



*F*inal Report and Recommendations
of the
Governor's Commission
on Climate Change

Presented to
Governor James H. Douglas

October 2007

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**Report of the
Governor's Commission on Climate Change
Montpelier, Vermont
October 2007**

Overview

The climate change crisis may represent the most important and comprehensive global challenge of our lifetime. At the same time, however, it is a wake-up call and can serve as an opportunity to rethink and redesign our practices, technologies, businesses, and services in a manner that can simultaneously be viable, sustainable, and inspirational. Indeed, Vermont can make an enormous difference and serve as a model for the region, nation, and world. Vermont is well-positioned to be at the leading edge of identifying and designing solutions to a pressing and complex array of local and global challenges, while at the same time building a new “green economy” that will serve the best interests of our state and its citizens. Because of our commitment to innovation, entrepreneurship, and the value of Vermont’s natural resources and working landscape, the Governor’s Commission on Climate Change is convinced that Vermont can lead the way. However, we must devise mechanisms to deploy our passion for innovation and our collective intellectual resources to advance the common good. This report recommends those mechanisms.

The time for debate over the realities of global climate change is over. Global climate change is occurring, and every Vermonter will experience its impacts on the quality of life for which Vermont is justifiably famous. Today, our ability to “keep Vermont, Vermont” is at grave risk. Accordingly, we all – individual citizens, businesses, institutions and government alike – bear a responsibility to reduce our greenhouse gas contributions to our warming planet. The reduction of carbon dioxide and other greenhouse gases (GHGs), and the activities that cause their emission, will be the major challenge facing Vermonters in the years to come. If properly seized, however, climate change action can provide an unprecedented economic development opportunity for Vermont. Concerted collaboration among Vermont’s public, private, and academic sectors, could offer the state the opportunity to secure a significant competitive advantage in the emerging “green economy.” By identifying, developing, implementing, and exporting efficient energy technologies, innovations, and renewable energy opportunities, we will help preserve Vermont’s rural character and high quality of life while dramatically reducing the State’s GHG emissions.

Background and Process

Governor James H. Douglas set ambitious goals for Vermont when he established the Governor’s Commission on Climate Change (GCCC) by Executive Order 07-05 on December 5, 2005.¹ He directed the six-member Commission to develop an accurate

¹ Appendix 1 contains the Governor’s Executive Order.

picture of Vermont's past, present, and future GHG emissions and a comprehensive set of policy recommendations for reducing Vermont's GHG emissions from all sectors, consistent with the state's need for continued economic growth and energy security. The Governor's executive order specified a target of reducing Vermont's greenhouse gas GHG emissions by 25% from 1990 levels by 2012; 50% by 2028; and, if practical, 75% by 2050. The Governor's goals were subsequently affirmed and reinforced by Vermont's General Assembly in the passage of Act No. 168 (S.259) in 2006.

Following its first meeting, the GCCC determined that it would benefit from the input and involvement of a diverse array of Vermont stakeholders. A 31-member Plenary Group (PG) was established representing a broad range of interests, backgrounds and capabilities to provide their diverse expertise and perspectives to the GCCC's efforts. The PG was asked to identify, analyze, and recommend policy options for the GCCC's consideration in its report to the Governor. The Vermont Agency of Natural Resources provided contract, logistical, and staff support to the Plenary Group. The Commission decided to employ a consensus-building process developed by the non-profit Center for Climate Strategies (CCS) that had been utilized in other state initiatives, and CCS provided both evaluative facilitation and technical analysis to the Plenary Group in formulating its recommendations.

The combined GCCC and Plenary Group met seven times from September 2006 to July 2007. During this period, four sector-based technical work groups (TWGs) consisting of PG members and additional experts also met. The TWGs identified and developed potential policy options in the areas of Energy Supply and Demand (ESD); Transportation and Land Use (TLU); Agriculture, Forestry and Waste (AFW); and Cross-Cutting Issues (CC). The options brought forward by the TWGs were discussed, evaluated, revised as necessary, and approved by the Plenary Group as policy recommendations for consideration by the GCCC. Analysis conducted by the TWGs for each approved policy recommendation included (among other items and to the extent possible) quantification of expected GHG emission reductions and net present value of expected costs or savings. The GCCC also requested quantification of anticipated up-front outlays necessary for the initial years of implementation. The full Plenary Group report is attached as Appendix 2 and is incorporated by reference.

The Commission and its larger, advisory Plenary Group considered hundreds of policy options – some of them innovative, some of them obvious, and many of them already underway or on the drawing boards of Vermont's officials, businesses, and educators. Ultimately, 38 policy recommendations were forwarded by the Plenary Group to the GCCC for its consideration. To assist in reviewing the Plenary Group's recommendations, the Commission developed a matrix reflecting High, Medium, and Low rankings against a number of attributes, including GHG reduction benefits, potential for cultural change, upfront cost, long-term cost, challenges to implementation, and collateral benefits and/or damages. (This matrix, which was applied to each of the policy recommendations, is attached as Appendix 3.)

Recommendations

The Governor's and General Assembly's GHG emission reduction goals represent a challenge for Vermont; they reflect the most aggressive climate action targets of any U.S. state. While attainment of the state's ambitious goals requires the implementation of all of the 38 Plenary Group options, the Commission recognizes that several of them need more analysis, assessment and refinement by state agencies and other appropriate entities before implementation can occur. We recommend that this additional work begin immediately and have, we believe, provided a framework for that to happen. Through its deliberations, the Commission identified the following six overarching recommendations and we urge the Governor to focus the state's efforts on them first.

1. Building on Vermont's Energy Efficiency Leadership and Renewable Energy Potential

The Commission strongly urges the Governor and the Legislature to explore together ways to continue and expand the state's nationally recognized demand-side management (DSM) practices for electricity and natural gas. Vermont has had an unparalleled history of investment in DSM and energy efficiency through electric and gas utilities for more than a decade. As a result, today Vermont has the most aggressive efficiency program in the nation. These efforts have not only reduced air pollution, but paid economic dividends to Vermont businesses and residents. Integrating Efficiency Vermont into the new green economy web makes prudent sense.

The Commission also supports, through a combination of incentives and/or mandates, expanding the role of renewable energy in Vermont and in the regional power mix. If Vermont were to lead in the innovative development of renewable power for community use, the state could build a significant competitive advantage in the green economy.

In particular, we urge the Governor to:

- Cost-effectively enhance energy efficiency by developing mechanisms to extend Vermont's existing and highly effective DSM efforts to include additional fuels beyond electricity and natural gas, especially heating oil used in residential, commercial, and industrial establishments.
- Explore viable mechanisms and insure the necessary research to stimulate investment in strategically located renewable energy facilities, such as wind turbines, with a focus on the needs of local communities.

2. Keeping Our Farms, Farms and Our Forests, Forests

Central to curbing the state's greenhouse gas emissions is the conservation of Vermont's significant existing "Green Bank" – our working landscape, our abundant forests, our maintenance of open land. Indeed, Vermont's most precious and effective mechanism for countering climate change is our forested

landscape, which represents nearly 80% of the state's land area and provides us all with a rich array of collateral services, such as clean water, stable and fertile soils, and a vibrant recreation and tourism industry, that benefits both the culture and economy of our state. Our forests ecosystems, the durable wood products derived from them, and the working landscape afford a tremendous opportunity to sequester carbon from the atmosphere, which holds the promise of economic benefit, such as offsets under a potential future carbon cap-and-trade system, while simultaneously protecting the Earth's atmosphere and Vermont's rural quality of life. It is imperative that the state develop and follow prudent ways to sustain the health of our forests and protect open space and agricultural land, by strengthening local farm and forest economies and encouraging development of our town centers. Programs that promote the production, storage, processing, and distribution of locally-grown food and wood products can reduce transportation and manufacturing emissions as well as contribute to local economic sustainability.

The Commission urges the Governor to:

- Promote the establishment and support of creative and effective multi-layered marketing programs including a “virtual marketplace” for local food and forest products and markets.
- Protect working farms and forests by pursuing strategies to reduce the rate at which existing crop, pasture, and forest lands are converted to developed uses.

3. Reducing Emissions in a Renewed Transportation System Within and Between Vibrant Town Centers

Future development along the lines of Vermont's historic settlement pattern of compact town centers surrounded by open countryside will also provide multiple benefits. Not only would it be consistent with Vermont's traditional character, it would reduce travel demand and create a more transit-oriented pattern of growth. In the long run, this will help bend the upward curve of Vehicle Miles Traveled (VMT), which is the most significant source of greenhouse gas production in Vermont.

At the same time, Vermont must invest more in its transportation infrastructure, including highways, railroads and park-and-ride facilities, so that the development of public transportation can be accelerated. Vermont should also encourage the purchase of fuel-efficient, low-emission vehicles through financial incentive programs. In order to take these steps, Vermont should consider ways of enhancing transportation revenues through non-traditional means that will not be affected by VMT reductions. The Commission is not recommending a specific approach to funding but, rather, making it clear that greater investment will be necessary to counter the increasing contribution of single-occupant vehicles (SOV) to the problem of climate change.

In particular, we urge the Governor to:

- Evaluate a number of potential new revenue enhancing options that simultaneously serve as incentives for reduced travel or low emitting vehicles, such as “feebates” for low mileage vehicles, a percentage-based sales tax on gas in place of the existing per-gallon approach, and restructuring of the current distribution of transportation funds;
- Develop and begin implementing a long-term plan to efficiently and effectively expand and improve inter-city bus and rail service, including both passenger and freight transport and inter-modal connectivity, such as bicycle, pedestrian, shuttle services, etc.;
- Promote planning efforts that adopt and embrace the concept of town centers

4. Educating and Engaging Vermonters About Climate Change

The Commission hopes that the Governor, state government, the state’s institutions of higher learning, its businesses and, most importantly, its residents recognize the costs of not doing enough to address climate change. All parties must come to the table, and perhaps the most effective way to do so is to dedicate government resources – many of them already in place – to foster a vigorous, proactive, public/private partnership. Indeed, the Agency of Natural Resources is creating a “Center for Climate Change and Waste Reduction” (as part of an overall reorganization) to deploy state resources in concert with those of the state’s major intellectual and economic institutions. The Commission also believes strongly that we need to empower Vermonters to do everything that they can individually in pursuit of climate action. Accordingly, we have included in Appendix 4 a list of several actions that Vermonters can undertake today.

While engagement of all citizens in efforts to counter climate change is critical, the Commission recognizes that there is the potential for enormous, systemic, and long-term cultural, cross-generational change in our awareness and behavior through the efforts of our formalized K-12 public and private school systems. The Commission applauds the extraordinary work and dedication of Vermont’s school teachers, who help shape the minds, behaviors, and values of our children - the next generation of community and civic leaders and decision makers. We note also that much of the success in our statewide recycling efforts can be attributed to the positive behaviors shaped in our schools, which in turn were translated into improved behaviors in households. Indeed, our formal education system can play a substantial role in shaping a sustainable and desirable future for Vermont through the content and delivery of its educational programs.

In particular, we urge the Governor to:

- Insure the implementation of a new Center for Climate Change and Waste Reduction within the Agency of Natural Resources and, furthermore, to charge that Center to (a) serve as a visible and accessible clearinghouse of

information about measures to reduce greenhouse gas emissions; (b) insure that incentives are in place that promote good environmental behavior and that any disincentives are minimized; and (c) examine and understand the “unintended” environmental consequences of existing and proposed government policies.

- Work jointly with the Vermont Department of Education to insure that all future teachers licensed in Vermont possess a fundamental level of environmental literacy and stewardship and have the capacity to teach with and about nature. In addition to promoting good environmental stewardship among students and their families, the Commission believes the incorporation of ecological thinking in the teaching of math and science, in particular, will also enhance the scientific understanding and capacity of our citizenship, and our competitiveness in pursuing the “green economy.”

5. Leading by Example

In the course of its efforts, the Commission became acutely aware that existing separate and distinct “stovepipe” approaches to public policy issues are clearly inadequate for addressing an issue like climate change, which profoundly and comprehensively impacts all sectors, individuals, and interests. Accordingly, the GCCC believes that Vermont must comprehensively integrate its efforts to address climate change, just as climate change comprehensively threatens the state’s traditional character and its extraordinary quality of life.

State government – itself long characterized by “stovepiped” executive branch agencies – should set the standard in moving to a more integrated approach. Its leadership by example will encourage others to approach climate change in a similarly comprehensive and more integrated fashion.

In particular, we urge the Governor to insure Vermont state government leads by example by:

- Creating a climate change cabinet that will coordinate climate change efforts across all agencies and initiate the review and accountability process with respect to the further analysis and development of the 38 recommendations of the plenary group;
- Completing the transformation of the fleet of government vehicles into a model of fuel efficiency by purchasing hybrid vehicles or other highly efficient modes of transportation as appropriate to its needs and uses, and challenging other major institutions and enterprises in Vermont to follow the government lead.
- Developing an internal carbon offset program within state government specific to functions, such as air travel, which may not be possible to eliminate or dramatically alter by behavior changes, and using the

proceeds from such offsets for the purposes of supporting renewable energy or carbon sequestration initiatives in Vermont.

6. The Vermont Climate Collaborative: A Signature Partnership of Vermont's Government, Academic, and Private Sectors

While scientific understanding of atmospheric and climatic processes is substantial, the Commission recognizes that many aspects of the new and evolving "climate change science" are in their infancy. For example, our understanding of our energy future, the ever-evolving carbon economy, and mechanisms to thoughtfully manage our landscape to effectively sequester carbon are just beginning to be understood. As such, our outlook will be pessimistic unless we can ensure and promote new research and outreach efforts to advance and effectively implement the many good ideas put forward in this and the Plenary Group report. Bold and effective solutions will require strategic partnerships and the development and advancement of new ecologically based and economically viable technologies, businesses, and services. Indeed, we need to insure the best science is put into a context of the long-term welfare of humanity.

Central to seizing the opportunity before us is *a strategic partnership among the State of Vermont, including its agencies, departments, the General Assembly, and the Office of Governor; the University of Vermont, among the nation's leading centers of environmental education and research, and Vermont's other premier academic and research institutions; and the private business and non-governmental sectors*. Through this new, unprecedented collaborative model of integration, the Commission envisions the bold development and implementation of new approaches to building elements of a Vermont "Green Economy" that will support continued high quality of life for Vermonters and lead to a sustainable and desirable future. We believe this partnership should be jointly led by the Governor on behalf of the State, the President of The University of Vermont on behalf of higher education in Vermont, and leaders from the business and non-governmental private sectors.

We envision the Vermont Climate Collaborative as a strategic partnership to conduct and intensify capacity for essential research, innovation, and technology transfer in environmental and sustainable technologies that can spawn new, environmentally sound economic opportunities. The Commission views the partnership as the core element of a Vermont "brain trust," comprised of environmental scientists and policy makers from the academic, public, and private sectors, who would insure coordination of efforts and the development of cross-cutting initiatives to address climate change.

Specifically, the Commission believes the partnership should:

- Ensure that the most critical climate change research and outreach for Vermont is conducted, emphasizing pressing issues such as defining our energy future, developing a comprehensive biomass plan, understanding

our carbon footprint and the rapidly evolving carbon economy, and managing Vermont's critically important "Green Bank" to maximize benefits for our natural resources and our people

- Pursue the potential of the "green economy" as an opportunity to explore new economic models and paradigms and encourage innovation as well as creating new, job-creating enterprises devoted to environmental technologies and new markets.
- Ensure objective analysis of environmental issues, including environmental education, economic development, and environmental protection.
- Ensure that the collective resources of the State are coordinated and effectively deployed to address research and implementation of energy efficiency and conservation initiatives, including matching federal grants with public and private funds already committed to environmental initiatives.

Conclusion

The Governor's Commission on Climate Change believes that Vermonters must be proactive and innovative in order to safeguard our precious natural resources and protect our cherished way of life.

Much of our success in addressing climate change, meeting the Governor's and Legislature's greenhouse gas reduction targets, and positioning the state to benefit most from cleaner, greener economic opportunities rests on our ability to overcome our natural resistance to change and to greet the new economy in a way that redefines yet retains the historical relationship between Vermonters and their working landscape.

Vermonters have an exceptional opportunity during this time of global climate crisis. The state's communities – residential, business, non-profit, academic, regulatory and governmental – are small and well enough interconnected to make working together toward dramatically reducing the State's carbon footprint not only possible, but imminently achievable. Because of these attributes, Vermont can establish model approaches that will echo across the country for decades to come. To do so, however, we must exploit all areas of applied and direct research into climate action, creating a "Green Economy" and making Vermont a center of its activity. We need to harness the almost ceaseless potential of Vermont's residents to develop and implement more sustainable – and rewarding – practices and technologies, embracing a culture that encourages innovation in the way we heat our homes, travel, manufacture our products, do our work, process our waste, and otherwise live our lives.

Vermont is poised to make a genuine energy-related paradigm shift – both in sources and uses of energy – borne out of the necessity to confront the growing reality of global climate change. Making this shift may not be easy, especially in the short run, but it is

certainly not optional; global warming risks all that we as Vermonters hold dear and the costs of inaction – to our “Green Bank” – will be even greater. By taking pro-active steps now, Vermont can harness the challenge of climate change, turning its challenges into an engine of economic innovation, to the ultimate benefit of our economy, our landscape, and the well being of our citizens.

Appendices

Appendix 1: Executive Order #07-05

Vermont Governor's Commission on Climate Change – Executive Order No. 07-05 December 5, 2005

WHEREAS, the Conference of the New England Governors and Eastern Canadian Premiers recognizes that “scientific evidence of the destabilizing human influence on global climatic systems is continuing to build, creating a growing momentum for a response;” and

WHEREAS, it is imperative that governments work individually and collectively to address the economic, environmental and societal consequences of climate change; and

WHEREAS, Vermont’s goal is to reduce emissions by an amount consistent with the recommendations of the Conference of the New England Governors and Eastern Canadian Premiers Climate Change Action Plan; and

WHEREAS, the goals established by the Conference are to reduce region-wide greenhouse gas emissions from the 1990 baseline by twenty-five percent by 2012, fifty percent by 2028 and, if practicable using reasonable efforts, seventy-five percent by 2050; and

WHEREAS, the State of Vermont, recognizing that state government activities contribute to climate change, has been proactive in developing ways in which state government can reduce greenhouse gas emissions; and

WHEREAS, in 2003 a Climate Neutral Working Group was established by Executive Order to recommend ways by which state government agencies and departments could reduce greenhouse gas emissions from state government buildings and operations; and

WHEREAS, the State of Vermont has implemented many of the recommendations of the Climate Neutral Working Group, including replacing older state-owned automobiles with more fuel-efficient vehicles, including hybrid vehicles, encouraging state employees to use these fuel-efficient vehicles rather than their own vehicles, building more efficient state facilities, purchasing only energy- efficient devices and developing a State Agency Energy Plan to reduce state government’s energy use; and

WHEREAS, recognizing that emissions from cars and other vehicles are the largest source of greenhouse gas emissions in Vermont, the Agency of Natural Resources is implementing new emissions standards that will reduce Vermont’s greenhouse gas emissions; and

WHEREAS, several entities within state government, including the Department of Environmental Conservation, the Department of Public Service, and the Public Service Board are participating in developing the Regional Greenhouse Gas Initiative (RGGI), under which signatory states would act together to control emissions of carbon dioxide from electricity-generating power plants within those states; and

WHEREAS, it is important that the State of Vermont take the lessons learned from these efforts and develop and implement an effective statewide greenhouse gas emissions reduction program; and

WHEREAS, it is important for Vermonters to understand climate change and its economic, environmental and societal consequences, and be provided strategies to take personal responsibility for addressing the problem.

NOW THEREFORE, pursuant to the authority vested in me as Governor of the State of Vermont, I, James H. Douglas, do hereby create the Governor's Commission on Climate Change. The Commission shall consist of no more than six members appointed by the Governor. The Governor shall appoint a Chair. The Vermont Department of Environmental Conservation shall provide administrative and technical support to the Commission, and the Commission may call upon other state agencies or departments to assist as appropriate in implementing this Order and achieving its purposes.

The Commission shall be advisory to the Governor and shall have the following functions and duties:

1. To examine the real and potential effects of climate change on Vermont, including, but not limited to the impact of climate change on public health, natural resources and the economy; and
2. To produce an inventory of existing and planned actions that contribute to greenhouse gas emissions in Vermont; and
3. To educate the public about climate change and develop educational tools that will help Vermonters understand how they, as individuals, can play a role in reducing greenhouse gas emissions; and
4. To request input from representatives of the business, environmental, forestry, transportation, non-profit, higher education, municipal and other sectors regarding opportunities to reduce emissions and conserve energy; and
5. To develop recommendations to the Governor to reduce greenhouse gas emissions in Vermont, consistent with Vermont's need for continued economic growth and energy security. These recommendations, and all other pertinent information, shall be included in a Climate Change Action Plan that shall be submitted to the Governor no later than September 1, 2007. The Commission may also, as it sees fit, make interim recommendations to the Governor prior to issuing a final report.

This Executive Order shall take effect upon signing and shall expire upon the issuance of a final Climate Change Action Plan by the Commission.

Witness my name hereunto subscribed and the Great Seal of the State of Vermont hereunto affixed at Montpelier this 5th day of December, 2005.

James H. Douglas, Governor

By the Governor:

Neale F. Lunderville, Secretary of Civil and Military Affairs

Executive Order No. 07-05

Appendix 2: Plenary Group Recommendations & Appendices

Appendix 3: GCCC Deliberation Matrix



Governor's Commission on Climate Change
 Policy Option Deliberation Matrix
 October 21, 2007²

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
Energy Supply & Demand TWG						
ESD-1 (Evaluation & Continuation / Expansion of Existing DSM for Electricity & Natural Gas)	H	H	M	Savings	L	
ESD-2 (Evaluation & Expansion of DSM to Other Fuels)	M/H	M	M	M	M/H (Strong agreement on concept, but disagreement on how to fund & implement)	
ESD-3 (Building Efficiency Codes, Training, Tracking)	M	H	L	Savings	L	
ESD-4 (Evaluate Potential for Contracting Nuclear Power)	No additional GHG reductions, but maintains low GHG generation mix. Subject is controversial. Collateral damages include waste and safety issues.					

² **VH** = Very High, **H** = High, **M**= Medium, **L**=Low

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
ESD-5 (Support for Combined heat & Power)	M	M/H	H	Savings	M/H (Logistical hurdles, possible resistance from local utilities?)	(Broad environmental & economic benefits, with possible community benefits)
ESD-6 (Incentives &/or Mandate for Renewable Electricity) Scenario 1 Scenario 2	M/H	M	L/M	L/M	M/H	Non-combustion renewables provide concomitant reduction in other air pollutants. Sustainable use of biomass waste promotes 'Green Bank'
ESD-7 GHG Cap & Trade and/or GHG Tax	GHG cap & trade should be done on a regional, national, or even international level. Vermont is a participant in the Regional Greenhouse Gas Initiative (RGGI). Depending on the RGGI market development, Vermont may receive substantial funding that could be directed towards policy options that provide direct consumer benefits.					
ESD-8 (Incentives for Clean Distributed Technologies for Electricity or Heat)	L		H			

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
ESD-9 (Wind-Specific Support Measures) New Wind, Scenario 1 New Wind, Scenario 2	See ESD-6					
ESD-10 (Hydro-Specific Support Measures) Continued Large Hydro, Scenario 1 Continued Large Hydro, Scenario 2 New Hydro, Scenario 1 New Hydro, Scenario 2						
Agriculture, Forestry, & Waste Management TWG						
AFW-1 (Programs to Support Local Farming / Buy Local)	L (Low GHG benefit in a relative sense, but very important 'signature' piece for Vermont)	Very High (Signature piece for Vermont)	L (Also, cost not necessarily shouldered by State Government)	L	L to none	Supports the new "Green Economy." Few challenges beyond enhancing consumer awareness, and keeping in mind consumer 'willingness to pay' level. Arm individual citizen with ability to participate.

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
AFW-2 (Agricultural Nutrient Management Programs)	L (But many co-benefits)	M	M / H (Some Programs already in place with committed funding)	M	L	Benefits (lower emissions of N ₂ O & NO _x , less nutrient runoff to water bodies, reduced fertilizer use, cost savings to farmers, etc.)
AFW-3 (Manure Management Methods to Achieve GHG Benefits)	L (But many co-benefits)	M/H	H (But some existing funding)		Technology challenge to enhance cost-effectiveness for smaller farms	Benefits (enhances dairy industry viability & efficiency; some pollution reduction benefits)
AFW-4 (Protect Open Space / Agricultural Land)	M	H	L (Plenary Group analysis cost)	L (Plenary Group analysis)	Need to consider policy complements that promote	Benefits (maintains Vermont's culture & working

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
<p>AFW-7 (Forest Protection – Reduced Clearing & Conversion to Non-Forest Cover)</p>	<p>Very High</p>		<p>would be considered ‘High’, but it assumes purchase of easements, which is not the only way to achieve protection. Also, there are ongoing state forestry programs with existing funding)</p>	<p>cost would be considered ‘High’, but it assumes purchase of easements, which is not the only way to achieve protection)</p>	<p>farmland and forestland conservation as working landscape, without creating future unintended consequences</p>	<p>landscape or “Green Bank”)</p>
<p>AFW-5 (Forestry Programs to Enhance GHG Benefits **)</p>	<p>There is a high degree of scientific uncertainty whether a net carbon benefit can be achieved by a strategy overly focused on forest productivity, to the exclusion of adequate consideration of sequestration in extant forests.</p>					
<p>AFW-6 (Increased Forest Biomass Energy Use)</p>	<p>Risk and uncertainty would be reduced through a comprehensive modeling of alternate forest management scenarios in terms of net effects on carbon budgets. Without having completed such an analysis, this option carries significant risk of not achieving the desired objective.</p>					
<p>AFW-8 (Expanded Use of Durable Wood Products – especially from Vermont sources)</p>	<p>Specifically, substantial uncertainty exists related to the amount of land available in Vermont to boost productivity based on a) site specific limitations, b) the goals of existing and future land management plans, and c) the varied land management goals of landowners who are not enrolled in the Use Value Appraisal Program. There is more general scientific uncertainty in the current literature regarding the balance between enhanced forest sequestration for the long term and enhanced harvest, younger rotations, and storage in harvested wood products</p>					

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
AFW-9 (Advanced / Expanded Recycling & Composting)	M/H	H	Variable depending on programs	Variable depending on programs		Benefit – new job creation. Arm individual citizen with ability to participate.
AFW-10 (Programs to Reduce Waste Generation)	M/H	H	Variable depending on programs	Variable depending on programs		Benefit – new job creation. Arm individual citizen with ability to participate.
AFW-11 (Waste Water Treatment – Energy Efficiency Improvements)	L	H	L	L	Acceptance of sustainable technology and treatment systems is new but being accepted by public over time	Benefit – Ecological design of waste treatment systems supports new job creation. Cleaner water.

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
AFW-12 (In-State Liquid Biofuels Production) Ethanol Production Biodiesel Production	L	H	L	L	Many existing 'pieces' need to come together to create sustainability. Cellulosic ethanol technology awaits commercialization but has great future benefits.	Many potential benefits, like Ag job creation, retaining "Green Bank," but potential damages to be aware of include: competition with food markets, impacts upon conventional air pollutant emissions. Intensive cultivation of fuel crops may negate benefits.
Transportation & Land Use TWG						
TLU-1 (Compact & Transit-Oriented Development Bundle)	H GHG reduction data are 'soft-edged' but concept of TLU-1 very important climate strategy	H	L Provide assistance to regional & local planners	L (provides financial savings)	M Groundwork already in place, but need for political & social change	Benefits for Land Use & Tourism
TLU-2 (Alternatives to Single Occupancy Vehicles – SOVs)	M/H	H	L	L (provides financial savings)	L/M need incentives	Arm individual citizen with ability to participate.
TLU-7 (Commuter Choice / Parking Cash-out)						

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
TLU-3 (Vehicle Emissions Reductions Incentives)	M/H	M/H	L	L	-Challenges are financial / taxation & political -For new passenger vehicles, but need to consider pros and cons of including pickups	Possible funding for public transportation
TLU-4 (Pay-as-you-drive insurance)	Defer to Current Statutory Framework where it is allowable but not required					
TLU-5 (Alternative Fuels and Infrastructure – LCFS)	M/H	H	L	L	L (first hurdle is to create a market, and remove other potential barriers such as manufacturer warranty or UL listing issues)	(Degree of collateral benefits depends on usage ... i.e., use in direct-firing heating units preferable to transportation d/t air quality concerns)
TLU-8 (Plug-in Hybrids [part of TLU-5])						
TLU-6 (Regional Intermodal Transportation System-Freight & Passenger)	L with potential to be H	H	M although already existing funding	M	L/M	This option needs to be encouraged as it has key implications to the lifespan of the highway infrastructure

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
TLU-9 (Fuel Tax Funding Mechanism [TWG recommends examining this as part of a funding package after reductions policies are chosen])	This option should be considered as part of a suite of funding mechanisms for the other policy options. Appropriate structuring would create a mechanism to raise funds, not a mechanism to change behavior per se.					
Cross-Cutting Issues TWG						
CC-1 (GHG Inventories & Forecasts)	H	H	L	L	L	Crucial mechanisms to enable emissions quantification, tracking of progress toward goals, & policy modification over time
CC-2 (GHG Reporting)						
CC-3 (GHG Registry)						
CC-4 (Public Education & Outreach)	H	Very High	L	L	L	Benefits – potential to improve teaching and learning in science and technology. Arm individual citizen with ability to participate.
CC-5 (Adaptation)	Adaptation is a key piece of the climate change issue that has received few resources to date. One important step is to develop a partnership between Vermont’s academic institutions and state government to focus research and policies on ‘adaptive management’ of Vermont’s natural and built infrastructures.					
CC-6 (Options for Goals & Targets)						

Plenary Group Policy Option	GHG Benefits	Potential for Cultural Change	Upfront Cost	Long-Term Cost	Challenges to Implementation	Collateral Benefits and/or Damages
CC-7 (The State's Own GHG Emissions)	<p>Much work is already underway through the Climate Neutral Working Group and State Agency Energy Planning processes. The GCCC supports these efforts and challenges state government to do even more.</p>					

Appendix 4:

Vermonters Quick Tips for Carbon Dioxide Reduction

Buying green tags and carbon offsets is only part of the solution to global warming. We must also reduce the amount of activity that creates excessive carbon dioxide and other greenhouse gases (GHGs) such as methane. Here's a quick series of tips that all of us can put into action:

TRAVEL

- Reduce unnecessary short trips in your car. Plan out and combine your daily trips (work, errands, shopping, etc.) so you can maximize your efficiency with the fewest number of trips.
- Remove unnecessary weight from your vehicle; this will cut down fuel consumption and carbon dioxide emissions
- Improper tire inflation causes your vehicle to use more fuel and wear out your tires more quickly, so make sure all 4 tires are inflated properly
- Use public transportation wherever possible – if public transit is lacking in your area; express your concerns & ideas to local officials

HOME

- If you don't need it, switch it off at the wall or power strip. Appliances running on standby power (such as remote control TVs, computers, stereo equipment, etc.) consume a great deal of energy, unnecessarily even when not in active use.
- Take shorter showers and use the shower instead of the bath (you burn less fuel to heat the water, release fewer GHGs and save gallons and gallons of water too!)
- Turn down the heat a few degrees in winter and don't set the air-conditioning too cold in summer. Do you really need to get around in summer clothes during the winter? Even setting your thermostat up or down a degree or two can make a huge difference in electricity consumption.
- Recycle and reuse whatever you can. While recycling glass, paper, and cans etc. does require energy to reform new products, it's far less than having to mine, drill or harvest the raw resources.

WORK/OFFICE

- See if you can telecommute (work from home) a day a week. This will save you gas and money and your employers a bit of electricity at the office!
- Talk to your employer about carbon emission reduction strategies e.g. a 'lights off when not in use' policy. Approach it not only from the warm and fuzzy environmental viewpoint, but point out the financial benefits. You never know, you may just get a promotion or a salary raise!

GARDEN

- Don't burn leaf litter - mulch or compost it instead – burning vegetation emits carbon dioxide and other pollutants, which are harmful to your health, into the atmosphere.

FOOD

- Try to buy local, organically grown fruits and vegetables. Some green produce is shipped thousands of miles in refrigerated trucks before it hits your supermarket.
- Cut down a little on red meat – livestock release millions of tons of methane, which is 21 times more potent than carbon dioxide, into the air each year.

GENERAL PURCHASES

- Before buying anything, ask yourself – “Do I really need this?” Rampant consumerism plays a huge role in greenhouse gas emissions. Manufacturing products and packaging materials requires energy, which leads to emissions of carbon dioxide and toxic pollutants. When purchasing, keep “green” close to mind. This reduces GHG emissions and keeps more “green” in your wallet.

OFFSET

- We can't all buy 100% organically and locally produced items that have been created with renewable energy all the time, so try to purchase green tags to help offset carbon dioxide emissions. Rather than being an exercise in futility, offsets and green tags help provide investment capital for renewable energy programs.

SOME USEFUL WEBSITES WHERE YOU CAN LEARN MORE

<http://www.anr.state.vt.us/air/Planning/htm/ClimateChange.htm>

<http://yosemite.epa.gov/oar/globalwarming.nsf/content/actionsIndividual.html>

http://www.epa.gov/climatechange/emissions/ind_calculator.html

<http://www.epa.gov/climatechange/wycd/home.html>

<http://www.ctclimatechange.com/WhatCanIDo.html>