



## Residential, Commercial, and Industrial (RCI) Technical Work Group Catalog of State Climate Mitigation Options

Prepared for the RCI Technical Working Group (TWG) Call #3, June 6, 2006, 1:30 PM

Key to Rankings of Options in the Table that Follows:

Potential Emission Reductions <u>1/</u>	Potential Cost or Cost Savings <u>1/ 2/</u>
<b>High (H):</b> At least 1 Million Metric Tons (MMT) carbon dioxide equivalent (CO <sub>2</sub> e) per year by 2020 (~1% of current NC emissions)	<b>High (H):</b> \$50 per Metric Ton CO <sub>2</sub> e (MTCO <sub>2</sub> e) or above
<b>Medium (M):</b> From 0.1 to 1 MMT CO <sub>2</sub> e per year by 2020	<b>Medium (M):</b> \$5-50/MTCO <sub>2</sub> e
<b>Low (L):</b> Less than 0.1 MMT CO <sub>2</sub> e per year by 2020, or 1 MMT CO <sub>2</sub> e by 2050	<b>Low (L):</b> Less than \$5/MTCO <sub>2</sub> e
<b>Uncertain (U):</b> Not able to estimate at this time	<b>Uncertain (U):</b> Not able to estimate at this time
<u>1/</u> Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.	
<u>2/</u> Costs are denoted by a positive number. Cost savings (i.e., "negative costs") are denoted by a negative number.	

**NOTE:** This version of the "Options Catalog" includes **in yellow highlighted text** RCI suggestions from TWG following made during and following RCI TWG Call #2. Text in blue highlights was added based on suggestions made by attendees at the CAPAG meeting #2 (5/23/06). Also included are rough, initial notations on potential emissions reduction and potential cost or net cost savings compiled by Center for Climate Change staff. These estimates are intended to give TWG members an approximate idea of the savings and costs that can be expected from policy options, but are NOT intended as definitive categorizations, and are open to re-estimation as needed.

**Definition of “Priorities for Analysis”:**

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low:** Low priority options will be analyzed last, time and resources permitting.

**\* Options marked with an asterisk (\*) indicate options that are at least partially “base case” policies, i.e., that have been considered or undertaken at some level in North Carolina.**

**\*\* Options marked with a double asterisk (\*\*) indicate options that are included as recommendations in the September 1, 2005 NC DENR Report under the Clean Smokestacks Act of 2002.**

**\*\*\* Options marked with a triple asterisk (\*\*\*) indicate options that are included in or consistent with recommendations by the North Carolina Legislative Commission on Global Climate Change**

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
RCI-1	<b>Energy Efficiency Programs, Funds, and Goals</b>					
1.1	Demand Side Management (DSM) Programs for electricity, natural gas, propane, fuel oil* ***		High	Cost Savings - High Cost	Co-benefits could include transmission/distribution system costs reduction. Significant potential overlap with many other options. Implementation should include utility incentives to provide substantial programs, and also substantial incentives for consumer to participate	Electric Utilities providing DSM programs include: Progress Energy, Dominion Power, Duke Energy. Programs mostly information only, with a few financing programs <sup>1</sup> . <a href="http://www.seea.us/PDFs/SEEA_DSM.pdf">http://www.seea.us/PDFs/SEEA_DSM.pdf</a> Gas utilities and other fuel provider organizations include Piedmont Natural Gas, Scana - Public Service Company North Carolina (PSCNC), North Carolina Propane Gas Association, North Carolina Petroleum Marketers Association, and Carolina Fuel Institute TWG members noted that costs and performance vary substantially between measures within this option, that some options may present low capital costs and higher operating costs (or vice versa), and that there is uncertainty about the costs and savings for some options. Should include LED, other efficient lighting

<sup>1</sup> Other ongoing programs in North Carolina that are relevant to this policy option include the Industrial Extension Service (IES) at NCSU, energy and water efficiency programs at the Division of Pollution Prevention and Environmental Assistance (DPPEA), Western Waste Reduction Partners (WRP) and other similar programs. The North Carolina State Energy Office also offers a number of programs in many sectors.

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RCI-1	<b>Energy Efficiency Programs, Funds, and Goals (continued)</b>					
1.2	<b>Expand</b> Energy Efficiency Funds (e.g. Public Benefit Funds) administered by State agency, utility, or 3rd party (e.g. Advanced Energy Corporation)** ***		High	Cost Savings/ Low Cost	[As above] Should provide programs with substantial incentives for consumer to participate	CSA recommendation LT-5, <i>Develop a Public Benefits Fund</i> NCUC is presently investigating several issues involving DSM and Energy Efficiency in the current Integrated Resource Planning Docket No. E-100, Sub 103. This investigation includes Public Benefit Funds. Costs for this policy are also uncertain, depending on measures included. Separating into private-,public-sector measures suggested May wish to consider breaking this option into public and private components

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RCI-1	<b>Energy Efficiency Programs, Funds, and Goals (continued)</b>					
1.3	Energy Efficiency Requirements (e.g. Utility Savings Goals or Energy Portfolio Standards) **		High	Cost Savings/ Low Cost	[As above]	<p>CSA recommendation LT-4, <i>Continue to Establish and Expand Efforts to Formulate and Adopt Renewable Portfolio Standards and Environmental Portfolio Standards</i></p> <p>May wish to tie to or repeat current NC legislation proposals (Urlaub/Kalland)</p> <p>Costs for this policy are also uncertain, depending on measures included.</p> <p>The North Carolina Utilities Commission has a study on the costs and benefits of an RPS underway</p> <p>May wish to consider breaking this option into public and private components</p>
1.4	Market transformation and technology development programs		High	Cost Savings/ Low Cost		<p>Could include market transformation for improved electric motors and drives, heat pumps</p> <p>Could include industry/government partnerships</p> <p>May also wish to include mobile homes under this option</p>

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<b>RCI-2</b>	<b>Appliance Standards</b>					
2.1	Development of State-level Appliance Efficiency Standards*		Low-High	Cost Savings/ Low Cost	Feasibility enhanced by ongoing effort in nearby states	State Energy Plan (SEP) recommends ENERGY STAR from 2008 on
2.2	State Voices Support for Adoption of More Stringent Federal-level Appliance Efficiency Standards		Low-High	Cost Savings/ Low Cost	Potential overlap with previous option	One or both of 2.1 and 2.2 should be defined broadly enough to include, for example, commercial sector, and IT equipment May wish to consider design for recycling of materials in appliances as part of standards
<b>RCI-3</b>	<b>Buildings</b>					
3.1	Improved Building Codes, including improved enforcement of codes* See also 3.4 and 3.15		High	Cost Savings/ Low Cost	Potential to also yield water savings, comfort/air quality improvements.	NC has building energy codes modeled on IEC 2000 for residential and commercial and enforced by Building Code Council, SEP R-4 recommends reviewing compliance and potential improvement. Analyses have been undertaken by Jeff Tiller at ASU Will want to make more specific as TWG work continues Building codes are enforced by the Building Code Council and the North Carolina Department of Insurance It may be useful to separate public- and private-sector components of this option May wish to include Mobile Home Manufactured Industry in discussion of this issue Could include X%/yr improvement mandate

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<b>RCI-3</b>	<b>Buildings (continued)</b>					
3.2	<p>Promotion and Incentives for Improved Design and Construction (e.g. LEED<sup>2</sup>, green buildings, Healthy Built Homes) * ***</p> <p>See also section 6.1 Incentives for Technologies and 6.5 White roofs and Landscaping</p> <p>Could also include the promotion of active and passive solar building technologies</p> <p>LEED Certification for State and Local Government Buildings and Universities, and Other Buildings Constructed with State Funds</p>		Medium/High	Cost Savings/Low Cost	Potential overlap with previous option [co-benefits as above]	<p>NC Green Building Technology database provides searchable database on case studies</p> <p>S2001, H1272 required state government to review the use of High Performance Building guidelines in 7 buildings. Examples of existing programs: NC Healthy Built Homes Healthy Building Resource Center Environments for Living<sup>3</sup></p> <p>SEP recommends :</p> <ul style="list-style-type: none"> <li>a. ENERGY STAR home requirements by county.</li> <li>b. energy efficient mortgages.</li> <li>c. develop further programs to support privately funded projects</li> <li>d. Require high performance building standards for permits to build privately funded school projects</li> </ul> <p>A TWG member recommends support of an energy use reduction mandate for all publicly owned buildings, 40% new and 10% existing by {set date}.</p> <p>It may be useful to separate public- and private-sector components of this option</p> <p>Apply to existing buildings as well as new</p>

<sup>2</sup> LEED = Leadership in Energy and Environmental Design, a national building certification program.

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<b>RCI-3</b>	<b>Buildings (continued)</b>					
3.3	Training and Education for Builders and Contractors (e.g. HVAC <sup>4</sup> sizing, duct sealing, energy analysis program, C&D waste recycling, renewable energy system installation, water distribution systems) *		Medium	Cost Savings/ Low Cost	[As above]	Advanced Energy Corporation and NC Solar Center, and others have ongoing programs in this and similar areas Option could include introduction of related skills in the Trade School and Community College Curricula (see 3.13)
3.4	Training of Building Code and other Officials in Energy Code Enforcement* See also 3.1 and 3.15		Medium	Cost Savings/ Low Cost		Recommended in State Energy Plan
3.5	Building Commissioning and Recommissioning, including Energy Tracking and Benchmarking		Medium	Cost Savings/ Low Cost		Could include provision for blower door testing as an element of building commissioning and recommissioning Recommissioning important for rehabilitated older buildings <sup>5</sup>
3.6	Energy Management Training/Training of Building Operators*		Medium	Cost Savings/ Low Cost		SEP recommends training programs for state building operators and for private building operators

Comment: Added this sentence AJB

<sup>3</sup> In addition to those listed, groups offering programs and other services related to building energy efficiency and related programs include CERT at NCA&T, Appalachian State, Southern Research Institute, RTI, and others.

<sup>4</sup> HVAC = Heating, Ventilation, and Air Conditioning

<sup>5</sup> This and several other recommended related to RCI policies are included in the document Commission on Smart Growth, Growth Management and Development: Findings and Recommendations, dated Fall, 2001, and available as [http://www.ncsmartgrowth.org/archive/sg\\_commission/sgcrpt.pdf](http://www.ncsmartgrowth.org/archive/sg_commission/sgcrpt.pdf). This document (and the process that generated it) was referenced by attendees at the 5/23 CAPAG meeting.

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<b>RCI-3</b>	<b>Buildings (continued)</b>					
3.7	Increased Use of Blended Cement (substituting fly ash or other pozzolans for clinker reduces CO <sub>2</sub> emissions)		Low/ Medium	Cost Savings/ Low Cost	May provide modest avoided waste disposal co-benefit, depending on standard practice	(TWG member suggests should be in Section 6). This suggestion discussed during call#2; TWG decided to keep option in Section 3. Impact of fly ash as clinker substitute being studied in state.
3.8	Reduction of Emissions from Diesel Engines Used in New Construction Developments		Low	Low Cost		For example, require all new diesel engines for construction equipment meet low emission standards within 5 years
3.9	Support for growth and health of the residential building performance specialist industry.		Uncertain	Cost Savings/ Low Cost		
3.10	Continuing Education for building Design Professionals, including architects, engineers, developers, contractors, urban planners, and realtors		Uncertain	Cost Savings/ Low Cost		
3.11	Promote work scheduling and telecommuting as means of reducing building energy consumption		Uncertain	Uncertain		For example, can moving to 4 10-hour workdays from 5 8-hour shifts save energy? How can telecommuting affect building use efficiency? It was noted that even reducing occupancy of a commercial building by half might not change building energy much. (Would need co-ordination with Transport TWG)
3.12	Promotion of the use of locally created and available building materials		Uncertain	Uncertain		

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<b>RCI-3</b>	<b>Buildings (continued)</b>					
3.13 (NEW)	Energy efficiency and related education introduced at community colleges and trade schools ***		Uncertain	Cost Savings/ Low Cost		Suggested during call#2
3.14 (NEW)	Clearinghouse for information on and access to software tools to calculate impact of energy efficiency and solar technologies for buildings ***		Uncertain	Cost Savings/ Low Cost		Suggested during call#2, Advanced Energy Corporation is currently reviewing nine calculators. Availability of tools could be widened.
3.15 (NEW)	Improved enforcement of building codes See also 3.1 and 3.4		Uncertain	Cost Savings/ Low Cost		Suggested by TWG member following call#2
3.16 (NEW)	Add Photovoltaic Panels on New Commercial Buildings and Many New Homes; Add Solar Hot Water Heaters on Homes and Other Buildings		High	Medium – High Cost		Suggested by CAPAG member, part of “Vision of NC Future”. (not clear if intent was as a voluntary or mandatory policy) <sup>6</sup>
3.17 (NEW)	Cap on Consumption of Energy per Unit Area of Floorspace for New (?) Buildings		High	Cost Savings – Medium Cost		Suggested at CAPAG meeting. Would include reduction of cap figure over time, ensuring continuous improvement
3.18 (NEW)	Solar Hybrid Lighting		Uncertain	Uncertain		Suggested at CAPAG meeting.
3.19 (NEW)	Increase Flexibility within Building Codes for Use of Non-conventional Energy-efficient Building Materials		Uncertain	Uncertain		Suggested at CAPAG meeting; straw bale construction an example.

<sup>6</sup> At the 5/23CAPAG meeting, the Environments for Living program (<http://www.eflhome.com/>) was noted as an example, with builders having built 80,000 homes in the South and Southwest under the program in the last five years. Also, it was noted that solar water heating is included in the NC Green Power Program.

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<b>RCI-3</b>	<b>Buildings (continued)</b>					
3.20 (NEW)	Promote SmartGrowth designs that also reduce energy and water consumption in buildings		Uncertain	Uncertain		Higher building density and site orientation will influence energy consumption in the RCI sectors and in other sectors (such as transport). Increasing density in downtowns of existing communities can reduce energy and water losses that occur in transmission to new remote subdivisions <sup>7</sup> .
<b>RCI-4</b>	<b>Education and Outreach</b>					
4.1	Consumer education programs** *** (Probable overlap with Cross-Cutting TWG)		Uncertain	Cost Savings/ Low Cost		Potential contribution difficult to estimate CSA Recommendation A-7: Public Education on Climate Change Continued funding to meet the expanding role of State Energy Office as a key consumer information outlet. Emphasize provision of resources directing consumers to information and technologies for energy-efficiency and climate impacts reduction
4.2	Introduce in School Curriculum *** (Probable overlap with Cross-Cutting TWG)		Uncertain	Cost Savings/ Low Cost		[As above] NC Air Aware provides info for teachers, focus on ozone. <a href="http://daq.state.nc.us/airaware/">http://daq.state.nc.us/airaware/</a>

<sup>7</sup> Commission on Smart Growth (2001—see earlier footnote for full reference) recommends developing “smart growth management tools that encourage ... compact neighborhoods and more intensive use of land”. The document also recommends encouraging development of downtown areas. This option will likely overlap heavily with options in the Transportation and Land Use TWG.

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<b>RCI-5</b>	<b>Pricing and Purchasing</b>					
5.1	Green Power Purchasing*		Medium/High	Low - High	(Consider pricing of green power so that it is less expensive to consumers than conventional power, reflecting its climate benefits)	The North Carolina Green Power Program has been in place for approximately 3 years. It solicits voluntary contributions from utility customers for use in subsidizing green power purchases in North Carolina (TWG member input) SEP recommends state commit to state-use purchases of 25% growing to 100% (10% as near-term goal for State—next 3 years?) Interaction with RPS option <sup>8</sup> . Consider adding feature to emphasize purchase of green power generated in NC
5.2	Bulk Purchasing Programs for Energy Efficiency or other Equipment (Public or Private sector)		Low - High	Cost Savings/ Low Cost		May interact with utility programs. May wish to use in combination with standards for appliance purchases by state agencies.

<sup>8</sup> Will require development of Green Power supplies, thus will need to be coordinated with Energy Supply group policy options.

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RCI-5	<b>Pricing and Purchasing (continued)</b>					
5.3	<p><b>Review</b> net-metering policies (for example, for electricity consumers who install on-site combined heat and power or, distributed generation fueled with renewable or fossil fuels) *</p>		Low / Medium	Cost Savings/ Low Cost		<p>Policy on net metering has been established by the NCUC, and corresponding tariffs approved, in Docket No. E-100, Sub 83. The establishment of Small Generator Interconnection Standards in Docket No. E-100, Sub 101 is designed to streamline the process for customers seeking to install net metering applications, as well as other small renewable energy generation applications. (TWG member input)</p> <p><b>Review could consider the impact of NO<sub>x</sub> and power factor requirements on net-metering and availability of information for small customers.</b></p>

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
RCI-5	<b>Pricing and Purchasing (continued)</b>					
5.4 (OLD)	Time of Use Rates (including, for example, rates that vary by time of day so as to provide consumers with signals to reduce peak demand, or to offer incentives for on-peak distributed generation)*		Low/ Medium	Cost Savings/ Low Cost	Significant utility system co-benefits	Time-of-use rates and real time rates for electric customers are currently in place. Time of use rates have been in effect for at least the last twenty years, and, with the exception of Dominion NC Power, real time rates have been available for at least the last ten years. (TWG member input) Option eliminated since it is well-established in NC
5.4 (NEW)	Performance-based Contracting for finding of energy efficiency improvements		Medium – High?	Cost Savings/ Low Cost?		Capital costs paid back through energy savings
5.5 (NEW)	Utility Rate Reform		Uncertain	Uncertain		At CAPAG Meeting on 5/23, it was suggested that there is a need to look harder at rate issues in NC, including decoupling (of utility revenues from sales) and rate design, with a specific focus on the impacts of rate design on greenhouse gas emissions

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<b>RCI-6</b>	<b>Technology-Specific Policies</b>					
6.1	Incentives for Renewable Energy Applications *** (Solar roofs, water heaters, etc.), including tax incentives		High	Cost savings/ High	Programs could help to lower capital and installation costs	Incentives could reduce first cost to a specific payback level; could be coupled with requirements for new buildings <sup>9</sup>
6.2	Clean Combined Heat and Power *		High	Cost Savings - Medium Cost	Cost dependent on price of natural gas; interconnection an issue; utility system co-benefits.	SEP recommendation Consider use of waste heat from new electricity generation units to substitute for fossil-fueled heat in the RCI sectors. In some cases of industrial CHP, it may be necessary to assess the impact of CHP presence on given distribution circuit New and existing technologies allow CHP to be used in residential, commercial sectors as well, so these sectors should be included <sup>10</sup>
6.3--	Promotion and Tax or Other Incentives (e.g. Energy Star, credits for solar hot water)		High	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	Now included in 6.1

<sup>9</sup> Specific implementation measures mentioned as possible for this policy include tax credits, low/no interest loans, and similar financial incentives to business, industries and commercial firms to upgrade their equipment (including manufacturing and pollution control equipment) to more energy efficient technologies. The latter approach is especially important for small manufacturers, and could just be access to micro-loans.

<sup>10</sup> Examples cited at the 5/23 CAPAG meeting include stacks of newly-developed ½ watt fuel cells, 1 kW residential CHP providing hot water, and microturbines for residential and small commercial applications.

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<b>RCI-6</b>	<b>Technology-Specific Policies (continued)</b>					
6.3 (OLD 6.4)	Appliance Recycling/Pick-Up Programs*		Low	Cost Savings/ Low Cost	Long-term impact uncertain	SEP recommends appliance-swapping Consider as an implementation strategy providing waiver of dumping and disposal fees where appliances are replaced with Energy Star appliances Program exists already in NC to dispose of a refrigerator for free. This program would target retiring of working but inefficient appliances.
6.4 (OLD 6.5)	White Roofs, Rooftop Gardens (Green Rooftops), and Landscaping (including Shade Tree Programs)*		Medium/ High	Cost Savings/ Low Cost	Results likely to vary substantially with design	SEP recommends developing and implementing further programs to promote 'Cool Cities' and white roof Programs. May wish to include a requirement for government buildings to have white roofs. Encourage/promote regenerative, sustainable design

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<b>RCI-6</b>	<b>Technology-Specific Policies (continued)</b>					
6.5 (NEW)	Promotion of distributed generation by renewables and clean fossil fuels (including microturbines, internal combustion engines, and fuel cells***)		Medium/High	Uncertain	Cost savings and decreased impacts of transmission and distribution	SEP recommends the Department of Commerce and the State Energy Office should encourage and support economic development of energy-related enterprises whose products are intended to increase energy efficiency or use renewable resources, such as providers of specialized insulation and window products, heating and air conditioning equipment and controls, distributed generation equipment, solar and wind energy equipment, biofuels, and fuel cells. Renewables options can go beyond use on/in buildings-only (e.g., by NC DOT)
6.6 (NEW)	Capture and use process heat from industrial and commercial operations		Uncertain	Uncertain		Suggested during call#2
6.7 (NEW)	Solar-powered (absorption) Air Conditioning for residential and Commercial Applications		Uncertain	Uncertain		Suggested during CAPAG Meeting #2
6.8 (NEW)	Promotion of Ground-source Heat Pumps for Residential and Commercial Heating and Cooling		Medium	Cost Savings – Medium Cost		Suggested during CAPAG Meeting #2

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<b>RCI-6</b>	<b>Technology-Specific Policies (continued)</b>					
6.8 (OLD 6.6)	Focus on specific end-uses/technologies: window AC units, lighting, water heating, plug loads, networked PC management, power supplies, motors, pumps, boilers, etc. Consumer products programs, may include incentives, retailer training, marketing and promotion, education, etc *, **		(By option, range from Low to High)	Cost Savings/ Low Cost	Interaction with appliance standards, utility programs.	In 1980 the North Carolina Utility Commission (NCUC) established a systems benefit charge, creating a non-profit corporate to administer the funds with the charter "to encourage energy efficient economic development in North Carolina." The non-profit Advanced Energy operates programs for subsidized and market-rate home construction, and provides energy efficiency assistance to North Carolina industry. <a href="http://www.advancedenergy.org/">http://www.advancedenergy.org/</a> State Energy Office is involved in federal Industries of the Future. CSA recommendation A-5: <i>Promote and Support Efforts to Establish North Carolina as a World Leader in GHG, Non-Carbon Fuels and Energy Efficiency Technologies</i> SEP recommends further incentives for high efficiency motors

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<b>RCI-7</b>	<b>Non-Energy Emissions (HFCs, PFCs, SF<sub>6</sub>, CO<sub>2</sub> Process Emissions<sup>11</sup></b>					
7.1	Participation in Voluntary Industry-Government Partnerships SOME TWG Members Suggest that this be moved into another section?? SECTION 1?		Uncertain	Medium		For example, Climate Leaders, a USEPA program (see that “..encourages companies to develop long-term comprehensive climate change strategies and set [GHG] emissions reduction goals.” <sup>12</sup> A state recognition and reward program can be an effective tool for emissions reduction. This policy could be part of the existing Environmental Stewardship Initiative (ESI, see <a href="http://www.p2pays.org/esi">www.p2pays.org/esi</a> ).
7.2	Process Changes/Optimization (Improving manufacturing so as to require less energy and/or release less GHG process gases to the atmosphere)		Uncertain	Uncertain		Impact, cost likely highly process-specific There are a number of efforts in NC being coordinated by Industrial Extension programs <sup>13</sup>

<sup>11</sup> North Carolina has relatively few electronic component manufacturing facilities, which may limit the application of some of the policy options in this section. Implementation of many of these policy options could, as for option 6.1, include tax credits, low/no interest loans, and similar financial incentives to business, industries and commercial firms to upgrade their equipment (including manufacturing and pollution control equipment) to more energy efficient technologies.

<sup>12</sup> “Companies participating in Climate Leaders set a corporate-wide GHG reduction goal and inventory their emissions to measure progress”. See <http://yosemite.epa.gov/oar/globalwarming.nsf/content/ActionsNationalPartnerships.html>. Also, note that this policy option, as with others in this section, is not designed to include energy efficiency for industries, which is included in other options.

<sup>13</sup> In addition, technical assistance on pollution prevention and manufacturing efficiencies is provided by DPPEA, WRP and others.

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<b>RCI-7</b>	<b>Non-Energy Emissions (HFCs, PFCs, SF<sub>6</sub>, CO<sub>2</sub> Process Emissions (continued))</b>					
7.3	Leak Reduction /Capture, Recovery and Recycling of Process Gases (gases used in industrial processes)		Medium	Uncertain		For example, solvents used in electronics industry, recovery of refrigerants, reduction of leaks in refrigeration equipment
7.4	Use of Alternative Gases (other HFCs, hydrocarbon coolants/refrigerants, foam blowing agents, etc.)		Medium/High	Low/Medium		For example, use of lower Global Warming Potential gases in specific applications, such as hydrocarbons in place of HFCs in commercial refrigeration Note that some of these changes may affect energy use as well
7.5	Cement Industry: Use of Alternative Fuels					Option removed since no cement plants in NC
<b>RCI-8</b>	<b>GHG Emissions-Specific Goals and Policies</b>					
8.1	Support for switching to less carbon-intensive fuels (coal and oil to natural gas or biomass)		Medium/High	Cost Savings/Medium Cost	Cost dependent on relative fuel prices	Instances where fuel-switching is applicable (for example, electricity to natural gas for water heat, fossil fuels to biomass for space/process heat)
8.2	Industry-Specific Emissions Cap and Trade Programs		Medium/High	Low/Medium	Highly dependent on specification of trading systems	For example, participation of industrial consumers in a statewide or regional program of trading emissions allowances
8.3	Voluntary Emissions Targets for Industrial Operations		Uncertain	Uncertain		

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<b>RCI-8</b>	<b>GHG Emissions-Specific Goals and Policies (continued)</b>					
8.4	Small-source Aggregation (to achieve reductions for groups of smaller-volume energy consumers)		Uncertain	Uncertain		For example, programs allowing the aggregation of commercial or residential consumers to set joint emissions targets, pursue
8.5	Negotiated Emissions or Energy Savings Agreements*		Uncertain	Uncertain		SEP recommendation. For example, agreements between government and industrial or other large GHG emitters to reduce emissions on a specific time-frame
<b>RCI-9</b>	<b>Other</b>					
9.1	Government Agency Requirements and Goals (including procurement)*		Uncertain	Cost Savings/ Low Cost		Potential overlap with other options SEP recommends state procurement of environmentally preferable products
9.2	Focus policies and programs for building energy efficiency on specific market segments: existing homes (weatherization), new construction, apartments, low income, etc. * **		Medium/ High	Cost Savings/ Low Cost		Potential overlap with other options NC Weatherization Assistance Program, for low income earners SEP recommends extending weatherization

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
<b>RCI-9</b>	<b>Other (continued)</b>					
9.3	Reinvestment Fund* (providing financing for energy-efficiency and other GHG emissions-reduction efforts)		Uncertain	Cost Savings/ Low Cost	Would help to provide local employment and grow renewable energy use	Potential overlap with other options State Energy Office's has low-interest energy loan program, SEP recommends restructuring the underwriting provisions Use in part to create infrastructure to deliver energy-efficiency renewable technologies <sup>14</sup>
9.4	Municipal Energy Management (programs of energy-efficiency improvement coordinated at the municipal level)		Uncertain	Uncertain		Potential overlap with other options

<sup>14</sup> It was noted during the 5/23 CAPAG meeting that the NC Tax Credit for Renewable Technology Investment had "sunseted" (lapsed), and should be brought back (or replaced with a program with similar goals). It was also noted that the Reinvestment Fund could take the form of a Special fund for capital for businesses developing renewable energy sources, such as the Pennsylvania "Energy Harvest" program. It was suggested that other programs adopted by Pennsylvania may also be applicable to NC.

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
<b>RCI-9</b>	<b>Other (continued)</b>					
9.5	Focus on Small and Medium Enterprises (SMEs)* (Provide resources for small and medium businesses to evaluate and pursue energy efficiency/GHG emissions reduction activities)		Uncertain	Uncertain		Potential overlap with other options Industrial Assessment Center at NC State University provides energy conservation and cost reduction assessments to small to medium sized enterprises <a href="http://www.mae.ncsu.edu/Centers/IAC/">http://www.mae.ncsu.edu/Centers/IAC/</a> A TWG member suggests that this option be combined with options in RCI-1, along with options 9.6 and 9.7, below. <sup>15</sup>
9.6	Industrial ecology/ by-product synergy		Uncertain	Uncertain		For example, promote review and modification of industrial processes to encourage waste reduction, highly efficient use of materials and energy.
9.7	Industrial Audits* *** (For example, make available/encourage use of industrial audits to identify energy-efficiency, other GHG-emissions savings opportunities)		Medium/ High	Cost Savings/ Low Cost		Industrial Extension Services at NC State University provides surveys and audits of industrial operations to provide suggestions on cost savings from energy efficiency <a href="http://www.ies.ncsu.edu/energysurveys/">http://www.ies.ncsu.edu/energysurveys/</a> <sup>16</sup>
<b>9.8 (NEW)</b>	Extend green campus initiatives to all university buildings*		Medium	Cost Savings/ Low Cost		SEP recommendation

<sup>15</sup> This type of assistance is also currently provided by DPPEA and WRP, as well as the IES. In addition, the types of activities suggested in policy options 9.6 and 9.7 are also provided by DPPEA and WRP, and could be included in the demand side management recommendation as part of 1.1.

<sup>16</sup> Waste Trader, an on-line waste exchange system, and Biomass Trader, a similar system for biomass, are joint projects between DPPEA and SEO that are relevant to option 9.7 (see [www.p2pays.org](http://www.p2pays.org) for more information).

Option No.	GHG Reduction Policy Option	Priority for Analysis	Potential GHG Emissions Reduction	Potential Cost or Cost Savings	Ancillary Impacts, Feasibility Considerations	Notes
<b>RCI-9</b>	<b>Other (continued)</b>					
9.9 (NEW)	Energy benchmarking, measurement, and tracking programs for municipal and state buildings*		Medium	Cost Savings/ Low Cost		SEP recommendation
9.10 (NEW)	Integration with Regional Demand Response Initiatives/recommendations*		Medium	Cost Savings/ Low Cost		SEP recommendation
9.11 (NEW)	Water use reduction		Low/ Medium	Cost Savings/ Low Cost		TWG member input
9.12 (NEW)	Funding of Research and Development for Energy Efficiency, Renewable Energy, Other GHG Reduction Strategies***		Uncertain	Uncertain		Could include R&D contracts with private firms, grants and contracts with universities, Intramural R&D conducted at government labs, R&D contracts with private/public consortia
9.13 (NEW)	Direct or Indirect support for commercialization and production; Indirect support for development***					Could include patent protection, R&D tax credits, production subsidies or tax credits to firms bringing new technologies to market, tax credits or rebates for new technology buyers, government procurement, and demonstration projects