



Brief Description of State Climate Actions: Residential, Commercial and Industrial Sectors

(Note: This is a listing of energy efficiency and conservation policies targeting the Residential, Commercial, and Industrial (RCI) sector. These are policy options considered by numerous states as part of their climate change planning process with the Center for Climate Strategies (CCS). In a CCS-facilitated process, Technical Work Group members provide input to modify these policies and add new ideas to craft a unique program for their state. CCS works with states to incorporate their own recent actions or existing programs related to these topics.)

RCI-1. Energy Efficiency Programs, Funds, and Goals

1.1 Utility Demand-Side Management Programs for Electricity

This option focuses on increasing investment in electricity demand-side management (DSM) programs run by utilities or others, on energy efficiency funds, and on energy efficiency goals. These options are typically termed DSM activities and may be designed to work in tandem with other strategies that can also encourage efficiency gains.

The policy design includes two key dimensions: achievable and desirable energy savings and the policy and administrative mechanisms to achieve these savings. To implement expanded DSM programs, a number of candidate mechanisms should be considered, such as revising existing statutes to enable utilities to invest in energy efficiency and considering programs that are cost-effective, taking into account the valuation of carbon dioxide (CO₂) emissions. Possible policy and administrative mechanisms include regulator-verified savings targets, public benefit charges, portfolio standards, “energy trusts,” integrated resource planning, performance-based incentives, decoupling of rates and revenues, and appropriate rate treatment for efficiency. Elements that might be considered in designing this option include

- Implementation and administration by utilities (including municipal utilities and cooperatives), state agencies, or third-party actors;
- Subsidized energy audits for homeowners, businesses, and industries;
- Incentives for specific technologies, such as lighting, water heating, plug loads (power needs from electrical devices that plug into wall outlets), networked personal computer (PC) management, power supplies, motors, pumps, boilers, customer-side transformers, water use reduction, ground-source heat pumps, and others; and
- Energy efficiency reinvestment funds.

This policy could have a broad focus or it could focus on specific market segments. One complementary policy could emphasize appliance recycling or pick-up programs. Measures supporting this option might include consumer education, performance contracting, and energy end-use surveys.

1.2 Utility DSM Programs for Natural Gas, Propane, and Fuel Oil

This option has most of the same attributes and options for design elements and implementation as option 1.1, but it focuses on increasing investment in DSM programs related to the use of natural gas, propane (or liquefied petroleum gas [LPG]), and fuel oil run by utilities or others, energy efficiency funds, and/or energy efficiency goals.

1.3 Non-Utility DSM Programs for Electricity

This option has most of the same attributes and options for design elements and implementation as option 1.1, but it focuses on municipal utilities and cooperatives that provide electricity.

1.4 Energy Efficiency Funds (e.g., Public Benefits Funds) Administered by State Agency, Utility, or Third Party (e.g., Energy Trust)

A public benefits charge (sometimes called systems benefits charge) is a fee attributed to utility customers on the basis of their use of energy in a given time period. With deregulation in many states, the utility commissions have lost their ability to require electric utilities to have efficiency programs. The result in many states was the development of the public benefits charge, which is a non-bypassable charge on electric bills. The funds collected are then given to a third party that provides energy efficiency programming.

1.5 Regional Market Transformation Alliance

Market transformation alliances use voluntary efforts, typically implemented by non-utility organizations, to encourage greater uptake by consumers (residential, commercial, and industrial, as well as the professionals that service energy-using equipment) of cost-effective energy efficiency practices. A market transformation program is designed to create a situation where the bulk of the private market automatically adopts or incorporates technologies or techniques that result in improved energy efficiency. The goal of a market transformation and technology development program is to put energy efficiency technologies and practices into a position where they will be demanded by the public, chosen by builders and manufacturers, and provided by retailers and contractors. Methods of transformation can be different for each technology or technique but often revolve around public and private review of quality and effectiveness and partnerships between government agencies, retailers, manufacturers, and non-governmental agencies. Market transformation programs can be statewide or regional.

Market transformation also seeks to ensure a sufficient supply of technologies and practitioners to meet the subsequent increased demand for energy efficiency.

Potential elements of a market transformation program include

- Target specific measures, such as ground-source heat pumps, solar water heating, photovoltaics (PV), or other relevant technologies;
- Support for commercialization of promising technologies; and
- Bulk purchasing programs (public-private) or arrangements with retailers.

Consumer education is a significant supporting measure for market transformation programs.

1.6 Reduced Cost or Free Residential Energy Audits

This option includes providing energy technical assistance (energy audits) to those in the residential sector to identify and recommend options for reducing fossil energy and electricity use and for reducing non-energy emissions of greenhouse gases (GHGs). A combination of incentives, expertise, and information to implement recommended options could be included in the policy to encourage residential customers to follow up on audit recommendations.

1.7 Reduced Cost Energy Audits For Businesses

This option includes providing energy technical assistance (energy audits) to those in the commercial sector to identify and recommend options for reducing fossil energy and electricity use, and for reducing non-energy emissions of GHGs. A combination of incentives, expertise, and information to implement recommended options could be included in the policy to encourage businesses to follow up on audit recommendations.

1.8 Low-Cost Loans for Energy Efficiency Improvements

This option refers to revolving low-interest loan funds for energy efficiency investments in distribution service areas that are not covered by existing utility programs.

1.9 Saving Energy, Savings Sales Tax

This option refers to a sales tax exemption for energy-efficient products such as compact fluorescent light bulbs and highly efficient electric heat pump water heaters (HPWHs), natural gas water heaters, and natural gas furnaces.

1.10 Reduce Energy Use By 10% In State-Owned Buildings

Recognizing that governments should “lead by example,” this option provides energy use targets to improve the efficiency of energy use in state and local government buildings. This option sets energy-efficiency goals for the existing government building stock, as well as for new construction and major renovations of government buildings.

RCI-2. Buildings

2.1 Improved Building Codes for Energy Efficiency

Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing major renovations. Given the long lifetime of most buildings, amending state and local building codes to include minimum energy efficiency requirements and periodically updating energy efficiency codes could reduce GHG emissions over the long term. Implementation of building energy codes, particularly when much of the building occurs outside urban centers, can require additional resources. A building code policy could

- Require high-efficiency appliances in new construction and retrofits and
- Require training of building code and other officials in energy code enforcement.

Potential measures supporting this option can include consumer education, improved enforcement of building codes, training for builders and contractors, and development of a clearinghouse for information on and access to software tools for calculating the impact of energy efficiency and solar technologies on building energy performance.

2.2 Training Building Code and Other Officials in Energy Code Enforcement

This option refers to an education and outreach program for building inspectors that would encourage them to incorporate energy-efficiency and GHG emissions-reduction into inspection protocols.

2.3 Improved Design and Construction, Government “Lead-by-Example”

Recognizing that governments should “lead by example,” this option provides energy use targets to improve energy use efficiency in new and existing state and local government buildings. The proposed policy provides energy efficiency targets that are much higher than code standards for new state-funded and other government buildings. This option sets energy-efficiency goals for the existing government building stock, as well as for new construction and major renovations of government buildings. The following are potential elements of this policy:

- Requiring that energy efficiency be a criterion in procurement of energy-using equipment and systems and in the improvement in operation of buildings and other facilities.
- Audits of energy performance and operations of state and other government buildings (in tandem with an audit program). Audit results could be used to target and prioritize investments in improving government building energy efficiency. Improvement and review of efficiency goals over time and development of flexible contracting arrangements that encourage integrated energy-efficient design and construction.
- Recommendations that the infrastructure for implementation (meters, bookkeeping systems, and staff) be established as soon as possible.
- State bulk purchase of appliances and equipment with higher-than-standard energy efficiency for public facilities.
- Establishing “retained savings” policies whereby government agencies are able to retain funds saved by reducing energy bills for further energy efficiency and renewable energy investments or other uses.

Potential supporting measures for this option include training and certification of building sector professionals and performance contracting/shared savings and could also include surveys of government energy and water use, energy benchmarking, measurement, and tracking programs for municipal and state buildings.

2.4 Increased Use of Blended Cement (Substituting Fly Ash or Other Pozzolans For Clinker)

Promote the use of blended cement in buildings and other applications. (Substituting fly ash or other pozzolans for clinker—the chief ingredient of cement—reduces CO₂ emissions associated with clinker production from limestone.)

2.5 Support for Energy Efficient Communities Planning, “Smart Growth”

“Smart Growth” aims to create communities that are, among other attributes, livable, designed for reduced use of energy in homes and businesses and in the transport sector, and have a reduced environmental impact relative to typical developments. Variants on the smart growth concept exist, but many call for clustering living units with easy access (often walking distance) to shops, schools, and entertainment and recreational facilities, incorporating elements of energy-efficient design and renewable energy in buildings, sharing energy facilities between buildings (for example, district heating systems), and preserving open spaces. See, for example, http://www.epa.gov/smartgrowth/about_sg.htm for additional information about Smart Growth.

2.6 Promotion and Incentives for Improved Design and Construction (e.g. LEED1, Green Buildings) in the Private Sector

This policy provides incentives and targets to induce the owners and developers of new and existing buildings to improve the efficiency with which energy and other resources are used in those buildings, along with provisions for raising targets periodically and providing resources to building industry professionals to help achieve the desired building performance. This policy can include elements to encourage the improvement and review of energy use goals over time, and to encourage flexibility in contracting arrangements to encourage integrated energy- and resource efficient design and construction.

Additional potential elements of this option include:

- Target new, renovated, and/or existing buildings (retrofits).
- Set a cap on consumption of energy per unit area of floor space for new buildings.
- Encourage building commissioning and re-commissioning, including energy tracking and benchmarking.
- Provide incentives, in the form of tax credits, DSM program support, financing incentives (such as “green mortgages”), or other inducements for retrofit of existing residential and commercial buildings.
- Encourage the use of alternative and local building materials and practices.

Potential supporting measures for this option include training and certification of building professionals, consumer and primary/secondary education, performance contracting/shared savings arrangements, and setting up of a clearinghouse for information on and access to software tools to calculate the impacts of energy efficiency and solar technologies for buildings.

2.7 Feebate Program to Encourage Energy Efficiency in Building Design

This option refers to the set up of a “feebate” program to encourage energy efficiency in building design. The feebate concept is usually associated with the transport sector, but it is essentially any government program designed to reduce energy use and pollution by levying a fee on fuel-inefficient devices and facilities and by offering a rebate on fuel-efficient devices and facilities.

¹ Leadership in Energy and Environmental Design; see U.S. Green Building Council, <http://www.usgbc.org>.

2.8 Incentives for Retrofit of Existing Residential Buildings

This policy provides incentives and targets to induce the owners of existing homes to improve the efficiency with which energy and other resources are used and has provisions for raising targets periodically. This policy can include elements to encourage the improvement and review of energy use goals over time and can target renovated and/or existing dwellings.

2.9 Training and Education for Builders and Contractors (e.g., HVAC Sizing, Duct Sealing)

This option refers to an education and outreach program for building professionals to encourage them to use their knowledge of energy efficiency and GHG emissions reduction to meet building requirements. This can be accomplished by

- Starting programs to train builders and contractors on proper heating, ventilation, and air conditioning (HVAC) sizing and installation,
- Mandating that State Boards of Licensing for building professionals cover knowledge of the improved building codes and building energy performance requirements reflected in various policy options in licensing exams, and
- Implement code training and technical assistance for builders and architects.

2.10 Energy Management Training and Training of Building Operators

Energy management training provides administrative and technical training for energy managers, school officials, building operators, and others responsible for energy-efficient facility operation. This policy could include

- Training commercial building energy managers, for example, by making use of the building operator training and certification program developed in the Pacific Northwest; and
- Training industrial energy and facility managers in techniques for improving the efficiency of their steam, process heat, pumping, compressed air, motors, and other systems, perhaps dovetailing with the U.S. Department of Energy policies in this area.

RCI-3. Appliance Standards

3.1 Expansion of State-Level Appliance Efficiency Standards

Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards, or where higher-than-federal standard efficiency requirements are appropriate.² Regional coordination for state appliance standards can be used to avoid concerns that retailers or manufacturers may (1) resist supplying equipment to one state that has advanced

² In recent years, Arizona, Oregon, and Washington, among other states, adopted state standards for several appliances; this led to the inclusion of standards for these appliances in the 2005 federal energy bill.

standards or (2) focus sales of lower efficiency models on a state with less stringent efficiency standards.

Potential elements of appliance efficiency standards policy include

- Establishment and enforcement of higher-than-federal state-level appliance and equipment standards (or standards for devices not covered by federal standards),
- Joining with other states in adopting higher standards,
- Requiring high-efficiency appliances in new construction and retrofits, and
- Consumer education is a potential supporting measure for this option.

3.2 Support for Federal-Level Appliance Efficiency Standards

This policy option involves advocating for the development and implementation of higher federal-level appliance efficiency standards.

3.3 Require High-Efficiency Appliances in New Construction and Retrofits

This policy option involves a requirement for the use of high-efficiency appliances in new residential and commercial buildings, as well as in any retrofits of new residential and commercial buildings.

RCI-4. Education and Outreach

4.1 Consumer Education Programs

The ultimate effectiveness of emissions reduction activities often depends on providing information and education to consumers regarding the energy and GHG emissions implications of their choices. Public education and outreach are vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions in their personal and professional lives. Public education and outreach efforts should integrate with and build upon existing outreach efforts involving climate change and related issues in the state. Ultimately, public education and outreach will be the foundation for the long-term success of all of the mitigation actions.

4.2 Energy Efficiency School Curriculum

The long-term effectiveness of emissions reduction activities depends on providing information and education not only to present consumers, but also to future consumers. This policy option involves the education of primary and secondary school students regarding the energy and GHG emissions implications of consumer and societal choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including co-benefits, such as clean air and public health) among the state's young citizens. As with adult consumers, public education and outreach efforts should be integrated with and build upon existing outreach efforts involving climate change and related issues in the state.

4.3 Truth-in-Advertising Campaign

Truth-in-advertising campaigns target advertising of energy-consuming products to provide factual and accurate information regarding the GHG emission implications of the products.

4.4 In-Home Energy Displays

There are a number of energy use display units that are now available to provide customers with readily accessible, real-time (or near real-time) information about their energy use. Though such units have been deployed in relatively small numbers, several studies of and experience with prepayment programs (where the number of devices in use is more significant) demonstrate that in-home display devices can help catalyze customer energy conservation, with savings ranging from 4% to 20%. The cost of display units has been an obstacle to mass deployment. However, increased attention to demand response and advanced metering infrastructure in the United States and in energy conservation for emissions reductions in Canada has spurred recent interest.

RCI-5. Pricing and Purchasing

5.1 Green Power Purchasing for Consumers

Green power purchasing comprises a variety of consumer-driven strategies to increase the production and delivery of low-GHG power sources, above and beyond levels achieved through renewable portfolio standards and other mandatory programs.

Possible elements of green power programs include

- A definition of what power sources a relevant authority has qualified as green power,
- Regulatory encouragement for utilities to develop green power tariff structures,
- Implementation of regulatory requirements that power sources and emissions data be reported in consumer utility bills,
- State goals or mandates for green power purchases or for the renewable fraction of standard purchased electricity that would apply to all non-federal government buildings, including local government buildings, public schools, and public universities. This could also be a part of state “lead-by-example” programs.
- Promotion by the state or other entities of voluntary purchasing of green power through provision of information and promotional materials.

5.2 Net-Metering for Distributed Generation

This policy option involves the consideration and adoption by state regulatory authorities of rate designs, coupled with the necessary metering technology, that promote reduction in GHG emissions by encouraging consumers to install distributed generation systems—especially those based on renewable fuels—and combined heat and power (CHP) systems that offer the opportunity to improve the overall efficiency of fuel use.

Potential elements of this option include

- Reviewing existing net-metering policies, including policies that affect electricity consumers who install on-site CHP or distributed generation fueled with renewable or fossil fuels. Consider the impact of nitrogen oxides (NO_x) and power factor requirements on net-metering and availability of information for small customers.
- Reviewing rate issues, including decoupling of utility revenues from sales, and considering a specific focus on the impacts of rate design on GHG emissions. This could include an exploration of the impacts of time-of-use rates on GHG emissions.
- Reviewing and considering utility and other technical rules related to the interconnection of consumer-sited power sources to the electricity grid to ensure that they offer equitable treatment of potential distributed generation hosts while providing adequate safeguards for the public and for power sector workers.

5.3 Time-of-Use Rates

Time-of-use rates typically price electricity higher at times of higher power demand, and thus better reflect the actual cost of generation. Time-of-use rates may or may not have a significant impact on total GHG emissions but do affect on-peak power demand and thus the need for both peaking capacity and fuel for peaking plants.

5.4 Tiered (Increasing Block) Rates for Electricity and Natural Gas Use

Tiered (increasing block) rates for electricity and natural gas use provide affordable base usage rates for consumers, but they increase with increasing consumption, thus providing a built-in rate incentive for energy conservation and efficiency.

5.5 Bulk Purchasing Programs for Energy-Efficient Appliances or Other Equipment

Bulk purchasing of appliances and equipment with higher-than-standard energy efficiency by public agencies and organizing similar bulk-purchase programs in the private sector are components of a policy option that can augment DSM, market transformation, or state lead-by-example programs. In this option, a government or non-governmental organization purchases large quantities of energy-efficiency products (such as high-efficiency refrigerators, office equipment, or solar water heaters) and/or services (such as home weatherization services) at a bulk price. The organization then either uses the purchased items and services internally or sells them at an attractive price to other buyers. Bulk purchase programs can help the markets develop more rapidly for energy-efficient or low-GHG goods and services.

Potential elements of this option include

- Municipal or state government programs, possibly including training in the use of existing bulk-purchasing tools,³

³ For example, the ENERGY STAR bulk purchasing tool—developed by the U.S. Department of Energy, in collaboration with the Department of Housing and Urban Development and the U.S. Environmental Protection Agency—is designed to make it easy to comparison shop for energy-efficient products. The tool provides a simple

- Programs for schools, and
- Private-sector programs (possibly in coordination with market transformation programs).

RCI-6. Customer-Sited Distributed Energy and Combined Heat and Power

6.1 Incentives to Promote Implementation of Renewable Energy Systems

Distributed electricity generation sited at residences and commercial and industrial facilities and powered by renewable energy sources (typically solar, but also wind, small hydroelectric power sources, or biomass or biomass-derived fuels) displaces fossil-fueled generation and avoids electricity transmission and distribution losses, thus reducing GHG emissions. This policy can also encourage consumers to switch from using fossil fuels to using renewable fuels in applications such as water, process, and space heating and to supply new energy services using fuels that produce low or no GHG emissions. Increased use of renewable energy applications in homes, businesses, and institutions can be achieved through a combination of regulatory changes and financial incentives. Potential elements of this option include

- Solar roofs (roofing materials with built-in solar photovoltaic cells, or solar PV panels erected on roofs);
- Solar water heating and solar space heating systems;
- Wind power systems, particularly for rural areas;
- Biomass-fired generation, space, or water heating systems;
- Geothermal heating and cooling systems;
- Programs targeted at specific customer sectors (residential, commercial, and industrial), or specific markets within sectors; and
- Tax credits, and/or utility or other incentives to lower the first cost of distributed energy systems to users.

Potential supporting measures for this option include training or certification of installers and contractors, net metering and other pricing arrangements, interconnection standards, and creation and support of markets for biomass fuels.

6.2 Incentives and Resources To Promote Combined Heat and Power (cogeneration)

Fossil fuel use and GHG emissions can be reduced by improving the efficiency of CHP systems, relative to separate heat and power technologies, and by avoiding transmission and distribution losses associated with moving power from central power stations that are located far away from where the electricity is used. Potential elements of this option include

way to obtain bids on ENERGY STAR-qualified products such as appliances, compact fluorescent light bulbs, and light fixtures.

- Promoting the use of gas-fired CHP systems;
- Promoting the use of biomass-fired CHP systems;
- Creating and expanding markets for and incentives designed to promote implementation of CHP units in capacities suitable for residential, commercial, and industrial users; and
- Providing tax benefits, attractive financing arrangements, and other incentives to promote CHP technologies.

Potential supporting measures for this option include training or certification of installers and contractors, net metering and other pricing arrangements, establishment of clear and consistent interconnection standards, and creation and support of markets for biomass fuels.

6.3 Efficient Transformers on the Customer Side of the Meter

Industrial and commercial facilities served by 480-volt three-phase power from a utility typically use dry-type transformers to distribute power internally at lower voltages for lighting and plug power. Efficient transformers are able to produce lower losses throughout the period of usage. When combined with incentives, the electricity saved by qualified energy-efficient transformers typically has a 3-year payback period.

6.4 Incentives for Passive Solar Heating

This option provides incentives for incorporating passive solar design into building construction. Passive solar heating applications represent a cost-effective means of providing heat to buildings. Passive solar applications, when included in initial building design, add negligible cost to the overall cost of a building, but they result in reduced operational costs and reduced equipment demand. Passive solar heating is a conventional, well-understood technology that is reliable, mechanically simple, and economically viable.

6.5 White Roofs, Rooftop Gardens, and Landscaping (Including Shade Tree Programs)

High summer roof temperatures increase the need for more electricity for air conditioning and produce black carbon from updrafts. Incentives for white roofs, rooftop gardens, and landscaping can lower electricity demand.

6.6 Focus on Specific End-Uses and Technologies

Policies focusing on specific energy end-uses and technologies can target window air conditioning (AC) units, lighting, water heating, plug loads (e.g., TVs, VCRs, small appliances), networked PC management, power supplies, motors, pumps, boilers, among others. Consumer products programs may include education, incentives, retailer training, and marketing and promotion.

6.7 Passive Solar Heating Design

See option 6.4.

6.8 Solar Hot Water Heating

Solar hot water systems use the sun's energy to heat water and are almost always used along with conventional water heaters. These systems use the sun's energy either to heat water directly or to heat a fluid such as antifreeze that indirectly heats the water through a heat exchanger. Solar-heated water is then stored for use as needed. A conventional water heater provides any additional heating that might be necessary. Solar hot water systems are always mounted on a south-facing roof, a south-facing outside wall, or on the ground facing south, to take greatest advantage of the sun's rays. Solar hot water systems can be either active or passive.

6.9 Appliance Recycling and Pick-Up Programs

Emissions associated with improper disposal of discarded appliances can be reduced by facilitating appliance recycling and disposal. This policy may be considered in tandem with RCI-1.1 (Utility Demand-Side Management for Electricity) and other policies that affect appliance turnover.

RCI-7. Non-Energy Emissions (HFCs, PFCs, SF₆, and CO₂ Process Emissions)

(HFCs = hydrofluorocarbons; PFCs = perfluorocarbons; SF₆ = sulfur hexafluoride; CO₂ = carbon dioxide)

7.1 Voluntary Industry–Government Partnerships

Voluntary agreements with industries can be used to reduce the emissions of process gases that have high global warming potential (GWP, a measure of the potential climate impact of different gases in terms of carbon dioxide equivalent [CO₂e]). Voluntary programs and public–private partnerships can be implemented or support can be provided to programs at the local or county level.

7.2 Promotion and Funding for Leak Reduction or Capture, Recovery, and Recycling of Process Gases

Promote and fund leak reduction or capture, recovery, and recycling of process gases with high GWP.

7.3 Promotion and Funding for Process Changes and Optimization

Promotion and funding for process changes and optimization can be used to reduce the emissions of process gases with high GWP.

7.4 Use of Alternative Gases (Other HFCs, and Hydrocarbon Coolants and Refrigerants)

A number of the energy services provided by gases typically used in the RCI sectors can be met by using alternative gases, for example, for air conditioning and refrigeration. The move to less carbon-intensive gases and technology combinations in some end uses can be achieved with a combination of promotion and incentive programs along with market creation and expansion.

RCI-8. GHG Emissions-Specific Goals and Policies

8.1 Support for Switching to Less Carbon-Intensive Fuels (Coal and Oil to Natural Gas or Biomass)

A number of the energy services provided by fuels use in the RCI sectors can be met through the use of alternative fuels. Prime examples here are water and space heating, as well as industrial process heat, which can be provided by burning coal, oil, gas, biomass, and perhaps hydrogen, or by using electricity or solar heat. There are also alternatives for air conditioning, where absorption air conditioning units using heat from combustion of fuels or from solar heat can be substituted for electric units. The move to less carbon-intensive fuel and technology combinations in some end uses can be achieved with a combination of promotion and incentive programs and market creation and expansion (for biomass fuels or for equipment not common in the market, for example).

8.2 Industry-Specific Emissions Cap-and-Trade Program

A cap-and-trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and capped entities can trade permits (a permit is an allowance to emit one ton of carbon dioxide equivalent [tCO₂e]). In principle, trading lowers the overall costs of meeting a given emission target, because participants with lower costs of compliance can choose to overcomply and sell their additional reductions to participants for whom compliance costs are higher.

Among the important considerations with respect to a cap-and-trade program are

- The sources and sectors to which it would apply (“upstream” at the fuel extraction or import level vs. “downstream” at points of fuel consumption);
- Whether electricity is dealt with from a load-based or generation-based perspective;
- The level and timing of the cap;
- How allowances would be distributed (e.g., via grandfathering and/or auctioning) and how new market entrants would be accommodated;
- What, if any, offsets would be allowed;
- Over what region the program would be implemented (e.g., nationally or regionally);
- Which GHGs are covered;
- Whether price caps (e.g., safety valves) are included;
- Whether there is linkage to other trading programs;
- Whether banking and/or borrowing among time periods is allowed;
- Early reduction credit;
- What, if any, incentive opportunities may be included;

- Use of any revenue accrued from permit auctions; and
- Provisions for encouraging energy efficiency, if relevant.

The principal example of a GHG cap-and-trade system in the United States is the Northeast States Regional Greenhouse Gas Initiative (RCCI): <http://www.rggi.org/>. For the RCI sectors, a cap-and-trade program may be considered primarily for large industrial sources of GHGs (as envisioned by the option) or may include other sectors as well.

8.3 Negotiated Emissions or Energy Savings Agreements

Government agencies could work with industrial and other large users of energy (and of process gases that are GHGs) to encourage those organizations to set emissions reduction targets. This option may be implemented through a combination of financial and other incentives, public–private partnerships and agreements, provision of information and technical assistance, and other methods.

Organizations that use large amounts of energy (electricity, gas, or other fuels) or are responsible for large volumes of direct GHG emissions would be encouraged to set and pursue their own emissions reduction targets. The organizations participating in such a program would typically be large industrial plants although, in some cases, large commercial or governmental organizations and facilities might also participate. Emission reductions can be achieved in the industrial sector through energy efficiency, process changes, and switching to the use of less carbon-intensive fuels to provide key energy services. Providing tools and information that residents, businesses, and communities can use to inventory GHG emissions, and inventory results they can use to set reduction targets, can also be elements of this option.

8.4 Local Government Program for Voluntary Emissions Targets by Businesses

Local governments could work with industrial and other large users of energy in their jurisdiction to encourage those organizations to set emissions reduction targets above targets that are in effect throughout the rest of the state. This option could be implemented through a combination of financial and other incentives, public–private partnerships and agreements, provision of information and technical assistance, and other methods.

8.5 Provide Tools and Information for Residents, Businesses, and Communities To Use for GHG Inventories

Inventory tools could take the form of Web-based calculators (of which there are many available) that walk the user through their GHG emissions; information from those tools can help residents, businesses, and communities evaluate and act upon GHG inventory results.

RCI-9. Other

9.1 Government Agency Requirements and Goals

Recognizing that governments should lead-by-example, this option generates energy reductions by government agency services. This option sets energy-efficiency goals and is consistent with option 1.10.

9.2 Reduce Energy Use by 10% in State-Owned Buildings

See option 1.10.

9.3 State Building Carbon-Neutral Requirement

Carbon-neutral building incorporates the following features:

- Encourages consideration of the overall building life cycle for carbon-neutral impacts, including siting, site preparation, construction materials and techniques, and construction debris disposal;
- Integrates development considerations such as transportation, water, wastewater, food, and energy supply;
- Points developers and builders toward overall low-impact designs that use local materials to minimize embodied energy; and
- Includes reforestation, agriculture, or other sequestration methods for offsetting any net positive emissions.

9.4 Municipal Energy Management

Under this type of policy, states can initiate and provide funding for municipal energy management systems, as well as audits of energy performance and operations of local government buildings. Audit results could be used to target and prioritize investments in improving government building energy efficiency.

9.5 Statewide Effort to Retrofit Existing Buildings (Residential, Commercial, Public, and Industrial) for Energy Efficiency

This policy provides incentives and targets to induce the owners of existing buildings to improve the efficiency with which energy and other resources are used in those buildings, along with provisions for raising targets periodically. This policy can include elements that encourage the improvement and review of energy use goals over time, and target renovated and/or existing buildings.

9.6 Focus on Specific Market Segments

Energy efficiency programs, funds, or goals can focus on specific market segments, such as existing homes (weatherization), new construction, apartments, low-income residential, and small and medium businesses. Targeting specific market segments can also be an effective component of a regional market transformation alliance.

9.7 Energy Efficiency Reinvestment Funds

This policy involves setting up a fund from which grants are made available to organizations that are implementing energy-saving projects through internal loans from the fund. The project loan is repaid at a percentage of annual energy savings, and once it is repaid, the organization continues to benefit from ongoing energy savings. As repayments are recycled back into the

fund, they are available for reinvestment, creating a self-sustaining pot of money for further energy efficiency projects.

9.8 Industrial Audits

This policy option includes providing technical assistance (energy audits) to the industrial-sector to identify and recommend options for reducing fossil energy and electricity use and for reducing non-energy emissions of GHGs. A combination of incentives, expertise, and information for implementing recommended options could be included in the policy to encourage the operators of industrial-sector facilities to follow up on audit recommendations.

9.9 Focus on Industrial Ecology and By-Product Synergy

The state can engage in outreach activities and voluntary partnerships with industry to promote implementation of industrial ecology, using innovation and systems-based analysis to reduce GHG emissions and by-product synergy in which waste streams from one industry or process are used as a resource for another.