



**Cross-Cutting Issues Policy Work Group  
Summary List of Pending Policy Options**

	Policy Option	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value 2007–2020 (Million \$)	Cost-Effectiveness (\$/tCO <sub>2</sub> e)	Status of Option
		2012	2020	Total 2007–2020			
CC-1	GHG Inventories and Forecasts	Not Quantified					Pending
CC-2	State GHG Reporting	Not Quantified					Pending
CC-3	State GHG Registry	Not Quantified					Pending
CC-4	Statewide GHG Reduction Goals and Targets	Not Quantified					Pending
CC-5	State and Local Government GHG Emissions (Lead-by-Example)	Not Quantified					Pending
CC-6	Comprehensive Local Government Climate Action Plans	Not Quantified					Pending
CC-7	Public Education and Outreach	Not Quantified					Pending
CC-9	Establish a Proactive Public-Private Partnership to Seek Investment Capital and Philanthropic Funding for Reducing GHG Emissions and Supporting Development of the New Energy Economy in Colorado	Not Quantified					Pending
CC-10	Vulnerability and Adaptation	Not Quantified					Pending
	<b>Sector Total After Adjusting for Overlaps</b>						
	<b>Reductions From Recent Actions</b>						
	<b>Sector Total Plus Recent Actions</b>						

*Note: The numbering used to denote the above policy options is for reference purpose only; it does not reflect prioritization among these important policy options. There is no policy option CC-8, as this catalog option was determined not to be a priority for analysis by the CAP.*

## CC-1. GHG Inventories and Forecasts

### Policy Description

Greenhouse gas (GHG) emissions inventories and forecasts are essential for understanding the magnitude of all emission sources and sinks (both anthropogenic and natural), the relative contribution of various types of emission sources and sinks to total emissions, and the factors that affect trends over time. Inventories and forecasts help to inform state leaders and the public on statewide trends, opportunities for mitigating emissions or enhancing sinks, and verifying GHG reductions associated with implementation of action plan initiatives. Responsibility for preparing GHG inventories and sinks often resides with the environmental agency, which typically has the expertise needed to systematically compile information on GHG sources and sinks using established methods and data sources. Inventory and forecast efforts should be ongoing over time reflecting improvements to the accuracy and completeness of data collected.

### Policy Design

The CC PWG recommends that the state institute a formal GHG inventory and forecast function within the Colorado Department of Public Health and Environment (DPHE), to be assisted by other state agencies as needed.

### Goals:

- Develop a periodic, consistent, and complete inventory of emission sources and sinks and an accompanying forecast of future GHG emissions in at least 5 and 10 year increments extending at least 20 years into the future. The GHG forecast should reflect projected growth as well as the implementation of scheduled mitigation options, and should, through differences year-to-year, provide a basis for documenting and illuminating trends in state GHG emissions.
- Develop a consistent protocol for preparing the inventory and forecast. In forecasting future GHG emissions, treatment of uncertainties should be transparent, as consistent as possible across sectors and time, and to the extent possible, reflect multiple scenarios.
- Inventory all natural and man-made emissions generated within the boundaries of the state (i.e., a production-based inventory approach) as well as emissions associated with energy imported and consumed in the state (i.e., a consumption-based inventory approach).

**Timing:** This function should be implemented as soon as possible as allowed by current funding and enhanced over time.

**Parties Involved:** All GHG emission sources and sinks (both anthropogenic and natural) should be included in the inventory and forecast.

**Other:** Not applicable.

### **Implementation Mechanisms**

The PWG recommends that the Colorado DPHE collect and project GHG emissions data from regulated sources already providing criteria pollutant emissions data as a permit requirement, and estimate current and project future GHG emissions for source categories without permits using methods and databases available to the public.

### **Related Policies/Programs in Place**

Colorado DPHE currently regulates, permits, and inventories point sources of criteria pollutants down to a few tons/year. Adding GHG emissions reporting requirements to these permits over time, prioritized by size of GHG emissions by source category, would fit in with CC-2 and CC-3 policy options, and is necessary to support implementation of those options.

### **Types(s) of GHG Reductions**

To be determined (TBD)

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options.

### **Additional Benefits and Costs**

TBD

### **Feasibility Issues**

TBD

### **Status of Group Approval**

Pending.

### **Level of Group Support**

TBD.

### **Barriers to Consensus**

TBD.

## CC-2. State Greenhouse Gas Reporting

### Policy Description

Greenhouse gas (GHG) reporting reflects the measurement and reporting of GHG emissions to support tracking and management of emissions. GHG reporting can help sources identify emission reduction opportunities and reduce risks associated with possible future GHG mandates by moving “up the learning curve.” Tracking and reporting of GHG emissions can also help in the construction of periodic state GHG inventories. GHG reporting is typically a precursor for sources to participate in GHG reduction programs, opportunities for recognition, and a GHG emission reduction registry, as well as to secure “baseline protection” (i.e., credit for early reductions). Further, collaboration with other states in the development of a GHG reporting program could influence the development of GHG reporting practices throughout the region and nation and build consistency and reciprocity with other state or regional GHG reporting programs.

### Policy Design

The CC PWG recommends that the state develop GHG reporting opportunities for all sources. Mandatory reporting should be required for significant sources as determined by the DPHE. Elements that the DPHE may wish to include are:

- Subject to consistently rigorous quantification, opportunity to voluntarily report GHG emissions should be open to all sources (e.g., combustion, processes, vehicles, etc.) using common sense regarding de minimis emissions. In order to encourage GHG mitigation activities from all quarters, reporting should not be constrained to particular sectors, sources, or approaches.
- GHG reporting requirements should be phased in by sectors as rigorous, standardized quantification protocols, base data, and tools become available, and as responsible parties become clear. Entities should be allowed to report GHG emissions voluntarily before mandatory reporting applies to them; and the state, municipalities, and other jurisdictions should be allowed to report emissions associated with their own activities and any programs they may implement.
- The goal should be reporting of “organization-wide emissions within the state” but with adequate “granularity” to enable facility-level baseline protection.
- Reporting should occur annually on a calendar-year basis for all six traditional GHGs and, to the extent possible, for black carbon.
- Reporting of direct emissions<sup>1</sup> should be required; reporting of emissions associated with purchased power and heat<sup>2</sup> should be phased in, and voluntary reporting of other indirect emissions<sup>3</sup> should be allowed.

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<sup>1</sup> Defined as “Scope 1” emissions in the *GHG Protocol*.

<sup>2</sup> Defined as “Scope 2” emissions in the *GHG Protocol*.

- Every effort should be made to maximize consistency with federal, regional, and other states' GHG reporting programs.
- GHG emissions reports should be verified through self-certification and DPHE spot-checks; to qualify for future registry purposes, reports should undergo third-party verification.
- Project-based emissions reporting should be allowed, when properly identified as such and quantified with equally rigorous consistency.
- The reporting program should provide for appropriate public transparency of reported emissions.

**Goals:** Implementation of a state GHG Reporting Program as early as possible.

**Timing:** As soon as possible, preferably by 2008.

**Parties Involved:** As universal as possible.

### **Implementation Mechanisms**

Reporting protocols, opportunities, and, in the case of mandatory reporting, underlying regulatory requirements.

### **Related Policies/Programs in Place**

Many sources in Colorado report criteria pollutant emissions in order to comply with various federal and state regulatory programs. Most electric generating units are also required to report CO<sub>2</sub> emissions to the Energy Information Administration (EIA). Some sources may report GHG emissions on a voluntary basis to federal, state, or privately-run programs.

In early May 2007, Colorado joined *The Climate Registry* as a charter member. Colorado sources that choose to participate in this registry will be subject to the reporting protocols for estimating their GHG emissions and emissions reductions.

### **Types(s) of GHG Reductions**

GHG reporting is an enabling policy to encourage management, and ultimately reduction, of GHG emissions. It does not reduce GHG emissions itself per se.

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

Uncertainties exist with respect to quantification of some GHG emissions from some sources, but standard quantification protocols are rapidly being developed and accepted widely. There remain significant uncertainties with respect to how various state, regional, and/or federal GHG reporting programs may develop.

### **Additional Benefits and Costs**

Participation in a GHG reporting program may cause some additional GHG accounting costs for Colorado businesses and other entities.

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<sup>3</sup> Defined as "Scope 3" emissions in the *GHG Protocol*.

This policy option – particularly when coupled with CC-3 *GHG Registry* – will help provide Colorado entities with “baseline protection” and position them for participation in an emissions trading program should one develop in the future, leading to cost savings. Although establishment of or participation in credible reporting and registry programs is essential for participating in a trading program, these elements do not reduce GHG emissions themselves.

#### **Feasibility Issues**

TBD

#### **Status of Group Approval**

Pending.

#### **Level of Group Support**

TBD.

#### **Barriers to Consensus**

TBD.

## CC-3. State Greenhouse Gas Registry

### Policy Description

A greenhouse gas (GHG) registry enables measurement and recording of GHG emissions reductions in a central repository with a “transaction ledger” capacity to support tracking, management, and “ownership” of emission reductions as well as to encourage GHG reductions, to enable potential recognition, baseline protection, and/or the crediting of actions by implementing programs and parties in relation to possible emissions reduction goals, and to provide a mechanism for regional, multi-state, and cross-border cooperation. Subject to appropriately rigorous quantification, GHG registration should not be constrained to particular sectors, sources, or approaches so as to encourage GHG mitigation activities from all quarters.

### Policy Design

The CC PWG notes that the State of Colorado has joined the effort to develop a national GHG registry through *The Climate Registry*. Being a charter state in this effort should help ensure that Colorado’s needs and priorities are addressed in the course of *The Climate Registry*’s development. To the extent that Colorado’s needs may not be fully met by *The Climate Registry*, Colorado should consider developing supplemental or ancillary registry capacity or opportunity.

Elements to consider include:

- Geographic applicability at least at the statewide level and as broadly (i.e., regionally or nationally) as possible.
- Allowing sources to start as far back chronologically as good data exists, as affirmed by third-party verification, and allowing registration of project-based reductions or “offsets” that are equally rigorously quantified.
- Incorporating adequate safeguards to ensure that reductions aren’t double-counted by multiple registry participants; providing appropriate transparency; and allowing the state to be a valid participant for reductions associated with its programs, direct activities, or efforts.
- Striving for maximum consistency with other state, regional, and/or national efforts; greatest flexibility as GHG mitigation approaches evolve; and providing guidance to assist participants.

**Goals:** Implementation of a GHG registry for Colorado sources as soon as possible.

**Timing:** As soon as possible

**Parties Involved:** Probably overseen by Colorado DPHE; costs shared by participants benefiting from the registry.

### Implementation Mechanisms

Joining *The Climate Registry*

### **Related Policies/Programs in Place**

In early May 2007, Colorado joined *The Climate Registry* as a charter member.

### **Types(s) of GHG Reductions**

TBD

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

There remain significant uncertainties with respect to how various state, regional, and/or federal GHG registry programs may develop. Involvement in early registry implementation – as issues are deliberated among collaborating states – will advantage Colorado in terms of ultimate outcomes.

### **Additional Benefits and Costs**

Participation in *The Climate Registry* may cause some additional GHG accounting costs for Colorado businesses and other entities.

### **Feasibility Issues**

TBD

### **Status of Group Approval**

Pending.

### **Level of Group Support**

TBD.

### **Barriers to Consensus**

TBD.

## CC-4. Statewide GHG Reduction Goals and Targets

### Policy Description

The overarching purpose of the CAP stakeholder effort is to develop recommendations for actions that can be taken in Colorado to reduce the state's contribution and vulnerability to a changed climate. Following the development, review, and approval of a current and comprehensive inventory and forecast of Colorado greenhouse gas (GHG) emissions from 1990 to 2020, statewide GHG emissions reduction goals and/or targets for future time periods should be established and implemented. The GHG reduction goals or targets recommended by the CAP should be consistent with the parallel goal of an efficient, robust CO economy. Within this framework, a statewide goal or target can provide vision and direction, as well as a basis for implementation of CAP policy recommendations and regular periodic assessments of progress toward reaching the statewide goal.

### Policy Design

Scientists have concluded (1) that global greenhouse gas emissions may have to be reduced by 50 to 85% by 2050, compared to 2000 levels, to stabilize global temperature increases at no more than about 4°F, a level that some scientists have suggested represents a threshold of dangerous interference with the global climate; and (2) that emission reductions in the next two to three decades will have a large impact on opportunities to achieve that kind of climate stabilization.<sup>4</sup> Consistent with these scientific conclusions, the Governor of Colorado should set goals for the reduction of greenhouse gas emissions in Colorado. The Climate Action Panel believes the goals should be in the vicinity of a 20% reduction in greenhouse gas emissions by 2020 and an 80% reduction by 2050, both compared to 2005 levels. The Climate Action Panel believes the goals should guide actions in the state, but should not be a firm cap. The Climate Action Panel believes these kinds of goals are realistic because (1) the panel's recommendations that have been analyzed quantitatively would achieve most of the emission reductions that would be needed to meet such a 2020 goal; (2) other panel recommendations that were not analyzed quantitatively would lead to additional reductions; and (3) other reasonable measures to reduce emissions beyond those recommended by the panel are available now, and more will become available in the future.

**Goals:** As noted above.

**Timing:** As noted above.

**Parties Involved:** Statewide.

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<sup>4</sup> See "Summary for Policy Makers" in R. Bosch, R. Dave, and L. Meyer (eds), *Climate change 2007: Mitigation: Contribution of Working group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, United Kingdom, and New York, NY, 2007), especially pages 22-23.

### **Implementation Mechanisms**

The PWG recommends that the Colorado DPHE periodically report (e.g., annual or biannual) current GHG emissions data relative to goals or targets, assess accuracy of earlier projections, revise as needed future projections, and identify changes needed to future goals or targets - for GHG emissions data from regulated sources already providing criteria pollutant emissions data as a permit requirement, and GHG emissions estimates for source categories without permits using methods and databases available to the public.

### **Related Policies/Programs in Place**

- Governor Ritter's "Greening Government" Executive Orders (<http://www.colorado.gov/governor/executive-orders.html>, 4/16/07).

### **Types(s) of GHG Reductions**

All.

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options.

### **Additional Benefits and Costs**

To the extent that statewide GHG reduction goals or targets can help motivate additional and/or more rapid emission reductions, co-benefits associated with GHG reductions will also occur in parallel.

### **Feasibility Issues**

None cited.

### **Status of Group Approval**

Pending.

### **Level of Group Support**

TBD.

### **Barriers to Consensus**

TBD.

## CC-5. State and Local Government GHG Emissions (Lead-by-Example)

### Policy Description

State and local government is responsible for providing a multitude of services for the public that are delivered through diverse operations and result in wide-ranging GHG emission activities. State and local government can take the lead in demonstrating that reductions in GHG emissions can be achieved by analyzing their own current operations, identifying significant GHG sources, and implementing changes in technology, procedures, behavior, operations, and the services provided. State and local governments can also encourage and/or incent GHG reductions by others in a variety of ways.

### Policy Design

The CC PWG recommends that state and local governments establish GHG reduction targets for their own GHG emissions. The establishment of broad-ranging goals for reducing governments' own GHG emissions will be helpful in both setting an example and building expectations. Actual reductions will typically be realized at the individual agency level, so disaggregating individual government's own GHG emissions to the agency or department level and requiring annual agency- or department-specific reports on GHG reduction progress can be an effective way to measure and manage each government's progress in reducing its GHG emissions. Government agencies or departments would first need to develop agency- or department-specific GHG emissions inventory data. This would become the baseline data for ongoing emission reduction activities and measurement, which would be summarized in annual reports by each agency or department. Agency and/or department reports would be aggregated into a summary report reflecting state GHG emissions. A multi-agency group should oversee the on-going climate efforts of the government's agencies or departments, review their performance, and provide direction, guidance, resources, shared approaches, and recognition to agencies or departments and their employees that are working to reduce the government's GHG emissions.

**Goals:** The State should reduce its emissions by at least an amount consistent with the statewide emission reduction goals established under CC-4 (Statewide GHG Reduction Goals and Targets).

**Timing:** The state's efforts to lead-by-example in reducing its own GHG emissions should start immediately. The first annual report by agencies will necessarily reflect initial agency-level inventories. The second annual report should reflect initial progress in reducing GHG emissions as agencies begin to plan and implement operational changes. Future annual reports should show further progress in reducing agency GHG reductions.

**Parties Involved:** Coverage should include all operations of all state agencies and all departments of local governments.

### Implementation Mechanisms

- Public education and outreach to state agencies and employees.
- Performance reviews and recognition of agency progress.

- Procurement of low-GHG products.

**Related Policies/Programs in Place**

TBD

**Types(s) of GHG Reductions**

Not applicable.

**Estimated GHG Savings and Costs per MTCO<sub>2</sub>e**

Not applicable.

**Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options, including those associated with the state's own GHG emissions.

**Additional Benefits and Costs**

TBD

**Feasibility Issues**

TBD

**Status of Group Approval**

Pending.

**Level of Group Support**

TBD.

**Barriers to Consensus**

TBD.

## CC-6. Comprehensive Local Government Climate Action Plans

### Policy Description

A number of local governments in Colorado have already taken the initiative to address climate change in their communities. Aspen, Boulder, Denver, Fort Collins, Telluride, and Frisco are just a few examples of local communities that are establishing greenhouse gas (GHG) reduction goals and developing plans to reduce GHG emissions. Additionally, several communities are partners of the Rocky Mountain Climate Organization (RMCO), and many have signed the Mayors Climate Protection Agreement. The CAP strongly encourages all local communities in Colorado to develop such plans. Additionally, the CAP sees a strong role for the state government, local government association (such as Colorado Counties, Colorado Municipal League, and regional Councils of Governments), RMCO, and other non-governmental organizations in promoting GHG reduction initiatives by local governments and in serving as a clearinghouse for local government initiatives.

The state government, local government associations, RMCO and others could help spread the successful actions and efforts of some local jurisdictions broadly to others through several means, such as workshops and conferences, a website clearinghouse, education and outreach to public and municipal officials, recognizing local government GHG emission reduction achievements, etc.

### Policy Design

The CC PWG recommends that Colorado promote adoption of community climate action plans by all local governments to set and achieve local GHG reductions and to help achieve state GHG reduction goals. The PWG further recommends that these locally-adopted plans be used to stimulate equivalent GHG reduction initiatives by the private sector and non-governmental entities in each community. These initiatives can be considered economic development opportunities in concert with policy option CC-9, as well as adaptation-oriented strategies, supporting policy option CC-10. The CC PWG recommends that local climate action plans include an assessment of opportunities for reducing GHG emissions by element at the community scale, specific goals or target values and a timeline for the emissions reductions, and adoption of local strategies to adapt to climate change. The types of community scale elements to be considered would include, but are not limited to:

- Urban planning processes;
- Land use management activities;
- Transportation management planning;
- Management of municipal power and water utilities; and
- Waste management

**Goals:** Adoption of community climate action plans by all local governments in Colorado.

**Timing:** TBD.

**Parties Involved:** Cities, towns, counties, water districts, metropolitan districts, fire protection districts, regional Councils of Governments (COGs), and other public jurisdictions.

### **Implementation Mechanisms**

A workshop organized and held by the state government, associations of local governments, and/or RMCO could help local governments initiate and strengthen local climate protection efforts. Development of a model plan by a consortium of state and local agencies / districts could help to facilitate implementation of this option as well as promote consistency and reduce costs to local agencies / districts. The state government should also provide technical assistance to local agencies / districts and help local agencies / districts secure funding (e.g., grants) to develop their climate action plans.

### **Related Policies/Programs in Place**

- Similar programs in Aspen, Boulder, Denver, Fort Collins, Telluride, and Frisco.

TBD

### **Types(s) of GHG Reductions**

TBD

### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options.

### **Additional Benefits and Costs**

TBD

### **Feasibility Issues**

TBD

### **Status of Group Approval**

Pending.

### **Level of Group Support**

TBD.

### **Barriers to Consensus**

TBD.

## CC-7. Public Education and Outreach

### Policy Description

Public education and outreach can provide significant greenhouse gas (GHG) emission reduction through direct individual action, as well as broad public support for other GHG emissions reduction programs, policies, or goals. 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 Colorado citizens. Such awareness is necessary to engage citizens in actions to reduce GHG emissions. Public education and outreach efforts should integrate with and build upon existing state and local outreach efforts involving climate change and related issues in Colorado. Ultimately, public education and outreach will be the foundation for the long-term success of all the mitigation actions proposed by the CAP as well as those which may evolve in the future.

### Policy Design

The CC PWG recommends that the State and local communities establish pro-active public education and outreach capabilities, using them to target education and outreach activities to at least the five specific audiences below. Ideas for specific public education and outreach activities are provided in the accompanying attachment.

- Policymakers (legislators, regulators, executive branch, agencies) – because implementation of climate actions hinges on policymakers’ approval.
  - For example, provide regular briefings to policymakers on climate change science, policy, and progress toward goals.
- Younger Generations – by integrating climate change into educational curricula, post-secondary degree programs, and professional licensing programs.
  - For example, encourage science centers, zoos and museums to include a climate science focus.
- Community Leaders & Community-Based Organizations (e.g., institutions, municipalities, service clubs, social & affinity groups, non-governmental organizations, etc.) – in order to recognize leadership; share success stories and role models; and expand climate involvement and participation within civic society.
  - For example, develop and provide concrete information on co-benefits to entities to use in boosting their climate efforts.
- General Public – to increase awareness and engage citizens in climate actions in their personal and professional lives.
  - For example, develop a state website providing climate change information and resources, including a speakers bureau.

- The CC PWG recommends that one or more organizations in Colorado (e.g., state agency and/or non-governmental organization) implement a statewide program to encourage and structure voluntary individual actions to reduce GHG emissions. Such a program might be called “Colorado Climate Keepers” and echo models in other states and local communities, such as the “10% Challenge” program in Burlington, VT. This program should also include an accountability process to measure the effectiveness of the program.
- Industrial and Economic Sectors – in order to recognize leadership; share success stories and role models; and expand climate involvement and participation within the business community.
  - For example, implement a state program of voluntary business actions like Fort Collins’ Climate Wise (See also RCI-10), or develop a state award program to recognize business leaders in GHG reduction.
- Particular Sectors – to increase awareness and engage sectors in mitigating GHG emissions (e.g., users of public lands, forest industry, farmers, ranchers, etc.).

**Goals:** Implementation of the programs cited above.

**Timing:** Public education and outreach efforts should commence as rapidly as possible.

**Parties Involved:** State government, local governments, RMCO, water districts, metropolitan districts, fire protection districts, regional Councils of Governments (COGs), and others.

#### **Implementation Mechanisms**

Coordinate statewide initiatives with emerging local initiatives to address climate change.

#### **Related Policies/Programs in Place**

TBD

#### **Types(s) of GHG Reductions**

Not applicable.

#### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

#### **Key Uncertainties**

Not applicable.

#### **Additional Benefits and Costs**

TBD

#### **Feasibility Issues**

TBD

#### **Status of Group Approval**

Pending.

**Level of Group Support**

TBD.

**Barriers to Consensus**

TBD.

## **CC-9. Establish a Pro-active Public-Private Partnership to Seek Investment Capital and Philanthropic Funding for Reducing GHG Emissions and Supporting Development of the New Energy Economy in Colorado**

### **Policy Description**

The intent of this policy option is to encourage and facilitate the involvement of funding and investment sources, business interests, and entrepreneurs in pursuing business opportunities associated with greenhouse gas (GHG) reductions and global warming solutions as quickly and as significantly as possible. The creation of this clearinghouse-like entity may make it possible to match technology developers and other climate solution entrepreneurs with necessary financing more effectively and expeditiously. In addition, this clearinghouse-like entity should also assist in matching funding sources with research and development efforts as well as to support successful scale-up and commercialization of new products and services. As a result, Colorado's ability to identify and secure early business opportunities associated with climate change may be enhanced, increasing its global competitive advantage and job creation within the state.

Potential funding sources include philanthropic organizations, high net worth individuals, or others interested in supporting innovative, environmentally effective market solutions. Recognizing that fortunes are likely to be made in the "new energy economy," for-profit investors, pension funds, mutual funds, and/or venture capitalists may be looking to fund similar business opportunities. Although technology entrepreneurs are often cited as offering potential global warming solutions, equally progressive solutions may lie in the fields of law, accounting, marketing, production, and even government relations and lobbying. The objective of this policy option is to leverage Colorado's specific talents for global warming solutions into securing the business opportunities and market advantages that well-supported "early bird" efforts are likely to reap in a carbon-constrained world. Further, some funding under this policy option could address – but not exclusively target – implementation of other policy options recommended by the CAP in this Climate Action Plan.

### **Policy Design**

The CC PWG recommends that the state (together with local governments as desired) establish a clearinghouse to seek investment capital and philanthropic funding for reducing GHG emissions and supporting development of the new energy economy in Colorado. This clearinghouse should be established with a small office and staff to execute its purposes and functions.

**Goals:** Establish the public-private partnership and clearinghouse described above.

**Timing:** As soon as possible

**Parties Involved:** State and local governments and agencies, philanthropic entities, entrepreneurs, venture capitalists and other investment entities, etc.

### **Implementation Mechanisms**

- Entrepreneurs and philanthropists should be challenged to fund the start-up of this partnership, and its operations going forward should include financial commitment from both public and private entities.
- The state should fund the partnership and clearinghouse. Alternately, the Governor or another appropriate state governmental official could seek local philanthropic funding to underwrite the first 2-4 years of its operation.
- Encourage the state legislature to create financial incentives (e.g., tax incentives) to achieve the goals of this option.

#### **Related Policies/Programs in Place**

The Governor's Energy Office has established a \$7 million fund to encourage clean energy development, energy efficiency projects, and other opportunities for reducing GHG emissions (<http://www.state.co.us/oemc/>).

#### **Types(s) of GHG Reductions**

TBD

#### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

#### **Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options.

#### **Additional Benefits and Costs**

TBD

#### **Feasibility Issues**

TBD

#### **Status of Group Approval**

Pending.

#### **Level of Group Support**

TBD.

#### **Barriers to Consensus**

TBD.

## CC-10. Vulnerability and Adaptation

### Policy Description

Even if Colorado plays a lead role in both reducing its GHG emissions and helping to bring about reductions elsewhere, it will still face changes in its climate and a multitude of impacts. Greenhouse gases (GHGs) have long atmospheric life-times, and Colorado will face additional warming and related changes from GHGs that have already been emitted, let alone from those that will be emitted in the future. The changes Colorado will face in the long term will be more manageable if it begins now to reduce emissions, but now is also the time to begin preparing to deal with the changes that are already underway and likely to become more dramatic. Undertaking these adaptation efforts is urgent and essential to developing an effective and comprehensive action plan that will ensure that Colorado remains such a special place to live.

### Policy Design

The CC PWG recommends that:

- The state government conduct a comprehensive assessment of Colorado's vulnerabilities to the effects of climate change.
- Without awaiting the results of the above vulnerability assessment, the state government take the lead, with appropriate involvement by local governments, other governmental entities, affected businesses, colleges and universities, nongovernmental organizations, and others, in launching efforts to develop statewide action plans to prepare for and deal with the most potentially serious categories of adverse climate-change impacts likely in Colorado. These could be either separate action plans focused just on particular categories of climate-change impacts, or parts of other planning efforts, either ongoing or newly launched, so long as the consideration of climate-change impacts is given appropriate attention. In some cases, local action plans undertaken by local governments would also be appropriate. Among the categories of climate-change impacts likely in Colorado for which statewide, and perhaps also local, action plans are needed are:
  - Effects on water quantity and water quality, which in turn are likely to affect every aspect of life in Colorado. (*See the separate recommendations elsewhere in this report on those issues.*)
  - Increases in heat-related deaths and illnesses, particularly during heat waves, which are predicted to become more frequent, more severe, and more long-lasting.
  - Increases in air pollution and its effects on mortality and health, in particular as ozone levels increase in response to higher temperatures.
  - Potential increases in diseases, such as West Nile disease borne by mosquitoes that can become more numerous and more widespread as a result of changes in climate.

- Increases in the length of wildfire seasons and of the frequency and severity of wildfires.
- Increases in severe weather, including major storms (potentially including tornados and other highly destructive storms), extreme precipitation events, and flooding.
- Effects on agriculture stemming from changes in water supplies and availability and the effects of increased temperatures on livestock and crops.
- A reduction of skiing and other snow-dependent outdoor recreation and tourism, along with the jobs, business income, and tax revenues derived from them.
- Increased warm-season congestion on transportation corridors to and in Colorado's mountains, and other manifestations of overcrowding from increased warm-season visitation and tourism in the mountains, as additional heat at lower elevations will lead more Coloradans and tourists to seek the relief of relatively cooler temperatures in the mountains.
- Changes in ecosystems, such the substantial loss of lodgepole pines and other trees now occurring across the mountains as a result of bark beetle infestations caused by, among other things, a reduction in extreme cold temperatures that have historically served as a natural check on beetle populations.
- Effects on opportunities for recreational fishing (as higher temperatures push streams beyond their ability to support cold-water fish populations) and hunting (particularly for waterfowl).

**Goals:** Not applicable.

**Timing:** The state should initiate efforts immediately to implement the recommendations in this option.

**Parties Involved:** Probably overseen largely by Colorado DPHE, but involving many parties.

#### **Implementation Mechanisms**

- Public education and outreach
- Potential recommendations for incentives
- Potential recommendations for codes and standards

#### **Related Policies/Programs in Place**

Fort Collins is one of four pilot cities in the United States that will be participating in ICLEI's Climate Resilient Communities pilot program to evaluate vulnerability to climate change and to develop a plan for "adapting" to the vulnerabilities identified.

#### **Types(s) of GHG Reductions**

Not applicable.

#### **Estimated GHG Savings and Costs per MTCO<sub>2e</sub>**

Not applicable.

### **Key Uncertainties**

Substantial uncertainty surrounds future growth rates in GHG emissions, particularly beyond 2020, as well as the timing and scope of implementation of CAP recommendations for specific policy options. Significant uncertainty also prevails regarding the nature, magnitude, timing, and frequency of the climate impacts that Colorado is likely to experience.

### **Additional Benefits and Costs**

TBD

### **Feasibility Issues**

TBD

### **Status of Group Approval**

Pending.

### **Level of Group Support**

TBD.

### **Barriers to Consensus**

TBD.