

**Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries**

**New Hampshire Climate Change Policy Task Force
Draft Action Report List and Summaries**

**Residential, Commercial and Industrial
Working Group**

**Prepared by NHDES
July 29, 2008**

Climate Change Action Plan
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Table of Contents

RCI Goal 1 - Maximize Efficiency in New Construction and Existing Buildings

- RCI Action 1.1 Maximize Efficiency in New Construction
- RCI Action 1.2 Maximize Efficiency in Existing Conditioned Buildings - Residential
- RCI Action 1.3 Maximize Efficiency in Existing Conditioned Buildings – Commercial, Industrial & Municipal
- RCI Action 1.4A Upgrade Building Energy Codes
- RCI Action 1.4B Increase Building Energy Code Compliance
- RCI Action 1.5 Establish an Energy Properties Section in MLS Listings
- RCI Action 1.7 Building Conservation and Sustainable Communities as Instruments of Climate Change Policy
- RCI Action 1.8 Conserving the Embodied Energy in Existing Building Stock

RCI Goal 2 - Maximize Efficiency in Commercial, Industrial and Municipal (CIM) Processes

- RCI Action 2.1 Incentive Programs to Install Premium Efficiency Equipment, Processes, and Systems
- RCI Action 2.3 Mandatory CO₂ Emissions Reporting
- RCI Action 2.4 Best Practices for Energy Efficient Process Equipment
- RCI Action 2.5 Net Zero or Minimal Emissions Industrial and Commercial Clusters

RCI Goal 3 - Install Renewable Thermal Systems and Low CO₂e Thermal Systems

- RCI Action 3.1 Renewable and Low CO₂ Emissions Thermal Energy Systems (*New*)

RCI Goal 4 - Education/Behavior Changes

- RCI Action 4.1 Energy Efficiency and Conservation in School Curriculum
- RCI Action 4.2 Maximize Efficiency through Building Management Education Programs
- RCI Action 4.3 Residential Energy Demand Reduction
- RCI Action 4.4 Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program (*formerly RCI Action 1.6*)
- RCI Action 4.5 Establish an Energy Efficiency and Sustainable Energy Systems Web Portal

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

RCI Action 1.1 – Maximize Energy Efficiency in New Building Construction

Summary

Maximize Energy Efficiency and minimize net CO₂ output in new residential, commercial, institutional and industrial building construction. To the extent economically feasible, minimize life cycle CO₂ output and life cycle energy consumption and costs by constructing new buildings that incorporate state-of-the art energy efficiency and renewable energy systems in the building envelope, operating systems (HVAC in particular), and energy consuming appliances and devices.

RCI Action 1.2 - Maximize Efficiency In Existing Conditioned Buildings - Residential

Summary

Retrofit existing NH housing stock to minimize or eliminate net CO₂e output, and further, to ensure that current and future investments minimize embedded CO₂e output. To the extent economically feasible, program elements to include: (1) building shell and fenestration upgrades, including instrumented air sealing and thermographic inspections, (2) space conditioning equipment upgrades/replacements, including ductwork and duct sealing, (3) domestic hot water system upgrades, (4) ENERGY STAR lighting, (5) water saving measures, (6) ENERGY STAR appliances, and (7) use of renewable energy systems. Any replaced equipment would be permanently removed from service.

RCI Action 1.3 - Maximize Efficiency In Existing Conditioned Buildings – CI & M

Summary

Retrofit existing NH commercial, industrial and municipal buildings to minimize or eliminate net CO₂e output, and further, to ensure that current and future investments minimize embedded CO₂e output. To the extent economically feasible, program elements to include the following: (1) lighting, (2) heating, ventilating and air conditioning (HVAC) system upgrades/replacements, (3) process (air compressor equipment, air leak reduction, motors, VFDs, injection molding equipment, etc.) (4) control equipment and technologies to ensure lighting, HVAC, business equipment (copy machines, computers, motors, etc.) and other equipment is operating optimally to save energy and to reduce demand, (5) Refrigeration equipment (grocery stores, supermarkets, gas station / convenience stores, restaurants, etc.) (6) building shell and fenestration upgrades, (7) hot water system upgrades, (8) reduced water usage, (9) use of renewable energy systems. Any replaced equipment would be permanently removed from service.

RCI Action 1.4A - Upgrade Building Energy Codes

Summary

New Hampshire first adopted an energy building code under RSA 155-D in 1979 and through legislation adopted the most recent edition of the International Energy Conservation Code (IECC2006) in 2007. The state recognizes that building energy codes represent one of the more cost-effective ways to reduce energy use (both electric and heating/cooling fuel) and the related carbon emissions. Energy codes can be used to both regulate energy use in new construction and substantial renovation of all buildings, and, when administered in tandem with “stretch codes” or “beyond code” provisions, can also inform other high performance or “green” construction standards to serve additional state policy objectives. By ensuring the regular update of the states residential and commercial building energy codes that reference the latest national/international model code as a baseline, the state sets as its “floor” the latest technologies and practices inherent in that most updated code. In addition, the state can then use an informative appendix to the code similar to the “Field Guide for Residential

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

Construction” currently available to New Hampshire builders to define the “higher floor” it wishes to establish by setting beyond-code high performance building standards.

RCI Action 1.4B - Increase Building Energy Code Compliance

Summary

Building energy codes represent one of the more cost-effective ways to reduce long-term energy use (both electric and heating/cooling fuel) and the related carbon emissions. Energy codes can be used to both regulate energy use in new construction and substantial renovation of all buildings, and, when administered in tandem with “stretch codes” or “beyond code” provisions, can also inform other high performance or “green” construction standards to serve additional state policy objectives. However, any effort to capture savings from building energy codes has to come with the understanding that the best code is only as good as the compliance rates with that code.

Many NH communities do not have a local code official to enforce any aspect of the state’s building code, effectively leaving new construction in those communities uninspected. And although energy code training has been offered to builders and code officials at no cost consistently since the inception of the energy building code nearly 30 years ago, the training process must continue to be examined for areas of improvement. Thus, the state should consider mechanisms that would result in stricter enforcement of the energy code. They might include a formal certification process for inspectors beyond the current voluntary process offered through the ICC. Consideration should be given to the development of a system to encourage strict enforcement even in rural communities to ensure that all new buildings constructed in New Hampshire will meet the state’s building energy code.

While no definitive analysis has been done of compliance rates with the building energy code in New Hampshire, NEEP did in 2001 commission a survey of code officials in New Hampshire and Rhode Island to gain a sense of the issues local code officials had with the administration of the building energy code. Of note were the following:

- A question asking local code officials to assess their knowledge of the residential building energy code revealed that only 41 percent considered their knowledge of the code “very good.” And with regard to the commercial code, only 16 percent assessed their knowledge level as “very good,” while a full 30 percent said they had “not very much” knowledge at all.
- Only 30 percent of the officials had ever received any training in the commercial energy code.
- Perhaps most troubling, the report noted that: “Large areas of the state, generally central and northern NH do not have anyone responsible for energy code compliance at the town level. Responses from the contact activity suggest this lack is generally a resource lack: there is no one with the appropriate expertise in the energy codes (other aspects of building codes are enforced), or there is a lack of financial resources to fund this aspect of compliance activity.”

RCI Action 1.5 - Establish an Energy Properties Section in MLS Listings

Summary

Include an energy properties section in the Multiple Listing Service (MLS) real estate listings. Establish a specific, defined set of criteria/ratings to be included as options for this section of the MLS listings. The idea being that the consumer is aware that energy is a factor in decision-making, and provides the consumer with a means for comparison between homes.

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

RCI Action 1.7 – Building Conservation and Sustainable Communities as Instruments of Climate Change Policy

Summary

State policies and programs exist that would promote the reuse, rehabilitation, and preservation of older buildings and neighborhoods. This action would collect and promote these policies and programs, promoting the conservation of embodied energy and avoiding the expenditure of new energy by first maximizing the use of rehabilitated older buildings and neighborhoods as a matter of public policy. Current urban planning policies are recognizing that increased density, as is present in older plats, reduces energy use in transportation, new infrastructure, building materials, and landscaping. Compact communities, such as New Hampshire villages and urban centers, promote a pedestrian-friendly lifestyle and may provide nodes for public transit; they also preserve open space. Many of the buildings extant in these centers are underutilized, with their upper stories no longer serving their intended business or residential uses. Full use of these spaces will provide greater density, will offer housing units and office space with little additional carbon impact, and will preserve the original, sustainable plans of the NH villages.

RCI Action 1.8 - Conserving Embodied Energy in Existing Residential Building Stock

Summary

State-wide policies and programs that recognize, quantify, and encourage the conservation of the energy embodied in the state's older building stock will reduce the future expenditure of energy in New Hampshire. Research, education, and incentive programs that incorporate conservation of embodied energy as well as life-cycle assessment of buildings, components and materials will reduce total carbon emissions.

“Embodied energy is the total expenditure of energy involved in the creation of the building and its constituent materials,” and the energy invested in it throughout its use.¹ Embodied energy is a key component of life-cycle analysis, which examines the environmental impact of building materials and systems from raw material, through use within a building, to demolition and disposal. Energy is conserved within the existing building; it is not expended in demolition or new construction; and new materials needs are minimal, even in an efficiency-increasing project.

The federal census reports that approximately 140,000 of the estimated 660,000 total housing units in the state were built before 1940.² Buildings constructed prior to 1920 have shown, in recent studies, to be more energy efficient than those built at any time in the rest of the century.³ The majority of these buildings were constructed using sustainable, often local, and repairable materials, were site-oriented for maximum energy efficiency, and incorporate passive energy-conserving design features (natural lighting, cross-ventilation, etc.). Best practices for the maintenance of these older buildings, including energy efficient improvements, call for repairing existing building fabric or replacing in-kind with traditional building materials, which tend to be renewable and require minimal manufacturing. This results in a smaller carbon footprint for the project than

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

² According to the NH Office of Energy and Planning website, accessed 6 June 2008, 32.3% of net energy overall is used to heat buildings and structures, and another 36.6% is used to generate electricity. Net energy use by the residential sector is 14.7% of the total NH energy use.

³ Energy Information Administration, “2003 Buildings Energy Consumption Survey: Building Characteristics Tables.” Revised June 2006, Table B24, 150.

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

would full replacement with new materials. Research, education, and incentives will increase the number of these types of projects in New Hampshire.

RCI Action 2.1 - Incentive Programs to Install Premium Efficiency Equipment, Processes, and Systems

Summary

Commercial, industrial, and municipal processes can significantly reduce net CO₂ output by properly designing process lines and through the use of high efficiency lighting and equipment (e.g. motors, transformers, VFDs, energy management and compressed air systems, etc.). The CORE Programs offered by the electric utilities currently provide these services for electric measures and the gas utilities have comparable programs for natural gas measures. Programming must be expanded to include all cost-effective measures which reduce CO₂e emissions regardless of fuel type; this would include the use of renewable generation and CHP (Combined Heat and Power). A combination of targeted and comprehensive energy audits could be used to identify efficiency improvements and opportunities to reduce CO₂ emissions from manufacturing processes. Incentive programs could be offered to retrofit inefficient processes and equipment and to help offset the additional costs of premium efficiency equipment in new construction.

RCI Action 2.3 - Mandatory CO₂ Emissions Reporting

Summary

Commercial and industrial facilities shall be required to report their calculated annual CO₂ emissions in an effort to increase awareness and promote CO₂ reductions. Whereas many facilities are already required to inventory and report other pollutants to DES on an annual basis, this could easily be added to that reporting structure. A facility would be able to use approved emissions factors and annual fuel usage to calculate its emissions. All facilities burning an amount of fossil fuels above a set minimum would be required to report calculated CO₂ emissions.

RCI Action 2.4 - Best Practices for Energy Efficient Process Equipment

Summary

Industry groups in New Hampshire will work together with utilities and environmental professionals to develop industry specific best practices. These guidelines will include efficiency standards for process equipment that is specific to the industry to aid in purchasing the most energy efficient equipment. Additionally, efficient operating procedures can be documented and shared across industries. Smaller operations will benefit from these best practices as they may not always have the resources to explore energy efficiency on their own.

RCI Action 2.5 – Net Zero or Minimal Emissions Industrial and Commercial Clusters

Summary

Commercial and industrial facilities utilize over 20% of energy consumed in NH. A program could be instituted to promote minimization of overall energy use in commercial and industrial clusters, primarily in new construction, and secondarily in existing entities by optimizing complementary uses, activities and shared facilities such as cogeneration, waste heat utilization, and district heating and cooling. The ideal facility would emit no net CO₂, but moving in that direction installations that utilize state-of-the-art energy minimization strategies will substantially reduce greenhouse gas emissions in this sector. To augment this program, industry groups, DES, DRED, and OEP would provide a matrix indicating projected energy and cost savings utilizing up-to-date energy conservation technologies and state of the art energy sources (bio-mass, solar, wind, CHP and co-generation) and might help in “match-making” complementary business activities such as greenhouse operations that could utilize waste heat from wood chip based electric power generation.

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

RCI Action 3.1 - Renewable and Low CO₂ Emissions Thermal Energy Systems

Summary

Thermal energy use for space, water, and process conditioning comprises approximately one third of our energy use. This action is to promote and expand the use of renewable and low CO₂ emissions thermal energy systems to reduce fossil fuel use and GHG emissions from thermal energy use.

RCI Action 4.1 - Energy Efficiency and Conservation in School Curriculum

Summary

The existing K-12 school curriculum standards should be enhanced to promote the development of a citizenry that possesses a comprehensive understanding of the complex issues of climate change, and the opportunities to engage in energy efficiency and conservation measures. Greenhouse gas emission reductions would be achieved as the students carry their growing knowledge of sustainable behavior back to their families and communities. Sustainable behaviors can happen as part of daily habits, life-long decisions, individual advocacy, and community involvement.

RCI Action 4.2 - Maximize Efficiency through Building Management Education Programs

Summary

The State, energy utilities and energy companies (like oil and propane distributors) should continue to provide training for building maintenance and energy management staff. The industrial, small business and government sectors should make use of the many educational opportunities provided by utilities and the private consulting firms to help with the identification of and continual improvement of building management best practices. Training should focus on energy audits as a proven method used to identify energy efficiency opportunities to minimize or eliminate net CO_{2e} output in existing buildings, while “beyond code” certification can assure that new buildings create the least negative environmental impact.

The state and its business organizations should promote the creation of building manager positions within companies and government agencies still without these positions. Furthermore, the concept of placing one person in charge of energy efficiency should be introduced to small businesses. This would encourage regular reviews of energy use and identification and implementation of savings opportunities. These entities should provide these managers with the responsibility and the budget tools to implement energy savings and preventative maintenance programs to ensure that energy use and harmful emissions are minimized. These managers should have the ability to seek out grants and shared savings programs to save energy and reduce emissions.

RCI Action 4.3 - Residential Energy Demand Reduction

Summary

The State should adopt a community-based educational outreach program with the aim to reduce GHG emissions in the residential sector. Residential GHG emissions account for roughly half of all greenhouse gas emissions, when personal vehicles are included, and there needs to be an organized, concerted effort to engage residents in a voluntary reduction of their household energy consumption. Such a program would provide the information, tools, and support needed to enable households to understand how they use energy and map out a strategy to reduce their energy consumption. Emphasis should be placed on the financial savings achievable through home energy reduction. The program should make use of the various networks and communities of which residents are part (towns, neighborhoods, civic groups, faith-based organizations, businesses etc) since

Climate Change Action Plan
Residential Commercial and Industrial (RCI) - Draft Action Report List and Summaries

these communities can encourage and support their members in making sustained, socially beneficial changes at the individual household level. To foster change at the household level, research-based behavioral change strategies that target the root causes of climate change inaction should be employed through a comprehensive system of outreach activities that strengthen communities and do not rely solely on information-based campaigns.

RCI Action 4.4 - Establish a Comprehensive Energy Efficiency and Renewable Energy Education Program

Summary

Establish a comprehensive Energy Efficiency and Renewable Energy Education Program serving all sectors of building design, construction, sale and ownership/maintenance. This program would provide accessible resources and educational opportunities to the appropriate parties who design, build, evaluate/rate, maintain, sell and occupy buildings. The program would be established and administered at various locations throughout the state including, demonstration centers, community colleges, training seminars, etc.

RCI Action 4.5 - An Energy Efficiency and Sustainable Energy Systems Web Portal

Summary

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