction plans.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The proposed action would generate local involvement in energy policy and help effect true reductions in energy consumption and CO<sub>2</sub> emissions. It would allow residents to set up municipal commissions dedicated to achieving energy efficiency and conservation. Faced with the daunting task of curbing the tide of climate change, New Hampshire citizens are seeking local means by which to do their part. The local energy commissions would serve as conduits through which residents could have positive and meaningful impacts in their own communities.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: The NH legislature will need to pass legislation in order to amend RSA 674 and grant NH towns the authority to establish formal energy committees with specific authority. An inherent relationship exists with LEC's and local planning and zoning boards, which should be considered when crafting legislation to amend RSA's such as RSA 672 and RSA 674. Once the necessary RSA's are amended, each town will be responsible for establishing their communities Energy Commission.

*Note:* Legislation was recently passed that allows municipalities to create an Energy Chapter to the communities Master Plan. This further supports the connection between energy planning and the local planning board/department in addressing local energy concerns.
  - b. *Resources Required*: Financial support at the state level to RPC's, or enhanced support at relevant state agencies will assist Energy Committees during the creation and start-up operations. At least one staff member at each RPC, along with at least one staff member at a determined state agency should be designated to help support and answer questions of communities opting to create an Energy Committee.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Potential barriers arise if the Energy Committees are not given enough authority to oversee and make weighted recommendations to the local governing bodies regarding energy conservation, sustainable design and energy generation. This barrier can be corrected through a provision within the enabling statute directly stating the Committee's jurisdiction and authority. Otherwise, Committee recommendations may fall on deaf ears. An additional barrier will evolve in regards to appropriate funding provided to RPC's to support the various needs LEC's may request.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation:* The principal parties responsible for implementation are the NH Legislature and the individual municipalities. Additionally, RPC's will play a significant support role for the Commissions during the creation phase.
  - b. *Parties Paying for Implementation:* In respect to the Energy Committees, since committees are volunteer based, the payments for implementation would be largely reserved to some staff, office and copying support through the municipality. In regards to RPC support payments, state resources may need to be applied to help support that particular role within the RPC's.
  - c. *Parties Benefiting from Implementation:* Beneficiaries of these committees include:
    - i. Local residents and municipalities through programs created by the Energy Committees or the RPC's;
    - ii. The community and municipality through energy inventories of municipal buildings aimed at identifying and reducing energy costs found within those facilities;
    - iii. Local businesses and industry seeking assistance in reducing energy consumption and their (local and global) carbon footprint; and
    - iv. Other municipal committees and boards seeking support in sustainable energy measures.
4. Related Existing Policies and Programs: Utilities programs that provide assistance with electricity use; planning commissions provide assistance to member towns with transportation planning, Master Plans, Hazardous Material Plans, Open Space Plans, and a host of other local land use regulatory components
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
6. Timeframe for Implementation: 2009
7. Anticipated Timeframe of Outcome: Typically one year elapses from analysis of an inventory to adoption of a municipal energy plan. Upon the adoption of the energy plan a community would likely see substantial progress within three to five years. Significant energy consumption and emission reductions (on the realm of 20, 30, or 40% reductions) for municipalities would likely be seen within five to seven years.

### Program Evaluation

#### 1. Estimated CO<sub>2</sub> Emission Reduction:

- a. Short-term (2012): Unknown\*
- b. Mid-term (2025): Unknown\*
- c. Long-term (2050): Unknown\*

\*Because of the uncertainty associated with the types of programs and efforts each Energy Committee and RPC will conduct, the estimated CO<sub>2</sub> emissions reductions are currently unknown. There are, however, endless opportunities for substantial emissions reductions within municipal buildings, local school facilities, and the greater community as a whole. Nevertheless, it is fairly safe to say that with the formation of an Energy Committee and additional assistance and support from a communities RPC, emission reductions for individual communities could well exceed 20-30%.

#### 2. Economic:

- a. Costs: Dependant on level of support desired for RPC's and State Agencies to assist LEC's
- b. Savings: Significant savings could be seen at the municipal level in terms of energy savings for municipal facilities. Additionally, education provided by LEC's to the broader community regarding building energy efficiency can make the difference for some small businesses between being able to whether escalated energy costs and having to close their doors.

3. Other Benefits/Impacts:

- a. *Environmental*: On-site energy conservation/sustainable generation will help reduce the overall carbon footprint of specific buildings, the municipality, and the overall community. Additionally, this reduced energy consumption helps reduce the overall impact of energy consumption within New Hampshire and the country as a whole.
- b. *Health*: Reduced health risks associated to acute illness such as asthmatic reactions to unhealthy air quality generated through power plant generators. The reduction of energy demand will help reduce the frequency of these health risks.
- c. *Social*: Increased awareness and implementation of energy saving efforts through increased public participation and education. Increased mobilization of concerned state residents regarding climate change and the potential resulting impacts faced to New Hampshire. A potential impact to a community may be slight upfront costs related to innovative energy upgrades and generation systems.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Technical obstacles may include learning curves associated with energy auditing and facility upgrades
- b. *Economic*: Economic opportunities will be seen with the overall energy cost reductions after making energy upgrades. Economic challenges include the initial upfront costs associated with energy upgrades.
- c. *Statutory/Regulatory*:
- d. *Social*: Social challenges may occur regarding the level of expertise found on LEC's. This variation in knowledge lends more weight to the need for dedicated expertise at the RPC and state agency levels. Continued challenges with education to communities will also likely continue.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

## GLA Action 1.5 – Include Climate Change Adaptation and Mitigation in Programs and Planning

### Summary

New Hampshire should adopt a policy that requires climate change adaptation and mitigation to be incorporated by each state agency into all of the agency's planning and programmatic activities. Climate change has impacts that could affect the entire spectrum of activities (e.g., economic, recreational, agricultural) conducted within the state. At the same time, the vast majority of activities in New Hampshire are contributing to climate change in large and small ways. Because the state has the capacity to influence all these activities regardless of origin – governmental, commercial, residential, or industrial – New Hampshire's government agencies should be proactive in seeking solutions to climate change. A logical starting point is to require consideration of climate change in all state planning and programming functions.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): By incorporating climate change mitigation and adaptation into all of its planning and programming activities, the state can institutionalize climate change action and distribute responsibility to implement recommended actions across state government. The state's proactive response to climate change will affect both governmental and non-governmental interests and will help to engender climate change action as a necessary and normal part of the New Hampshire way of life.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: Executive Order
  - b. *Resources Required*: A broad education and outreach campaign may be required to increase the awareness of climate change science and impacts with State agencies and staff. A central body may be required to provide guidance to the State agencies.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Resistance to change and resource limitation may be issues to consider.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: All State agencies and the governor's office
  - b. *Parties Paying for Implementation*: State agencies and ultimately the tax payers
  - c. *Parties Benefiting from Implementation*: All state residents.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):  
The State Development Plan contains reference to climate change
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. *Existing*:
  - b. *Proposed*: All Adaptation working group actions, especially ADP Action 7 – Establish a Permanent Climate Change Advisory Council
6. Timeframe for Implementation: Immediate
7. Anticipated Timeframe of Outcome: Immediate

### Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions
  - a. Short-term (2012): N/Q
  - b. Mid-term (2025)

c. Long-term (2050)

2. Economic Effects

a. Costs:

- i. Short-term (2012): N/Q
- ii. Mid-term (2025)
- iii. Long-term (2050)

b. Savings:

- i. Short-term (2012): N/Q
- ii. Mid-term (2025)
- iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Integrating climate change into every aspect of government operations will increase the overall security of the state by increasing the stability of the energy supplies and reducing the affect that climate change impacts will have on our communities.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There may be some barriers to implementation as the required data for future infrastructure may need to be developed to account for the changing climate and associate altered precipitation patterns.
- b. *Economic*: the cost outside the development of updated information may be minimal as it would be incorporated into existing procedures and programs.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

## GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations

### Summary

New Hampshire should adopt aggressive building and energy code requirements for all construction and renovation of state-owned facilities. Accordingly, the state should set an immediate target of 30 percent greater energy efficiency than the existing State Energy Code. This requirement should extend to all building projects receiving state funding (e.g., state facilities, with the possible exception of local schools). Over the longer term, the state should set additional targets as follows:

- By 2015, mandate that all construction subject to the policy be designed to exceed existing code by 40 percent, or reduce energy use on a kBtu /sq ft basis by a similar amount;
- By 2025, require that all construction receive LEED silver certification through the U.S. Green Buildings Council (USGBC), or reduce energy use on a kBtu /sq ft basis by 50 percent, whichever is more stringent.

To achieve these goals, the state should provide education and outreach to cities and towns, to the NH Department of Education, and other appropriate entities, to assist them with understanding the new standards and the benefits they would provide. In the case of schools, rather than impose a mandate, it would be more effective to increase the state's CHPS bonus from 3 percent to 5 percent as an incentive to entice schools to meet the higher standards.

### Program Description

#### 1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Current state policy requires that new construction and major renovations projects exceed existing State Energy Code by 20 percent. This standard satisfies the mid-level criteria for Leadership in Energy and Environmental Design (LEED) – Energy & Atmosphere Section. Past projects have shown that a more stringent level of efficiency may be in order. Because both energy codes and LEED criteria are changing quite frequently, an alternate solution would be to set targets of total energy usage in buildings on a kBtu/sq/ft/yr basis. Energy codes and criteria vary considerably by building type, so the goals should be set by building type as well.

Before new construction or major renovation takes place, a calculation should be made to assess a building's current kBtu/sq/ft/yr usage based on actual consumption or building design code. Improvements would begin with an immediate target of 30 percent reduction in energy usage. The target reductions would increase to 40 percent by 2015 and to 50 percent by 2025, which the building's architect and contractor would be expected to meet. Targets would vary by building type (*i.e., warehouse, office building, elementary school, etc*), and a chart would be prepared to aid this process. Once a project is completed, both energy modeling and actual data collection would be performed to ensure that the applicable standards have in fact been met.

#### 2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Create a working group to bring existing Code, LEED criteria, and kbtu/sq/ft/yr into meaningful congruence in a table by building type. Circulate these goals and then implement legislation or rules whichever is appropriate to establish these for all state building construction.
- b. *Resources Required*: Funding to cover the costs associated with any incremental increases in first costs.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding for the costs associated with upgrades may not be available in current State fiscal environment. There may also be a resistance to change.

#### 3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: Director of Plant & Property, the State Energy Manager, and the Energy Management Unit (to be formed).

- b. *Parties Paying for Implementation:* New Hampshire taxpayers.
  - c. *Parties Benefiting from Implementation:* Any state agency involved in a renovation or construction project; New Hampshire taxpayers.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
- a. *Existing:*
  - b. *Proposed:*
    - GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
    - GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction
    - RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
    - RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
    - RCI Action 1.4A – Upgrade Building Energy Codes
    - RCI Action 1.4B – Improve Building Energy Code Compliance
6. Timeframe for Implementation: Immediate
7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions:
- Mandate that by 2012, all new construction and renovation (0.05% building turnover rate) must be designed to exceed current energy code 20% according to the exec order, enforced with >80% compliance, model 6.6% (not exceeding code) and 8% energy reductions (code exceeded 20%).
  - After 2025, all new construction must receive LEED silver certification through the U.S. Green Buildings Council (USGBC) reducing the overall energy use by 32% from the CBECS average of 91 kBtu/SF.

<b>CO2 Reductions (MTCO2eq/yr):</b>		
	6.6% reduction	8% reduction
2012	21	26
2025	91	94
2050	91	94

2. Economic Effects
- a. Costs:
    - i. Short-term (2012):
    - ii. Mid-term (2025)
    - iii. Long-term (2050)
  - b. Savings:
    - i. Short-term (2012):
    - ii. Mid-term (2025)
    - iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There should be no technical barriers to implementing this action.
- b. *Economic*: Due to the current fiscal limitations there may be resistance to the slight incremental first costs associated with higher efficiency buildings, even with the short-term payback and long-term avoided costs associated with many energy efficiency actions.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

## GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings

### Summary

New Hampshire should develop a set of policies to increase the energy efficiency of the existing building stock occupied by state agencies, including both state-owned and leased properties. The policies would include the establishment of criteria with which all existing state-owned buildings would need to comply as well as criteria specific to leased space. Additional policies should be established to ensure that the builds are continually recommissioned in order to realize any and all reasonable efficiency gains throughout the remaining life or occupancy of a space.

### Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* The existing state-occupied building stock may be operating at a low level of energy efficiency and consuming larger amounts of energy than necessary. This situation may be due to less stringent codes that the buildings were designed to meet or to the gradual degradation of efficiencies resulting from the aging of facilities and equipment. Reduced efficiencies could also be caused by diminished system integration resulting from altered equipment settings (e.g., adjustments to HVAC equipment that were not reset).

To address this problem, efficiency criteria such as EPA's Energy Star rating system should be established for all state-owned facilities and translated into a desired kBtu/sq/ft/yr thermal usage number. The target selected should take into account the energy efficiency associated with the code for new and renovated state buildings and should exceed the targeted efficiency rating of existing commercial space in the private sector.

All state buildings should be benchmarked to determine their energy efficiency ratings. For the Energy Star program, those buildings achieving a rating in the 75th percentile or better would be entitled to Energy Star status. For those buildings not meeting the desired specifications, a series of management and capital improvement projects should be developed to provide retrofits or upgrades. A financial model should be run on the various alternatives to establish which ones are most cost-effective and to enable prioritization of projects. The full gamut of state buildings should then be ranked by department to give a clear indication of where energy efficiency improvements should start. All buildings should be upgraded within 10 years, beginning with the least efficient.

The state should additionally develop a policy of leasing only Energy Star or better-rated space. This policy would provide an incentive for private building owners to incorporate energy efficiency into their leased spaces. The state should require all landlords that sign *Gross Leases* to supply the occupying agencies with copies of utility bills for their review. This measure would help to ensure that reductions in energy use by state employees in leased space are being reflected in cost savings to the state.

To maintain optimum operating efficiency in existing state facilities, the state should develop a policy for periodic re-commissioning of buildings. Re-commissioning (or continuous commissioning) is a systematic process to make sure that a building performs in accordance with the design intent, contract documents, and the owner's operational needs. Over time, routine maintenance may not be performed at intervals needed to keep building systems operating at optimal energy efficiency. By re-commissioning buildings on a regular schedule, each building's energy systems can be maintained at their highest levels of efficiency while providing the highest degree of integration among related system components. The initial re-commissioning schedule should also include "retro-commissioning," an independent process that takes place after construction for buildings not previously commissioned.

2. *Implementation Plan (i.e., how to implement the specific policy or program):*
  - a. *Method of Establishment (e.g., legislation, executive order):* Create a working group to bring develop a stringent efficiency rating for existing state-owned buildings and leased space, expressed in kbtu/sq/ft/yr as well as a recommissioning schedule for all State facilities. These goals will be circulated and then the legislation or rules will be implemented as appropriate to establish these for all state building construction.

- b. *Resources Required*: Funding to cover the costs associated with any incremental increases in first costs.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding for the costs associated with upgrades may not be available in current State fiscal environment. There may also be a resistance to change.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
- a. *Parties Responsible for Implementation*: Dir. of Plant & Property & the State Energy Manager and the Energy Management Unit (to be formed).
  - b. *Parties Paying for Implementation*: NH taxpayers
  - c. *Parties Benefiting from Implementation*: Any state agency occupying existing state-owned facilities which are not scheduled for renovation as well as NH taxpayers.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
- a. Existing
  - b. Proposed:
    - GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
    - GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction
    - RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
    - RCI Action 1.3 – Maximize Efficiency in Existing Commercial, Industrial, and Municipal Buildings
    - RCI Action 1.4A – Upgrade Building Energy Codes
    - RCI Action 1.4B – Improve Building Energy Code Compliance
6. Timeframe for Implementation: Immediate
7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions
- Require state buildings to reduce energy use by 10% by 2012 according to the exec order.
  - Require state buildings to achieve an energy star rating of 75, increasing efficiency by 20%, by 2015.
  - Require state buildings to achieve an energy star rating of 95, increasing efficiency by 50%, by 2030.

<b>CO2 Reductions:</b>	
	MTCO <sub>2</sub> eq/year
2012	6,268
2025	12,536
2050	31,340

2. Economic Effects
- a. Costs:
    - i. Short-term (2012):
    - ii. Mid-term (2025)

iii. Long-term (2050)

b. Savings:

i. Short-term (2012):

ii. Mid-term (2025)

iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There should be no technical barriers to implementing this action.
- b. *Economic*: Due to the current fiscal limitations the funding to establish and maintain the fund may be difficult to set aside, even with the short-term payback associated with much energy efficiency actions.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- US DOE – Energy Efficiency and Renewable Energy – Commercial Buildings – Commissioning, <http://www1.eere.energy.gov/buildings/commercial/commissioning.html>.

## GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies

### Summary

Current state policy requires all electronic equipment and appliances purchased or leased for use in state buildings to be Energy Star certified or better. This policy should be expanded and more widely implemented as a way to provide energy savings and reduce greenhouse gas emissions in state government.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The proposed action would revise state procurement policies to ensure improved power efficiency and reduced energy consumption of computers, other office equipment, and appliances used in state buildings via the requirement of Energy Star certification. This action would apply to products not covered elsewhere by energy efficiency criteria in new construction, renovation, and retrofit projects.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: The current state policy, established by Executive Order, requires all purchases for office equipment, appliances, lighting, and other building components to be Energy Star compliant. (See the Energy Star Products & Equipment Procurement Policy.) The policy could be revised to require purchases to meet the best energy efficiency standards available at the time, including Energy Star, Climate Savers, or other. The state should also join the Climate Savers Computing Initiative, lead by the National Governor’s Association (NGA). The initiative is a nonprofit organization dedicated to promoting smart technologies that can improve the power efficiency and reduce the energy consumption of computers.
  - b. *Resources Required*: There is currently no oversight for ensuring that smaller purchases such as field purchase orders are complying with current policy, and energy and monetary savings are not currently being tracked. The establishment of an Energy Management Unit could help ensure compliance with the policy and measure its effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: None
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: Department of Administrative Services – Purchasing
  - b. *Parties Paying for Implementation*: NH taxpayers (for establishment of the Energy Management Unit)
  - c. *Parties Benefiting from Implementation*: The state (cost savings in energy use reductions); NH taxpayers
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): New Hampshire state government has signed on to the State Electronics Challenge (a regional off shoot of the Federal Electronics Challenge at <http://stateelectronicschallenge.net/>). The challenge for New Hampshire includes 3 components: Acquisition & Procurement Activities, Operation & Maintenance Activities, and End-of-Life Management Activities.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. *Existing*:
  - b. *Proposed*:
    - GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
    - GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction
    - RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings

- RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
- RCI Action 1.4A – Upgrade Building Energy Codes
- RCI Action 1.4B – Improve Building Energy Code Compliance

6. Timeframe for Implementation: Immediate

7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions:

- Require state buildings to reduce energy use by 10% by 2012 according to the exec order.
- Require state buildings to phase in energy star office equipment, 20% each year starting in 2010, reducing energy use by 925,000kWh/year by 2015
- Require state buildings to phase in energy star refrigerators, 1% each year starting in 2010, reducing energy use from refrigerators by 15% by 2025.
- Require state buildings to phase in efficient lighting by 2010, 7.2% replacement per year, reducing energy use from lighting by 72% by 2020.

<b>CO2 Reductions:</b>	
	MTCO <sub>2</sub> eq/year
2012	4,976
2025	12,941
2050	12,941

2. Economic Effects

a. Costs:

- i. Short-term (2012)
- ii. Mid-term (2025)
- iii. Long-term (2050)

b. Savings:

- i. Short-term (2012)
- ii. Mid-term (2025)
- iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental:* This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social:* Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By

producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.

- d. *Other:* The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical:* There will need to be education of individual state departments about the requirements for purchasing of small electronic devices that are not processed by the DAS to assure energy efficient equipment purchases.
- b. *Economic:* Due to the current fiscal limitations the funding to establish and maintain the fund may be difficult to set aside, even with the short-term payback associated with much energy efficiency actions.
- c. *Statutory/Regulatory:* There should be no barriers to implementation.
- d. *Social:* This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

## GLA Action 2.4 – Implement Energy Reduction Measures for State Employees

### Summary

New Hampshire should establish and implement policies to reduce energy use by government employees in their daily business conduct. The policies should cover, but not be limited to, 1) personal computers, laptops, speakers, monitors, copiers, and printers; 2) lighting and miscellaneous electrical equipment; 3) water conservation; and 4) waste/paper reduction.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): A new program would be developed by the proposed Energy Management Unit (EMU) to implement policies, track their effectiveness, and educate all state employees in ways to reduce energy use. This program would go beyond simply raising awareness of actions to save energy by making use of research-based techniques that utilize social norms and incentives to promote the desired behaviors. The proposed action would reduce the energy consumption of computers, other office equipment, and appliances used in state buildings and would conserve water, paper, and other expendable resources.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: Establish state policy by Executive Order.
  - b. *Resources Required*: The establishment of an Energy Management Unit to develop policy and perform oversight to help ensure compliance with the new policy and measure the effectiveness of the policy.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding to establish an EMU.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: Energy Management Unit
  - b. *Parties Paying for Implementation*: New Hampshire taxpayers (for establishment of the EMU)
  - c. *Parties Benefiting from Implementation*: The state (cost savings in energy use reductions): New Hampshire taxpayers
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. *Existing*:
  - b. *Proposed*:
    - GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
    - GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
    - GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction
    - RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
    - RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
    - RCI Action 1.4A – Upgrade Building Energy Codes
    - RCI Action 1.4B – Improve Building Energy Code Compliance
6. Timeframe for Implementation: After establishment of the EMU.
7. Anticipated Timeframe of Outcome: Short-term (by 2012) and occurring throughout the life of the program.

## Program Evaluation

### 1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012): N/Q
- b. Mid-term (2025)
- c. Long-term (2050)

### 2. Economic Effects

- a. Costs:
  - i. Short-term (2012): N/Q
  - ii. Mid-term (2025)
  - iii. Long-term (2050)
- b. Savings:
  - i. Short-term (2012): N/Q
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

### 3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

### 4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Education of individual state employees about the requirements the new policy
- b. *Economic*: Cost savings will benefit the state taxpayer overall and each department in particular.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

### 5. Other Factors of Note:

6. Level of Group Interest: High

### 7. References:

## GLA Action 2.5 – Implement Energy Reduction Measures for State Facilities

### Summary

The state should establish and implement policies to reduce energy use in state facilities relative to operation and maintenance of equipment and buildings. The policies should cover, but not be limited to, 1) lighting and miscellaneous electrical equipment; 2) facilities management (e.g. thermostat settings, hot water settings); 3) water conservation; and 4) waste/paper reduction.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): A new program would be developed by the proposed Energy Management Unit (EMU) to implement policies, track their effectiveness, and educate all facility managers to reduce energy use. The proposed action would reduce the energy consumption of equipment and appliances used in state buildings and would conserve water, paper, and other expendable resources.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: Establish state policy by Executive Order.
  - b. *Resources Required*: The establishment of an Energy Management Unit (EMU) to develop policy and perform oversight to help ensure compliance with the new policy and measure the effectiveness of the policy.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding for establishing an EMU and funds that may be needed for equipment upgrades (e.g. energy efficient boilers, thermostats, energy efficient lighting, etc.)
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: The proposed Energy Management Unit, Department of Administrative Services, other departments that own or lease a facility.
  - b. *Parties Paying for Implementation*: NH taxpayers
  - c. *Parties Benefiting from Implementation*: The state (cost savings in energy use reductions); NH taxpayers
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. *Existing*
  - b. *Proposed*:
    - GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
    - GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
    - GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction
    - RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
    - RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
    - RCI Action 1.4A – Upgrade Building Energy Codes
    - RCI Action 1.4B – Improve Building Energy Code Compliance
6. Timeframe for Implementation: After establishment of the proposed Energy Management Unit and the required funding mechanisms.

7. Anticipated Timeframe of Outcome: There may be a slight delay in outcome as these require behavioral modification and could take time to set in initially and even later to achieve widespread long-term adoption.

### Program Evaluation

#### 1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012): N/Q
- b. Mid-term (2025)
- c. Long-term (2050)

#### 2. Economic Effects

- a. Costs:
  - i. Short-term (2012): N/Q
  - ii. Mid-term (2025)
  - iii. Long-term (2050)
- b. Savings:
  - i. Short-term (2012): N/Q
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

#### 3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

#### 4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical* - education of individual facility managers about the requirements the new policy;
- b. *Economic* - cost savings will benefit the state taxpayer overall and each department in particular; funding for the proposed Energy Management Unit and facility upgrades may be an obstacle due to the current fiscal situation. However, additional funding to develop program and resources may be difficult under current fiscal climate even with short payback.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and businesses and individual households as they observe the government integrating this in standard operating procedures and may begin to do so on their own.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

Draft

## GLA Action 2.6 – Increase CHPS Funding for Public Schools

### Summary

New Hampshire should provide a meaningful increase in the state's Collaborative for High Performance Schools (CHPS) funding bonus on the order of 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. Meeting CHPS criteria would lead to the development of more energy efficient school buildings that are more conducive to learning throughout the school year.

### Program Description

#### 1. Mechanism (*i.e., how the policy or program achieves the desired result*):

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 proactive, cost-effective, and integrated design and operational strategies and technologies that result in productive, healthy, efficient, and responsible educational centers in our communities.

CHPS oversees the nation's first green building rating program especially designed for K-12 schools. The CHPS Criteria is a comprehensive system of environmentally responsible benchmarks designed by the CHPS technical committee, which is made up of over fifty school facilities experts, including state agency officials, designers, school district officials, contractors, product manufacturers and energy and water utility officials. A CHPS school is a school that has strived to achieve excellence in environmental efficiency and healthy building practices. CHPS recognizes superior design teams and school districts through award ceremonies, case studies, and media outreach. Schools can self-certify through the free CHPS Designed program, or seek third-party verification of their high performance school through the CHPS Verified program.

Northeast Energy Efficiency Partnerships (NEEP) has adapted the CHPS Criteria Volume for New England schools. NEEP provides education and outreach to school districts and design firms on high performance school building. The NH School Building Aid program provides financial reimbursement for the cost of construction or substantial renovation of school buildings. School districts may receive up to 60 percent of the cost of construction, land acquisition, planning and design, furniture, fixtures, and equipment. This office also provides information and technical advice concerning planning, construction, and maintenance of school facilities. New Hampshire currently provides 3 percent additional reimbursement for schools meeting CHPS-NE criteria. By increasing this funding, a greater number of schools would likely pursue CHPS certification and lead to long-term energy savings with the attendant CO<sub>2</sub> and cost reductions.

#### 2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. Method of Establishment (e.g., legislation, executive order): *Establish state policy by Executive Order.*
- b. Resources Required: *Additional funding required for the program.*
- c. Barriers to Address (especially for medium to low feasibility actions): *In the current fiscal environment, the allocation of additional funding, even for one with a short-term payback and long-term avoided costs may be difficult to accomplish.*

#### 3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. Parties Responsible for Implementation: *The NH Dept. of Education School Aid Program and the Jordan Institute.*
- b. Parties Paying for Implementation: *NH taxpayers*
- c. Parties Benefiting from Implementation: *NH taxpayers and municipalities.*

#### 4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. *Existing*

b. *Proposed:*

- GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
- GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
- GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
- GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
- GLA Action 2.5 – Implement Energy Reduction Measures for State Facilities
- RCI Action 1.1 – Maximize Energy Efficiency in New Construction
- RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
- RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
- RCI Action 1.4A – Upgrade Building Energy Codes
- RCI Action 1.4B – Improve Building Energy Code Compliance

6. Timeframe for Implementation: Immediately

7. Anticipated Timeframe of Outcome: There may be a slight delay due to the lag time between the dispersal of funds and project completion. Over time the emissions and cost reductions would grow larger as the useable lifespan of the building enables long-term savings.

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012)
- b. Mid-term (2025)
- c. Long-term (2050)

2. Economic Effects

- a. Costs:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)
- b. Savings:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental:* This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social:* Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then

provide savings for consumers and economic security for the State in the mid to long-term. This action would be beneficial to both students in terms of enhanced learning environments and school districts struggling to meet their rising energy costs while fulfilling their mandate to provide a quality education.

- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There are no perceived barriers as the technology exists and is already being applied.
- b. *Economic*: The cost savings will benefit the state taxpayer overall and to the individual school districts that receive CHPS funding. However, the allocation of additional funds may be difficult in the near term even with short payback and long-term savings.
- c. *Statutory/Regulatory*: There should be no barriers to implementation.
- d. *Social*: This could have a positive impact on municipalities and students and would likely be well supported by NH communities struggling to educate students and pay for school energy bills.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

- CHPS overview, <http://www.chps.net/overview/index.htm>.
- National CHPS, <http://www.chps.net/national.htm#Neeep>.
- New Hampshire Department of Education's School Building Aid Program, [www.ed.state.nh.us/buildingaid](http://www.ed.state.nh.us/buildingaid).
- NH Partnership for High Performance Schools. [www.nhphps.org](http://www.nhphps.org).
- Northeast Energy Efficiency Partnerships (NEEP), <http://www.neep.org/>.

## GLA Action 3.1 -- Encourage Renewable Energy and Energy Efficiency Projects for Existing State-Owned Buildings and Facilities

### Summary

New Hampshire's existing inventory of state-owned buildings is deficient in terms of energy efficiency, water consumption, and other resource usage. In a more positive light, state government has many opportunities to reduce energy use, conserve resources, and save money by upgrading its facilities. Building upgrades that maximize energy efficiency as a priority could include creative and exciting projects using renewable technologies. Integration of wind and solar power, for example, into state government building projects would not only save energy and reduce greenhouse gas emissions but would also provide opportunities to engage the public through education and job creation.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Using the capital budget building and maintenance schedule, New Hampshire state government would upgrade its existing buildings and facilities by making improvements to utilities and undertaking other projects that maximize energy efficiency. Projects would be designed to reduce consumption of resources and make best use of renewable energy applications. Possible examples include installing water catchments systems on university buildings to conserve water; planting roof-top gardens in high-density locations to reduce heating and cooling loads; and installing solar panels on parking garages or rooftops.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: In conjunction with the BECI program and the earlier chapters of this section, inventory all existing state buildings and facilities; while other programs will identify and prioritize based on a hierarchy of energy efficiency measures and resource use, this program will focus on renewable energy application; then using the capitol budget schedule apply upgrades.
  - b. *Resources Required*: Funds in the capitol budget would need to be shifted to prioritized upgrades; perhaps new staff or at least new responsibilities
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Hiring freeze; shifting resources that have a longer-term benefit, local code ordinances, and PUC regulations.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: budget committees, the Department of Admin Services, and facility managers
  - b. *Parties Paying for Implementation*: the State as well as potential revenue streams resulting from RGGI allowance auctions and the RPS alternative compliance payment (ACP).
  - c. *Parties Benefiting from Implementation* : Taxpayers, local business providers
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. Existing: Building Energy Conservation Initiative (BECI); The Renewable Portfolio Standard (RPS); and The Regional Greenhouse Gas Initiative (RGGI)
  - b. *Proposed*:
    - GLA Action 2.1 – Apply High-Performance Building Standards to New Construction and Renovations
    - GLA Action 2.2 – Maximize Energy Efficiency in Existing Government Buildings
    - GLA Action 2.3 – Revise State Appliance and Equipment Procurement Policies
    - GLA Action 2.4 – Implement Energy Reduction Measures for State Employees
    - RCI Action 1.1 – Maximize Energy Efficiency in New Construction

- RCI Action 1.2 – Maximize Energy Efficiency in Existing Residential Buildings
- RCI Action 1.3 – Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
- RCI Action 1.4A – Upgrade Building Energy Codes
- RCI Action 1.4B – Improve Building Energy Code Compliance

6. Timeframe for Implementation: Immediate

7. Anticipated Timeframe of Outcome: unknown

### Program Evaluation

#### 1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012): unknown
- b. Mid-term (2025): unknown
- c. Long-term (2050): unknown

#### 2. Economic Effects:

- a. Costs:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)
- b. Savings:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

#### 3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased awareness and implementation of energy saving and sustainable generation efforts through public participation and education will alleviate climate change. However, methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

#### 4. Potential for Implementation (i.e., including challenges, obstacles and opportunities):

- a. *Technical*: Working with older building presents a challenge; there are a lot of opportunity and fresh ideas to apply; excellent opportunity to provide pilot educational experiences and job creation programs
- b. *Economic*: Limited funds; challenges and changes the current way of “doing business”; saves money;
- c. *Statutory/Regulatory*:

- d. *Social:* The general public is excited to be a part of the new green economy; the public outreach component can help direct that excitement and stimulate involvement
5. Other Factors of Note: Upgrading the existing infrastructure is the best place to start from when considering energy use and conservation. As with energy efficiency, the savings appear in what is not spent or phased out. By raising the level of all buildings/facilities owned by the state, the state saves money by reducing costs in land acquisition, new building construction and utility costs.
6. Level of Group Interest: This step is critical for the state and truly defines leadership.
7. References:

Draft

## GLA Action 3.2 -- Use Renewables for Building Heat and Hot Water

### Summary

New Hampshire state government should lead-by-example in establishing a policy that requires a percentage of heat and hot water supply in state-occupied buildings, whether state-owned or leased, to come from systems that use renewable energy sources. The existing inventory of state government buildings is deficient with respect to energy efficiency. The proposed action would upgrade existing heat and hot water systems in state facilities to improve their energy efficiency and include a renewable component. At least some of the improvements would involve retrofits powered by biogenic heating oil, solar hot water, combined heat and power, ground source heat pumps, and biomass.

### Program Description

1. Mechanism (i.e., how the policy or program achieves the desired result): Using the capital budget building and maintenance schedule, New Hampshire state government would install upgrades to existing heat and hot water systems in state-occupied buildings. These upgrades would include renewable energy applications to the maximum practicable extent. The following are examples of renewable energy systems that could save the state money, improve energy efficiency, and reducing CO2 emissions:
  - a. The state can use bioheat in oil burning furnaces, which is a mixture of biodiesel and petroleum-based #2 residential heating oil or #6 industrial fuel oil.
  - b. Solar heating harnesses the power of the sun to provide solar thermal energy for hot water, space heating, and pool heaters. While higher in initial capital cost these systems typically supply 70 percent of the buildings energy requirements and hedging energy cost increases. Renewables are typically equated to the pre-purchase of that percentage of energy they are offsetting for the life of the improvement.
  - c. Cogeneration, or combined heat and power (CHP), is becoming more widely accepted. Conventional electricity generation is inherently inefficient, converting only about a third of the fuel's potential energy into usable energy. CHP – which produces both electricity and useable heat – converts as much as 90 percent of the fuel into usable energy. CHP systems use fuels, both fossil and renewable, to produce electricity or mechanical power and useful thermal (heating and cooling) energy far more efficiently and with lower emissions than conventional separate heat and centralized power systems.
  - d. The geothermal heat pump, also known as the ground source heat pump, is used for space heating and cooling, as well as water heating. The technology relies on the fact that the Earth (beneath the surface) remains at a relatively constant temperature throughout the year, warmer than the air above it during the winter and cooler in the summer. The geothermal heat pump takes advantage of this by transferring heat stored in the Earth or in ground water into a building during the winter, and transferring it out of the building and back into the ground during the summer. The ground, in other words, acts as a heat source in winter and a heat sink in summer.
  - e. Biomass power technologies convert renewable biomass fuels, like wood, to heat and electricity using processes similar to that used with fossil fuels. There are four primary classes of BioPower systems: direct-fired, co-fired, gasification, and modular systems.
2. Implementation Plan (i.e., how to implement the specific policy or program):
  - a. *Method of Establishment (e.g., legislation, executive order)*: New policies to retrofit heat and hot water systems in state buildings would be developed by the proposed Energy Management Unit (EMU), which will be responsible for implementing policy, tracking effectiveness, and educating all state departments and state employees on minimizing business travel. These policies should be instituted by an Executive Order from the governor. In conjunction with the BECI program and the earlier chapters of this section, inventory will be required in all existing state buildings and facilities.

- b. *Resources Required*: Funds in the capitol budget would need to be shifted to prioritize upgrades. The establishment of an EMU will be necessary to develop policy, perform oversight, ensure compliance, and measure effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Barriers include funding for funding an EMU. Renewable technologies will need to adhere to state building codes and local ordinances. Work force development, expansion of existing energy programs in colleges and universities. Education of building owners and citizens in their current energy purchase practice
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    - a. *Parties Responsible for Implementation*: The proposed Energy Management Unit, budget committees, the Department of Admin Services, facility managers
    - b. *Parties Paying for Implementation* : State, federal incentives
    - c. *Parties Benefiting from Implementation*: Improves profitability of local companies, job stability and job creation, state technical colleges and universities through increased enrollments for workforce development. Taxpayers through reduced and stable future energy costs.
  4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
  5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    - a. *Existing*: Established in April 1997, the Building Energy Conservation Initiative (BECI) program analyzes State buildings for energy and resource conservation opportunities. BECI utilizes a "paid from savings" procedure known as "Performance Contracting." This allows agencies to perform energy retrofits and building upgrades that would otherwise not be funded through capital appropriations, providing the energy savings can pay for the project cost, as outlined in RSA 21-I. PSNH and COOP CORE utility programs currently include incentives for the installation of geo-thermal heat pumps, and Solar Thermal systems.
    - b. *Proposed*:
      - RCI Goal 1 – Maximize Energy Efficiency in New Construction and Existing Buildings
      - GLA Goal 2 – Reduce Energy Use in Government Buildings
      - GLA Action 3.1 – Encourage Renewable Energy and Energy Efficiency Projects for Existing State-Owned Buildings and Facilities
  6. Timeframe for Implementation: Technologies are currently available; however, funding may not be available immediately.
  7. Anticipated Timeframe of Outcome: All heating and hot water systems in state buildings should be converted to a portion of renewable energy by 2050.

## Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions
  - i. Bioheat: Biodiesel is non-toxic, biodegradable, and renewable. NO<sub>x</sub>, sulfur, carbon monoxide, smoke, hydrocarbons, and particulate matter are all reduced when using bioheat (although different studies find differing reductions). B20's net life cycle CO<sub>2</sub> emissions are reduced by 15.66% due to carbon recycling by the plants
  - ii. Geothermal: According to the EPA, geothermal heat pumps can reduce energy consumption—and corresponding emissions—up to 44% compared to air-source heat pumps and up to 72% compared to electric resistance heating with standard air-conditioning equipment.

- iii. Combined Heat and Power: Nationally, and primarily from large industrial facilities such as in the paper, refining and chemical industries, CHP reduces:
  - NOx emissions by 0.4 million tons per year
  - SO2 emissions by over 0.9 million tons per year
  - Emissions of CO2e into the atmosphere by 35 million metric tons.

Reduce energy use 10% by 2012 according to the exec order and continue to 30%,50%, and 80% less fossil-based energy in 2050.

<b>CO2 Reductions MTCO2eq/year:</b>			
Year	(30%)	(50%)	(80%)
2012	5,448	5,448	5,448
2025	7,743	12,906	18,500
2050	16,349	27,249	43,600

## 2. Economic Effects

### a. Costs

#### i. Short-term (2012)

- Bioheat: In Massachusetts, heating oil prices have increased by 64% over the past three years. Bioheat prices, on the other hand, will drop as more distributors and processing plants come online in New England, increasing the supply and competition. As of November 2007, there were 165 credited processing plants in the US and 80 under construction, up from 25 plants in 2004. Biodiesel prices should be more stable than oil, as biodiesel is not affected by global supply or political issues.
- Solar: Solar energy systems typically have a high initial cost and extremely low operating costs. Solar domestic water heaters systems are reasonably priced (\$6,000-\$8,000) and can show pay backs of four to seven years depending upon the fuel displaced (electric or gas). Space air heating systems can vary from inexpensive wall heaters (\$1,600) to costly large central systems (\$30,000+). Space cooling systems are not currently competitive.
- Geothermal: Even though the installation price of a geothermal system can be several times that of an air-source system of the same heating and cooling capacity, the additional costs are returned in energy savings in 5–10 years. System life is estimated at 25 years for the inside components and 50+ years for the ground loop.

#### ii. Mid-term (2025)

#### iii. Long-term (2050)

### b. Savings:

#### i. Short-term (2012)

- Solar: The U.S. Energy Policy Act implemented a 30% tax credit, currently capped at \$2,000 for consumers who install solar water heating systems. To be eligible for this tax credit, the systems must be certified by the Department of Energy's non-profit partner, the Solar Rating & Certification Corporation (SRCC).
- Geothermal: The biggest benefit of geothermal heat pumps is that they use 25%–75% less electricity than conventional heating or cooling systems.

- Combined Heat and Power: Produces over 9% of the electric power generated in the U.S., saving users over \$5 billion each year in energy costs and decreasing energy consumption by almost 1.3 trillion Btus a year.

ii. Mid-term (2025)

iii. Long-term (2050)

3. Other Benefits/Impacts:

- Environmental:* Biomass burning without controls may emit air pollutants including nitrogen oxides, carbon monoxide, organic gases, and particulate matter, many of which have adverse health effects. In many urban and rural areas, smoke from wood burning is a major contributor to air pollution. Because of this, some municipalities restrict wood heating appliance use when the local air quality reaches unacceptable levels. Others restrict or ban the installation of wood-burning appliances in new construction.
- Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Specifically, renewable energy types, such as solar, geothermal, and biomass help clean our air and could help reduce the NH asthma rate, one of the highest in the country.
- Social:* The general public is excited to be a part of the new green movement; the government should take the lead in this paradigm shift. A public outreach component can help direct that excitement and stimulate involvement.
- Other:* Renewables like CHP reduce the load on Electric Transmission Infrastructure through distributed generation.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- Technical:* Working with older building presents a challenge. Over a four-year period, B20 was field tested by Brookhaven National Laboratories in several hundred homes in the Northeast and no significant problems were found. Active and passive solar space heating and water heating, are well-developed technologies. Active solar space cooling is marginally developed. Geothermal heat pumps (sometimes referred to as GeoExchange, earth-coupled, ground-source, or water-source heat pumps) have been in use since the late 1940s.
- Economic:* Limited funds to retrofit existing buildings; challenges and changes the current way of “doing business”; most lenders are not knowledgeable of renewable systems. Excellent opportunity to provide pilot educational experiences and job creation programs.
- Statutory/Regulatory:*
- Social:* There are problem areas associated with the general public perception of renewable systems because they are assumed to be futuristic, still needing technological breakthroughs to be viable, and uneconomic. A primary concern for owners of renewable systems is whether they can be maintained by conventional means (the owner does not have to assume extraordinary responsibilities).

5. Other Factors of Note: Upgrading the existing infrastructure is the best place to start from when considering energy use and conservation. As with energy efficiency, the savings appear in what is not spent or phased out. By raising the level of all buildings/facilities owned by the state, the state saves money by reducing costs in land acquisition, new building construction and utility costs.

6. Level of Group Interest: This step is critical for the state and truly defines leadership

7. References:

- U.S. DOE Energy Efficiency and Renewable Energy, Renewable Energy, <http://www.eere.energy.gov/>.

- UMASS Amherst Center for Energy Efficiency and Renewable Energy, Combined Heat and Power, [http://www.ceere.org/iac/iac\\_combined.html](http://www.ceere.org/iac/iac_combined.html).
- Bioheat Fact Sheet, Harvard Green Campus Initiative, <http://www.greencampus.harvard.edu/cre/documents/bioheatfactsheet.pdf>.

Draft

## GLA Action 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet

### Summary

New Hampshire should increase the overall fuel efficiency of the state vehicle fleet by requiring that any vehicle purchased for state use be matched to the intended use, and therefore “right-sized,” and that each such vehicle be among the most fuel efficient in its class for the year of acquisition. This policy would need to recognize that the most fuel efficient vehicles could have higher first costs but, as in the case of high-MPG hybrids, significantly lower operating costs over their useful life.

### Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* By focusing on purchasing vehicles based on their intended use, the state could avoid buying “more vehicle” than is necessary, reduce the average vehicle size, and increase the average fuel economy of the fleet. Through such action, the state will save operating costs through reduced fuel consumption and set an example for New Hampshire businesses and residents. The proposed Energy Management Unit (EMU) would develop the necessary and appropriate policies, verify compliance, track effectiveness, and inform and educate all state departments of the program in place.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
  - a. *Method of Establishment (e.g., legislation, executive order):* The governor’s Executive Order 2005-4; *An Order for State Government to Lead-by-Example in Energy Efficiency* was established to direct state agencies and departments to purchase new passenger and light duty vehicles with efficiency as a priority<sup>1</sup>. Updated policies would be developed by the EMU to reduce emissions of the state fleet further.
  - b. *Resources Required:* The establishment of an EMU will promote and extend policy by performing oversight necessary to ensure compliance and measure its success. A list of vehicles that identifies the life cycle cost of owning the vehicle over its useful life will be necessary to make informed vehicle purchases that balance higher capital costs with the lower operating costs. This list will need to be updated annually.
  - c. *Barriers to Address (especially for medium to low feasibility actions):* Barriers include funding for establishing an EMU and legislative resistance to new, more stringent policies.
3. *Parties Affected by Implementation:*
  - a. *Parties Responsible for Implementation:* State government agencies must follow Executive Order or other new legislation when purchasing new fleet vehicles. They must not only consider highly fuel efficient or alternative vehicles, but also consider the appropriate size for the tasks required of the vehicle (i.e., right-sizing).
  - b. *Parties Paying for Implementation:* State government agencies will purchase and maintain the vehicles; however, tax monies will provide financial support for the implementation of the policy by the EMU.
  - c. *Parties Benefiting from Implementation:* The public will benefit from cleaner air with reduced pollution from vehicle emissions.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):* The Granite State Clean Cities Coalition is a collaborative of over 70 public and private interests from all regions in New Hampshire. Coalition members support the goals of reducing dependence on foreign oil, and improving air quality, through the use of domestically produced, cleaner burning alternative fuels and other fuel reduction strategies.
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*
  - a. *Existing:* Executive Order 2005-4; *An Order for State Government to Lead-by-Example in Energy Efficiency* directs state agencies to develop Clean Fleets Programs and reduce fuel use<sup>1</sup>. This policy

requires the purchase of high fuel efficiency vehicles whenever possible and requires implementation of best management practices for existing vehicles, such as right-sizing (choosing the smallest sized vehicle capable of the task intended), the use of low rolling resistance tires, a reduction in vehicle idling time, and the implementation of preventative maintenance programs. Based on this policy, the State of New Hampshire has established a Clean Fleets Policy for the purchase of new or used state vehicles and the implementation of procedures to improve fuel efficiency in state vehicles.

b. *Proposed:*

- TLU 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
- TLU 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
- TLU 1.C.1 – Adopt a Low-Carbon Fuel Standard
- TLU 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
- GLA 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies
- GLA 1.1 – Establish an Energy Management Unit (EMU)

6. Timeframe for Implementation: Adoption of the policy took place with the governor’s Executive Order set in 2005; for CT it took four years (2004-2008) from the date of adoption to actual implementation<sup>3</sup>.
7. Anticipated Timeframe of Outcome: Immediate. Full implementation will require ~ 15 years as a vehicle’s average lifetime is approximately 15 years. Therefore, all vehicles should be replaced with the most fuel efficient, right-sized vehicle in their class within 15 years of the implementation of policy.

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions

**CO<sub>2</sub> Emission Reduction MTCO<sub>2</sub>e/yr**

	<b>2012</b>	<b>2025</b>	<b>2050</b>
Replace LTs with vehicles that get 26mpg, 42% increase in efficiency, by 2020	1,073	2,064	2,064
Replace PVs with vehicles that get 45 mpg, 50% increase in efficiency, by 2020	970	1,763	1,763

2. Economic Effects

- a. Costs:
  - i. Short-term (2012):
  - ii. Mid-term (2025):
  - iii. Long-term (2050):
- b. Savings:
  - i. Short-term (2012):
  - ii. Mid-term (2025):
  - iii. Long-term (2050):

3. Other Benefits/Impacts:

- a. *Environmental:* Improving efficiency of the state fleet is expected to reduce toxic pollutants such as acetaldehyde, 1,3-butadiene, formaldehyde, and benzene and improve air quality. These policies also address vehicle greenhouse gas emissions including non-methane organic gas (NMOG), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO).

- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Reduced reliance on foreign oil is a benefit for society. Continued use of the automobile for transportation is beneficial, however, does not necessarily create a large impact on reducing emissions or changing people's habits for the long term.
- d. *Other*: Adoption of regulations requiring vehicle efficiency in state fleets will strengthen regional demand for the sale of more efficient vehicles. Increased demand will lower the cost of these efficient vehicles.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges, as alternative vehicle technologies are rapidly improving in the automobile manufacturing industry.
- b. *Economic*: Continued escalation of petroleum costs will make efficient vehicles more desirable; greater demand will, in turn, lower costs.
- c. *Statutory/Regulatory*:
- d. *Social*: Continued use of the automobile provides minimal social change.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- Lynch, John H. Executive Order Number 2005-4 – *An Order for State Government to Lead-by-Example in Energy Efficiency*. State of New Hampshire. <http://www.nh.gov/governor/orders/index.htm>
- National Highway Traffic Safety Administration (NHTSA) Website <http://www.nhtsa.dot.gov/>
- Connecticut Climate Change Action Plan 2005. Transportation and Land Use Sector. Action I: California LEV II Standards.
- California Environmental Protection Agency, Air Resources Board, Staff Report: Initial Statement of Reasons: 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, January 10, 2003.

## GLA Action 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies

### Summary

A policy should be established that requires New Hampshire government to purchase vehicles with advanced technologies, such as new hybrid electric vehicles (HEV), plug-in hybrids (PHEV), advanced electric vehicles (EV), fuel cell vehicles (FCV), and vehicles capable of operating on alternative and renewable fuels such as ethanol, biodiesel, methanol, compressed natural gas, propane, hydrogen and electricity. These vehicles should represent a growing portion of the state's vehicle fleet. Aside from the substantial clean air benefits, these fuels are also produced domestically, strengthening America's energy independence. Attention should be paid, however, to the life-cycle carbon emissions of these newer technologies and fuels. Government agencies that own and operate vehicle fleets represent a small yet highly visible component of the transportation sector. Under the proposed policy, the state would lead-by-example to motivate individual municipalities and their political subdivisions to establish similar vehicle purchase programs.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): New Hampshire state government can play a unique role in the promotion and establishment of advanced fuels and technologies before they are commercially viable. By adopting these fuels and technologies early, the state can assist in the development and expansion of the infrastructure required for a new fuel to become part of vehicle fleets. More importantly, by integrating advanced technologies and fuels into its daily fleet operations, the state can take on the risk that private fleet managers may be unwilling to assume. In demonstrating the effectiveness of these fuels and technologies, the state can encourage private fleets to adopt them widely.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: State legislation will be developed to require the purchase of advanced vehicles that use alternative fuels for the state fleet. Updated policies would be developed by the proposed Energy Management Unit (EMU), which will verify compliance, track effectiveness, and educate all state departments of legislation in place.
  - b. *Resources Required*: The establishment of an EMU is necessary to perform oversight, ensure compliance, and measure the effectiveness of the policy.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Barriers include funding for establishing an EMU and legislative resistance to the new, stringent policies. Determination of the carbon intensity of a given fuel will need to include a full life cycle analysis and inclusion of indirect impacts. Life cycle issues need to be addressed for biofuels before purchasing diesel and FCVs with the intention of using biodiesel and ethanol. Currently, petroleum based fuels are used to harvest and produce biofuels, a practice which eliminates biofuels from significantly reducing greenhouse gas emissions.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: State government agencies must follow legislation when purchasing new fleet vehicles. Automobile manufacturers will need to see the benefit to producing and offering more fuel efficient vehicles. This can be accomplished by implementation of new CAFE standards by the federal government or Low Carbon Fuel Standards (LCFS) by the region.
  - b. *Parties Paying for Implementation*: State government agencies will purchase the vehicles using either State funds or federal grant monies.
  - c. *Parties Benefiting from Implementation*: Private fleet managers may benefit by allowing the State to take on the risk associated with innovation, and all residents who will benefit from improved clean air over the longer term as the pollutants associated mobile sources decreases.
4. Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

In June of 1996, the NH Governor's Office of Energy and Community Services (ECS), now the Office of Energy and State Planning (OEP), received a Congestion Mitigation and Air Quality Improvement (CMAQ) grant to establish a State fleet of alternative fueled vehicles and develop a network of refueling stations. The Alternative Fuel Vehicle Project (AFVP) was established with members of the ECS, DES, and DOT to facilitate the distribution of funds. A second program established within the state was the Granite State Clean Cities Coalition (GSCCC). Clean Cities is a national program supported by the U.S. Department of Energy (DOE) designed to encourage the use of AFVs and build supporting infrastructure for these vehicles.

A moderately satisfactory fleet of vehicles powered by electricity (EV), propane (LPG) and compressed natural gas (CNG) was procured for various state agencies with the CMAQ grant. CNG refueling stations were established at three locations throughout the state, as well as 13 Electric Charging stations/outlets to support the state's fleet. Flexible fuel vehicles (FFV) that can run on 85% ethanol (E85) were also purchased; however, these must run on gasoline or 10% ethanol because the infrastructure for E85 has not yet been developed in New England.

The Granite State Clean Cities Coalition is a collaborative of over 70 public and private interests from all regions in New Hampshire. Coalition members support the goals of reducing dependence on foreign oil, and improving air quality, through the use of domestically produced, cleaner burning alternative fuels and other fuel reduction strategies. Nationally, Clean Cities is a program sponsored by the U.S. Department of Energy, which is designed to encourage the use of Alternative Fuel Vehicles (AFV's) and their supporting infrastructure throughout the nation. By encouraging AFV use, the Clean Cities program will help achieve energy security and environmental quality goals at both the national and local levels.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing*: Federal laws mandate states incorporate Alternative Fuel Vehicles (AFVs) into their existing fleets to reduce the negative impact transportation has on air quality. The Energy Policy Act (EPAct) was passed in 1992 to establish a timeline and set targets that state fleets must meet, such that by 2001, 75% of the light duty vehicles purchased would be AFVs<sup>1</sup>.
- b. *In Process*: A Low Carbon Fuel Standard (LCFS) reduces greenhouse gas emissions by analyzing the life cycle carbon intensity of a given motor vehicle fuel, and increasing the portion of lower carbon fuels in the transportation fuel supply mix. Fuel supply and distribution infrastructure limitations effectively prevent New Hampshire from seeking a LCFS on its own, necessitating a regional approach to adoption of a fuel standard. Currently New Hampshire is involved in LCFS workgroups with both NESCAUM (Northeast States for Coordinated Air Use Management which incorporates all New England states plus New York and New Jersey) and the NEG-ECP (Northeast Governors-Eastern Canadian Premiers). Both workgroups are in the process of identifying lower carbon fuel potentials for the region, including availability of biomass for regional production of advanced biofuels including cellulosic ethanol and biodiesel. Other alternative fuels such as natural gas and propane also offer lower carbon impacts than conventional petroleum fuels despite the fact they are fossil fuels themselves. Natural gas can be a very low carbon fuel when recovered from landfill operations, animal feed and waste facilities, and other non-traditional sources. Technological innovation is a key component of a successful LCFS, with increased use of battery electric vehicles that are charged with low carbon energy (solar, wind, etc.), being a prominent strategy to meet such a standard.
- c. *Proposed*:
  - TLU 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
  - TLU 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
  - TLU 1.C.1 – Adopt a Low-Carbon Fuel Standard
  - TLU 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
  - GLA 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies
  - GLA1.1 – Establish an Energy Management Unit (EMU)

6. Timeframe for Implementation: Many AFVs are currently available at reasonable cost, and the state has the ability to run fleet vehicles on CNG and electricity. The PHEV market is expected to begin in 2010. Continued escalation of petroleum prices will drive this market based on economics. The FCV market is unknown because of the lack in hydrogen infrastructure and it will have to compete with a competitive PHEV market.
7. Anticipated Timeframe of Outcome: Full replacement of current fleet with AFVs should begin to phase in by 2010. By 2025 (assuming an average vehicle life of 15 years), all vehicles within the state fleet will be AFVs.

### Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reduction: The State could lead by example by ensuring that every vehicle it purchases gets the best achievable mileage per pound of CO<sub>2</sub> emitted in its class. For example, a new 4-door gas-electric hybrid car now gets 52 mpg city, 45 mpg highway and emits roughly 4 tons of CO<sub>2</sub>/year. By comparison, the Pontiac Sunfire (in the same Small Car Class as the 4-door hybrid), gets 24 mpg city and 33 mpg highway and emits 6.9 tons CO<sub>2</sub>/year. Not only would the hybrid save the State more than \$450/year in fuel costs compared to the Sunfire, it also would avoid 2.9 tons CO<sub>2</sub>/year, or 17.4 tons over six years. Furthermore, within every class of vehicles (e.g., small car, sedan, station wagon, pickup, van, etc.) there is at least a 25% difference in the amount of CO<sub>2</sub> emitted annually between the most efficient and least efficient car in the class.

Reduce carbon content of fuel 10% by 2010, 20% by 2020 and 50% by 2050 (better than LCFS)

- a. Short-term (2012): 990 MTCO<sub>2</sub>e/year
- b. Mid-term (2025): 2,063 MTCO<sub>2</sub>e/year
- c. Long-term (2050): 4,126 MTCO<sub>2</sub>e/year

### 2. Economic Effects

#### a. Costs:

- i. Short-term (2012): Until demand for advanced vehicles increases and infrastructure for alternative fuels is instituted, costs for new fleet vehicles will be greater than the petroleum-powered, internal combustion engine vehicle counterpart in the same class.
- ii. Mid-term (2025):
- iii. Long-term (2050): Over the long term, and with the introduction of more stringent federal standards (CAFÉ), advanced vehicles and their corresponding fuels will become less expensive compared to the traditional petroleum-powered internal combustion engine vehicles.

#### b. Savings:

- i. Short-term (2012): In the emissions reduction example above, a hybrid vehicle would save approximately \$450/year in gasoline costs compared to a comparative gasoline-powered sedan.
- ii. Mid-term (2025)
- iii. Long-term (2050)

### 3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Reduced reliance on foreign oil is a benefit. Continued use of the automobile for transportation is beneficial, however, does not necessarily create a large impact in reducing emissions or change people's

habits. However, there may be impacts of using agricultural land to grow feed stocks for biofuel rather than food. Alternative feed stocks, such as algae or waste streams for biodiesel and ligno-cellulosic material for ethanol, should be the focus of state and federal research before committing to these low-carbon, domestic fuels in state fleets.

d. Other: None.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges, technology is rapidly improving.
- b. *Economic*: Continued escalation of petroleum costs will make AFV's more desirable. The state should investigate the possibility of aggregating demand from large fleets to cause manufacturers to introduce new, significantly more efficient vehicles. This "golden carrot" approach has worked in the past, for example, in the 1990's, several states used their combined demand to bring about very high-energy efficiency refrigerators into the marketplace. Industry experts report that a manufacturer requires a minimum annual market size of about 25,000 vehicles before it will introduce a new model vehicle. A limiting factor is that market studies indicate that the immediate market is only for about 12,000 alternative vehicles per year in the U.S. An initial campaign would be to amass an annual purchase of about 12,000 vehicles to "match" the current market potential. Because the state itself does not purchase enough new vehicles each year to meet this threshold, it should explore partnering with other levels of local government and/or private fleets in the state to increase the size of purchasing aggregation<sup>2</sup>.
- c. *Statutory/Regulatory*: Policies to promote state purchases of alternatives to gasoline and diesel fueled vehicles have emerged from both federal and state levels of government based on concerns over energy security, air quality and climate change. Other states that have issued legislation similar to that proposed here:
  - i. New York Executive Order 111 (January 10, 2001) – Requires 50% of all new state light-duty vehicle acquisitions to be clean fuel vehicles by 2005, increasing to 100% by 2010. Hybrid electric vehicles are eligible under this program.
  - ii. State of Maine Executive Order 05-FY 02/03, Gov. Angus S. King, Jr., "Procurement of Fuel Efficient, Less Polluting Vehicles" (Jan. 7, 2003)
- d. *Social*: Continued use of the automobile provides minimal social change.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

## GLA Action 4.2.1 -- Reduce Diesel Particulate Emissions through Use of Retrofit Devices

### Summary

New Hampshire government should lead-by-example in supporting the reduction of diesel particulate emissions (i.e., “black carbon” particulate matter emissions) from all state-related activities. This action would occur by installing diesel retrofit technologies on diesel trucks in the state fleet with a model year of 2006 and older or by retiring diesel trucks and replacing them with new technology and cleaner operating engines to achieve reductions of particulate matter (PM). Retrofit technologies should also be installed on diesel non-road equipment including construction equipment, diesel generators, and the like. State contracts for road and building construction projects should also include funding for the installation of diesel retrofit equipment on vehicles and equipment in state contracts (e.g., roads, buildings). The program would require all companies that participate in state contracts to retrofit the emission control systems on their diesel vehicles. The program would target its funds to vehicles that meet criteria related to their age (i.e., remaining operational life) and hours of operation per year in order to affect the greatest reductions per dollar invested.

### Program Description

#### 1. Mechanism (i.e., how the policy or program achieves the desired result):

The retrofit of existing diesel vehicle exhaust systems, whether state- or contractor-owned, would reduce the “black carbon” (i.e., particulate matter, PM, or soot) emissions that are released by diesel fuel combustion. “Black carbon” has been identified as having a large and fast-acting warming impact on the atmosphere. It is relevant to climate change because this soot has a global warming potential of about 600 times that of CO<sub>2</sub>. The dark-colored carbon component of PM reduces the reflective capabilities of the earth by absorbing light, thus increasing heat. Fine PM can travel long distances on air currents and is a major cause of haze and air pollution which contributes to respiratory health problems.

Efforts to reduce PM affect both climate change and public health. Diesel trucks produced in 2007 and newer include technology that dramatically reduces PM, CO, etc. For older vehicles, there are currently a range of retrofit technologies available that work similar to a muffler and will reduce PM emissions in diesel vehicles. Emissions standards for non-road vehicles and equipment will not be implemented until later years, so all old and newly purchased equipment can benefit from particulate retrofit equipment. Diesel emissions are a primary source of air pollution in the northeastern United States.

In order to address the issue of black carbon and the existing vehicle stock which contribute to its emissions, State vehicles could be rated first on the basis of their black carbon emissions per year and then on the primary location of operation. This latter consideration incorporates health considerations. Vehicles would then be scheduled for retrofit based on criteria that account for both considerations.

Those vehicles that are used to fulfill state contracts, such as transportation construction projects, would all be required to be retrofit as part of the contract terms. For this program, funds would be made available in all state contracts for the conversion of construction vehicles that have a specific remaining operation lifespan and annual hours of use. The funds would be incorporated into the total cost of the project and would target the reduction of black carbon (soot), a component of the PM released by diesel fuel combustion.

#### 2. Implementation Plan (i.e., how to implement the specific policy or program):

##### a. Method of Establishment (e.g., legislation, executive order):

- i. Establish a state policy by Executive Order to require retrofits for vehicles and equipment in the state fleet. New policies would be developed by the proposed Energy Management Unit (EMU) to implement policy, track effectiveness, inform and educate all state departments and hired

contractors about reducing the amount of PM from diesel fuel emitted in state fleet vehicles and equipment.

ii. Establish a 10-year strategic plan to achieve the maximum reduction in health risk from diesel soot. The plan should complement the federal regulations by retrofitting aftermarket emission controls into existing engines. There should be targets set for emissions reductions and deadlines to meet these targets, recommended legislation or regulations, and an established steady source of funding to help defray the cost of retrofits during the 10-year period. Anti-idling should also be encouraged for on-road state vehicles that have the potential to access idling alternatives such as auxiliary power units or shore power.

b. *Resources Required:* The establishment of an Energy Management Unit (EMU) to develop policy and perform oversight to help ensure compliance with the new policy and measure the effectiveness of the policy. The EMU will be responsible for creating awareness and mandating retrofits on government fleets.

c. *Barriers to Address (especially for medium to low feasibility actions):* The barriers involve funding for establishing an EMU, but also, funding will be needed to purchase the retrofit devices for existing diesel vehicles, which can range from \$1,000 to \$10,000 each.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

a. *Parties Responsible for Implementation:* NH State government departments.

b. *Parties Paying for Implementation:* Costs will be incurred in part by the state government to administer the programs. Federal funds can be used to retrofit those State vehicles identified as candidates for conversion.

c. *Parties Benefiting from Implementation:* The general public will benefit from better air quality, as well as operators of diesel equipment who have the greatest chronic exposures.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

The Northeast Diesel Collaborative (NEDC) hosts workshops for municipalities, hospitals, and universities on retrofitting, hybrid technologies, and contract specification for construction projects. After an NEDC workshop, the city of Manchester, NH applied for funding from the Diesel Emissions Reduction Act (DERA) to retrofit city-owned vehicles and encouraged the local chapter of Associated General Contractors to think about voluntary retrofits<sup>1</sup>.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. *Existing:* The statutory authority 1998 NH Laws 207, Chapter SAF-C 5800 Roadside Diesel Opacity Inspection implemented a roadside heavy-duty diesel emissions testing program. The law applies to heavy-duty vehicles with a gross vehicle weight rating (GVWR) greater than 10,000 pounds and diesel buses that can carry more than 25 passengers<sup>2</sup>.

In January 2001 and in June 2004, EPA finalized the Highway Diesel and Nonroad Diesel Rules, respectively, which implemented more stringent standards for new diesel engines and fuels. The rules mandate the use of lower sulfur fuels in diesel engines beginning in 2006 for highway diesel fuel, and 2007 for nonroad diesel fuel. These fuels will enable the use of after-treatment technologies for new diesel engines, which can reduce harmful emissions, including PM, by 90% or more. After-treatment technologies will start phasing into the diesel sector beginning in 2007 for highway and 2011 for nonroad<sup>3</sup>. While ULSD-only emission reductions for PM are relatively modest on a per-vehicle basis compared to retrofit devices (25 to 85 percent PM reduction), the emission reductions can be significant if an entire fleet is fueled with ULSD.

In June 2005, the U.S. Senate passed an amendment to the Energy Bill that provides funding to cut

emissions from high-polluting diesel engines and create a national program to fund the cleanup of all types of diesel-powered vehicles, including trucks, buses, tractors, ships, and trains. The Diesel Emissions Reduction Act builds upon successful incentive programs in Texas and California. The legislation authorizes \$200 million per year over five years in grants and loans for states and organizations to clean up existing diesel fleets<sup>4</sup>.

b. Proposed: TLU 1.C.3 – Install Retrofits to Reduce Black Carbon Emissions

6. Timeframe for Implementation: Immediately and ongoing as diesel retrofit technology is currently available in the marketplace.
7. Anticipated Timeframe of Outcome: 2008 through 2025. Beyond 2025, diesel trucks with a model year of 2006 or older will be twenty years or older and it will be necessary to retire these vehicles as they become antiquated. Some non-road engines will likely continue to benefit from retrofits beyond this timeframe.

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions: By retrofitting existing non-road and on-road diesel engines with emission controls, the state can cut dangerous diesel emissions by between 50-90% per engine. The greatest reductions will occur from 2008 to 2012 with vehicles purchased after 2006 that must abide by EPA’s Highway Diesel and Nonroad Diesel Rules. By purchasing diesel vehicles with enhanced emissions controls, retrofitting emission controls onto existing engines, and implementing an aggressive campaign to eliminate unnecessary idling, the state could dramatically cut emissions of PM and slow warming of the earth over the short term.

**CO<sub>2</sub> Emission Reduction MTCO<sub>2</sub>e/yr by 2012**

	Low range	High range
100% DOCs by 2012	2,724	6,190
100% FTFs by 2012	4,960	11,274
100% DPFs by 2012	7,209	16,384

2. Economic Effects

- a. Costs:
  - i. Short-term (2012): \$1,000 to \$10,000 per unit.
  - ii. Mid-term (2025)
  - iii. Long-term (2050)
- b. Savings:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: Fine particles (PM<sub>2.5</sub>) are the major cause of reduced visibility (haze). Particles can be carried over long distances by wind and then settle on ground or water. The effects of this settling include: making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems<sup>5</sup>.
- b. *Health*: Reduced PM improves air quality, thus improving human health. Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into

the lungs and cause serious health problems. People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or breathing difficulty
  - decreased lung function;
  - aggravated asthma;
  - development of chronic bronchitis;
  - irregular heartbeat;
  - nonfatal heart attacks; and
  - premature death in people with heart or lung disease<sup>5</sup>.
- c. *Social*: Particle pollution can stain and damage stone and other materials, including culturally important objects such as statues and monuments<sup>5</sup>.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges exist as the technology is well developed. There are three basic types of retrofits. Diesel Oxidation Catalysts (DOCs) can be used on virtually any diesel engine and will reduce PM by approximately 25%. DOCs are similar to a muffler and there is no maintenance involved after installation and devices usually last for six years. They may not be appropriate for engines older than 1990. Flow through Filters (FTFs) work similar to DOCs but have additional filtering material, e.g. wire mesh to capture more PM. FTFs will reduce PM by approximately 50%. FTFs require a duty cycle to create a minimum exhaust temperature and not all diesel vehicles are able to meet this criteria. Diesel Particulate Filters (DPF's) can be either active or passive. A passive DPF works by simply filtering the exhaust flow. An active DPF relies on additional energy to increase the heat in the exhaust to burn off excess PM. DPF's reduce PM by approximately 85%. A passive DPF requires a duty cycle to create a minimum exhaust temperature and not all diesel vehicles are able to meet this criteria. Active DPF's can be used with virtually any diesel engine<sup>6,7</sup>.
- b. *Economic*: DOCs range from \$1,000 to \$2,000 per installation. FTFs last for approximately 6 years and range from \$3,000 to \$4,000 per installation. DPF's cost from \$5,000 to \$10,000 and need to be cleaned every 12 to 24 months for a fee of \$200 to \$400. DPF's will also increase fuel use by 1 to 3% for passive applications and up to 7% for active applications<sup>6,7</sup>.
- c. *Statutory/Regulatory*:
- d. *Social*: As it is also associated with improved air quality and human health, this action should receive positive public support.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- Black Carbon Pollution Emerges As Major Player In Global Warming, <http://www.sciencedaily.com/releases/2008/03/080323210225.htm>
- [http://www.epa.gov/region01/topics/air/sips/nh/2003\\_saf5800\\_NH.pdf](http://www.epa.gov/region01/topics/air/sips/nh/2003_saf5800_NH.pdf)
- <http://www.northeastdiesel.org/>
- <http://www.epa.gov/oms/regs/fuels/diesel/420f06033.htm>
- GovTrack.us. S. 1265 - 109th Congress (2005): Diesel Emissions Reduction Act of 2005, GovTrack.us (database of federal legislation), <http://www.govtrack.us/congress/bill.xpd?bill=s109-1265>
- <http://www.epa.gov/air/particlepollution/health.html>

- <http://www.epa.gov/ne/eco/diesel/retrofits.html>
- <http://www.epa.gov/cleandiesel/documents/retrofit-tech-prog-exp.07-2005.pdf>

Draft

## GLA Action 4.2.2 – Increase Fuel Economy through Improved Vehicle Maintenance

### Summary

The most fuel-efficient vehicles achieve the greatest number of miles per gallon of fuel and, in so doing, reduce their greenhouse gas (GHG) emissions per trip. The state should maintain or improve the fuel economy of the *existing* state fleet by expanding the use of maintenance methods that contribute directly to improved fuel economy. Available methods include the use of low-friction engine oil and low-rolling-resistance replacement tires.

### Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* State fleet managers would focus on adopting improved maintenance techniques for the vehicles in the *existing* State fleet. In so doing, the state would increase the average fuel economy of fleet vehicles prior to their replacement. The state would save operating costs through reduced fuel consumption and would set an example for New Hampshire businesses and residents. The proposed Energy Management Unit (EMU) would develop the necessary and appropriate policies, verify compliance, track effectiveness, and inform and educate all state departments of the program in place.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
  - a. *Method of Establishment (e.g., legislation, executive order):* The governor's Executive Order 2005-4; *An Order for State Government to Lead-by-Example in Energy Efficiency* was established to direct state agencies and departments to purchase new passenger and light duty vehicles with efficiency as a priority<sup>1</sup>. Updated policies would be developed by the EMU to reduce emissions of the state fleet further.
  - b. *Resources Required:* The establishment of an EMU will promote and extend policy by performing oversight necessary to ensure compliance and measure its success. An education program may be required to assist fleet managers in the adoption of the required measures and EMU staff may be needed to assist in the identification and procurement of the tools and materials required to adequately maintain the vehicles.
  - c. *Barriers to Address (especially for medium to low feasibility actions):* Barriers include funding for establishing an EMU and legislative resistance to new, more stringent policies.
3. *Parties Affected by Implementation:*
  - a. *Parties Responsible for Implementation:* State government agencies must follow Executive Order or other new legislation when purchasing new fleet vehicles. They must not only consider highly fuel efficient or alternative vehicles, but also consider the appropriate size for the tasks required of the vehicle (i.e., right-sizing).
  - b. *Parties Paying for Implementation:* State government agencies will purchase and maintain the vehicles; however, tax monies will provide financial support for the implementation of the policy by the EMU.
  - c. *Parties Benefiting from Implementation:* The public will benefit from cleaner air with reduced pollution from vehicle emissions.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):* The Granite State Clean Cities Coalition is a collaborative of over 70 public and private interests from all regions in New Hampshire. Coalition members support the goals of reducing dependence on foreign oil, and improving air quality, through the use of domestically produced, cleaner burning alternative fuels and other fuel reduction strategies.
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*
  - a. *Existing:* Executive Order 2005-4; *An Order for State Government to Lead-by-Example in Energy Efficiency* directs state agencies to develop Clean Fleets Programs and reduce fuel use<sup>1</sup>. This policy requires the purchase of high fuel efficiency vehicles whenever possible and requires implementation of

best management practices for existing vehicles, such as right-sizing (choosing the smallest sized vehicle capable of the task intended), the use of low rolling resistance tires, a reduction in vehicle idling time, and the implementation of preventative maintenance programs. Based on this policy, the State of New Hampshire has established a Clean Fleets Policy for the purchase of new or used state vehicles and the implementation of procedures to improve fuel efficiency in state vehicles.

b. *Proposed:*

- TLU 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
- TLU 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
- TLU 1.C.1 – Adopt a Low-Carbon Fuel Standard
- TLU 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
- GLA 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies
- GLA1.1 – Establish an Energy Management Unit (EMU)

6. Timeframe for Implementation: Adoption of the policy took place with the governor’s Executive Order set in 2005; for CT it took four years (2004-2008) from the date of adoption to actual implementation<sup>3</sup>.
7. Anticipated Timeframe of Outcome: Immediate. Full implementation will require about 15 years as a vehicle’s average lifetime is approximately 15 years. Therefore, all vehicles should be replaced with the most fuel efficient, right-sized vehicle in their class within 15 years of the implementation of policy.

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions

**CO2 Emission Reduction MTCO<sub>2</sub>e/yr**

	<b>2012</b>	<b>2025</b>	<b>2050</b>
Tires replaced and always inflated by 2012 (3%), low viscosity oils & filter changes on-time by 2025 (1.5%), and on-time air filter replacements by 2050 (5%).	95	277	558
Tires replaced and inflated properly, low viscosity oil & filter replacements by 2012 (4.5%), air filters replaced regularly by 2025 (5%).	277	558	558
Tires replaced and inflated properly, low viscosity oil & filter and air filter replacements by 2012 (9.5%).	558	558	558

2. Economic Effects

- a. Costs:
  - i. Short-term (2012):
  - ii. Mid-term (2025):
  - iii. Long-term (2050):
- b. Savings:
  - i. Short-term (2012):
  - ii. Mid-term (2025):

iii. Long-term (2050):

3. Other Benefits/Impacts:

- a. *Environmental*: Improving efficiency of the state fleet is expected to reduce toxic pollutants such as acetaldehyde, 1,3-butadiene, formaldehyde, and benzene and improve air quality. These policies also address vehicle greenhouse gas emissions including non-methane organic gas (NMOG), oxides of nitrogen (NO<sub>x</sub>), and carbon monoxide (CO).
- b. *Health*: Reduction of these pollutants will promote human health and well-being.
- c. *Social*: Reduced reliance on foreign oil is a benefit for society. Continued use of the automobile for transportation is beneficial, however, does not necessarily create a large impact on reducing emissions or changing people's habits for the long term.
- d. *Other*: Adoption of regulations requiring vehicle efficiency in state fleets will strengthen regional demand for the sale of more efficient vehicles. Increased demand will lower the cost of these efficient vehicles.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges, as alternative vehicle technologies are rapidly improving in the automobile manufacturing industry.
- b. *Economic*: Continued escalation of petroleum costs will make efficient vehicles more desirable; greater demand will, in turn, lower costs.
- c. *Statutory/Regulatory*:
- d. *Social*: Continued use of the automobile provides minimal social change.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- Lynch, John H., Executive Order Number 2005-4, *An Order for State Government to Lead-by-Example in Energy Efficiency*. State of New Hampshire, <http://www.nh.gov/governor/orders/index.htm>.
- National Highway Traffic Safety Administration (NHTSA) Website <http://www.nhtsa.dot.gov/>.
- Connecticut Climate Change Action Plan 2005. Transportation and Land Use Sector. Action I: California LEV II Standards.
- California Environmental Protection Agency, Air Resources Board, Staff Report: Initial Statement of Reasons: 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, January 10, 2003.

## GLA Action 5.1.1 – Implement a State Vehicle Idling Policy

### Summary

New Hampshire state government should implement a no-idling policy to reduce emissions from state motor vehicles. Light- and heavy-duty vehicle idling wastes fuel, damages engines, and results in excess greenhouse gas (GHG) and criteria air pollutant emissions. An Argonne National Laboratory report estimated that more than 13 million light- and medium-duty trucks use more than 600 million gallons per year of fuel (gasoline and diesel) for idling<sup>1</sup>. Consumers and operators of state-owned vehicles have become accustomed to idling for a simple reason: most drivers seem not to make the connection between idle time, increased emissions, and wasted fuel. For vehicle fleets, a good idle reduction policy is the first line of attack to save fuel and ensure vehicles are idling only when necessary. Another step is to consider the technologies available for idle reduction for light- and medium-duty vehicles, such as coolant heaters, air heaters, and energy recovery systems<sup>2</sup>.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): To address this issue, the New Hampshire state government should implement a robust idling reduction program that targets all state fleet and contract vehicles. Effectively, the state could adopt regulations and provide outreach within departments to target excessive idling in light cars and trucks, as well as heavy-duty trucks and construction equipment, in both its fleet and contract vehicles.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: The proposed Energy Management Unit (EMU) will be responsible for implementing a robust anti-idling policy, performing oversight, ensuring compliance, tracking effectiveness, and educating all state departments and state employees. Updated policies could be instituted by an Executive Order from the governor.
  - b. *Resources Required*: The EMU will be employed to execute state policy issued by the Executive Order 2005-4 to reduce idling in state fleets and contracts.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding for establishing an EMU will be necessary. Certain vehicles are exempt from idling regulations. Those exemptions include vehicles in traffic, emergency vehicles, vehicles providing power take-off (PTO) for refrigeration or lift gate pumps, and vehicles supplying heat or air conditioning for passenger comfort during transportation.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: State agencies will be responsible for initiating employee training and it will be the responsibility of the employees to take action on this education.
  - b. *Parties Paying for Implementation*: State agencies will pay for training of employees.
  - c. *Parties Benefiting from Implementation*: The state agencies will benefit financially from decreased fuel use. The general public will benefit in health from reduced air pollution from idling vehicles.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

The Granite State Clean Cities Coalition is a collaborative of over 70 public and private interests from all regions in New Hampshire. Coalition members support the goals of reducing dependence on foreign oil, and improving air quality, through the use of domestically produced, cleaner burning alternative fuels and other fuel reduction strategies<sup>4</sup>.

The State of New Hampshire has regulatory limits on the time motor vehicles operating on diesel are allowed to idle based on temperature. At 32°F or above, the limit is 5 minutes, between 10-32°F, 10 minutes is allowed, and below 10°F, there is no limit. The New Hampshire Department of Environmental Services (NH DES) has been promoting idling reduction through several voluntary programs through their Engine Idling Reduction and School Bus Initiative programs. In an effort to reduce air pollution in New Hampshire, DES informs diesel truck and bus drivers and owners about the environmental, financial, and health consequences of engine idling while

the vehicle is not in motion through information, sample idling policies, and signage. Signs are available at no charge through DES to encourage drivers to turn off engines<sup>5</sup>.

5. Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):
  - a. *Existing*: The governor's Executive Order 2005-4, *An Order for State Government to Lead-by-Example in Energy Efficiency*, proposed the establishment of a Clean Fleets Program that would initiate an anti-idling policy<sup>3</sup>.
  - b. *Proposed*:
    - TLU 1.D.2 – Reduce Vehicle Idling
    - GLA 1.1 – Establish an Energy Management Unit
    - GLA 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet
    - GLA 4.2.1 – Reduce Diesel Particulate Emissions through Use of Retrofit Devices
    - GLA 4.2.2 – Increase Fuel Economy through Improved Vehicle Maintenance and Technology
    - GLA 5.1.2 – Promote Improved Driver Habits
6. Timeframe for Implementation: Employee training can take place immediately with very little funding. Immediate action will provide the best savings in fuel costs and greenhouse gas (GHG) emissions.
7. Anticipated Timeframe of Outcome: The outcome will depend primarily on the attitudes of the employees, as well as how much precedence the state agencies place on the need to abate idling, particularly for diesel burning vehicles. It may take a long time to change habits. The cost of fuel may expedite this process at the business level because state agencies' funding is usually limited.

## Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions
  - a. Short-term (2012): Idling vehicles use up to several billion gallons of fuel and emit large quantities of air pollution and greenhouse gases each year. Idle reduction technologies and practices are an important way to cut petroleum consumption and emissions. Significant CO<sub>2</sub> reductions can be realized by reducing the amount of idling in state vehicles and contracts.
  - b. Mid-term (2025)
  - c. Long-term (2050)
2. Economic Effects
  - a. Costs:
    - i. Short-term (2012): State agencies would be required to pay for training of employees that operate vehicles and are subject to the reduced idling regulations and new policy. Idling reduction devices could be installed on state vehicles.
    - ii. Mid-term (2025):
    - iii. Long-term (2050):
  - b. Savings:
    - i. Short-term (2012): Idling consumes a significant amount of fuel, adds wear and tear to the engine, and ends up costing thousands of dollars each and every year. With effective idling reduction policy, the state will save on fuel costs. The American Trucking Association (ATA) reports that engine idling not associated with normal driving makes up as much as 30 to 50% of truck operating hours. The ATA estimates that engine wear caused by idling one hour every day is equivalent to driving 64,000 miles per year. Idling not only wears the engine and leads to higher maintenance and repair costs, but it also reduces fuel economy. Idling consumes one gallon of fuel per hour, resulting in close to a billion gallons of diesel fuel wasted each year nationwide<sup>2</sup>.

- ii. Mid-term (2025)
- iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: Drivers of diesel vehicles would create a significant impact on air quality and the environment by reducing truck engine idling. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Emissions from idling trucks contribute to air pollution and haze and may affect drivers' health, as well as the health of the general public. By enforcing idling policy, exposure of truck drivers and the public to harmful pollutants in diesel exhaust would be greatly reduced. Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: By implementing no idling policy, the image of the state vehicle fleet, particularly of the heavy-duty trucks, would be positively viewed by the public. *The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.*
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Technologies available for idle reduction for light- and medium-duty vehicles include coolant heaters, air heaters, and energy recovery systems. Although the state does not typically employ or contract long-haul truck drivers, there are alternatives to idling when cab comfort is a concern for truck operators during summer and winter months. For example, "anti-idling devices" include direct-fired burners for cab and engine block heating; thermal storage devices for heating and cooling; and auxiliary power units for heating, cooling, and electrical power. These units use only 10% to 15% of the fuel a diesel truck engine uses and also emit much less air pollution per gallon burned. All devices are commercially available, easy to install, efficient, and relatively inexpensive to operate.
- b. *Economic*: Anti-idling devices can also save the average long-haul truck driver as much as \$4,000 each year in fuel costs alone. Less idling time means less wear on the engine, which saves on preventative maintenance and repair costs.
- c. *Statutory/Regulatory*: It is difficult to enforce no idling policy by means other than signage. However, police officials should make an effort; it is possible that fines may be disseminated for excessive idling.
- d. *Social*: There will be resistance to change the habit of idling because the employees do not have to pay for their gas usage, state agencies do.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- Gaines, Linda, Anant Vyas, and John L. Anderson. Paper No. 06-2567 - Estimation of Fuel Use by Idling Commercial Trucks. Center for Transportation Research, Argonne National Laboratory. Submitted for presentation at and the 85th Annual Meeting of the Transportation Research Board, Washington, D.C.. January 22–26, 2006. <http://www.transportation.anl.gov/pdfs/TA/373.pdf>
- U.S.DOE. Energy Efficiency and Renewable Energy. Alternative Fuels and Advanced Vehicles Website. Idle Reduction Strategies for Light and Medium Duty vehicles. [http://www.eere.energy.gov/afdc/vehicles/idle\\_reduction\\_light.html](http://www.eere.energy.gov/afdc/vehicles/idle_reduction_light.html)
- Lynch, John H., Executive Order Number 2005-4, *An Order for State Government to Lead-by-Example in Energy Efficiency*. State of New Hampshire, <http://www.nh.gov/governor/orders/index.htm>.

## GLA Action 5.1.2 – Promote Improved Driver Habits

### Summary

New Hampshire state government should seek to reduce emissions from existing state motor vehicles by implementing a policy to promote driving habits that increase vehicle fuel efficiency and save money on gas. State employees and contractors should be educated in the practice called "hypermiling." Hypermiling entails avoiding aggressive driving, such as rapid acceleration and sudden braking, observing the speed limit, consolidating and planning trips, avoiding drag by keeping windows closed, not idling, removing excess cargo weight, using cruise control, and not using air conditioning whenever feasible. These practices can be readily implemented, and overlooking them wastes copious amounts of fuel. While each vehicle reaches its optimal fuel economy at a different speed (or range of speeds), gas mileage usually decreases rapidly at speeds above 60 mph. Hypermiling can improve overall fuel efficiency by 33 percent at highway speeds and by 5 percent around town – a savings equivalent to \$0.19-\$1.23 per gallon of fuel at a price of \$3.71 per gallon. Sensible driving is also safer, so more than gas money would be saved<sup>1</sup>.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Education will be the key to implementation. By simply adjusting driving habits, one can realize a 30-percent or greater improvement in fuel economy. Hypermiling is a term that catches people's attention. It not only cuts fuel costs and vehicle emissions, but it can also reduce drivers' stress on the road. Other payoffs include lower car maintenance and repair costs, fewer accidents and traffic tickets, and reduced auto insurance premiums. Employees should be graded on their periodic evaluations for adopting improved habits in all areas of energy efficiency, including driving habits. To support the proposed action, gas mileage should routinely be calculated and recorded for all state vehicles.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: The proposed Energy Management Unit (EMU) would be employed to implement policy, track effectiveness, and educate all state departments and all state employees about improved driving habits. The governor should establish state policy by Executive Order, rather than through legislation, particularly since these actions affect only the state employees and not the common citizens.
  - b. *Resources Required*: The establishment of an EMU to develop policy, provide oversight, ensure compliance and measure effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding for establishing an EMU will need to be addressed. State departments that have encouraged improved driving habits, like the Department of Resources and Economic Development (DRED), have experienced resistance from their employees because people inherently do not want to drive slower, particularly when they are not paying for the fuel, their employer is.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: State agencies will need to provide education for their employees to encourage improved driver habits and the state employees and contractors will be responsible for taking action on the education received.
  - b. *Parties Paying for Implementation*: State agencies will be required to pay for training of employees.
  - c. *Parties Benefiting from Implementation*: The state agencies will benefit financially from decreased fuel use. Employees may benefit psychologically from driving slower, because it inherently lowers stress and lessens the potential for road rage.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): The Granite State Clean Cities Coalition is a collaborative of over 70 public and private interests from all regions in New Hampshire. Coalition members support the goals of reducing dependence on foreign oil, and improving air quality, through the use of domestically produced, cleaner burning alternative fuels and other fuel reduction strategies<sup>2</sup>.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. Existing:

b. Proposed:

- TLU 1.D.1 – ReduceSpeed Limits
- TLU 1.D.2 – Reduce Vehicle Idling
- TLU 2.A.1 – Implement Commuter Trip Reduction Initiative
- TLU 2.B – Establish a Balanced, Integrated, Multi-modal Transportation System
- GLA 1.1 – Establish an Energy Management Unit
- GLA 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet
- GLA 5.1.1 – Implement a State Vehicle Idling Policy
- GLA 5.2 – Reduce State Business-Related Travel
- GLA 6 – Reduce Fuel Consumption by State Employee Vehicles

6. Timeframe for Implementation: Employee training can take place immediately with very little funding. Immediate action will provide the best savings in fuel costs and greenhouse gas (GHG) emissions.

7. Anticipated Timeframe of Outcome: The outcome will depend primarily on the attitudes of the employees, as well as how much precedence the state agencies place on the need to change the driving habits of employees. It may take a long time to change habits. The cost of fuel may expedite this process at the business level because state agencies’ funding is usually limited.

Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions

**CO2 Emission Reduction MTCO2e/yr**

	<b>2012</b>	<b>2025</b>	<b>2050</b>
25% of people change habits by 2012, 50% by 2025.	171	343	343
50% of people change habits by 2012.	343	343	343

2. Economic Effects

a. Costs:

- i. Short-term (2012): Short-term costs include training for employees on fuel-saving driving habits.
- ii. Mid-term (2025)
- iii. Long-term (2050)

b. Savings:

- i. Short-term (2012): State agencies will save money from improved employee driving habits.
- ii. Mid-term (2025): In the mid- to long-term, even with the addition of advanced vehicle technologies and alternative fuels, improved driver habits will continue to generate emission reductions.
- iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: Improved driver habits will have an impact on air quality; by reducing the amount of fuel used, fewer pollutants will be emitted. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our

ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.

- b. *Health*: Improved air quality decreases exposure of humans to toxic and hazardous air pollutants. Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: This action will make employees more aware of fuel wasting habits, which they will also apply to their daily lives outside of work.
- d. *Other*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Vacuum gauges can be installed on some vehicles to give drivers an indication of the fuel economy they are achieving in various driving situations. Sampling air pressure in the intake manifold, the gauge signals when the driver is using excessive throttle and wasting gas. Another control that can be installed on state vehicles are pilot monitors that set off an alarm if the driver exceeds a maximum revolutions per minute (rpm).
- b. *Economic*: Reduction in fuel costs will result from less aggressive and more conscious driving habits.
- c. *Statutory/Regulatory*: It is difficult to enact legislation on this issue, however employee evaluations are a good way to monitor and encourage improved driving habits.
- d. *Social*: There will be resistance to changing habits of employees, because people do not inherently want to drive less aggressively, and because the employees do not have to pay for their gas usage when traveling for work purposes.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- U.S. DOE Fuel Economy Website, <http://www.fueleconomy.gov/feg/driveHabits.shtml>
- Granite State Clean Cities Coalition Website, <http://www.granitestatecleancities.org>

## GLA Action 5.2 – Reduce State Business-Related Travel

### Summary

New Hampshire government should take strides to reduce excessive state business travel. There are a variety of available solutions for reducing or offsetting an organization's emissions related to business travel: Seminars and meetings should be accomplished via telephone, video and web-conferencing whenever feasible. Business trips should be consolidated; several short trips taken from a cold start can use twice as much fuel as a longer multipurpose trip covering the same distance when the engine is warm. Routes should be planned according to the most efficient traffic flow; and, rather than spreading miles evenly over all vehicles in the fleet, vehicle assignments should be right-sized to match the purpose of the trip and to obtain maximum overall fuel efficiency. State policy should also encourage alternative/mass transportation for travel to and from conferences and meetings within the region. For distant travel needs, particularly by air, it may be appropriate for state agencies to be required to purchase carbon offsets to compensate for air emission impacts.

### Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): New Hampshire state government should lead-by-example in instituting policies and practices that require more widespread use of strategies to reduce state business travel and promote better trip planning. According to the Association of Corporate Travel Executives (ACTE), the corporate business community is beginning to take seriously the contribution of professional travel to global warming. Companies are looking at rail and bus service as alternatives to automobile and air travel, and are considering locating their facilities closer to public transportation centers to reduce travel-related emissions. For public and private organizations alike, consideration of climate risk should be an important component of smart financial management. Concerns about pollution are part of a general movement within the government and business communities toward greater social and environmental responsibility<sup>1</sup>.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: New policies would be developed by the proposed Energy Management Unit (EMU), which will be responsible for implementing policy, tracking effectiveness, and educating all state departments and state employees on minimizing business travel. These policies should be instituted by an Executive Order from the governor.
  - b. *Resources Required*: The establishment of an EMU will be necessary to develop policy, perform oversight, ensure compliance, and measure effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Barriers include funding for funding an EMU. The state may see resistance to these stringent policies that require people to change their habits. Meetings may not be as effective over the phone as in person. It also takes more time to use public transportation methods, particularly until they are well established in New Hampshire, versus driving a company vehicle.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: The EMU and state agencies will be responsible for instituting policy and outreach to educate employees on methods of minimizing business related travel.
  - b. *Parties Paying for Implementation*: The state agency will be required to pay for implementation of training programs regarding new policies. It may be necessary for the state to invest in improving mass transit options for employees to use to and from work, meetings, and job sites.
  - c. *Parties Benefiting from Implementation*: Wear and tear of state vehicles will be minimized by improved trip planning. By purchasing carbon offsets, the alternative energy market will improve.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Currently there are no courses of action or programs in New Hampshire that promote sustainable business travel policies.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. Existing:

b. Proposed:

- TLU 2.A.1 – Implement Commuter Trip Reduction Initiative
- TLU 2.B – Establish a Balanced, Integrated, Multi-modal Transportation System
- GLA 1.1 – Establish an Energy Management Unit
- GLA 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet
- GLA 5.1.2 – Promote Improved Driver Habits
- GLA 5.3 – Apply Smart Growth Principals to State Office Locations
- GLA 6 – Reduce Fuel Consumption by State Employee Vehicles

6. Timeframe for Implementation: Employee training can take place immediately with very little funding. Immediate action will provide the best savings in fuel costs and greenhouse gas (GHG) emissions.

7. Anticipated Timeframe of Outcome: The outcome will depend primarily on the actions taken by employees to minimize their business related travel. It may take a long time to change habits. The cost of fuel may expedite this process at the business level because state agencies' funding is usually limited.

### Program Evaluation

1. Estimated CO<sub>2</sub> Emission Reductions: By instituting policy regarding business travel alternatives, particularly by reducing air and automobile travel, GHG emissions can be reduced significantly. American business travel accounts for between 20 and 60 percent of most corporations' pollutants. Transport (all forms) represents about one-third of all global climate-changing greenhouse gas emissions. A typical business jet emits a pound of climate-changing gases per passenger mile and flights deposit CO<sub>2</sub> where it does the worst possible damage, between 30,000 and 40,000 feet above the earth's surface. While travel avoidance is preferred, businesses that require travel to operate are finding a pragmatic and transparent solution in carbon-offset programs. The premise is that if a corporation tracks its pollutants, it can then take a countermeasure to offset its impact. Funding from carbon-offset programs often goes into research and development of cleaner, more reliable forms of energy. In this way, the state can attempt to make its business travel carbon neutral.

Reduce State related travel by 10% in 2012, 25% in 2025, and 50% in 2050.

- a. Short-term (2012): 825 MTCO<sub>2</sub>e/year
- b. Mid-term (2025): 2,063 MTCO<sub>2</sub>e/year
- c. Long-term (2050): 4,126 MTCO<sub>2</sub>e/year

### 2. Economic Effects

a. Costs:

- i. Short-term (2012): Training employees on new business travel policy would be a minimal cost. By purchasing carbon offsets when traveling out-of-state by airplane, the business travel becomes carbon neutral. Purchasing carbon offset for out-of-state travel by air would be a more significant cost incurred by the state government agencies.
- ii. Mid-term (2025): Invest in improved mass transportation for employees.
- iii. Long-term (2050):

b. Savings:

- i. Short-term (2012): This action will result in less wear and tear on the fleet vehicles if people travel less frequently for business purposes or use alternative forms of transportation like bus or rail. Minimizing travel will save the state agencies money because employees will not need to be reimbursed for travel expenses, nor be paid for time spent traveling.
- ii. Mid-term (2025)

iii. Long-term (2050)

3. Other Benefits/Impacts:

- a. *Environmental*: Moderating business related travel will have a corresponding benefit to air quality because of reduced emissions. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Improved air quality will, in turn, reduce the exposures of humans to toxic and hazardous air pollutants. Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: This action will make employees more aware of fuel wasting habits, which they will then apply to their daily lives.
- d. *Other*: The government would be able to set an example for municipalities and New Hampshire businesses to watch and model in their own operations.

2. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: A technical issue exists in that currently the infrastructure is not established and the land use planning is inappropriate for mass transportation to be utilized efficiently for business related travel.
- b. *Economic*: Funding for mass transportation improvements will be a significant expense for the state. However, with minor changes in habits, for example teleconferencing, there are means of reducing business related travel and saving money for the state agencies.
- c. *Statutory/Regulatory*:
- d. *Social*:

3. Other Factors of Note:

4. Level of Group Interest:

5. References:

- Greenbiz.com, <http://www.greenbiz.com/>

## GLA Action 5.3 – Apply Smart Growth Principals to State Office Locations

### Summary

New Hampshire should lead-by-example in making *smart growth* principles a priority consideration when choosing state agency office locations, whether they involve new construction or leased facilities. There is a growing concern that current development patterns – dominated by "sprawl" – contribute significantly to excessive energy consumption and greenhouse gas (GHG) emissions. State agencies are often situated in locations that pull their employees out of downtowns and into peripheral areas, thus promoting sprawl. Current state purchasing policy limits agencies to choosing lowest rent locations. Such locations tend to be outside established downtowns<sup>1</sup>. State agencies can help promote smart growth by selecting office locations in urban or village centers and utilizing existing building space. Preferred sites would offer readily available transit opportunities (e.g. bus, rideshare, bicycle or pedestrian routes) and would be located so as to avoid disturbance of the natural environment. By placing future office building sites in close proximity to existing community centers and transit facilities, the state would also promote the walkability of those sites. Proper regional planning can reduce the need for vehicle use by making areas of development more compact.

### Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* The state needs to encourage broad and forward-thinking land use and transportation plans in order to stabilize growth in VMT. This includes investments in infrastructure in or near existing population centers or in designated high-growth areas that meet defined criteria for minimum development density and have a mix of land uses. The state agencies should be encouraged or required to locate offices around bus/rail stations and interconnected walkable street patterns.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
  - a. *Method of Establishment (e.g., legislation, executive order):* Current policy includes RSA-9B, the State of New Hampshire's "Smart Growth" initiative. New policies would be developed by the proposed Energy Management Unit (EMU), which will be established to implement new purchasing policy, track effectiveness of Smart Growth planning, and educate all state departments. State policy will be enacted via Executive Order by the governor or legislation.
  - b. *Resources Required:* The establishment of an EMU to develop new policy, perform oversight, ensure compliance, and measure effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions):* Funding will be required for establishing an EMU. Existing state buildings on Hazen Drive promote walkability between departments; however, do not allow employee access to downtown facilities. Therefore, state employees need to leave the facility by car to access commercial businesses or residences. A solution might be a shuttle to downtown from the Hazen Drive complex, particularly during lunch hours.
3. *Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):*
  - a. *Parties Responsible for Implementation:* State agencies and their contractors are responsible for implementing Smart Growth principles when choosing locations for state offices.
  - b. *Parties Paying for Implementation:* The state agencies themselves will pay for construction or leasing of buildings for their employees.
  - c. *Parties Benefiting from Implementation:* State employees will benefit from Smart Growth planning because it increases walkability and social capital, reducing their vehicle miles traveled and fuel consumption, as well as connecting them with a mixed-use downtown center and increasing interactions with colleagues.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):*
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*

a. *Existing*: In 1999 the Legislature recognized the impact of state agency decisions on local land use patterns and enacted RSA 9-B. This statute requires each state agency to consider “smart growth” principles when providing advice, expending funds, or distributing grant monies, for public works, transportation, or major capital improvement projects, and for the construction, rental, or lease of facilities. RSA 9-B also calls for a coordinated and comprehensive effort by state agencies for economic growth, resource protection, and planning policy to encourage smart growth<sup>1</sup>.

b. *Proposed*:

- TLU Subgoal 2.B.1 – Increase Use of Alternative Modes for Local/Intra-Regional Travel
- TLU Goal 2.C – Develop Land Use Patterns That Support a Balanced Multi-Modal Transportation System and Reduce Vehicle Miles Traveled

6. **Timeframe for Implementation**: This action will take time to implement because changing office locations could be a difficult task for well-established state agencies. Particularly for the complex on Hazen Drive, these offices will most likely remain for years to come. Clearly, a shuttle to downtown areas running every 10-15 minutes through Hazen Drive would increase connectivity with businesses and residences throughout Concord’s population center. Satellite and other remote offices could be moved closer to population centers by 2025.

7. **Anticipated Timeframe of Outcome**: 2025-2050.

### Program Evaluation

#### 1. Estimated CO<sub>2</sub> Emission Reductions

- a. Short-term (2012)
- b. Mid-term (2025)
- c. Long-term (2050): This action will only reduce CO<sub>2</sub> emissions if the present mechanisms of land use planning are completely revised. By locating offices closer together and closer to downtown centers, employees will reduce their VMT to work and mass transportation will be more feasible. Both of these changes create a significant reduction in CO<sub>2</sub> emissions.

#### 2. Economic Effects

- a. **Costs**:
  - i. Short-term (2012)
  - ii. Mid-term (2025): Changing office buildings from remote locations could be costly, particularly if new buildings are constructed. Leasing buildings in downtowns is also more expensive.
  - iii. Long-term (2050): In the long term, once buildings are built/leased closer to population centers, mass transportation becomes viable. Instituting mass transportation networks will be costly for the government.
- b. **Savings**:
  - i. Short-term (2012)
  - ii. Mid-term (2025)
  - iii. Long-term (2050)

#### 3. Other Benefits/Impacts:

- a. *Environmental*: By promoting development in mixed-use community centers, development pressure on greenfield sites (sprawl) will be reduced, and preservation of open space and the character of the state’s remaining undeveloped areas will be enhanced. This would also reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.

- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Better siting may also enable State employees to walk more on breaks rather than driving to lunch or meetings downtown.
- c. *Social*: Mixed-use development promotes social capital, which improves wellbeing.
- d. *Other*: Between 2000 and 2003, VMT increased in New England and Eastern Canada regions by 1.8%. At this rate, annual VMT for this region is projected to increase from 177,000 million to 400,000 million miles by 2050. Various urban and suburban area studies have calculated that a doubling in residential density correlates with 20-30% lower per-capita VMT<sup>2</sup>.

2. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Although the technical resources and viability already exist and are generally well understood, the new program will require substantial outreach for understanding and acceptance.
- b. *Economic*:
- c. *Statutory/Regulatory*: New agency administrative rules will be required.
- d. *Social*: Residential and commercial development in suburban and exurban areas increases VMT as distances between homes and jobs increase. Since low-density development cannot support public transportation efficiently, single-occupancy vehicles are often the only practical transportation option.

3. Other Factors of Note:

4. Level of Group Interest:

5. References:

- The NH Council on Resources and Development 2006 Report on Growth Management, <http://www.nh.gov/oep/programs/CORD/documents/2006SmartGrowthReport.pdf>
- Climate Change Roadmap for New England and Eastern Canada, Environment Northeast
- ConnDOT's Master Transportation Plan, [www.ct.gov/dot/cwp/view.asp?a=1383&q=259760](http://www.ct.gov/dot/cwp/view.asp?a=1383&q=259760)

## GLA Action 6.1 – Promote Employee Travel Reductions

### Summary

New Hampshire state government should establish clear targets for the reduction of state employee commuter vehicle miles traveled (VMT). Specifically, the following reductions below projected VMTs are proposed:

- 10 percent by 2012
- 30 percent by 2025
- 60 percent by 2050.

This proposal would include instituting policies that promote more widespread use of strategies to reduce employee commuting miles, such as telecommuting and alternative work schedules. Commute trip reduction (CTR) programs use a variety of strategies and incentives to reduce vehicle miles and, therefore, emissions that contribute to climate change. Alternative or flexible start-end times may help employees to coordinate their work schedules with transit or car-pool schedules and avoid traffic during peak commuting hours. Compressed work weeks – e.g., four 10-hour days, or nine 9-hour days – could eliminate one trip to the office every week or two. Also, the state should lead-by-example in instituting policies that allow greater use of the state’s satellite offices to reduce the number of miles that state employees must drive to reach work. In addition to reducing the number of vehicle miles traveled (VMT) and the amount of fuel consumed, this initiative would enhance the personal productivity of state workers.

### Program Description

1. Mechanism (*i.e.*, how the policy or program achieves the desired result): Today’s commuting society significantly impacts environmental quality, economic vitality, productivity, and quality of life. Weekly fuel use can be reduced by more than half if commuters are driving together. New Hampshire state government should develop a comprehensive program that will enable and encourage state employees to reduce their annual VMT by substantial amounts. This program could include direct assistance to employees as well as employee incentives to reduce the number of cars traveling to and from state offices.

To accomplish the proposed action, state agencies must be enabled, through education and policy development, to implement alternative work schedules that allow telecommuting from home or satellite offices if it would reduce their VMT. State employees should also be allowed to stagger work hours to avoid travel during peak rush hours. State agencies would need to provide resources, marketing, and possible financial (tax) incentives to encourage employees to participate in the commute trip reduction program.

The state should lead-by-example in marketing its NH Rideshare program to increase the number of state workers who participate in carpools and vanpools<sup>1</sup>. At the same time, state agencies should offer the Guaranteed Ride Home benefit, described below.

New Hampshire Rideshare is a free commuter online matching service provided by the NH Department of Transportation dedicated to finding an alternative way for commuters to travel to and from work. To help commuters cut costs and to reduce traffic congestion and air pollution, NH Rideshare uses Geographical Computer Matching to provide commuters with information and assistance about ridesharing and alternatives to the single-occupancy vehicle, including carpools, vanpools, buses, and trains<sup>1</sup>. State agencies should offer, along with the NH Rideshare program, the Guaranteed Ride Home benefit, which provides a free taxicab ride home in case of emergency on a day when an employee uses a commuting alternative such as carpooling. Other benefits that can be offered are payroll tax deductions for carpooling and bonuses for ridesharers like preferential parking. A posting board for ridesharing would be linked to the state agencies’ websites for easy access and visibility.

Parking incentives could also be offered by state agencies to employees, including: 1) priority parking for carpools and carpool/transit users; and 2) parking cash-out, which assigns a monetary value to the employee benefit of free parking and more fairly subsidizes employee use of alternative work modes. Because it costs state agencies money to provide free parking to employees that commute in single-occupancy vehicles (SOVs), employees should receive cash allowances in lieu of parking spaces when commuting in high-occupancy vehicles (HOV). This monetary incentive motivates employees to explore alternative commuting options and reduces the state’s costs to build and maintain or lease parking spaces.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
  - a. *Method of Establishment (e.g., legislation, executive order)*: The governor's Executive Order 2005-4, *An Order for State Government to Lead-by-Example in Energy Efficiency*, proposed the establishment of a Clean Fleets Program that would encourage telecommuting<sup>2</sup>. New policies would be developed by the proposed Energy Management Unit (EMU), which will be responsible for implementing the policy, tracking effectiveness, and educating all state departments and state employees on telecommuting and alternative work schedules. These policies should be instituted by an Executive Order from the governor.
  - b. *Resources Required*: The establishment of an EMU will be necessary to develop policy, perform oversight, ensure compliance, and measure effectiveness.
  - c. *Barriers to Address (especially for medium to low feasibility actions)*: Barriers include funding for an EMU and resistance from employers to permit alternative work schedules. State employees will need to be aware not to abuse privileges of working remotely or during off-peak hours. It may also be difficult to convince people to change their habits of driving in single-occupancy vehicles without a "guaranteed ride home". Reasons people choose not to carpool include worry that an emergency might come up
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
  - a. *Parties Responsible for Implementation*: The EMU and state agencies will be responsible for defining policy and extending outreach to educate employees and employers on alternative work schedule rules and allowances. The New Hampshire Department of Transportation is working with the New Hampshire Regional Planning Commissions to develop the NH Rideshare program. The EMU will be responsible for implementing and promoting the program within the state departments.
  - b. *Parties Paying for Implementation*: The state agencies implementing the program will be required to pay for implementation of training programs regarding new policies and to pay for the parking cash-out incentive and the guaranteed ride home benefit. These costs may be balanced out by leasing or maintaining fewer parking spaces. The state government would be required to establish the Rideshare program, costs may include emergency taxi rides for the Guaranteed Ride Home benefit and other incentives offered to ridesharers, like tax breaks. The state will also have to maintain Park and Ride lots. State agencies would be required
  - c. *Parties Benefiting from Implementation*: Employees will benefit from driving to work less therefore saving on fuel costs and using less time per work focused on work.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): The governor's Executive Order Number 2005-4, an order for state government to lead-by-example in energy efficiency, was established to direct state agencies and departments to promote vehicle fuel conservation by encouraging carpooling.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
  - a. *Existing*: The Governor's Executive Order 2005-4, *An Order for State Government to Lead-by-Example in Energy Efficiency*, proposed the establishment of a Clean Fleets Program that would encourage telecommuting.
  - b. *Proposed*:
    - GLA 1.1 – Establish an Energy Management Unit
    - GLA 4.1.1 – Increase Overall Efficiency of State Vehicle Fleet
    - GLA 5.3 – Apply Smart Growth Principles to State Office Locations
    - TLU 1.B.2 – Implement a Carbon-Based Vehicle Registration Fee Structure
    - TLU 2.A – Change Consumer Behavior to Reduce Travel Demand
6. Timeframe for Implementation: This action could be implemented immediately. The increased price of gas will accelerate adoption of alternative work schedules and telecommuting policies within state agencies. Education is necessary to influence the decisions that state government employees make regarding their commute. However, its success will depend on the education of employees and their willingness to change habits.

7. **Anticipated Timeframe of Outcome:** The outcome will depend primarily on the actions taken by employees to minimize their vehicle miles traveled. It may take a long time to change habits. The rising cost of fuel and limited mass transit options in New Hampshire will help expedite this process. Increased commuter ridesharing could occur over the next few years.

### Program Evaluation

1. **Estimated CO<sub>2</sub> Emission Reductions:** Commute trip reduction methods can significantly reduce CO<sub>2</sub> emissions in the short term. By two people sharing a ride, emissions are halved. Carpooling is an effective way of reducing GHG emissions per person. Over the long term, with more mass transit options available, commuter trips could be reduced significantly, having a greater impact on CO<sub>2</sub> emissions reductions.

Reduce Commute VMT 10% by 2012, 30% by 2025, and 60% by 2050

- a. Short-term (2012): 2,280 MTCO<sub>2</sub>e/year
- b. Mid-term (2025): 7,868 MTCO<sub>2</sub>e/year
- c. Long-term (2050): 19,694 MTCO<sub>2</sub>e/year

### 2. Economic Effects

#### a. Costs:

- i. Short-term (2012): Initial costs include training of employers and employees in ethical alternative work schedule plans and telecommuting policies. Maintaining park and ride lots will cost the state funds, as well as providing the Guaranteed Ride Home benefit to employees that are stranded at work because of an emergency. Offering parking incentives may cost state agencies if they agree to the parking cash outs and guaranteed ride home benefit.
- i. Mid-term (2025)
- ii. Long-term (2050): Long term costs include improving the mass transit options for commuters to and from New Hampshire state facilities.

#### b. Savings:

- i. Short-term (2012): Employees will save money on fuel costs from reduced commutes. State employees would save greatly on fuel costs by using the Rideshare program more often.
- ii. Mid-term (2025)
- iii. Long-term (2050)

### 3. Other Benefits/Impacts:

- a. *Environmental:* This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social:* People may interact more with their community and have more time to spend with family if they are working alternative work schedules or commuting fewer days to work.
- d. *Other:* The benefits of offering a Rideshare program include increased employee productivity and lower stress levels, reduced traffic congestion, reduced demand for employee parking spaces (which saves maintenance and leasing costs), conservation of fossil fuels and improved air quality.

### 4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical:* Technical barriers may include maintaining as many park and rides as possible.

- b. *Economic:* There are no major economic barriers here as the Rideshare program is already developed and may only need to be promoted through marketing. Commuter travel reductions largely rely on redistribution of funds. Employers have an incentive to offer programs because they will either pay (or negotiate) lower leases because of reduced parking demand, or they will spend less money on owned real estate that can only be used for parking (wiser use of real estate because of lower parking requirements).
- c. *Statutory/Regulatory:* Legislation is not necessary.
- d. *Social:* There may be resistance to some of these policies as the public may perceive that State government is “working less.” Also, it may be difficult to change people’s habits of driving to work in single-occupancy vehicles (SOVs) during normal business hours.

Other Factors of Note: The NH Rideshare program was developed in the 1970s. Interest in the RideShare program waxes and wanes but currently has close to 1,500 participants. There has been a sizeable increase in the number of applicants to the service in recent months as gas prices have skyrocketed<sup>3</sup>.

5. Level of Group Interest:

6. References:

- <http://www.nh.gov/dot/nhrideshare/index.htm>.
- Lynch, John H. Executive Order Number 2005-4 – *An Order for State Government to Lead-by-Example in Energy Efficiency*. State of New Hampshire. <http://www.nh.gov/governor/orders/index.htm>.
- NH.com, June 12, 2008, *Rideshare can save you money*, <http://www.nh.com/apps/pbcs.dll/article?AID=/NS/20080611/NEWS01/643932057/-1/NEWSBIN>.