The New Hampshire Climate Change Policy Task Force

New Hampshire Climate Action Plan

A Plan for New Hampshire's Energy, Environmental and Economic Development Future

Appendix 4.2: Increase Renewable and Low-CO_2-Emitting Sources of Energy in a Long-Term Sustainable Manner

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NH Department of Environmental Services
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Recommended Actions

EGU Action 2.1 – Renewable Portfolio Standard (RPS)

Summary

Implement the Renewable Portfolio Standard enacted in 2007 that mandates that 23.8 percent of the retail sales to in-state customers will be met by renewable energy sources by 2025.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The RPS program requires retail electricity providers (a.k.a. distribution utilities or load-serving entities) to acquire renewable energy certificates (RECs), each representing one MWh and tracked by ISO-NE, in sufficient amounts to meet specified percentages of their energy portfolios. NH RPS requirements call for the following amounts of generation by 2025:
    - New solar 44,000 MWh (0.3%);
    - New other (defined as wind; geothermal; ocean thermal; wave, current or tidal energy; hydrogen derived from biomass fuels or methane gas; eligible biomass or methane gas; the equivalent displacement of electricity by end-use customers from solar hot water heating systems used instead of electric hot water heating; additional new solar; or incremental new eligible biomass, methane gas, or hydro) 2,340,000 MWh (16%);
    - Existing eligible small (<25MW) biomass & landfill methane 950,733 MWh (6.5%); and
    - Existing small (<5MW) hydro 146,267 MWh (1%).

    New Hampshire RPS demand combined with regional RPS demand is modeled to lead to new in-state development of 960 MW wind, 56 MW biomass, 15 MW landfill gas, and 33 MW solar by 2025. There is sufficient potential generation supply to meet the 22 million MWh of projected regional RPS demand for new renewable energy generation by 2025. In New Hampshire alone, the potential developable total renewable capacity and generation are 4,447 MW and 12,819,000 MWh by 2025.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order)*: Interim rule is in place; PUC will complete final rulemaking.
    b. *Resources Required*:
    c. *Barriers to Address*:

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: PUC and electric utilities.
    b. *Parties Paying for Implementation*: Ratepayers.
    c. *Parties Benefiting from Implementation*: Utilities; all citizens.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Today, New Hampshire has utility-administered energy efficiency programs funded by ratepayers through the System Benefits Charge (SBC) on electric bills and through a charge included in gas rates.

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

b. *Proposed*: EGU Action 2.2 – Regional Greenhouse Gas Initiative (RGGI).

6. Timeframe for Implementation: 2008 – 2025.

7. Anticipated Timeframe of Outcome: 2008 – 2025.

Program Evaluation

1. Estimated CO_2 Emission Reduction
    a. Short-term (2012): 0.28 $MMTCO_2e$/year
    b. Mid-term (2025): 1.40 $MMTCO_2e$/year
    c. Long-term (2050): 1.81 $MMTCO_2e$/year

2. Economic Effects
    a. Costs
        i. Implementation Cost: Moderately low ($2.5 million to $25 million)
        ii. Timing: Constant / even
        iii. Impacts: Evenly distributed
    b. Savings
        i. Potential Economic Benefits: Moderate ($25 million to $125 million)
        ii. Timing: Low short-term / mostly long-term
        iii. Impacts: Evenly distributed

3. Other Benefits/Impacts
    a. *Environmental*: This action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.
    b. *Health*: Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social*: Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other*: Energy efficiency and emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
    a. *Technical*: There is an immediate potential for implementing this action as the technology is available and the demand exists.

b. *Economic*: This action has high potential, as noted in the UNH report "Economic Impact of a New Hampshire Renewable Portfolio Standard."

c. *Statutory/Regulatory*: The existing statute is in place and regulations are under development

d. *Social*: Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Other Factors of Note

   a. The reductions are a portion of the reductions associated with implementation of RGGI and should not be double-counted.

   b. The current marginal CO_2 emission rate reported by ISO-NE is 1,100 lb/MWh.

6. Level of Group Interest: High

7. References:

   - UNH report "Economic Impact of a New Hampshire Renewable Portfolio Standard," http://www.des.state.nh.us/ard/climatechange/rps.htm

   - NHPUC, Energy Policy Commission Interim Report 2007 (12/1/07), http://www.puc.state.nh.us/Electric/electric.htm

RCI Action 3.1 – Increase Renewable Energy and Low-CO_2e Thermal Energy Systems

Summary

The state should institute an incentive program to promote the expanded use of renewable and low-CO_2-emissions thermal energy systems to reduce fossil fuel use and GHG emissions from thermal energy use. In New Hampshire, the energy used for space heating, hot water, and process conditioning makes up approximately one-third of total energy consumption. The proposed program would provide incentives and attractive financing for the use of cost-effective, renewable energy resources and high-efficiency/low-CO_2e systems to change the temperature of conditioned space, water, air or other materials for useful purposes. The incentive levels and financing should be directly correlated to the efficiency or conservation levels of the end use. Other criteria to consider include the cost-effectiveness of new systems and the potential value of market transformation and peak demand reduction arising from incentives for particular new systems.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result):* The program would provide incentives and attractive financing for the use of cost-effective, renewable energy resources and high-efficiency/low-CO_2e systems to meet thermal energy demand. The incentive levels and financing should be based on expected efficiency gains, cost-effectiveness, and other criteria to be developed.

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

    a. *Method of Establishment (e.g., legislation, executive order):* There are number of potential existing and new funding options, including:

        i. The Renewable Energy Fund supported by alternative compliance payments (ACPs) under the Renewable Energy Portfolio Standard established pursuant to RSA 362-F:10, which is expected to have funds available starting in July, 2009. This fund is to be used by the PUC "to support thermal and electrical renewable initiatives." HB 1628 (currently pending before the Governor) establishes a $3/watt incentive program for certain residential renewable electric generation systems and authorizes the PUC to establish additional incentives for certain renewable energy systems, all to be funded from the Renewable Energy Fund.

        ii. Existing electric and natural gas utility programs funded by the System Benefit Charge (SBC) for solar hot water or high-efficiency/low-CO_2e thermal energy systems that reduce electric or gas consumption.

        iii. Forward capacity market (FCM) payments, which could be used to help fund renewable programs that directly reduce future electric system peak capacity demands.

        iv. SB 451, (currently pending before the Governor), which would create the possibility of direct utility investment in distributed energy resources under certain circumstances.

        v. The GHG Emissions Reduction Fund under RSA 125-O:23, which can be used for programs that increase the electrical and thermal energy efficiency of buildings, including such measures as "integration of passive solar heating and ventilation systems," among other things.

        vi. Additional projects that reduce or avoid CO_2 emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency (including high efficiency equipment and renewable systems). These are projects that would qualify for CO_2 emissions offsets under the Regional Greenhouse Gas Initiative, which could create a revenue source up to the market value of CO_2 emission allowances.

vii. Loan Programs such as Ocean National Bank, USDA Rural Development, Energy Efficient mortgages, and other revolving loan funds, which could help in financing projects based on pay-back from savings.

viii. Federal tax credits, to the extent available.

ix. A possible Thermal Energy System Benefit Charge (TSBC), which could be levied on fuel oils, kerosene, propane, natural gas, and coal used for heating. Such a levy would be based on the carbon output per delivered energy unit, e.g., the tons CO_2e per million Btu. The proceeds would be deposited in a fund to be administered by a statewide authority. The TSBC would have to be implemented through legislative action. Corollaries exist in the language creating the Oil Discharge and Cleanup Fund and related statutes. (RSA 146-D through F).

b. *Resources Required*: For a Thermal Energy System Benefit Charge:

i. Data collection methodology for the fuels not currently subject to statutory regulation.

ii. Methodology for determining the relative renewable component of any energy source on a life-cycle basis.

iii. Administrative entity. It would be preferable to combine any TSBC or other new fund with an existing or future entity delivering energy efficiency and/or renewable energy services statewide

c. *Barriers to Address (especially for medium to low feasibility actions):*

i. Lost sales in the fossil fuel industry.

ii. Lack of infrastructure and investment to transition from fossil fuel sources to renewable fuel sources, such as bulk wood pellet distribution systems.

iii. Potential property tax impacts to owners arising from installation of capital-intensive renewable energy systems (or other high efficiency/low emission systems such as ground source heat pumps) that replace fossil fuel use that is not subject to the property tax, with regard to any state-wide property tax and with regard to local property taxes in communities that have not exercised the local option to exempt solar, wind, and/or wood heating systems pursuant to RSA 72:27-a and RSA 72:61-72.

iv. Short term incremental capital costs that may exceed short term savings.

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

a. *Parties Responsible for Implementation:* PUC, OEP, and other possible statewide organizations, the fossil fuel industry for a TSBC fund collection.

b. *Parties Paying for Implementation:* With regard to utility programs, RPS and RGGI funds: utility and especially electric utility ratepayers. With regard to a possible TSBC, the users of fossil fuel excluding those for electric generation and/or transportation use.

c. *Parties Benefiting from Implementation:* All users of thermal energy, producers of thermal energy systems and resources.

4. Related Existing Policies and Programs: Electric and gas utility energy efficiency programs and the weatherization program. The OEP is leading a Thermal Energy Study Group and is due to make a report and recommendations on certain issues concerning thermal renewable energy by November 1, 2008, pursuant to 2007, 26:6.

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

    a. *Existing:* The renewable energy portfolio standard (RPS), the Regional Greenhouse Gas Initiative (RGGI), and the Governor's 25 x '25 initiative for the state to get 25 percent of its energy needs from renewable energy by 2025.

    b. *Proposed:* The Energy Efficiency and Sustainable Energy Board proposed under HB 1561, currently pending before the Governor, which would, among other things, be responsible for developing "a plan for economic and environmental sustainability of the state's energy system including the development of high efficiency clean energy resources that are either renewable or have low net greenhouse gas emissions."

6. Timeframe for Implementation: Rules have been adopted by the PUC for the Renewable Energy Fund and initial funding is anticipated by July 2009. Rules need to be developed and adopted for use of the GHG Emissions Reduction Fund, which could have some funding by early 2009. The estimated time to draft and pass legislation authorizing a TSBC is about 2 years.

7. Anticipated Timeframe of Outcome: Programs could start to ramp up to scale beginning in 2009 and continue for a number of subsequent years until maximum penetration of thermal renewable systems is achieved.

Program Evaluation

1. Estimated CO_2 Emission Reductions

    a. Short-term (2012): 0.03 $MMTCO_2e$ /year
    b. Mid-term (2025): 0.13 $MMTCO_2e$ /year
    c. Long-term (2050): 0.24 $MMTCO_2e$ /year

2. Economic Effects

    a. Costs:

        i. Implementation Cost: Moderate ($25 million to $125 million)
        ii. Timing: Immediate / higher initial costs
        iii. Impacts: Consumer – evenly distributed

    b. Savings:

        i. Potential Economic Benefit: Moderate ($25 million to $125 million)
        ii. Timing: Low short-term / mostly long-term
        iii. Impacts: Consumer – evenly distributed

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*: Energy efficiency 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*: This program will have broad and deep economic development impacts, including reduction of cash outflows for fossil fuel imports and promotion of conservation of a valuable and finite natural resource.

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

a. *Technical*: The technologies exist, are advancing, and are increasingly available.

b. *Economic*: Return will lag investment by 1 to 2 years or more initially. Some renewable and high efficiency thermal systems may have long payback periods.

c. *Statutory/Regulatory*: Legislation is necessary for implementing a TSBC.

d. *Social*: Rising and volatile fossil fuels prices are greatly increasing public interest and support for high efficiency and renewable thermal systems. For adoption of a TSBC the greatest challenges to address may be fossil fuel industry and consumer resistance to a mandated cost and developing an incentive mechanism for the fossil fuel supply industry.

5. Other Factors of Note:

a. Program goals should be explicit, long term, aggressive, and durable.

b. Programs should be tied to an aggressive thermal mandate.

c. Programs should be offered in coordination with comprehensive efficiency and conservation measures.

d. This program may include incentives for fossil fuel-fired combined heat and power and district energy systems, but should have a preference for renewable fuel systems.

6. Level of Group Interest: High

7. References:

EGU Action 2.4 – Address Barriers to Low- and Non-CO_2-Emitting Electric Generation

Summary

The State of New Hampshire should identify and remove obstacles to siting and constructing low- and non-CO_2 emitting energy facilities and transmission infrastructure in the state. These actions would better facilitate the development of new low- and non-CO_2 emitting facilities in the state, to enable the state to move away from carbon-based supply-side resources (i.e., fossil-fuel-fired power plants) while offsetting the impact of any potential load growth. The development of the new low-and non-CO_2-emitting facilities could enable older high-CO_2-emitting facilities to be gradually retired and facilitate the achievement of New Hampshire's Renewable Portfolio Standard targets and the goal to meet 25% of the state's energy from renewable power by 2025. However, to do so it is imperative that electrical transmission capability within the state also be enhanced to enable power to be exported from those areas where hydro, solar photovoltaic, wind, geothermal, tidal and biomass technologies could best be deployed in order to serve the New England load. These two goals could be accomplished by seeking methods to expedite the ISO-NE interconnection application review and approval for these types of facilities, and by establishing appropriately streamlined state and local permitting processes. In addition, New Hampshire's planning efforts cannot stand in isolation and should be coordinated with other states and Canada.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Although significant and increasing resources will be deployed to reduce electrical demand through greater energy efficiency and clean distributed generation, existing supply-side resources will continue to be needed as New Hampshire makes the transition to a low-carbon future. The overall strategic plan must also anticipate load growth by enabling the construction of clean, new generating facilities.

   There is a critical need to meet demand and replace older facilities with newly constructed central-station plants that are large (200 + MW), medium (50-200 MW) and small (less than 50 MW) generating facilities. Furthermore, it is reasonable to assume that certain carbon-based fuels will become less readily available in the future and that energy prices will increase. An important component of a strategy to manage future energy supply and cost structure is diversification of the supply mix. Building low- and non-CO_2-emitting generating facilities over the next 5 to 10 years would help New Hampshire meet the inevitable and growing demand for carbon-free energy and would assist in stabilizing and containing future energy prices. The primary technologies under consideration are hydro, solar photovoltaic, wind, geothermal, tidal and biomass.

   While addressing supply needs, it is imperative that electrical transmission capability within the state also be enhanced and increased to support the development of new low- or non- CO_2-emitting generation facilities. Such projects would focus on in-state development but would also help facilitate for the importation of low- and non-CO_2-emitting power from other states and Canada. To facilitate this, the state should continue to evaluate existing barriers to both facility siting and electrical transmission, and should develop solutions to overcome any obstacles or deficiencies in the shortest possible time frame. Workable solutions would involve coordinated planning with neighboring states and Canada.

   Note: Because end-user, demand-side generation is addressed in other actions proposed by the EGU working group and the RCI working group, the action proposed here is not intended to include generation deployed at end-user locations to reduce consumption (e.g., solar panels and other demand-side technologies installed at industrial or residential sites).

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

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

i. Seek methods to influence ISO-NE to expedite interconnection application review and approval for these types of facilities.

ii. Establish streamlined state and local permitting processes. Consider an expedited process for smaller generation facilities using renewable resources.

iii. Include siting standards to protect environmental quality and siting procedures that provide for appropriate public participation.

b. *Resources Required*: ISO-NE, state government, PUC, NHDES, and local governing bodies must align support of such applications.

c. *Barriers to Address*: Eliminate barriers for construction of new, clean generation.

i. Address transmission infrastructure limitations, including the Coos County loop in northern New Hampshire

ii. Address obstacles to speedy and efficient project review at the state and local levels.

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

a. *Parties Responsible for Implementation*: State legislature, NHDES, PUC, New Hampshire Site Evaluation Committee, and regulated utilities.

b. *Parties Paying for Implementation*: Ratepayers in New Hampshire and potentially throughout New England would pay for enhanced transmission; company shareholders would pay for costs to construct new generation facilities.

c. *Parties Benefiting from Implementation*: All citizens would benefit from reduced CO_2 emissions; generation owners benefit from better access to the grid and to customers; transmission owners benefit through their return on investment on new transmission facilities.

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. Enable the development of transmission resources in northern New Hampshire to facilitate renewable power transfers to southern New Hampshire. Also, transmission facilities should be installed to allow clean energy purchases. (See Senate Bill 383 of the 2008 Session.)

b. Allow the deployment and installation of clean, small-scale distributed energy and heat producing generating facilities (See Senate Bill 451 of the 2008 Session, codified at RSA 374-G).

c. Evaluate the retention of existing nuclear power generation facilities into the future. This form of generation is considered in detail as a separate item (see EGU Action 2.5 – Nuclear Power Capacity).

6. Timeframe for Implementation: Begin in 2009 by passing appropriate legislation to provide an expedited facility siting review/approval process and to address existing electrical transmission limitations in New Hampshire.

7. Anticipated Timeframe of Outcome: Complete development of an expedited facility siting process and resolve existing transmission issues in 2009. Consider pending plans to construct facilities to meet on-line availability dates in the period from 2014 to 2020.

Program Evaluation

1. Estimated CO_2 Emission Reductions: This action is not individually quantified for potential emission reductions. This is considered a supporting action and could enable significant reductions by facilitating the construction of low- non-CO_2-emitting electric generation which displaces higher-CO_2-emitting fossil fuel fired generation.

   Significant reductions could be achieved through this action because it supports increased customer-sited and large scale in-state renewable energy generation. This action also helps to enable increased imports of clean energy from Maine and Canada to serve New England.

2. Economic Effects

   Note: Value analysis of electric rate change versus environmental benefit must be weighed for each program or project considered.

   a. Costs

      i. Implementation Cost: Low (0-$2.5 million)
      ii. Timing: Constant / even
      iii. Impacts: State government (due to administrative costs)

   b. Savings: Not directly quantifiable; proposed action is a supporting mechanism.

3. Other Benefits/Impacts:

   a. *Environmental*: The proposed action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems, to the extent that new clean generation displaces existing carbon-intensive generation. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.

   b. *Health*: Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.

   c. *Social*: Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce “green” jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.

   d. *Other*: New renewable energy will create demand for alternative technologies in the U.S. marketplace.

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

   a. *Technical*: Pending plans to construct facilities can be implemented relatively easily once siting and transmission policy issues are addressed.

b. *Economic*: New facilities will create many construction jobs, long-term employment and tax revenue which will have a positive impact on the state's economy and will avoid fuel expenses being paid to other states and countries.

c. *Statutory/Regulatory*: The Legislature and Commission has the authority to approve most needed changes. If NH attempts to socialize the costs of transmission improvements across New England, the ISO and/or FERC will need to be involved.

d. *Social*: Increased renewable energy provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

EGU Action 2.8 – Identify and Deploy the Next Generation of Electric Grid Technologies

Summary

In order to increase the efficiency of the grid and expand the integration of renewable distributed power generation to reduce total greenhouse gas emissions from the electric generation, the state of NH should work at the state and Regional level to facilitate the adoption of the next generation of electric grid standards, technologies, and practices through a *phased-in approach*. This transition will include the modernization of the electricity transmission and distribution system to incorporate digital information and controls technology, deployment of energy storage devices, and sharing of real-time pricing information with electricity customers and "smart" technologies in homes and businesses. Deployment of the technology and adoption of standards would occur in a step-wise fashion in which initial investments would first exploit the current most cost-effective technologies while more advanced technologies would be employed as they become more cost-effective. This transition would occur across New Hampshire and the entire ISO-NE grid to the point of general adoption and ongoing market support in the electric sector. Such action would lead to the creation of a self-monitoring, adaptive system capable of semi-automated restoration and higher energy efficiency through reduced line losses and better integration of renewable resources through energy storage capacity and the deployment of end use technologies that are able to shift electric use to times when renewable generation is greatest.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The state of NH should work at the state and Regional level to facilitate the adoption of Smart Grid standards, technologies, and practices across New Hampshire and ISO-NE electricity grid to the modernize the electricity transmission and distribution system by:
   - Conducting programs to deploy advanced techniques for measuring peak load reductions and energy efficiency savings on customer premises from smart metering, demand response, distributed generation and electricity storage systems;
   - Establishing demonstration projects specifically focused on advanced technologies for power grid sensing, communications, analysis, and power flow control, including the integration of demand-side resources into grid management;
   - Requiring electric utilities, before undertaking investments in non-advanced grid technologies, to demonstrate that alternative investments in advanced grid technologies have been considered;
   - Requiring electric utility rates to: (1) align utility incentives with the delivery of cost-effective energy efficiency; and (2) promote energy efficiency investments;
   - Requiring all electricity purchasers to be provided direct access by their electricity provider to daily information regarding prices, usage, intervals and projections, and sources;
   - Requiring state regulatory authorities and non-regulated utilities to reconsider specified standards to take into account Smart Grid technologies;
   - Encouraging deployment and integration of renewable energy resources, both to the grid and on the customer side of the electric meter;
   - Deploying and integrating of advanced electricity storage and peak-sharing technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning; and
   - Providing consumers with new types of information and control options.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
   a. *Method of Establishment (e.g., legislation, executive order):* Assess the state of current Smart Grid technology market penetration and the identification of state, regional and national regulatory and institutional opportunities and obstacles related to Smart Grid development and identify the necessary legislation, PUC orders and incentives required to initiate development.

b. *Resources Required:* Appropriate legislation and rules, government investment, and utility incentives and investment recovery mechanisms. Funding for initial development and expansion could come from the GHG Emissions Reduction Fund, funded by RGGI allowance auctions and administered by the NH PUC.
c. *Barriers to Address (especially for medium-to-low feasibility actions):* Expansion and replacement of transmission and distribution system can be extremely expensive.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: The Legislature; the Public Utilities Commission (PUC); the Office of Energy and Planning (OEP); the Department of Environmental Services (DES); the Energy Efficiency and Sustainable Energy (EESE) Board; and utilities.
    b. *Parties Paying for Implementation*: Utilities and consumers.
    c. *Parties Benefiting from Implementation*: All consumers.

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*:
        - Regional Greenhouse Gas Initiative (RGGI)
        - Renewable Portfolio Standard (RPS)
    b. *Proposed*:
        - EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

6. Timeframe for Implementation: The technology required already exists and could be deployed within a year.

7. Anticipated Timeframe of Outcome: Time to total upgrade of the existing grid and expand into new areas in order to take advantage of renewable distributed generation could exceed a decade.

Program Evaluation

1. Estimated CO_2 Emission Reductions: The GHG reductions that result from this action would be realized through other initiatives. The Smart Grid supports RGGI and the RPS

2. Economic Effects – Not yet determined.
    a. Costs:
        i. Implementation Cost:
        ii. Timing:
        iii. Impacts:
    b. Savings:
        i. Potential Economic Benefit:
        ii. Timing of Benefits:
        iii. Impacts:

3. Other Benefits/Impacts
    a. *Environmental:* Improvements in energy efficiency and expansion of renewables will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.

b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
c. *Social:* Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
d. *Other:* A Smart Grid is anticipated to reduce power outages and to localize their effect resulting in a reduction in economic impact and social disruption.

4. Potential for Implementation (*i.e., including challenges, obstacles, and opportunities*)
    a. *Technical*: Smart Grid technology already exists and can be installed immediately.
    b. *Economic*: Costs may be an issue for individual elements of a "smart grid" and will need to be phased in when economies of scale become applicable and the technologies become cost effective.
    c. *Statutory/Regulatory*: Legislation, PUC orders and revised regulations may need to be provided in order for advanced grid technologies to be deployed or deployed rapidly.
    d. *Social*:

5. Other Factors of Note: A Smart Grid has frequently been observed to be key to leveraging electric plug-in hybrid technology in order to reduce GHG emissions from the transp0ortation sector without causing a spike in peak load in the electric sector that would offset some or all of the transportation reductions depending on the energy source (e.g., coal vs. natural gas vs. renewables). With the development of a smart Grid, plug-in hybrids could be plugged into the grid and be programmed to charge when demand is lowest or when intermittent renewable generation such as wind is available.

6. Level of Group Interest: Developed at the request of the Climate Change Policy Task Force

7. References:
    a. House Committee on Energy and Commerce http://energycommerce.house.gov/energy_110/index.shtml
    b. House Committee on Energy and Commerce – Committee Print - Transition to a Smart Grid http://energycommerce.house.gov/cmte_mtgs/FC062707MU/ENBILL07_042_xml.pdf
    c. House Committee on Energy and Commerce – Committee Print - Plug-in Hybrid Promotion http://energycommerce.house.gov/cmte_mtgs/FC062707MU/ENBILL07_045_xml.pdf
    d. Google's 'Smart Grid' idea? Get the govt to pay for it http://www.theregister.co.uk/2008/09/19/google_ge_smart_grid_ploy/
    e. H.R. 3237, The Smart Grid Facilitation Act of 2007 http://www.washingtonwatch.com/bills/show/110_HR_3237.html
    f. Smart Grid Consortium to Develop Smart Grid City http://www.greencarcongress.com/2008/01/smart-grid-cons.html

EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

Summary

The State should continue to encourage the development of customer-sited low- and non-CO_2-emitting distributed generation (DG) through a combination of regulatory changes and incentives as begun with the passage of Senate Bill 451 (SB 451) in the 2008 Session. These distributed generation resources can include renewable power sources such as solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, and systems fueled with biomass, as well as extremely efficient fossil fuel fired cogeneration or combined heat and power (CHP). The distributed electricity generating systems provide electricity system benefits such as avoided capital investment and avoided transmission and distribution losses, while also displacing fossil-fueled generation and thus reducing greenhouse gas emissions. SB 451 authorizes authorizing rate recovery for electric public utilities investments in distributed energy resources located on the premises of a retail customer of the electric public utility. Additional policies designed to encourage and accelerate the implementation of customer-sited renewable distributed generation could include direct incentives for system purchase, market incentives - including "net metering", education and training, state goals or directives, and favorable rules for interconnecting renewable generation systems with the electricity grid.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
Distributed generation (DG) sited at residences and commercial and industrial facilities, and powered by low- and non-CO_2-emitting energy sources, provides electricity system benefits and displaces fossil-fueled generation, and therefore reducing greenhouse gas emissions. Distributed generation networks allow for relatively large numbers of electric generation sites to be deployed on the grid. DG is therefore much less susceptible to large-scale power outages caused by natural or the increasing number of manmade disasters that threaten national security. It reduces the amount of energy lost in transmitting electricity because the electricity is generated very near where it is used, perhaps even in the same building. This also reduces the size and number of power lines that must be constructed.

Diesel engines have long been used as distributed power sources to provide emergency back-up power to industry and emergency services. However, even newer DG units have GHG emissions that are significantly higher than power plants that burn cleaner fuels or have emission controls. Although there are state regulations (e.g., NH Code of Administrative Rules Chapter Env-A 3700 NO_x Emissions Reduction Fund for NO_x-Emitting Generation Sources[1]) that encourage installation of emission controls on diesel engines, these controls do not address GHG emissions.

The use of alternative technologies need s to be encouraged as a method for meeting demand for distributed power and can include solar photovoltaic systems, wind power systems, biogas and landfill gas-fired systems, geothermal generation systems, cogeneration or combined heat and power (CHP) and systems fueled with biomass. With the passage of NH Senate Bill 451, which authorized rate recovery for electric public utilities investments in distributed energy resources, the State of New Hampshire has provided significant support to expand the use of DG across the state. This legislation enables New Hampshire electric public utilities to invest in or own distributed energy resources, which are located on the premises of a retail customer of the electric public utility.

Increasing the use of renewable distributed generation in New Hampshire can be further achieved through a combination of regulatory changes and incentives including:

[1] Administrative Rules can be found at the NH Department of Environmental Services Website, see http://www.des.state.nh.us/.

- Training and education programs and certification for building planners, builders/contractors, energy managers and operators, renewable energy contractors, and state and local officials on the incorporation of distributed renewable generation and solar space/water heat in building projects;
- Assistance in siting, designing, planning renewable systems;
- Funding mechanisms and incentives could include low-interest loans, rebates on capital costs, tax incentives, and attractive rates for power purchases/net metering;
- The development of interconnection standards to facilitate DG installation;
- Net metering for some renewable distributed generation, and possibly avoided-cost pricing rules for others;
- Net metering standards for highly efficient fossil fuel-fired cogeneration systems
- Pilots and demos, such as renewable systems in government buildings; and
- Research to identify the distributed renewable generation systems most suited to New Hampshire or its regions.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
   a. *Method of Establishment (e.g., legislation, executive order):* Assess the utilization of low-CO_2-emitting and renewable distributed generation in the state and the identification of regulatory and institutional opportunities and obstacles related to expansion of this network and identify the necessary legislation, PUC orders and incentives required to initiate development.
   b. *Resources Required:* Appropriate legislation and rules, funding and incentives. Funding could come from the Renewable Energy Fund, funded by Alternative Compliance Payments, and the Greenhouse Gas Emissions Reduction Fund, funded by RGGI allowance auctions. Both funds are administered by the NH PUC.
   c. *Barriers to Address (especially for medium-to-low feasibility actions):* Existing Net-Metering rules in New Hampshire may preclude the integration of facilities that elect to install co-generation technology if the primary fuel is a fossil fuel. Other barriers may include: commercialization barriers; price distortions; failure of the market to value the public benefits of renewables; failure of the market to value the social cost of fossil fuel technologies; and market barriers such as inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, and "split incentives" between building owners and tenants.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)
   a. *Parties Responsible for Implementation*: The Legislature; the Public Utilities Commission (PUC); the Office of Energy and Planning (OEP); the Department of Environmental Services (DES); the Energy Efficiency and Sustainable Energy (EESE) Board; and utilities.
   b. *Parties Paying for Implementation*: Utilities and consumers.
   c. *Parties Benefiting from Implementation*: All consumers.

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*:
      - EGU Action 2.1 - The Renewable Portfolio Standard
      - EGU Action 2.4 - The Regional Greenhouse Gas Initiative
      - NH Senate Bill 451
   b. *Proposed*:
      - EGU Action 2.8 – Identify and Deploy the Next Generation of Electric Grid Technologies

6. Timeframe for Implementation: The technology required already exists and is being implemented. An expanded rate of implementation could occur as soon as the necessary incentives and regulations are put in place.

7. Anticipated Timeframe of Outcome: The time required to fully take advantage of the existing and future opportunities may depend on the construction of a Smart Grid which will better integrate renewable energy generation through energy storage and smart technologies and real-time pricing communication.

Program Evaluation

1. Estimated CO_2 Emission Reductions: The GHG reductions that result from this action would be realized through other initiatives. The promotion of low-CO_2-emitting and renewable distributed generation supports RGGI and possible RECs[2].

2. Economic Effects – These costs and benefits have not yet been assessed.
    - Costs:
        i. Implementation Cost:
        ii. Timing:
        iii. Impacts:
    - Savings:
        i. Potential Economic Benefit:
        ii. Timing of Benefits:
        iii. Impacts:

3. Other Benefits/Impacts
    a. *Environmental:* Improvements in energy efficiency will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water. Expanded distributed generation could result in a reduction in water consumption at central-station power plant for cooling.
    b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social:* Increased flexibility of electricity supply for consumers hosting generation. Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other:* Utility economic benefits also include loss reduction, reduced capital and operating costs, expanded generation capacity, distribution and transmission capacity investment deferral, reducing risk from uncertain fuel prices, green pricing benefits, etc. With the appropriate policies

[2] Individuals at the Public Listening Sessions in September 2008 wondered whether several small-scale renewable generators could combine their generation to qualify for RECs under the existing RPS.

in place renewable DG also offers a new income stream. Electricity (grid) system benefits also include reduced peak demand, improved utilization and performance of the electricity system.

4. Potential for Implementation (*i.e., including challenges, obstacles, and opportunities*)
    a. *Technical*: The technology already exists to be deployed.
    b. *Economic*: With the current credit crisis, their may be less private capital available for investment and access to the credits markets may be restricted. The need for state financing through the new RPS and RGGI Funds may be critical to allow expansion of DG resources during the current economic downturn.
    c. *Statutory/Regulatory*: SB 451 provides utilities with the authority to begin their own investment. Additional legislation and regulations may be needed to encourage broader investment and deployment.
    d. *Social*:

5. Other Factors of Note: Revenue decoupling must be combined with incentives for utilities to place greater emphasis on energy efficiency activities if the full benefits of decoupling are to be realized. California has had revenue decoupling in place for most of the past 25 years. There, the decoupling mechanism is generally accepted as a way to make the state's electric utilities indifferent to sales levels. Decoupling has had only small impacts on rate volatility. Analyzing ten years' worth of decoupling data, a 1994 U.C. Berkeley study concluded that "decoupling has had a negligible effect on rate levels and has, for [one of the three utilities analyzed], actually reduced rate volatility."[3]

6. Level of Group Interest: Developed at the request of the Climate Change Policy Task Force.

7. References:
    - *NH Senate Bill 451*
      AN ACT authorizing rate recovery for electric public utilities investments in distributed energy resources.
      http://www.gencourt.state.nh.us/legislation/2008/SB0451.html

[3] Joseph Eto, Steven Soft, and Timothy Belden, *The Theory and Practice of Decoupling*, Lawrence Berkeley Laboratory, University of California, January 1994, Report LBL-34555, UC-350 at 46. The cited excerpt of this report is attached hereto as Ex. A. The full report has been filed electronically, and is on file with ENE and available upon request.

AFW Action 2.4 – Encourage the Use of Biogenic Waste Sources for Energy Generation

Summary

The state should create and implement innovative programs to encourage the development of facilities and processes that utilize biogenic waste streams as energy sources and reduce New Hampshire's reliance on fossil fuels. These wastes can be generated in municipal, residential, agricultural, institutional, and industrial settings and can provide heat, power, and fuel through a number of applications. The potential wastes include sludge, septage, municipal and industrial wastewater, brown grease, residential and institutional food waste, leaf and yard waste, and manure.

Because of the impacts that a variety of factors can have on determining the most economical and efficient uses of waste streams for energy, the state should create a flexible program that would enable the most appropriate applications to be selected and developed. These projects could be incentivized in two ways: 1) by creating a loan program to assist livestock and industrial operations, and 2) by modifying existing municipal funding mechanisms to cover the higher initial capital costs of these projects, which would be offset by long-term reductions in operating costs and fossil fuel consumption. Additional resources could be developed to facilitate the optimization of the selected processes and achieve peak efficiencies.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The state would develop the resources required to promote and invest in opportunities to manage New Hampshire's solid waste and wastewater streams while generating heat, electricity, and fuel (e.g., landfill gas, pellets). These projects could include:

    - Anaerobic digesters, which provide a means to treat large volumes of organic municipal, industrial and livestock wastes in an energy-efficient and cost-effective manner while generating methane (CH_4). The digesters decompose manure and other organic material from residential, commercial, and institutional settings in a controlled environment and recover the methane produced in the oxygen-free environment. The methane captured can then be used to create electricity, steam, heat, and fuel for vehicles to offset fossil fuel use and its associated CO_2 and black carbon emissions.
    - Microbial fuel cells that utilize manure and landfill leachate and other liquids with high biological oxygen demand (BOD) or chemical oxygen demand or (COD) to electrical potentials.
    - The direct conversion of organic wastes to fuel. The waste could be dried and pelletized or converted to other forms and then used to generate electricity or heat. It could be incinerated alone or combined with coal and burned to capture the renewable energy it contains.

    A loan program could be established to provide funding for specific sectors of the economy. For municipal waste water treatment plants, a policy change would be needed to make grants and funding available for these facilities to upgrade to anaerobic treatment facilities because of the higher initial costs. Existing policies dictate that funds be used to pay for the lowest-cost facility and technology option rather than accounting for the operating costs associated with the facility over its useful life.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order)*: Legislation and policy modifications
    b. *Resources Required*: Funding for the manure methane and industrial digesters loans and grants for municipal applications and support for further research into new technologies.

c. *Barriers to Address (especially for medium to low feasibility actions)*: Digesters and other applicable technologies may have a higher first cost associated with them that will need to be addressed. Economy of scale: not all wastewater treatment facilities, industries or farms generate enough residuals to make the capital costs worthwhile or economically feasible (see 4a). Regionalization may be an appropriate concept to encourage in some segments of the state.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
   a. *Parties Responsible for Implementation*: New Hampshire state government, municipalities
   b. *Parties Paying for Implementation*: New Hampshire state government, municipalities, tax-payers, federal grant funds, livestock farmers and industrial facilities.
   c. *Parties Benefiting from Implementation*: Livestock farmers, municipal governments, tax-payers, industrial facilities.

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:* AFW Action 2.1 – Encourage the Use of Bioreactors for Landfills
      AFW Action 2.3 – Increase Development and Use of Secondary Feedstocks for Biodiesel

6. Timeframe for Implementation: Immediate

7. Anticipated Timeframe of Outcome: Short- to mid-term, based on the time required to site and permit new facilities.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions – Analysis not completed.
   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*: Anaerobic digesters reduce foul odor and can reduce the risk of ground- and surface-water pollution from manure and the volume of residual material that may need to be landfilled. The

ash and biosolids that are left following the extraction of the energy can be used as a source of fertilizer and reduce the need for fossil fuel based fertilizers while also replenishing valuable micronutrients.

b. *Health*: Improved air and water quality translates to better health and quality of life in the affected areas.

c. *Social*: Alternative generation and energy efficiency 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*:

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

   a. *Technical*: The anaerobic digester technology exists to be deployed immediately. The size of the dairy farms in the state may require special consideration when designing and operating an anaerobic digester, but could be addressed through the development of cooperatives.

   b. *Economic*: Digesters are often more expensive to install but are more cost effective to operate over the life of the facility. The cost to separate organics from the solid waste stream for biogas production could be prohibitive at first, but as energy prices continue to rise, it will likely be more cost effective.

   c. *Statutory/Regulatory*: Existing funding requirements may prevent the funding of aerobic digesters due to their higher capital costs.

   d. *Social*:

5. Other Factors of Note:

   New Hampshire is deficient in disposal capacity to address all of the septage and brown grease waste generated in the state. Municipalities are required under state statute (RSA 485-A:5-b) to provide or assure access to proper septage disposal for their residents. In addition, providing low- or no-cost disposal for brown grease will assist municipalities in managing this material properly. EPA suggests that the poor management of brown grease/grease trap waste (nationally) is the #1 cause of sanitary sewer overflows, which degrade the environment and pose a significant threat to public health.

6. Level of Group Interest: High

7. References:

- Biogas fuels city buses, garbage trucks, taxi cabs, even a train in Sweden, http://www.exchangemagazine.com/morningpost/2008/week27/Thursday/070304.html.

EGU Action 2.2 – Regional Greenhouse Gas Initiative (RGGI)

Summary

Implement the Regional Greenhouse Gas Initiative, beginning in 2009, to stabilize carbon dioxide (CO_2) emissions from power plants at 188,076,976 tons (regional 3-year average) through 2014. Reduce CO_2 emissions by an additional 2.5 percent per year for 4 years (10 percent total) through 2018. In 2012, evaluate the feasibility of further reductions after 2018.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The policy reduces carbon dioxide emissions by means of a "cap-and-trade" program. The cap sets the maximum amount of emissions that can be emitted in aggregate from all regulated sources in the region. It does not put any limits on emissions for individual units. Instead, allowances are created that each represent one ton of carbon dioxide emissions. Emission allowances are marketable commodities that can be purchased, sold, or banked (held for future use). Each quarter, a number of allowances will be auctioned. Regulated sources need to obtain enough allowances to cover the amount of carbon dioxide they emit by the end of each 3-year compliance period. A cap-and-trade program draws on the power of the marketplace by not prescribing specific mechanisms for regulated sources to manage their carbon emissions. Regulated sources can design their own compliance strategies to obtain all of the emission allowances they require using the lowest-cost approach. Revenues from the auctioning of allowances can be invested in additional energy efficiency that further reduces emissions and saves money over time.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order)*: Legislation, followed by rulemaking.
    b. *Resources Required*: Self-funded by auction revenues.
    c. *Barriers to Address (especially for medium to low feasibility actions)*:

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: New Hampshire Legislature, NHDES, NHPUC, RGGI Inc[4].
    b. *Parties Paying for Implementation*: Current ratepayers.
    c. *Parties Benefiting from Implementation*: Future ratepayers, the entire state, and neighboring states.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): RPS; Systems Benefit Charge CORE energy efficiency program.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    a. *Existing*:
    b. *Proposed*: Action 1.2 – Energy Efficiency Procurement and other energy efficiency programs.

6. Timeframe for Implementation: 2009 - 2018.

[4] RGGI, Inc. is a new non-profit corporation intended to provide a forum for collective policy deliberation by RGGI Signatory States and to support individual action by the member States in matters related to implementation of the RGGI program. A primary role for RGGI, Inc. will be the provision of technical and administrative support services to the member States in implementing the RGGI program.

7. Anticipated Timeframe of Outcome: 2009 - 2018.

Program Evaluation

1. Estimated CO_2 Emission Reductions/Avoided Increases:
    a. Short-term (2012): 0.47 $MMTCO_2e$/year
    b. Mid-term (2025): 2.79 $MMTCO_2e$/year
    c. Long-term (2050): 5.92 $MMTCO_2e$/year

2. Economic Effects
    a. Costs
        i. Implementation Cost: Moderate ($25 million to $125 million)
        ii. Timing: Constant / even
        iii. Impacts: Evenly distributed
    b. Savings
        i. Potential Economic Benefits: Moderately high ($125 million to $500 million)
        ii. Timing: Low short-term / mostly long-term
        iii. Impacts: Evenly distributed

3. Other Impacts
    a. *Environmental*: This action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems. Emission reductions will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water.
    b. *Health*: Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions will also be beneficial to the health of human populations and ecosystems in general.
    c. *Social*: Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving energy conservation and some alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.
    d. *Other*: Energy efficiency and emission reductions will reduce the load on our aging infrastructure and will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): High
    a. *Technical*: The technologies required already exist.
    b. *Economic*: This is a self-funded program that will cost the state more if it were not to participate in the regional effort to reduce greenhouse gas emissions.
    c. *Statutory/Regulatory*: There are low statutory and regulatory barriers remaining as the legislation in support of this policy passed in June 2008.

d. *Social:* Increased energy efficiency provides a variety of societal benefits, including cleaner air and lower energy costs. The effectiveness of energy efficiency programs, and the degree to which the public embraces them, will depend on the details of their design and implementation.

5. Level of Group Interest:

6. Other Factors of Note:

7. References:

- Ross Gittell, Ph.D. & Matt Magnusson, MBA, "Economic Impact in New Hampshire of the Regional Greenhouse Gas Initiative (RGGI): An Independent Assessment," University of New Hampshire Whittemore School of Business and Economics, January 2008.

EGU Action 2.6 – Importation of Canadian Hydro and Wind Generation

Summary

To the extent that it reduces or does not raise electricity rates to the consumer, high voltage transmission lines should be built to import clean power generated from Canadian hydro and wind sources as a complementary policy to developing non-CO_2-emitting generation in New Hampshire. Canada is developing vast new hydro and wind generation resources, which are greater than their local needs. This creates an opportunity for New Hampshire and the entire Northeast to obtain clean power. This could provide new power sources to offset future local and regional growth and facilitate retiring or curtailing the operation of fossil fuel-fired plants in New England. Contracts made for this renewable energy should be developed with consideration for the broader environmental impacts of the power sources as well as the impacts that this imported power would have on the development of in-state renewable resources.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): By both developing contracts or commitments for Canadian power companies or brokers and building new high capacity transmission lines, clean power can be purchased and transmitted south from Canada. This concept is not new. In the 1980s, a high voltage transmission line was built from Canada to facilitate lower cost energy purchases and transmission to New England. The new clean power line(s) go beyond the capability of the existing system so that new transmission is needed.

   The costs of the project, including construction and transmission costs would be included in the delivery cost of the electricity to the customers. The Task Force conditions its support for the development of these contracts with the requirements that any imported energy: be substantially and verifiably renewable; replaces fossil fuel generation; and is competitively priced for retail electric consumers. The energy supply contracts should also be developed with consideration for the broader environmental impacts associated with the power sources, and the impacts that this imported power would have on the development of in-state renewable resources. Once these criteria and considerations have been addressed, the state and Public Utilities Commission should view this Action as being positive.

   The Task Force also noted that the large hydro projects, which could supply a portion of the imported power, are not eligible for RECs as part of the New Hampshire Renewable Portfolio Standard.

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

   a. *Method of Establishment (e.g., legislation, executive order):* Public Utilities Commission (PUC) orders and positive legislative support to clarify issues as needed. The PUC would also need to coordinate with the ISO-NE and FERC.

   b. *Resources Required*: These agreements must be framed around the needed construction of a new high voltage transmission line(s) which would serve as a necessary conduit for power flow. A positive regulatory or legislative signal on this issue is very important.

   c. *Barriers to Address*: The barriers that New Hampshire needs to overcome are the state, and potential regional and federal level, approvals needed to allow such a project to proceed. This includes PUC and/or legislative approvals to allow construction of a new transmission system. This signal will be the key catalyst to bring deals to closure.

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

a. *Parties Responsible for Implementation:* PUC and utilities or customers purchasing power from Canadian supplier, FERC and ISO-NE.
b. Parties Paying for Implementation: Customers.
c. Parties Benefiting from Implementation: All customers, Canadian renewable resource owners, and transmission owners/investors who are regulated by the Federal Energy Regulatory Commission under FERC approved transmission rates.

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
      - Regional Greenhouse Gas Initiative (RGGI)
      - Renewable Portfolio Standard (RPS)
   b. *Proposed*:
      - EGU Action 2.4 – Address Barriers to Low- and Non-CO_2-Emitting Electric Generation
      - EGU Action 2.9 – Promote Low- and Non-CO_2-Emitting Distributed Generation

6. Timeframe for Implementation: Soon after 2012, depending on necessary review and approval steps.

7. Anticipated Timeframe of Outcome: Upon installation and successful testing.

<u>Program Evaluation</u>

Value analysis of electric rate change versus environmental benefit must be weighed for each program or project.

1. Estimated CO_2 Emission Reduction
   a. Short-term (2012): 6.09 $MMTCO_2e$/year
   b. Mid-term (2025): 6.09 $MMTCO_2e$/year
   c. Long-term (2050): 6.09 $MMTCO_2e$/year

2. Economic Effects – Costs and Savings for this Action have not yet been completed.

   a. Costs:
      i. Implementation Cost:
      ii. Timing:
      iii. Impacts:

   b. Savings:

      i. Potential Economic Benefit:
      ii. Timing of Benefits:
      iii. Impacts:

3. Other Benefits/Impacts
   a. *Environmental*: Importation of renewable energy can reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems, if that energy replaces fossil fuel generation in New England. Emission reductions resulting from retiring or reducing the operation of existing fossil fuel generation in New England will directly improve air and water quality while indirectly benefitting the fish, wildlife, and ecosystems that depend on clean air and water. Additional environmental benefits

would be gained in New England by avoiding the construction of new fossil fuel generation. However, there are concerns about the impact of hydro power on methane generation in the reservoirs that are a matter under review by the Canadian governments in their review of new hydro generation in Canada.

b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, as with all measures that mitigate climate warming by reducing harmful emissions, this action will also be beneficial to the health of human populations and ecosystems in general to the extent that imported renewable energy replaces existing fossil fuel generation in the New England.

c. *Social:* Programs that reduce emissions have immediate and long-term benefits to society.

d. Other:

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

   a. *Technical:* The technology exists to do this work. Lead time continues to lengthen due to current high global demand for this equipment.

   b. *Economic:* This recommendation provides short term value in the form of construction jobs during the 3-4 year construction period, provides a smaller number of long-term jobs related to the maintenance and operation of the new transmission facilities, provides long-term property tax value to the towns in which the facilities are located, and provides additional long-term state revenue tax revenue from the taxed net income on the facilities. The benefits to electric customers would be determined by the specific terms of any purchased power agreement and the reductions to New England fossil fuel generation which would be subject to state regulatory review and confirmation at the time of any filings for state approval.

   c. Statutory/Regulatory:

   d. *Social:* There may be resistance to allow siting of any new, larger power projects. This will require significant effort to address concerns and develop the necessary support.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:
   - ISO-NE Scenario Analysis Report
     Exploring the economic, reliability, and environmental impacts of various resource outcomes for meeting the region's future electricity needs
     http://www.iso-ne.com/committees/comm_wkgrps/othr/sas/mtrls/elec_report/scenario_analysis_final.pdf

EGU Action 2.7 – Allow Regulated Utilities to Build Renewable Generation

Summary

To the extent that it increases New Hampshire's overall renewable energy capacity and the rate at which those resources are brought online and helps to reduce CO_2 emissions, the State should provide regulated utilities with limited authority to construct and/or acquire renewable generating assets. The only regulated electric utility that currently owns generation is Public Service of New Hampshire (PSNH), and under existing law PSNH and other utilities[5] are only specifically authorized to invest in or own new small-scale distributed generation under a new 2008 law. As noted in the summary below, this issue has been an area of intense debate within the Legislature and a wide range of opinions exist among the various stakeholder groups across the state. However, in the interest of reducing the State's greenhouse gas (GHG) emissions and reducing vulnerability to global energy price volatility, New Hampshire's energy planning efforts should consider the significant resources and experiences that utilities can provide in the development of new renewable generation, in conjunction with a strategy of aggressively encouraging new low-carbon generation sources so that ultimately less fossil fuel generation plants are needed in New England. The key element to achieve the GHG reductions is to draft legislation that gives regulated utilities the authority to construct and/or acquire renewable generating assets. This authority should be provided with consideration to the impact that it will have on the benefits of market competition provided by non-utility owned merchant generating plants.

Program Description

Summary of Electric Generation Restructuring[6]

Revised Annotated Statutes (RSA) 374-F set forth the policy and implementation steps for restructuring New Hampshire's electric utility industry to a competitive market. As a result of the enactment of RSA 374-F in 1996, the PUC ordered the electric utilities to divest their ownership interests in generation assets in order to eliminate any vertical market power. Electric utilities were to become primarily transmission and distribution companies. After protracted court battles between the utilities and the state on various issues related to restructuring, divestiture proceeded, most notably in the negotiated PSNH Settlement Agreement as approved by the PUC in 2000. The Legislature, through passage of SB 472 in 2000, played a key role in enabling and setting forth important terms of the Settlement Agreement. In it, the Legislature directed that PSNH fossil fuel generation assets be sold by July 1, 2001, "unless the PUC finds due to circumstances beyond its control that further delay is in the public interest."

However, in 2001, House Bill 489 was passed in reaction to the electric restructuring debacle that occurred in California during the prior summer and the increases in wholesale prices for electricity in New England. The 2001 legislation specified that PSNH's fossil and hydro assets could not be divested any sooner than February 1, 2004, but that the PUC should expeditiously initiate and complete the sale of Seabrook to benefit customers' stranded cost recovery obligations. In addition, the legislation extended the availability of transition service for residential, commercial and industrial customers. In essence, the Legislature put a temporary brake on full divestiture of generation assets and created a safety net for electric consumers.

In 2003 the Legislature passed Senate Bill 170 (RSA 369-B:3-a) which specified that "the sale of PSNH fossil and hydro generation assets shall not take place before April 30, 2006…..subsequent to April 30, 2006, PSNH may divest its generation assets if the commission finds that it is in the economic interest of retail customers of PSNH to do so, and provides for the cost recovery of such divestiture."

[5] This excludes the New Hampshire Electric Cooperative and municipal electric utilities, which are not subject to the restrictions placed on other utilities in the state.

[6] This summary was based on a draft document, entitled "Legislative Policy on the Generation of Electricity", that was presented by Joel Anderson, House Committee Research Office, to the State Energy Policy Commission on October 25, 2006.

Senate Bill 170 provided that "prior to any divestiture of its generation assets, PSNH may modify or retire such generation assets if the commission finds that it is in the public interest of retail customers of PSNH to do so, and provides for the cost recovery of such modification or retirement." In large part, this statutory language was added to allow PSNH to convert one of its coal boilers at Schiller to a wood-burning unit, which was completed in 2006.

It is generally accepted that electric utilities can not currently build new power plants of any significant size. Recent attempts have been made in the Legislature, which have failed, to enable utilities to do so again. These attempts have triggered the policy debate on whether changes in the market, new supply needs, or other perceived public needs such as constructing a new wood-fired plant in the North Country, are best met by the private sector and competitive markets or by public utilities and regulated rates. This debate has not been resolved by the Legislature.

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

   Society needs to move away from carbon-based supply-side resources and transition towards generating facilities that are low- or non-CO_2-emitting. Although significant and increasing resources will be deployed to reduce electrical demand through greater energy efficiency, clean distributed generation and efficient co-generation projects, some of the current generating resources will be needed to bridge the transition from today's balance of supply and demand to a low-carbon emissions future. As efforts continue in improving efficiency and reducing demand, the overall strategic plan must also anticipate load growth. An additional, and reasonable, assumption is that certain fossil fuels will be less available and more expensive in the future. As this occurs, energy prices are likely to increase proportionately.

   An important component of a strategy to manage future energy costs is to diversify the supply mix and have less carbon-based supply facilities. This is accomplished by building low- and non-CO_2-emitting generating facilities over the next five to fifty years, and, importantly, by retiring older, dirtier and more carbon-intensive fossil fuel plants in New England. These investments will assist in stabilizing rates into the future and be sound investments to meet increasing demands for carbon-free energy. These investments can also provide high value to the New Hampshire economy by material procurement and wages for local craftsmen. This, in turn, benefits local town(s) and the state economy. Finally, the hope is that these plants will reduce future energy costs with savings returned to the customers.

   Regulated utilities may have a strong desire to develop new renewable generation. However, in order to allow them to do so, the current NH law that specifically addresses new regulated generation should be changed.

   It has been proposed that New Hampshire should address additional generation requirements with a portfolio of utility-owned renewable generation in addition to market provided renewable generation. The new state regulated generation could include a limited amount of generation, possibly including medium-sized biomass (50-200 MW) plants, small (less than 50 MW) distributed generation units to help meet peak load requirements, small wind projects, and photovoltaic (solar) cells. These efforts, in addition to merchant developed renewable generation, would complement increasing energy efficiency and demand-side programs while providing a balanced generation portfolio and keeping customers' best interests in mind. However, even with this amount of merchant and state regulated renewable generation, New England is expected to still fall short of its goals and even more renewable generation is desirable. It is also important to acknowledge that while addressing supply needs, the electrical transmission capability within the state must be enhanced and increased to support the development of new low- or non-CO_2-emitting generation if located in more remote areas of the state (see EGU Action 2.4).

It is also important that any policy to build new utility-owned renewable generation must be combined with aggressive efforts to reduce demand for electricity through energy efficiency and demand response, as well as retiring the unneeded fossil fuel-fired generating plants in New England. This is critical to achieve New Hampshire and the region's CO_2 reduction goals.

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

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

        i. Seek legislation to change existing law to allow regulated utilities to construct and or acquire renewable generation.

        ii. Establish streamlined state and local permitting processes. Consider an expedited process for smaller generation facilities using renewable resources.

        iii. Provide for expedited PUC proceeding schedules so that review processes may be held prior to commencement of a project and construction.

        iv. Establish partnerships between regulated utilities and renewable energy project developers.

    b. *Resources Required*: NH Legislature, state government, PUC, NHDES, and local governing bodies must align support of both legislation and specific proposals.

    c. *Barriers to Address*: Eliminate legal barriers for regulated utilities to construct new, clean generation.

        i. Establish clear legislation enabling regulated utilities to construct or acquire renewable generation.

        ii. Address obstacles to speedy and efficient project review at the state and local levels.

        iii. Address transmission infrastructure limitations, including the Coos County loop in northern New Hampshire.

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

    a. *Parties Responsible for Implementation:* State legislature, NHDES, PUC, New Hampshire Site Evaluation Committee, and regulated utilities.

    b. *Parties Paying for Implementation:* Customers of the regulated utility would pay the cost to construct new generation facilities.

    c. *Parties Benefiting from Implementation:* Customers of the utility would benefit from anticipated cost savings (e.g. lower compliance costs, avoidance of higher cost market purchases) that would be reviewed during a PUC proceeding. All citizens would benefit from reduced CO_2 emissions. Investors in utilities that build and own generation will also benefit through the state regulated rates of return they earn on such new plants, which would be included as one of the overall costs of the facilities serving customers which would be included in customers' electric rates for those customers who do not otherwise choose an electric supplier.

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. Enable the development of transmission resources in northern New Hampshire to facilitate renewable power transfers to southern New Hampshire. Also, transmission facilities should be installed to allow clean energy purchases. (See Senate Bill 383.)

    b. The deployment and installation of clean small scale distributed energy and heat producing generating facilities is now allowed. (See Senate Bill 451 of the 2008 Session, codified as RSA 374-G.)

    c. Evaluate the retention of existing nuclear power generation facilities into the future. This form of generation is considered in detail as a separate item (see EGU Action 2.5 – Nuclear Power Capacity).

6. Timeframe for Implementation: Begin in 2009 by passing appropriate legislation to allow regulated utilities to build new generation.

7. Anticipated Timeframe of Outcome: Once legislation is passed, low- and non-CO_2-emitting electric generation projects could be developed and come on line in 2-5 years.

<u>Program Evaluation</u>

Value analysis of electric rate change versus environmental benefit must be weighed for each program or project.

1. Estimated CO_2 Emission Reduction –
    a. Short-term (2012): 0.14 $MMTCO_2e$/year
    b. Mid-term (2025): 0.56 $MMTCO_2e$/year
    c. Long-term (2050): 1.12 $MMTCO_2e$/year

2. Economic Effects – *Costs and Savings for this Action have not yet been completed.*

A reasonable assumption is that certain carbon based fuels will be less available and more expensive in the future. As this occurs, energy prices will increase proportionately. An important component of a core strategy to manage future energy costs is to diversify the supply mix and have less carbon-based supply facilities. This is accomplished by building low and non-CO_2-emitting generating facilities over the next five to fifty years, thereby causing fossil based generation to be reduced. These investments can assist in stabilizing rates into the future and be sound investments to meet increasing demands for carbon-free energy. These investments will also provide high value to the New Hampshire economy by material procurement and wages for local craftsmen. This, in turn, benefits local town(s) and state economy. Finally, the hope is that these plants will reduce future energy costs, with savings realized by customers in electric rates.

g. Costs:
    i. Implementation Cost:
    ii. Timing:
    iii. Impacts:

h. Savings:

    i. Potential Economic Benefit:
    ii. Timing of Benefits:

iii. Impacts:

3. Other Benefits/Impacts
   a. *Environmental:* The proposed action will reduce emissions of carbon dioxide and other greenhouse gases and primary air pollutants that contribute to climate change and damage our ecosystems if fossil-fuel fired plants are operated less or retired as a result of building new cleaner generation. Emission reductions resulting from retirements or reduced need to operate fossil fueled generation in New England will directly improve air and water quality while indirectly benefiting the fish, wildlife, and ecosystems that depend on clean air and water.

   b. *Health:* Particulate matter and ozone precursors such as VOCs and NOx contribute to cardiac and respiratory ailments in humans and adversely affect the health of other living organisms. In particular, ozone formation increases dramatically during hot weather. Therefore, measures that mitigate climate warming by reducing harmful emissions through retiring or reducing the need to operate fossil fuel fired generating units in New England will also be beneficial to the health of human populations and ecosystems in general.

   c. *Social:* Programs that promote environmental sustainability by conserving natural resources and reducing emissions have immediate and long-term benefits to society. Increased public awareness arising from such programs will help to alleviate climate change. Programs involving alternative generation technologies have relatively short payback periods. These programs bolster the local economy in a number of ways: they produce "green" jobs, free up money that can be reallocated to other purposes, and result in greater economic security overall.

   d. *Other:* New renewable sources of energy will create demand for alternative technologies in the U.S. marketplace.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
   a. *Technical:* Pending plans to construct facilities can be implemented relatively easily once siting and transmission policy issues are addressed.

   b. *Economic:* New facilities will create many construction jobs, long-term employment and tax revenue which will have a positive impact on the state's economy and will avoid fuel expenses being paid to other states and countries. The rate impacts of any new plants should be reviewed by the PUC prior to construction.

   c. *Statutory/Regulatory:* The Legislature can authorize regulated electric utilities to build and/or own new renewable generation resources. The PUC and the Site Evaluation Committee would then review specific proposals under applicable state statutes

   d. *Social:*

5. Other Factors of Note:

6. Level of Group Interest:

7. References: