Brief Description of Catalog of State Actions
Residential, Commercial and Industrial (RCI)
and
Energy Supply (ES)

Draft Prepared for Alaska Climate Change Mitigation Advisory Group

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Descriptions of policy options prepared by the Center for Climate Strategies (CCS) based on actions undertaken or considered by Alaska and other states, including regional, state, local and private actions. Relevant descriptions for Alaska will be developed through the process as determined by the Mitigation Working Group.

RCI-1 ENERGY EFFICIENCY PROGRAMS, FUNDS, AND GOALS

RCI-1.1 Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity (including expansion of same)

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

The policy design includes two key and linked dimensions: achievable/desirable energy savings and policy/administrative mechanisms to achieve these savings. In order to implement expanded DSM programs, a number of mechanisms should be considered. Candidate mechanisms include revising existing statutes to enable utility investments in energy efficiency at the levels indicated above, to consider as potentially eligible programs that are cost-effective taking into account the valuation of for CO2 emissions. Policy and administrative mechanisms that might be applied 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 might include:

- Implementation/administration by utility (including municipal utilities and cooperatives), state agency, or third-party actors.
- Subsidized energy audits for homeowners, businesses, industries.
- Incentives for specific technologies, potential including (but not limited to) lighting, water heating, plug loads, networked personal computer management, power supplies, motors, pumps, boilers, customer-side transformers, water use reduction, ground-source heat pumps, and others.
- Energy efficiency reinvestment funds.

This policy may be broad in focus, or it can focus on specific market segments (see 10.1). Complimentary policies include appliance recycling/pick-up programs (9.4). Measures

supporting this option might include consumer education, performance contracting, and energy end-use surveys.

RCI-1.2 Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals 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 focuses on increasing investment in demand-side management programs related to the use of natural gas, propane (or liquefied petroleum gas—LPG), and fuel oil, through programs run by utilities or others, energy efficiency funds, and/or energy efficiency goals.

RCI-1.3 Energy Efficiency Funds (e.g., public benefits funds) administered by state agency, utility, or 3rd party (e.g., Energy Trust)

A public benefits charge (sometimes call systems benefits charge) is a fee attributed to utility customers based on their usage of energy in a given time period. With deregulation in many states, the utility commissions often lost the ability to require efficiency programs of the electric utilities. 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 provided to a third party to provide energy efficiency programming.

RCI-1.4 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, including partnerships between government agencies, retailers, manufacturers, and non-governmental agencies. Market transformation programs can be statewide or regional.

Market transformation also seeks to ensure sufficient supplies 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 WH/PV, or other technologies important for the state.
- Support for commercialization of promising technologies.
- Bulk purchasing programs (public/private) or arrangements with retailers.

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

RCI-1.5 Low-cost Loans for Energy Efficiency improvements

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

RCI-2 BUILDINGS

RCI-2.1 Improved Building Codes for Energy Efficiency

Building energy codes specify minimum energy efficiency requirements for new buildings or for existing buildings undergoing a major renovation. Given the long lifetime of most buildings, amending state and/or local building codes to include minimum energy efficiency requirements and periodically updating energy efficiency codes could provide long-term GHG savings. Implementation of building energy codes, particularly when much of the building occurs outside of urban centers, can require additional resources.

Potential elements of a policy to include building codes include:

- Require high-efficiency appliances in new construction and retrofits.
- 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 (see 2.7), and development of a clearinghouse for information on and to provide access to software tools to calculate the impact of energy efficiency and solar technologies on building energy performance.

RCI-2.2 Promotion and Incentives for Improved Design and Construction (e.g. LEED[1], 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 floorspace for new buildings.
- Encourage building commissioning and recommissioning, including energy tracking and benchmarking.

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

- Set up a “feebate” program to encourage energy efficiency in building design.
- 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 (see 4.3, 4.4), 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.

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

Recognizing that governments should “lead by example” the option presented here provides energy use targets to improve the efficiency of energy use 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.

In addition to the potential elements noted for option 2.2, most of which also apply here, potential elements of this policy include:

- 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. (See also 10.2)
- Improvement and review of efficiency goals over time, and development of flexibility in contracting arrangements to encourage integrated energy-efficient design and construction.
- Recommendations that the infrastructure for implementation (meters, bookkeeping systems, staff, etc.) 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/renewable energy investments or other uses.

Potential supporting measures for this option are also similar to those for option 2.2, including training and certification of building sector professionals (see 4.3, 4.4), and performance contracting/shared savings, but could also include surveys of government energy and water use, energy benchmarking, measurement, and tracking programs for municipal and state buildings.

RCI-2.4 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 both within 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.

Smart growth policies may include many of the potential design elements and supporting measures noted above for options 2.2 and 2.3.

RCI-2.5 Increased Use of Blended Cement (substituting fly ash or other pozzolans for clinker)

This policy option would 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.)

RCI-2.6 Training and Education for Builders and Contractors

This option refers to an education and outreach program for building professionals to encourage incorporation of energy-efficiency and greenhouse gas emissions-reduction considerations. Examples include:

- Start programs to train builders and contractors on proper heating and air conditioning sizing and installation.
- Mandate 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.
- Implement code training and technical assistance for builders and architects.

RCI-2.7 Energy Management Training/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.
- 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. DOE in this area.

RCI-3 APPLIANCE STANDARDS

RCI-3.1 More Stringent Appliance / Equipment 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 standards or (2) focus sales of lower efficiency models on a state with less stringent efficiency standards.

Potential elements of an 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.

Consumer education (see below) is a potential supporting measure for this option.

RCI-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.

RCI-4 EDUCATION AND OUTREACH

RCI-4.1 Consumer Education Programs

The ultimate effectiveness of emissions reduction activities in many cases depends on providing information and education to consumers regarding the energy and GHG emissions implications of consumer choices. Public education and outreach is vital to fostering a broad awareness of climate change issues and effects (including cobenefits, 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 proposed in the climate change planning process, as well as those that may evolve in the future.

RCI-4.2 Energy Efficiency and Environmental Impacts Awareness in School

[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.

Curricula

The long-term effectiveness of emissions reduction activities depends on providing information and education not only to present consumers, but to future consumers as well. 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 integrate with and build upon existing outreach efforts involving climate change and related issues in the state.

RCI-4.3 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, multiple studies 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 costs of display units have been an obstacle to mass deployment. However, increased attention to demand response and advanced metering infrastructure in the U.S., and in energy conservation for emissions reductions in Canada, has spurred recent interest. Truth-in-advertising campaigns target advertising of energy consuming products to provide factual and accurate information regarding the GHG emission implications of the product(s).

RCI-4.4 Energy Performance Disclosure

Energy performance disclosure requirements aim to ensure that purchasers of buildings, equipment and appliances are aware of the energy performance of what they are purchasing.

RCI-5 PRICING AND PURCHASING

RCI-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 qualify as green power source by a relevant authority.
- 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 and/or other entities of voluntary purchasing of green power through provision of information and promotional materials.

RCI-5.2 Net-metering for Distributed Generation and Combined Heat and Power

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 or cooling) and power systems that offer the opportunity to improve the overall efficiency of fuel use.

Potential elements of this option include:

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

RCI-5.3 Rate structures and Technologies to Promote Reduced GHG Emissions

This option, which is more general than 5.2 above, could include various elements of utility rate design that are geared toward reducing greenhouse gas emissions, often with other benefits as well, such as reducing peak power demand. The overall goal is to revise rate structures so as to better reflect the actual economic and environmental costs of producing and delivering electricity as those costs vary by time of day, day of the week, season, or from year to year. In this way, rates provide consumers with information reflecting the impacts of their consumption choices.

Potential elements of this option include:

- Time-of-use rates, which 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 both the need for peaking capacity and fuel for peaking plants.
- Tiered (increasing block) rates for electricity and natural gas use, which provide affordable base usage rates for consumers, but which increase with increasing consumption.
- "Smart metering"—implementation of consumer meters showing real-time pricing, and the level of GHG emissions related to consumption at any given time. Smart meters are

described as providing consumers with the information needed to make consumption choices, and can include the capability for consumers to adjust the type of power (for example, “green” versus conventional power) “on the fly”.

RCI-5.4 Bulk Purchasing Programs for Energy Efficiency or Other Equipment

Bulk purchasing of appliances and equipment with higher-than-standard energy efficiency by public agencies, and for the organization of similar bulk-purchase programs in the private sector, is a policy option that can augment or be a part of 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 or 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 to rapidly develop markets for energy-efficiency 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].
- Programs for schools.
- Private-sector programs (possibly in coordination with market transformation programs).

RCI-6 CUSTOMER-SITED DISTRIBUTED ENERGY AND COMBINED HEAT AND POWER

RCI-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 greenhouse gas 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, as well as to supply new energy services using fuels that produce low or no GHG emissions. Increasing the 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.

[3] For example, the EnergyStar 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 way to obtain bids on EnergyStar-qualified products such as appliances, compact fluorescent light bulbs, and light fixtures.

- Wind power systems, particularly for rural areas.
- Biomass-fired generation, space, or water heating systems.
- Programs targeted at specific customer sectors (residential, commercial, industrial), or specific markets within sectors.
- 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/certification of installers/contractors, net metering and other pricing arrangements, interconnection standards, and creation/support of markets for biomass fuels.

RCI-6.2 Incentives and Resources to Promote Combined Heat and Power (CHP, or "cogeneration")

Combined heat and power (CHP) systems reduce fossil fuel use and greenhouse gas emissions, both through the improved efficiency of the 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:

- Promotion of the use of gas-fired CHP systems
- Promotion of the use of biomass-fired CHP systems
- Creation/expansion of markets for, and incentives designed to promote implementation of, CHP units in capacities suitable for residential, commercial, and industrial users.
- Provision of tax benefits, attractive financing arrangements, and other incentives to promote CHP technologies.

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

RCI-7 GHG EMISSIONS-SPECIFIC GOALS AND POLICIES

RCI-7.1 GHG 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 CO2e). In principle, trading lowers the overall costs of meeting a given emission target, as participants with lower costs of compliance can choose to over-comply 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, regionally, etc.); 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-andtrade system in the US is the Northeast States' Regional Greenhouse Gas Initiative: http://www.rggi.org/. For the RCI sectors, a Cap and Trade program may be considered primarily for large (usually industrial) sources of greenhouse gases, or may include other sectors as well.

RCI-7.2 GHG or Carbon Tax

A carbon or GHG tax is typically a tax on each ton of CO2 or CO2e emitted from an emissions source covered by the tax. A GHG tax could be imposed upstream based on the carbon content of fuels (for example, imposed at the level of fossil fuel or electricity suppliers) or at the point of combustion and emission (this approach would typically be applied for large point sources of emissions such as large industrial plants). Taxed entities may pass some or all of the cost on to consumers, change production processes to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of GHG emissions in products and services, and could adjust their behavior to purchase substitute goods and services that result in lower GHG emissions. GHG tax revenue could be used in a number of ways, from income tax reduction to policies and programs to support GHG reductions or technology innovation. GHG tax revenue could also be directed to helping the competitiveness of industries or assisting communities or groups most affected by the tax. Carbon taxes have been in place in a number of European countries since the early 1990s.

RCI-7.3 Switching to Lower GHG Fuels

A number of the energy services provided by fuels use in the RCI sectors can be met through the use of different 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. Alternatives also exist for air conditioning, where absorption air conditioning units using heat from combustion of fuels or from solar heat can substitute for electric units. Moving to less carbon-intensive fuel/technology combinations in some end uses can be achieved through a combination of promotion and incentive programs, market creation/expansion (for biomass fuels or for equipment not common in the market, for example).

RCI-7.4 Policies and/or Programs Specifically Targeting Non-energy GHG Emissions

GHG emissions from RCI sources not directly associated with energy use include emissions of both major GHGs such as carbon dioxide, but also a number of specialty gases—such as refrigerants, fire retardants, and solvents—that are emitted in relatively small quantities but have proportionately much larger impacts on climate. This policy option can encourage industry to replace process gases that have high global warming potentials (GWP, a measure of the potential impact of different gases on climate in terms of "CO2-equivalent") in key applications with

alternative gases (other HFCs, hydrocarbon coolants/refrigerants, etc.) that have lower GWPs.

RCI-7.5 Negotiated/Voluntary Emissions or Energy Savings Agreements

Government agencies could work with industrial and other large users of energy (and/or of process gases that are greenhouse gases) 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) and/or are responsible for large volumes of direct greenhouse gas 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. Reductions in greenhouse gas emissions can be achieved in the industrial sector through energy efficiency, process changes, and/or switching to the use of less carbon-intensive fuels to provide key energy services. Providing tools and information for residents, businesses, and communities to inventory GHG emissions, and to use inventory results to set reduction targets, can also be an element of this option.

RCI-8 TECHNOLOGY-SPECIFIC POLICIES

RCI-8.1 White Roofs, Rooftop Gardens, and Landscaping (including Shade Tree Programs)

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

This policy may be considered in tandem with RCI-1.1 (Demand-Side Management/Energy Efficiency Programs, Funds, or Goals for Electricity).

RCI-8.2 Focus on specific end-uses/technologies

Policies focusing on specific energy end-uses and technologies can target window AC units, lighting, water heating, plus loads, networked PC management, power supplies, motors, pumps, boilers, and others. Consumer products programs may include education incentives, retailer training, and marketing and promotion.

RCI-9 NON-ENERGY EMISSIONS (HFCS, PFCS, SF6, CO2 PROCESS EMISSIONS)

RCI-9.1 Participation in Voluntary Industry-Government Partnerships

Voluntary agreements with industries can be used to reduce the emissions of process gases that have high global warming potentials (GWP, a measure of the potential impact of different gases on climate in terms of “CO2-equivalent”). The state can implement voluntary programs and public-private partnerships, or it can provide support to programs at the local or county level.

RCI-9.2 Process Changes/Optimization

Promotion and funding for process changes/optimization can be used to reduce the emissions of process gases with high global warming potential.

RCI-9.3 Leak Reduction / Capture, Recovery and Recycling of Process Gases

The state could engage in promotion and funding for leak reduction/capture, recovery and recycling of process gases with high global warming potential.

RCI-9.4 Appliance Recycling/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 (Demand-Side Management/Energy Efficiency Programs, Funds, or Goals for Electricity), RCI-1.4 (Regional Market Transformation Alliance), and other policies that effect appliance turnover.

RCI-10 OTHER

RCI-10.1 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 (See 1.1 and 1.3).

RCI-10.2 Municipal Energy Management

Under this type of policy, the state could 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.

RCI-10.3 Industrial ecology / 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 to another.

RCI-10.4 Industrial audits

This policy option includes providing industrial-sector energy technical assistance (energy

audits) 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 the operators of industrial-sector facilities to follow up on audit recommendations.

RCI-10.5 Green Building Tax Credit

This policy option offers state tax credits for the construction of buildings that meet specific green building criteria.

ES-1 EMISSIONS POLICIES AND OVERARCHING ITEMS

ES-1.1 GHG cap and trade

A cap-and-trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and those participating in the system can trade permits (a permit is an allowance to emit one ton of CO2e). By allowing trading, participants with lower costs of compliance can choose to over-comply and sell their additional reductions to participants for whom compliance costs are higher. In principle, overall costs of compliance should be lower than they would otherwise be.

For every ton of CO2e released, an emitter must hold an allowance. Therefore, the number of allowances issued or allocated is, in effect, the cap. The government can give allowances away for free, auction them, or some combination of the two. Participants can range from a small group within a single sector to the entire economy. The compliance obligation can be imposed "upstream" (at the fuel extraction or import level) or "downstream" at points of fuel consumption.

Among the important considerations with respect to a cap-and-trade program are: the sources and sectors to which it would apply; the level and timing of the cap; how allowances would be distributed (e.g., whether load-based or generation-based, how new market entrants are accommodated, how leakage is addressed, etc.); how allowances would be reduced over time; what if any offsets would be allowed; over what region the program would be implemented (e.g., nationally, regionally, etc.); and whether compliance with the cap could be achieved given leakage from non participating states and coal-fired generation located on tribal lands that would not be subject to the state-imposed cap. Other issues to consider include which GHGs are covered; whether there is linkage to other trading programs; banking and borrowing; 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.

The principal example of a GHG cap-and-trade system in the US today is the Northeast States' Regional Greenhouse Gas Initiative: http://www.rggi.org/.

ES-1.2 Carbon (GHG) tax

A carbon or GHG tax would be a tax on each ton of CO2e emitted from an emissions source covered by the tax. A GHG tax could be imposed upstream based on carbon content of fuels (e.g. fossil fuel suppliers) or at the point of combustion and emission (e.g., typically large point

sources such as power plants or refineries). Taxed entities would pass some or all of the cost on to consumers, change production to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of GHG emissions in products and services, and would adjust their behavior to purchase substitute goods and services that result in lower GHG emissions. GHG tax revenue could go completely to state revenue and be used in a variety of ways such as income tax reduction or policies and programs to assist with GHG reductions. GHG tax revenue can also be directed to helping the competitiveness of industries or assisting communities most affected by the tax.

ES-1.3 Generation Performance Standards or Mitigation Requirements

A generation performance standard (GPS) can take various forms. One type of GPS requires that load serving entities (LSE) to acquire electricity (e.g., California's Emissions Performance Standard, SB 1368). Another form requires that power plant developers build and operate new generation, with an emission rate (e.g., X lbs CO2/MWh) below a specified mandatory standard (e.g., in OR and WA). Finally existing power plants can be subject to GHG standards (as in Massachusetts). A market-based variation of a GPS would allow generators with emission rates lower than the GPS to sell their extra "credits" to generators with emission rates higher than the GPS.

In some cases, GHG offsets or credits can be used for compliance (e.g., OR and WA). GHG offsets are GHG emission savings from project-based activities in sectors or regions not covered by the standard or regulations, which typically need to meet specific criteria laid out in the regulation.

ES-1.4 Voluntary GHG targets

Voluntary targets can take a number of different forms. A target can be voluntarily undertaken by a company outside the context of a government program for voluntary reduction and not be legally binding.

US companies are free to take on such voluntary CO2 reduction targets, and a number of them have done so. The Chicago Climate Exchange (CCX) is an example of a trading exchange driven by voluntary participants making and selling reductions. A target could also be negotiated with the government through a program for voluntary reductions. The government might offer certain incentives, and companies voluntarily agree to reduction targets in exchange for receiving those incentives. Such agreements can be legally binding or not. Trading can be a component of any of these voluntary target variations. The most active trading, however, is likely to result with a negotiated but binding agreement.

Monitoring, reporting and verification systems need to be in place to ensure that reductions are actually being made, as this kind of system would not involve allocated permits. If a company reduced GHG emissions beyond its target, and these reductions are verified independently, then it could sell those excess reductions to other participating companies that had difficulty meeting the target. If targets are not binding, however, companies may or may not actually achieve their reduction targets.

ES-1.5 Technology R&D

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. For example, an agency can be established with a mission to help develop and deploy energy storage technologies. R&D funding can also be made available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use. Funding could be provided to increase collaboration between existing institutions for R&D on technologies.

ES-2 RENEWABLE ENERGY AND ENERGY EFFICIENCY

ES-2.1 Renewable and / or Environmental Portfolio Standard

A renewable portfolio standard (RPS) is a requirement that utilities must supply a certain percentage of electricity from an eligible renewable energy source(s). For example, an RPS of 5% would mean that for every 100 kilowatt hours (kWh) that a utility or a "load serving entity" (LSE) supplies to end users, 5 kWh must be generated from renewable resources. About 20 states currently have an RPS in place. In some cases, utilities can meet their requirements by purchasing or generating renewable-based electricity or by purchasing renewable energy credits (RECs).

An environmental portfolio standard (EPS) expands the RPS notion to include energy efficiency as an eligible resource as well, exchangeable or not with renewable energy obligations, depending on design. In some cases, utilities can also meet their RPS (or EPS) requirements by purchasing certificates from eligible energy projects, typically referred to as Renewable Energy Certificates (RECs) in the case of RPS policies.

Anyone can build an eligible renewable facility and earn RECs for the electricity that it generates. Anyone with RECs can sell them to a utility that needs to meet its RPS requirement. In this way, utilities themselves may not need to build and operate renewable generating facilities. By providing this flexibility, a market in these credits is created, which will provide an incentive to companies that are best able to generate renewable energy.

A "safety valve" can be put in place that limits the price of RECs at a specified level by allowing utilities to purchase RECs from the state at the "safety valve" price. The "safety valve" would provide a degree of cost certainty, but could make the penetration of renewables and corresponding GHG reductions uncertain if the actual price of RECs moves above the "safety valve" level.

ES-2.2 Grid-based Renewable Energy Incentives and/or Barrier Removal

This policy option reflects financial incentives to encourage investment in renewable energy sources by businesses that sell power commercially. These financial incentives for renewables include: (1) direct subsidies for purchasing/selling distributed renewable technologies given to the buyer/seller (e.g. via a public benefit fund); (2) tax credits or exemptions for purchasing

distributed renewable technologies given to the buyer/seller, (3) feed-in tariffs, which provide direct payments to renewable generators for each kWh of electricity generated from a qualifying renewable facility; (4) tax credits for each kWh generated from a qualifying renewable facility; and (5) regulatory policies that provide incentives and/or assurance of cost recovery for utilities that invest in customer-owned renewable energy systems.

ES-2.3 Distributed Renewable Energy Incentives and/or Barrier Removal

This option is focused on renewable energy located on-site at consumer facilities that whose principal business is not power sales. Financial incentives can be similar to those noted for the previous option. There are numerous barriers to distributed renewable energy, including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles. Policies to remove these barriers include: improved interconnection policies, improved rates and fees policies, streamlined permitting, recognition of the emission reduction value, financing packages and bonding programs, power procurement policies, education and outreach, etc…

ES-2.4 Green Power Purchases and Marketing

This option would provide support, incentives or requirements for the purchase of qualifying "green" power.

One option is to require state facilities to acquire minimum portions of their electricity from specified renewable resources. A State renewable purchase requirement is similar in concept to an RPS. It stipulates a date and level by which a portion of total electricity consumption by state agencies is met by renewable energy sources. New York, Maryland, and New Jersey have adopted this approach . In New York, Executive Order 111 called for state agencies to obtain 10% of their electricity needs from renewable sources, such as wind, solar, biomass, geothermal, and fuel cells by 2005, with the percentage increasing to 20% by 2010. The order applies to state buildings and those of quasi-independent organizations. The order also calls for state agencies to implement energy efficient practices, increase purchases of energy efficient products, and follow green building standards for new construction and renovation projects. In New Jersey, the current renewable purchase level is 152,000 MWhs or 15% of the bid state contract for electricity which was estimated to be 85% of the state facilities electric use.

ES-2.5 Combined Heat and Power (CHP) Incentives and/or Barrier Removal

Financial incentives for combined heat & power (CHP) could include: (1) direct subsidies for purchasing/selling CHP systems given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling CHP systems given to the buyer/seller; (3) tax credits or exemptions for operating CHP systems; (4) feed-in tariff, which is a direct payment to CHP owners for each kWh of electricity or BTU of heat generated from a qualifying CHP system; and (5) tax credits

for each kWh or BTU generated from a qualifying CHP system.

There are also numerous barriers to combined heat and power (CHP), including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles.

Policies to remove these barriers include:

- Improved interconnection policies
- Improved rates and fees policies
- Streamlined permitting
- Procurement policies
- Education/outreach

ES-2.6 Pricing strategies to promote renewable energy and/or CHP (e.g. net metering)

Net metering is a policy that allows owners of grid-connected distributed generation (generating units on the customer side of the meter, often limited to some maximum kW level) to generate excess electricity and sell it back to the grid, effectively “turning the meter backward.” This policy allows for low transaction costs (e.g., no need to negotiate contracts for the sale of electricity back to the utility) and is attractive to DG owners because they are compensated equal to their full cost of purchased electricity (i.e., the sum of wholesale generation, transmission and distribution, and utility administration costs) rather than just the utility’s avoided costs. This has the effect of paying retail electricity rates for the generation up to total on-site usage. These are considerably higher than wholesale prices available to other generators.

ES-2.7 Renewable energy development issues (zoning, siting, etc.)

ES-2.8 Demand-side energy efficiency (RCI focus)

Pricing strategies can provide electricity consumers much greater opportunity to manage their electricity consumption in response to price signals.

ES-2.9 Technology-focused initiatives (biomass, energy storage, etc.)

ES-3 FOSSIL FUEL AND NUCLEAR ELECTRICITY

ES-3.1 Advanced fossil fuel technology incentives, support, or requirements (IGCC,

CCS, etc.)

Advanced fossil technologies are more efficient than conventional fossil technologies and, therefore, have lower CO2 emission rates. Advanced fossil technologies combined with carbon capture and sequestration or reuse (CCS) could enable significantly lower CO2 emissions. Policies for advanced fossil technologies may include mandates or incentives to use advanced coal technologies for new coal plants. A mandate might require that new coal plants achieve a certain CO2 emission rate that is only achievable with advanced technology. Alternatively, a mandate might require that all new coal plants be of a certain type, e.g., Integrated Gasification Combined Cycle (IGCC). A mandate might also be a requirement that a certain percentage of new coal plants be IGCC or employ advanced fossil technologies. Incentives may be in the form of direct subsidies or assistance in securing financing and/or off-take agreements. A combination of mandates and incentives is also possible.

Policies to encourage CCS could include a state agency or department within an existing agency tasked with promoting CCSR, evaluation studies to identify geologically sound reservoirs, R&D funding to improve CCS technologies, financial incentives to capture and store carbon or to capture and reuse it, and/or mandates to capture and store carbon or capture and reuse it.

ES-3.2 Nuclear Power Support and Incentives

ES-3.2a (ES-4.1) New Nuclear Capacity and Licensing

As of the end of last year, there were 104 commercial nuclear generating units that are fully licensed by the U.S. Nuclear Regulatory Commission (NRC) to operate in the United States. Of these 104 reactors, 69 are categorized as pressurized water reactors (PWRs) totaling 65,100 net megawatts (electric) and 35 units are categorized as boiling water reactors (BWR) totaling 32,300 net megawatts (electric). Although the United States has the most nuclear capacity of any nation, no new commercial reactor has come on line since 1996 (this was the Watt's Bar reactor in Tennessee, owned and operated by the Tennessee Valley Authority which began commercial service in May 1996). The current Administration has been supportive of nuclear expansion, emphasizing its importance in maintaining a diverse energy supply and its potential for producing electricity with negligible greenhouse gas emissions during operation. As of October 31, 2005, however, no U.S. nuclear company has yet applied for a new construction permit. (source: http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/reactsum.html)

ES-3.2b (ES-4.2) Nuclear Plant Relicensing

Nuclear plant relicensing allows a nuclear power plant to extend the life of the facility for twenty years past its original 40-year license term. The Nuclear Regulatory Commission (NRC), the nation's regulatory authority for nuclear power, considers the relicensing program one of its major cornerstones of current regulatory activity. The NRC has promulgated new regulations pertaining to the safety and environmental reviews associated with license renewal and has reported that they are consistently able to complete licensing action reviews typically within 30 months from start to finish.

The NRC reports that there are many benefits of the renewal program that had not been

anticipated such as licensees completing significant component upgrades and refurbishments, activities that they argue have significantly enhanced the safety and inspection procedures of plants with renewed licenses. In addition, the NRC argues that developing a successful license renewal process has breathed new life into the nuclear industry in the U.S. Detractors of nuclear plant relicensing argue that relicensing is ill-advised because nuclear power stations pose tempting terrorist targets and aging equipment will pose safety hazards for surrounding communities. (source: http://www.nrc.gov/reading-rm/doccollections/commission/speeches/2004/s-04-004.html)

ES-3.2c (ES-4.3) Nuclear Plant Uprating

A nuclear power plant uprating is a process whereby a licensee receives approval from the NRC to operate a plant at a higher power level than the level authorized in the original license. The NRC has actually been reviewing and approving power uprates since the 1970's. With the advent of license renewal, however, the NRC has received more of these requests due to the refurbishment and replacement of major components that would enable operation at a higher power level. To date, the NRC has approved over 100 power uprate increases resulting in a gain of almost 4,200 megawatts electric at existing plants. Collectively, an equivalent of more than four large nuclear power plants has been gained through implementation of power uprates at existing facilities. Over the next five years or so, it is expected that a number of power uprates requests will be received by the NRC which, if approved, would add the equivalent of another two large nuclear plants to power supply. There have been a number of unanticipated operational concerns have resulted from the NRC's approval of plants operating at extended power levels. For example, several boiling water reactor units have experienced cracking in non-safety related steam dryer parts. (source: http://www.nrc.gov/reading-rm/doccollections/commission/speeches/2004/s-04-004.html

ES-3.3 Efficiency Improvements and Repowering Existing Plants

Efficiency improvements refer to increasing generation efficiency at power stations through incremental improvements at existing plants (e.g., more efficient boilers and turbines, improved control systems, or combined cycle technology). Repowering existing power plants refers to switching to lower or zero emitting fuels at existing plants, or for new capacity additions. This includes co-firing biomass at coal plants fuels or the use of natural gas in place of coal or oil. Policies to encourage efficiency improvements and repowering of existing plants could include incentives or regulations as described in other options, with adjustments for financing opportunities and emission rates of existing plants.

ES-3.4 Biomass co-firing at fossil fuel power stations

ES-3.5 Technology-focussed initiatives (fuel cells, energy storage, etc.)

ES-4 FUEL PRODUCTION, PROCESSING, AND DELIVERY

ES-4.1 Oil and Gas Production: GHG Emission Reduction Incentives, Support, or Requirements

There are a number of ways in which methane (CH4) and CO2 emissions in the oil and gas industry can be reduced. Natural gas consists primarily of methane; therefore, any leaks during production, processing, and transportation/distribution should be addressed. In addition to reducing GHG emissions, stopping these leaks may be economically beneficial because it can prevent the waste of valuable product.

The EPA Natural Gas STAR program offers numerous methods of preventing leaks. These methods, called Best Management Practices (BMPs) and Partnership Reduction Opportunities (PROs), are divided by industry sub sector: production, processing, and transportation/ distribution. Among the practices recommended are: *preventive maintenance*: (improving the overall efficiency of the gas production and distribution system), *reducing flashing losses (releases when pressure drops at* storage tanks, wells, compressor stations, or gas plants), and changing and replacing parts and devices to reduce leaks and improve efficiency, among others.

ES-4.2 Natural Gas Transmission and Distribution

ES-4.3 Oil Refining and/or Coal-to-liquids production : GHG Emission Reduction Incentives, Support, or Requirements

There are a number of ways in which CH4 and CO2 emissions can be reduced in the production of liquid fuels at oil refineries or coal-to-liquids plants. These options include various efficiency measures including enhanced combined heat and power along with carbon capture and storage. Coal-to-liquids (CTL) plants are energy-intensive, and produce about 10 times more CO2 emissions than conventional oil refineries in order to produce liquid fuels; however, with carbon capture and storage (and co-production of electricity and liquid fuels) such emissions can be substantially reduced.[1] Regulations, incentives, and/or support programs can be applied to achieve these reductions (see ES-5 for some examples).

ES-4.4 Coal Production: GHG Emission Reduction Incentives, Support, or Requirements

ES-4.5 Coal-to-liquids Production: GHG Emission Reduction Incentives, Support, or Requirements

ES-4.6 Low-GHG Hydrogen production incentives and support

ES-5 CARBON CAPTURE AND STORAGE OR REUSE

ES-5.1 CCSR enabling policies (administration, regulation, liability, incentives)

The ability to implement CCS at a given site may rely on the existence of an infrastructure for

transporting the CO2 to a suitable location for sequestration or reuse. The US currently has more than a thousand miles of CO2 pipelines, which are primarily used for enhanced oil recovery (whereby CO2 is pumped into old non-producing oil reservoirs to pump additional oil out of each well). This option would provide incentives for developing and investing in CO2 pipelines to serve CCS operations. It would also help coordinate the creation of a CO2 pipeline infrastructure with sites generating CO2.

ES-5.2 CCSR incentives

Carbon capture and storage or reuse (CCSR) involves capturing carbon dioxide and either (1) sequestering it permanently in a geologically sound reservoir or (2) reusing it to aid in oil and gas extraction or as a feedstock for industrial processes, and perhaps eventually as a feedstock that when combined with water can be reformed into liquid fuels. Where excess CO2 is found in some natural gas reservoirs – pipeline natural gas can contain only up to 2.5% CO2 by volume, and some gas fields have a higher concentration – it is typically vented to the atmosphere in gas processing plants. Carbon can also be captured in the process of gasifying coal to liquid fuels. This process is well established in the chemical industry and forms the basis for Integrated Gasification Combined Cycle (IGCC) electricity generating plants.

Policies to encourage CCSR could include a state agency or department within an existing agency tasked with promoting CCSR, evaluation studies to identify geologically sound reservoirs, R&D funding to improve CCSR technologies, financial incentives to capture and store carbon or to capture and reuse it, and/or mandates – coupled with technical feasibility and cost and investment recovery mechanisms, if appropriate – to capture and store carbon or capture and reuse it.

ES-5.3 R&D for CCSR

ES-6 OTHER ENERGY SUPPLY OPTIONS

ES-6.1 Transmission System Upgrading

Satisfying the long-term demand for electricity requires not only new generating capacity, along with demand-side measures, but measures to improve transmission to reduce line losses and bottlenecks and enhance throughput. Entirely new transmission capacity may also be necessary.

Siting new transmission lines can be a difficult process given their cost and their actual or perceived impact on health, environment, and the use, enjoyment, and value of property.

New construction and retrofit activities on the transmission grid could incorporate advanced composite conductor technologies, capacitance technologies, grid management software, and other technologies that may become available to increase transmission capacity that can increase line carrying capacity as much as threefold.

ES-6.2 General Distributed Generation Support (Interconnection Rules, Net Metering, etc.)

A standardized interconnection rule is a policy to increase the amount of clean distributed generation (DG). Standardized interconnection rules, which are generally developed and administered by a state's public utility commission, establish clear and uniform processes and technical requirements for connecting DG systems to the electric utility grid. These rules are an important mechanism for improving the market conditions for clean DG as utility interconnection can be a critical component of a successful DG project. Connecting to the grid enables the facility to: a) purchase power from the grid to supply supplemental power as needed, for example, during periods of planned system maintenance, b) sell excess power to the utility, c) maintain grid frequency and voltage stability, as well as utility worker safety. The primary objective of a standard interconnection rule is to obtain the benefits that clean DG can provide without comprising grid safety or reliability. This topic is of particular interest as the Energy Policy Act of 2005 (EPAct 2005) directs states to consider upgrading their standards for interconnecting small generators within one year of enactment. (source: http://www.epa.gov/chp/pdf/interconnection_factsheet.pdf)

ES-6.3 Reduce Transmission and Distribution Line Loss

ES-6.4 Environmental (emissions) Disclosure

Emission disclosure consists of establishing requirements that GHG emitters publish their estimated GHG emissions on a regular (e.g., annual) basis. In addition to emissions, disclosure can also include an accounting of business risks due to climate change, such as assets in danger of weather-related damage, threats to market share, and risks of future regulation.

Environmental disclosure allows investors and consumers to have information regarding a firm's GHG emissions and climate risks so as to better make purchasing and investment decisions. In the case of energy supply, environmental disclosure would take the form of providing consumers with information on carbon emissions per kWh in a form that it would help them make decisions about electricity purchases and consumption. It is effective particularly if coupled with the opportunity for consumers to select their electricity provider.

Sources: Carbon Disclosure Project www.cdproject.net/

World Economic Forum GHG Registry www.weforum.org/ghg