
A Comprehensive Climate Approach for Washington

(Working Title)

Draft Recommendations of the
Washington Climate Advisory Team

PRELIMINARY DRAFT FOR PUBLIC REVIEW

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I. Executive Summary

To be developed (following public comment)

II. The Compelling Challenge from Global Warming

This is a watershed moment for Washington State. The convergence of scientific analysis and prediction regarding the reality, pace and causes of global warming coupled with growing public understanding of the current impacts and future threats is creating a powerful mandate for deliberate intervention to reduce humanity's critical role in causing climate change. This clarion call for significant, meaningful action to drastically reduce harmful emissions of greenhouse gases (GHGs) in order to prevent global warming's most pronounced destructive impacts has been heard by Washington's Climate Advisory Team (CAT).

Accomplishing this daunting challenge will be both breathtaking in its scope and exciting in the opportunities it presents for the citizens of Washington. A clear sense of the path forward to guide our efforts, and unwavering determination and a commitment to succeed are each essential if we are to prevail. This interim report by the CAT presents a comprehensive directional approach for Washington to reduce the emissions causing a warming climate now, in order to build a healthier, more prosperous future. This is the framework for harnessing our collective determination to precede both urgently, and deliberately, in meeting this challenge.

Stabilizing the climate as quickly as possible with as little residual temperature rise as possible is one of the most critical, if not the defining, issues of the 21st century. Even with immediate action now, the task will take much of this century to complete. Fluctuations in the temperature of the atmosphere, greatly exacerbated by human activity, have increased the Earth's average air temperature by 1.33 (+/- 0.32) °F during the last 100 years.¹ Scientific information, traditional knowledge of native people and ad hoc observations throughout the populace all confirm the resulting dramatic changes in weather, climatic, coastal and terrestrial systems that this warming has wrought, often with significant disruptive or destructive effect, both here in Washington and throughout the world.

Unchecked global warming represents incalculable risks. We are largely responsible for this warming, and hence can reduce these threats by changing our previous choices and behaviors that have contributed to this warming. We must continue to change because the impacts, and the costs to adapt to those impacts, grow with each year of inaction. We must thoughtfully and deliberately persevere until we succeed because the alternative is a continuing escalation of economic and natural dislocation, and irreparable harm with untold human tragedy as our legacy.

We also must prevail because in doing so, we benefit from an enormous and perhaps unprecedented opportunity to be on the forefront of transforming our economy and our lifestyles. As we answer this clarion call and tackle global warming successfully through responsible, reasonable and practical actions, we can seize the economic benefits that will accompany the innovation, investment and job creation that this remarkable endeavor will require and create.

¹ Intergovernmental Panel on Climate Change: Fourth Assessment Report. Working Group 1. *Climate Change 2007: The Physical Science Basis*. Available at: <http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>

Washington's Climate Advisory Team

Governor Gregoire declared Washington's enduring commitment to address climate change on February 7, 2007, by signing Executive Order No. 07-02 and directed the Washington Department of Ecology (Ecology) and Department of Community, Trade and Economic Development (CTED) to lead the Washington Climate Challenge.² The Directors of Ecology and CTED formed the CAT to advise the Directors on the full range of policies and strategies that should be considered in order to achieve the goals specified in the Executive Order to reduce emissions, create clean energy jobs, and reduce expenditures on imported fuels. Business, academic, tribal, government, religious and environmental leaders were convened to form the CAT in March 2007.³

Do What Is Possible; Change What Is Possible to Do

In formulating a sustainable and effective response to the challenge of global warming, the CAT is advocating for a new way of thinking and acting. With other 'pollution' challenges, one party or another has often been seen as the 'source' of the pollution. With this challenge, everyone in society will need to contribute to reducing the currently ubiquitous release of GHG emissions into the environment. Leadership that ensures substantive and balanced contributions by all sectors of society in a thoughtful way will be crucial, and persistent action by all sectors that produces sufficient results now and over time, will be the ultimate measure of success.

Likewise, creating the Clean Economy that will inevitably result from reducing GHG emissions is a challenge, but can also be seen as an extraordinary opportunity. In response to Governor Gregoire's imperative to both reduce emissions and create economic opportunity, the CAT has developed a Comprehensive Climate Approach for Washington that recommends the framework needed to transition as efficiently and effectively as possible to the Clean Economy. The recommendations developed by the CAT describe responsibilities and identify opportunities that are broadly shared among individuals, businesses and institutions.

The CAT has focused practically on what is possible to do now, and has outlined what will help change what is possible to do. The very good news is that Washington has already begun to meet the challenge and seize the opportunity in addressing climate change and creating economic benefits. In Executive Order 07-02, Governor Gregoire also declared the state's commitment to implement the significant policy actions already taken in 2005 and 2006 to reduce GHGs. In its deliberations, the CAT has built upon what Washington has already accomplished, and has done so in a comprehensive and integrated fashion in order to provide direction on how best to achieve Washington's environmental and economic goals:

² The goals of Executive Order 07-02 were legislated during the 2007 Legislative session with the passage of Substitute Senate Bill 6001 (SSB 6001). On May 3, 2007, Governor Gregoire signed this landmark legislation which established in statute the statewide GHG emissions reduction goals and imposed an emissions performance standard on baseload electric generation. See Appendix A for Executive Order 07-02 and Appendix B for SB 6001.

³ See Appendix C for the CAT charter and the CAT website for additional information:
www.ecy.wa.gov/climatechange/cat_overview.htm

- **Greenhouse gas emission reduction goals:** By 2020, Washington will reduce GHG emissions to 1990 levels. By 2035, Washington will reduce emissions 25% below 1990 levels. By 2050, GHG emissions in Washington will be reduced 50% below 1990 levels.
- **Job creation goal:** By 2020, increase the number of clean energy sector jobs to 25,000, a three-fold increase from the 8,400 jobs in 2004.
- **Energy independence goal:** By 2020, reduce expenditures by 20% on fuel imported into the state

Achieving these goals will involve a transformation that the CAT believes should be accomplished in the quickest, most innovative, least disruptive and most economically advantageous way possible. In addition, this transformation should be carried out in the most equitable way possible, preventing artificial financial windfalls for some and minimizing or reducing undue burden for others. This transformation should also be keenly aware of the profound impacts of global warming on Washington's tribes, both their culture and their economy. Native people are often the first to experience disruptions to natural systems due to direct impacts on their subsistence economies and utilization of natural resources. The strategies to reduce emissions should incorporate the knowledge and contributions that tribes offer in order to ensure that success occurs 'on the ground'.

Section III of this report provides a brief review of Washington's current and projected emissions profile. Section IV provides a broad overview of the Comprehensive Climate Approach. Section V contains the CAT's specific recommendations and strategies. Section VI discusses fundamental principles associated with this Approach and the next steps key to continuing to refine how we can successfully implement it.

III. The Context for Action: The Need for Both Adaptation and Mitigation, Washington's GHG Emissions Inventory, and the Role of Natural Systems

“If there’s no action before 2012, that’s too late. What we do in the next **two to three years** will determine our future. This is the defining moment.” Rajendra Pachauri, head of the IPCC and 2007 Nobel Peace Prize Laureate, issued this call to action upon the release of the United Nations Intergovernmental Panel on Climate Change (IPCC) fourth and final report on November 17, 2007.⁴ The IPCC is the scientific body charged by the U.N. with providing objective information about climate change. The fourth IPCC report combines scientific data from three previous IPCC reports, and their comprehensive synthesis creates a striking sense of urgency.⁵

Conclusions from IPCC scientists include:

- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.
- Global GHG⁶ emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004 alone.
- Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations.
- Anthropogenic warming could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change.

Climate Change and Global Warming

Climate change is the variation in regional or global temperature and weather patterns. Changes in the modern climate include *global warming*, an increase in the average temperatures of the Earth’s near-surface air and oceans in recent decades, and its projected continuation.

The greenhouse effect is a naturally occurring process in the Earth’s atmosphere that helps retain solar heat. Some of the infrared radiation passing through the atmosphere is absorbed and re-emitted by certain gas molecules (most notably carbon dioxide, CO₂), warming the earth’s surface and the lower atmosphere. Increases in these greenhouse gases (GHGs) increase the amount of heat trapped by the atmosphere and cause overall warming of the planet.

The use of *climate change* in this document is in reference to the various impacts from *global warming*, and both terms are used interchangeably in this report.

⁴ Rosenthal, Elizabeth. "U.N. Report Describes Risks of Inaction on Climate Change." NY Times. 17 November 2007. Available online at: www.nytimes.com/2007/11/17/science/earth/17cnd-climate.html?pagewanted=print

⁵ Intergovernmental Panel on Climate Change: Fourth Assessment Report. Climate Change 2007: Summary for Policymakers. Available at: http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

⁶ GHGs cover the six types of gases included in the U.S. Greenhouse Gas Inventory: Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur hexafluoride (SF₆). Emissions of these GHGs are presented using a common metric, (CO₂e), which indicates the relative contribution of each gas to global average radiative forcing on a Global Warming Potential (GWP) weighted basis.

Rising global temperatures, changes in precipitation patterns and sea level rise increase the risk of flooding, extreme weather events, food and water shortages, species extinction, and health impacts. Washington is particularly vulnerable to climate change impacts because of our dependence on snowpack for much of our water supply and electricity, and anticipated sea level rise. Observed changes in Washington State over the 20th century include warming of 1.5 degrees F (about a half-degree higher than the global average); an approximately 30% overall decline in the lower Cascades spring snowpack (from 1950-1997)⁷; 10 – 30 days earlier for peak spring river runoff, and up to a 34% decrease in summer streamflows in sensitive river basins.⁸

Any significant global warming will profoundly disrupt natural and human systems, and has both environmental and economic impacts. Some of the anticipated impacts from changes to the climate of Washington State include milder winters and hotter summers; increased occurrence and severity of forest fires; reduced snowpack; receding glaciers; hydropower loss; declines in summer water supplies and stress on irrigated agriculture; changes in growing seasons; increases in forest and crop pests; increased occurrence and severity of extreme weather events, flooding and droughts; coastal flooding and erosion; sea level rise; loss of wetlands and estuaries; declines in native plant and animal populations, including extinctions due to habitat loss or inability to adapt to ecological changes; increased threats to the built environment like landslides; more human health problems such as heat-related illnesses and respiratory problems from increasing smog in urban areas due to higher summer temperatures; and loss of recreational opportunities.⁹

Mitigation and Adaptation

Mitigation in the context of global warming refers to actions taken to reduce the extent of climate change. Mitigation includes specific actions to directly or indirectly reduce GHG emissions, and retention of GHGs through storage or sequestration activities. The charge to the CAT is to develop mitigation policies and strategies.

Adaptation refers to action taken to minimize the effects of global warming. As part of the Washington Climate Challenge, Ecology and CTED formed Preparation and Adaptation Working Groups (PAWGs) to examine the impacts of climate change on Washington State and recommends specific steps and additional research needs as Washington prepares for the impact of global warming on human health, agriculture, coastal and infrastructure, forestry, and water resources and quality. Scientific conclusions about the impacts from global warming and recommendations for how Washington can prepare and adapt to these changes are discussed further in the report from the PAWGs.

⁷ Figure referenced from Mote et al. 2005. Research by the Climate Impacts Group at the University of Washington shows that spring snowpack, also referred to as snow water equivalent (SWE), has declined since monitoring became widespread in the 1940's. Many "individual" monitoring sites in the Cascades show 30-60% losses. SWE is affected by both temperature and precipitation, each of which shows large year-to-year and decadal variations associated with natural variability. Relative losses are greater in lower and mid-elevations where mid-winter temperatures are warmer; higher elevation sites where average mid-winter temperatures are still well below freezing don't show declines in SWE. www.climate.washington.edu/snowpackdiscussion.html

⁸ Climate Impacts Group, University of Washington. <http://cses.washington.edu/cig/>

⁹ *Ibid.*

Both Adaptation and Mitigation Are Required

Some inevitable climate change is already a reality. Even if all climate change emissions were immediately halted, effects from the impacts of previously emitted gases are already occurring and are projected to continue into the near future from the elevated concentrations of GHG emissions in the atmosphere. Although charged with examining opportunities to mitigate GHGs, the CAT recognizes the need for adaptation to the effects of global warming. However, adaptation alone will not be sufficient. In order to limit the impacts of further climate change, reduction or storage of current and projected GHG emissions is also an urgent necessity, and effective sustainable action to accomplish this is required.

While both mitigation and adaptation will entail significant investment and expenditures, the longer action is delayed, the greater the impacts and costs to society will rise. A 2006 economic study, sponsored by the Washington Departments of Ecology and CTED, documented impacts to Washington's economy from climate change already occurring, and warned that without focused efforts to reduce GHG emissions and prepare for impacts, the negative economic effects are likely to grow.¹⁰ By most estimates, the costs of inaction that leaves global warming unchecked would likely dwarf the costs of action to reduce it as much and as soon as possible.¹¹

Washington's GHG Emission's Inventory

To inform design of GHG mitigation strategies and future analysis of trends and progress being made, it is important to understand the sources and sinks of GHG emissions in Washington State.¹² Table 1 provides a summary of historical and projected GHG emissions for Washington from 1990 through 2020. Activities in Washington accounted for about 95 million metric tons (MMt) of *gross*¹³ carbon dioxide equivalent¹⁴ (CO₂e) emissions in 2005, or about

Business-As-Usual

The term *Business-as-usual* is used here to describe a set of assumptions about the usual state of activities or other factors contributing to emissions (e.g. existing control programs and economic growth). A "reference case" is developed to describe anticipated future states when the current, or "base year" is projected to one or more future years under business-as-usual conditions. This reference case provides a baseline against which to set future targets, and measure progress.

¹⁰ Doppelt et al, 2006. Impacts of Climate Change on Washington's Economy: A Preliminary Assessment of Risks and Opportunities. Washington Economic Steering Committee and the Climate Leadership Initiative Institute for a Sustainable Environment at the University of Oregon. November 2006. Available at: www.ecy.wa.gov/pubs/0701010.pdf

¹¹ Stern, 2006; Doppelt et al, 2006

¹² This section references the Washington State Greenhouse Gas Inventory and Reference Case Projections, 1990-2020 (December 2007). For the full report, see Appendix D.

¹³ Gross emissions estimates exclude carbon dioxide removed or sequestered from the atmosphere by as the result of land use, land use change, and forestry activities.

¹⁴ This analysis includes the six gases included in the U.S. Greenhouse Gas Inventory: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Emissions of these GHGs are presented using a common metric, CO₂ equivalence (CO₂e), which indicates the relative contribution of each gas to global average radiative forcing on a Global Warming Potential (GWP) weighted basis. In order to be consistent with the US EPA National GHG inventory, the GWP values in this report are from the Second Assessment Report (SAR) of the Intergovernmental Panel on Climate Change (IPCC).

1% of the total U.S. gross GHG emissions.¹⁵ Washington ranks 26th among the fifty states in terms of CO_{2e} emissions.

Table 1. Washington Historical and Reference Case GHG Emissions, by Sector^a

(Million Metric Tons CO _{2e})	1990	2000	2005	2010	2020
Electricity, Net Consumption-based	16.9	23.3	18.9	20.2	24.9
Coal	16.8	17.4	15.2	15.9	18.4
Natural Gas	0.1	5.3	3.6	4.2	6.3
Petroleum	0.0	0.6	0.0	0.1	0.2
Biomass and Waste (CH ₄ and N ₂ O)	0.0	0.0	0.0	0.0	0.0
Residential/Commercial/Industrial (RCI)	18.6	20.3	19.4	21.3	24.3
Coal	0.6	0.3	0.2	0.3	0.3
Natural Gas	8.6	11.4	10.3	11.0	12.7
Oil	9.1	8.4	8.5	9.7	11.0
Wood (CH ₄ and N ₂ O)	0.2	0.2	0.3	0.4	0.4
Transportation	37.5	45.9	44.5	48.5	56.9
Onroad Gasoline	20.4	24.5	24.8	26.2	29.1
Onroad Diesel	4.1	7.6	7.5	8.8	12.0
Marine Vessels	2.6	2.9	3.0	3.3	4.1
Jet Fuel and Aviation Gasoline	9.1	10.0	7.8	8.1	8.5
Rail	0.8	0.3	0.8	0.8	0.8
Natural Gas, LPG, other	0.6	0.6	0.7	1.3	2.5
Fossil Fuel Industry	0.5	0.7	0.9	1.0	1.1
Natural Gas Industry (CH ₄)	0.4	0.7	0.9	0.9	1.0
Coal Mining (CH ₄)	0.0	0.0	0.0	0.0	0.0
Industrial Processes	7.0	6.6	3.3	4.2	6.2
Cement Manufacture (CO ₂)	0.2	0.5	0.5	0.5	0.5
Aluminum Production (CO ₂ , PFC)	5.9	3.9	0.4	0.4	0.3
Limestone and Dolomite Use (CO ₂)	0.0	0.0	0.0	0.0	0.0
Soda Ash (CO ₂)	0.1	0.1	0.1	0.1	0.1
ODS Substitutes (HFC, PFC, and SF ₆)	0.0	1.6	2.1	3.0	5.1
Semiconductor Manufacturing (HFC, PFC, and SF ₆)	0.0	0.1	0.0	0.0	0.0
Electric Power T & D (SF ₆)	0.8	0.4	0.3	0.2	0.1
Waste Management	1.5	2.2	2.4	2.8	3.6
Solid Waste Management	1.0	1.5	1.8	2.0	2.7
Wastewater Management	0.5	0.6	0.7	0.8	0.9
Agriculture	6.4	6.4	5.4	5.1	4.8
Enteric Fermentation	2.0	1.8	1.6	1.5	1.3
Manure Management	0.7	0.9	0.9	1.0	1.2
Agricultural Soils	3.7	3.8	2.8	2.6	2.2
Total Gross Emissions	88.4	105.4	94.8	103.0	121.9
<i>Increase relative to 1990</i>		19%	7%	17%	38%
Forestry and Land Use	-28.6	-28.6	-28.6	-28.6	-28.6
Agricultural Soils	-1.4	-1.4	-1.4	-1.4	-1.4
Net Emissions (including sinks*)	58.4	75.4	64.8	73.0	91.9

¹⁵ Gross U.S. emissions in 2005 were 7,260 MMtCO_{2e} (U.S. EPA, *U.S. Inventory of Greenhouse Gas Emissions and Sinks 1990-2005*).

As illustrated in Figure 1, Washington’s historical GHG emissions rose fairly continuously throughout the 1990s until dropping significantly after the year 2000. This drop is largely attributable the response of industries and utilities to significant energy price swings and limited availability of hydroelectricity during the 2000-2001 period, and in particular, the decline of aluminum production in the state (which requires significant electricity use and produces industrial process emissions). Since 2003, GHG emissions have resumed their increase, and are projected, under a ‘business as usual’ scenario, to climb to 122 MMtCO₂e per year by 2020, about 38% above 1990 levels.

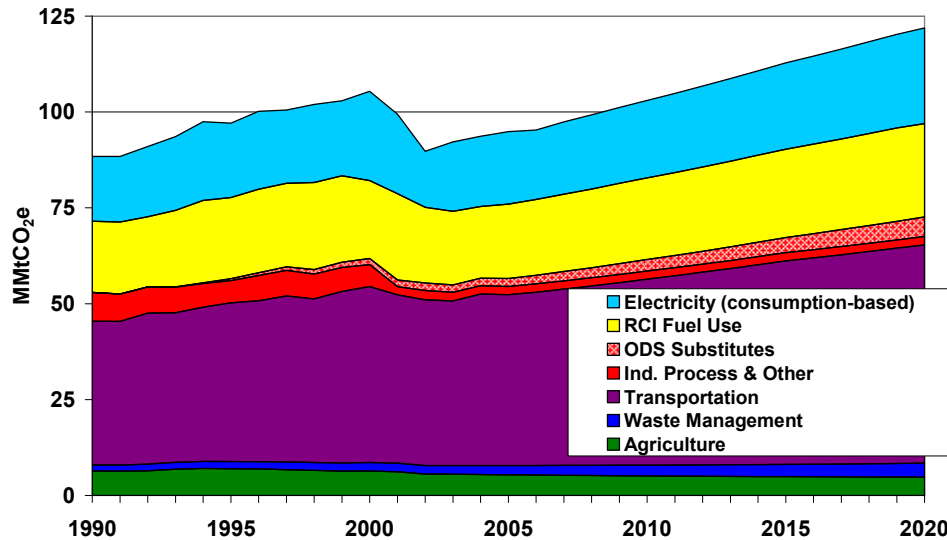


Figure 1: Washington Gross GHG Emissions by Sector, 1990-2020: Historical and Projected

The largest source of Washington’s GHG emissions is transportation, accounting for nearly half of total State gross GHG emissions in 2005. The next largest contributors to total gross GHG emissions are fossil fuel combustion in the residential, commercial, and industrial (RCI) sectors at 20%, and in the electricity generation facilities that deliver power to these sectors, also 20%. Agricultural activities such as manure management, fertilizer use, and livestock (enteric fermentation) result in methane and nitrous oxide emissions that account for 6% of state GHG emissions. Solid waste and wastewater management also result in methane and nitrous oxide emissions, which are less than 3% of Washington’s current emissions. Finally, industrial process emissions includes emissions of high global warming impact gases, such as PFCs from aluminum production (which have decreased by over 5 MMtCO₂e since 1990) and the use of hydrofluorocarbons (HFCs) as substitutes for ozone-depleting substances¹⁶ of GHG emissions from Washington State sources, as well as CO₂ emitted by cement and lime manufacture.

These shares differ significantly from the US as whole, as shown in Figure 2 below. While transportation makes up a larger fraction of Washington’s emissions, on a per capita basis, Washington consumes about the same amount of gasoline per capita as the US average. While

¹⁶ Chlorofluorocarbons and hydrochlorofluorocarbons are also potent greenhouse gases; however they are not included in GHG estimates because of concerns related to implementation of the Montreal Protocol. See final Appendix.

on a per capita basis transportation emissions are similar, emissions from electricity, RCI fuel use, and industrial processes are significantly lower than the U.S. average. This discrepancy, which explains much of the difference in the pie charts shown in Figure 2, is attributable to the state's abundant hydroelectric resources, and the limited presence of large, emissions-intensive industrial sources.

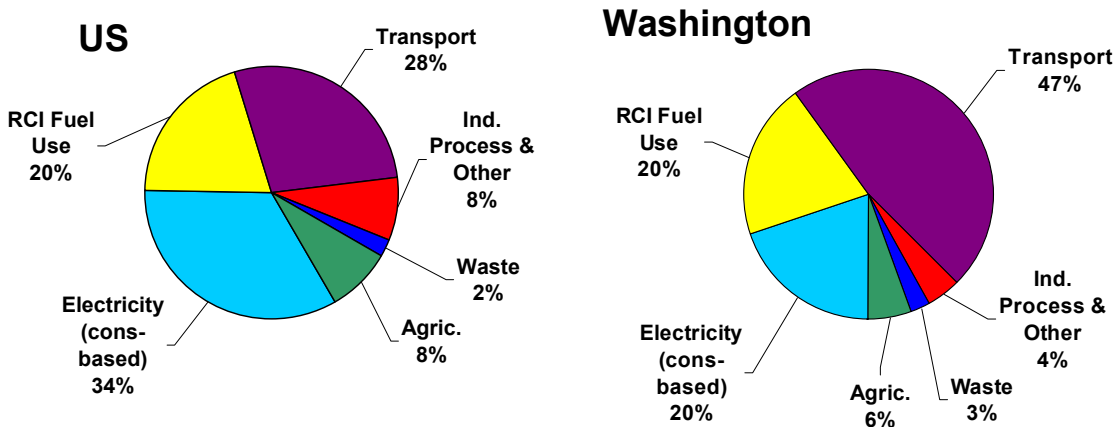


Figure 2: Gross GHG Emissions by Sector, 2005, Washington and US

The other key component of Washington's profile is the carbon stored in forest and agricultural lands. As shown at the bottom of table 1, these lands are currently estimated to sequester about 30 MMtCO_{2e}, based on estimates from the US Forest Service.

As shown in Figure 3, emissions associated with transportation are also projected to be the largest contributor to future emissions growth from 2005 to 2020. The figure shows that transportation growth could add just over 12 MMtCO_{2e} to Washington's emissions by 2020, under business as usual. The residential, commercial, and industrial sector could add another 6 MMt CO_{2e} over the same time period, while emissions from electricity produced to meet the state's needs could add another 5 MMtCO_{2e}

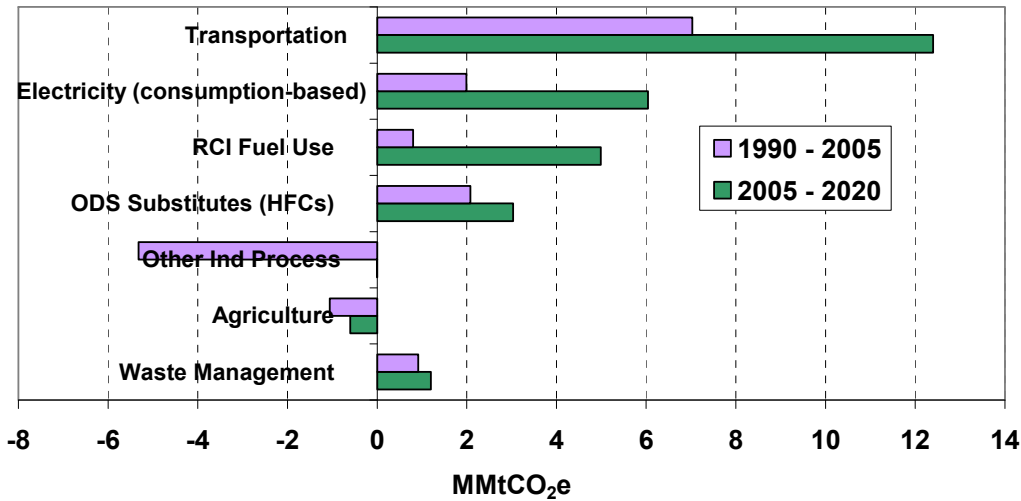


Figure 3: Sector Contributions to Emissions Growth in Washington

Function and Resiliency of Natural Systems with Regards to Global Warming

A key underlying assumption used to assess the sufficiency of actions taken to mitigate and adapt to climate change is the ongoing function and resiliency of natural systems. Washington's natural systems, however, have been degraded by past practices and will continue to be significantly disrupted by global warming. A healthy terrestrial system has significant capacity to store carbon, but in effect, that natural 'carbon bank' is being heavily 'overdrawn' due to other human activities. While most assessments of climate change impacts and solutions focus on the GHG contributions from human activities related directly to energy use, human activities that have impacted and altered the natural environment also have implications for both climate change and the effectiveness of mitigation efforts. As the ecological structure is altered, the function and natural capacity to store carbon and provide other ecosystem benefits that can reduce the severity of impacts from climate change (e.g. wetland capacity to minimize flooding) is degraded.

The CAT believes that the preservation, use and restoration of natural systems to reduce emissions and store carbon are significant. In addition to the behavioral and technical changes proposed to address climate change, it is also important to consider restoration activities to natural systems as part of a holistic and effective climate change response. Investments in ecosystem and natural resource rehabilitation and recovery will pay dividends in enhancing our mitigation efforts. Washington's natural carbon storage capacity and potential should be evaluated, and a baseline developed for potential credit of restoration activities and to measure efficacy of environmental improvements.

IV. The Climate Challenge for Washington Requires a Comprehensive Approach by Washington

Taken as a whole, the recommendations from the CAT lay out a comprehensive approach for Washington to rise to the real and urgent threat of global warming, and to seize the opportunity to build a healthier and more prosperous future. The CAT has identified a directional, encompassing road map that leads the State towards achievement of its emissions, fuel import reduction, and clean energy job goals. By following this road map, and implementing practical solutions that enable significant reduction, sequestration and removal of GHG emissions, Washington can develop a more robust economy, enhance rural prosperity, provide good jobs, improve our position in the global economy, and build healthier, more sustainable communities.

Full Range of Policies and Strategies Needed to Jump-start the Clean Economy and Reduce GHG Emissions Quickly, Effectively and Efficiently

In advancing these critical policy recommendations, the CAT is building on a strong base of policies already adopted by the State of Washington that reduce or remove GHG emissions. While Washington has made significant headway in addressing climate change through these recent policies¹⁷, additional actions are needed to achieve the 2020 GHG emissions reduction goal for Washington State and put Washington on a low-carbon emissions path to get sufficient long-term GHG emission reductions. The CAT has identified strategies that, when implemented, enable the State to meet these goals, as discussed further below.

As the CAT deliberated on how best to meet the near and longer-term goals and achieve a lower carbon future for Washington, the need for a foundational and systematic approach became clear. A results-oriented framework can bind

The Future Clean, Low-Carbon Economy

The terms *Clean Economy* and *Low-Carbon Economy* are used interchangeably in this report to describe activities related to the production and distribution of goods and services in a way that promotes environmental protection, economic prosperity, high quality jobs, social equity, and future quality of life, while emitting far less carbon and other greenhouse gases to the atmosphere.

The characterization of the clean energy sector for purposes of calculating the jobs goal defines the clean energy sector as a narrow subset of the Clean, Low-Carbon Economy. This sector consists of ten sub-industries: renewables, fuel cells, PV/solar, geothermal, small-scale hydro, wind, biomass, efficiency, smart, and unidentified industry categories.

¹⁷ The recent decision on December 19, 2007 by EPA to deny California's request for a waiver from the Clean Air Act so that it could implement tailpipe emissions standards for GHGs illustrates that reductions in GHG emissions can not be counted on until they actually occur. Washington State has also adopted the California standards, and the potential reductions from their implementation in Washington has been factored into the emission reductions and net cost/benefits of the 'recent actions' referred to in this draft report. The US Congress has passed and the President has signed, also on December 19, 2007, federal legislation that increases the Corporate Average Fuel Efficiency (CAFE) standards as well. The Governor has announced that the State will be suing EPA over its decision. This draft report has not been adjusted nor modified to reflect what either the delay or denial of the State's ability to implement the California standards or the increase of the CAFE standards might mean for either emission reductions or cost benefits, due to lack of time.

together diverse and disparate actions and provide certainty, structure, coherence, pace and accountability to the enterprise, focus on quantifiable results, and attract sufficient public and private investment in successful solutions. In this Comprehensive Climate Approach for Washington, the CAT has articulated directional recommendations that:

- Support the use of market mechanisms as invaluable instruments to ensure that emissions reductions goals are achieved efficiently and effectively economy-wide;
- Provide specific strategies to enable emission reductions goals to be met, while addressing other state goals;
- Call for the tools, resources and authorities government will need to implement and guide this Approach over time;
- Recognize the need for sufficient funding to support the investments needed to harvest the environment, social, and economic benefits identified; and
- Identify some of the substantive economic opportunities within Washington's economy that are enhanced by this Approach.

Recognizing that the opportunities and partnerships for Washington will far exceed those that can be identified here, the CAT seeks to set in motion a framework that will allow for a broad and flexible response to Washington's Climate Challenge. The CAT's Comprehensive Climate Approach is designed to drive and accelerate significant GHG emission reductions, spur innovative technological creativity, attract private investment in developing and implementing solutions, and help Washington share 'the pain and the gain' of this transformation equitably and compete successfully in the global market place that is rapidly emerging for GHG emission reduction and clean energy solutions. As well, the CAT sees this report as interim; significant work will be needed in 2008 to further scope and develop the specific policies and programs needed to implement these directional recommendations. The CAT looks forward to continuing to assist the State in this effort in 2008.

A New Way of Preventing GHG 'Pollution' Is Emerging

Smart GHG emission reduction policies will need to both signal economic opportunity and produce the necessary environmental safeguards. A new way of thinking and acting is needed to guide the simultaneous engagement, positive interactions, and mutual reinforcement between the various elements of society that are critical for success in reducing the reliance of carbon-based energy in our economy and way of life. If this is done correctly, the CAT believes we can unleash the state's enormous capacity for innovation and entrepreneurship to deliver solutions which will also support the health and well-being of our citizens and our natural systems. When this approach of appropriate government policy that supports entrepreneurial creativity and directs thoughtful capital investment is joined by a strong emphasis on workforce training, then opportunities for all citizens can be created to participate in the opportunity side of responding to climate change, now and into the future.

Meeting the challenge of climate change requires diverse elements in society to form strong partnerships and work together in new ways. Business, labor, governments at all levels, environmental groups, educational, academic and research institutions, and individuals through

their purchases and their behaviors, will all need to contribute to move Washington forward in meeting the state's GHG emission reduction goals and creating the Clean Economy. Reducing GHG emissions – and protecting and enhancing carbon stocks – will not be accomplished by identifying one component or sector of society as the 'problem' and then authorizing government to compel compliance. Instead, because of the overwhelming and pervasive use of carbon-based energy by all sectors of society, we all have to make a significant contribution to reducing GHG emissions. While recognizing that significant interim costs and behavioral changes may be necessary to transform parts of our economy to a lower carbon one, this creative and inclusive approach can reduce emissions more effectively and efficiently, and produce more economic benefits to share more broadly throughout society more quickly.

Reducing Emissions from Both the 'Top Down' and the 'Bottom Up' Is Essential

To be effective, this climate strategy must recognize and motivate the countless individual actions by government, business, and individuals that collectively are needed to reduce GHG concentrations in the atmosphere sufficient to stabilize the climate. This Comprehensive Climate Approach includes both broad, enabling ('top down') and sector-specific ('bottom up') strategies, which are inextricably intertwined and equally necessary. Pursuing both broad and specific approaches will expand our choices and strategies, and allow us to reach our goals most effectively and efficiently. The implementation of a market-mechanism will serve to structure and provide certainty in the transition to the Clean Economy of the future, while sector-specific strategies will augment, and in some instances support, development of this market as well as ensure predictable emission reductions are achieved in order to meet the State's goals. In addition, the market mechanism will take time to implement and mature: until the market is fully functional, some specific strategies can be deployed immediately to pursue 'low-hanging fruit', actions that have both immediate reductions benefits and cost savings.

Broad, Enabling Strategies are Critical to Success

As a prime component of the comprehensive approach to reduce GHG emissions and take advantage of opportunities created by the transition to the Clean Economy, the CAT proposes several directional recommendations designed to set in motion and support an economic market that recognizes and directs how carbon should become a 'cost' that can then be

Broad, Enabling Strategies

Directional recommendations designed to set in motion Washington's transition to a Low-Carbon Economy:

- Build Market-based Mechanisms to Unleash Investment in the Creativity and Innovation of Washington's Economy to Deliver Cost Effective Emission Reductions.
- Establish Emissions Reporting so that Progress in Emission Reductions Can be Tracked and Acknowledged.
- Analyze Greenhouse Gas Emissions and Mitigation Options Early in Decision-Making, Planning Processes, and Development Projects
- Invest in Worker Training for The Emerging Clean Economy to Ensure Having the Skilled Workforce and to Provide Meaningful Employment Opportunities Throughout the State.
- Give the State Sufficient Resources to Stay a Leader Regionally and Nationally and to Fulfill Its Responsibilities for Structuring and Guiding Implementation of Emission Reduction Strategies

factored into business and consumer decisions. The following considerations of a carbon market serves to illustrate how dynamic engagement between government action and regulation, business response, innovation and investment, and workforce preparedness and readiness can accomplish this.

To establish a market for carbon that will attract private investments in solutions and provide the benefits of reduced GHG emissions and Clean Economy opportunities, government must first set a limit or a price on GHG emissions. The market for carbon, regardless of the precise mechanism, is predicated on the constraint of carbon - a limit or cost on the amount of carbon emitted within Washington State. Such a clear limit, when accompanied by appropriate market mechanisms, will translate into the price that business and individuals either have to pay to use some of that limited carbon, or to reduce their use to meet the limit. This price is what attracts and directs investment to develop more efficient and less costly ways of reducing carbon – or ways to increase the storage of carbon. (This limit need not necessarily be applied economy-wide; government can set limits on carbon in specific sectors as well.) Once this strong market signal is in place, entrepreneurs, investors, business operators and individuals will be motivated to identify and invest in emerging opportunities, technologies, and choices to reduce carbon, thus facilitating establishment of a self-sustaining market to continue progress toward meeting the carbon limits.¹⁸

Because the transformation to a Low Carbon Economy will engage all of society, it is critical that investment capital be deployed as effectively and efficiently as possible. To ensure that this occurs, the CAT strongly recommends that whenever possible, the targets that drive choices be performance-based and not prescribed for a particular technology. Government should stimulate the direction of the market through clear, direct targets, and appropriate tools and programs, and the market can respond to the resulting price signal by developing and sorting out 'winning' technologies, efficiencies, or choices to reach the target. Government should "set the rules of the road" by restricting carbon

Specific Action Recommendations

Directional recommendations designed to ensure reductions of Washington's carbon footprint:

- Build and Continue to Redesign Communities That Offer Real and Reliable Alternatives to Single Occupancy Vehicles.
- Ensure Washington has Vehicles that are as Efficient as Possible and Use Non-Carbon or Lower Carbon Intensity Fuels Developed Sustainably from Regional Resources.
- Invest In and Use Washington's Existing Transportation Infrastructure to Move People and Goods Cleanly and Efficiently.
- Design, Build, Upgrade and Operate New and Existing Buildings and Equipment to Maximize Energy Efficiency.
- Deliver Power from Lower or Non-Carbon Energy Sources and More Efficient Use of Fuels.
- Restore and Retain the Health and Vitality of Washington's Farms and Forest Lands to Increase Carbon Sequestration and Storage, Reduce the Release of Greenhouse Gas Emissions and Support the Provision of Biomass Fuels.
- Reduce Waste and Washington's Emissions of GHGs Through Improved Product Choices and Resource Stewardship.

¹⁸ Members of the CAT organized and attended a meeting with representatives of the financial and entrepreneurial communities to discuss how best to enhance investments to reduce carbon and spur technological innovation throughout Washington's economy. This text builds on findings from these discussions.

through performance-based targets or standards rather than prescribing the choices made in how to reduce carbon and meet the targets; businesses, investors and consumers can then respond accordingly. For example, government can set a standard for low carbon fuels, and the subsequent capital attracted to that market opportunity will flow into fuel and vehicle technology that creates the necessary solutions.

This does not mean the government should be technology indifferent. While government target setting should be as technology-neutral as feasible, government can and should stimulate technology development through research and development incentives that send affirmative and intentional support for promising technologies or programs. These actions encourage and support entrepreneurs to seek innovative solutions, allowing them to “push” technology envelopes prior to market acceptance of them. Incentives may be needed to spur the market response more quickly, and/or demonstrate that specific solutions do or don’t work as anticipated, and thus help get more efficient and cleaner technology out more quickly than the market alone would. Incentives may also take the form of investments in human capital through workforce training programs or educational initiatives that inspire people to consider choices they may otherwise not have been aware of.

Specific Action Strategies are Needed to Meet the Challenges within Key Areas of the Economy and Society

Most activity in Washington’s economy, and many individual behaviors, as well as each way in which carbon-based energy is currently produced and used, can be made more efficient, can produce or utilize alternative fuels, and/or be performed in ways that do not emit nearly as much, if any, GHG emissions. Critical to accomplishing this is identifying these specific efficiencies and substitutes, making them cost-competitive with carbon intensive options, and shaping governmental, business and consumer choices so that these alternatives are both available and implemented through those choices.

To achieve Washington’s goals in reducing GHG emissions, the broad, enabling strategies should also be complemented by strategies that are appropriate for specific areas of Washington’s economy and aspects of individual behaviors. Implementing these types of strategies ensures that Washington’s GHG emission reduction and economic goals are achieved in meaningful ways. The specific strategies developed by the CAT represent a significant range of policies and programs the State of Washington could adopt or undertake. The suite of recommended strategies provide specific ways and target specific priorities for GHG emissions reductions to be achieved, and harnesses the participation across the sectors of society that will be required to meet the State’s goals.

Through its five Technical Working Groups (TWGs), the CAT conducted significant analysis of potential policy options and opportunities for specific sectors of the economy.¹⁹ The CAT convened the TWGs in April 2007 to advise the CAT on options that fit the unique characteristics of Washington’s economy, institutions and environment, and have the potential to

¹⁹ See Appendix E and the TWG websites for additional information:
www.ecy.wa.gov/climatechange/cat_twg_overview.htm

help achieve Washington's economic and emissions reduction goals. The TWGs were structured around five sectors of Washington's economy:

- **Agriculture**, including biofuels, waste reduction, recycling and energy recovery and solid waste management;
- **Energy Supply**, including heat and power generation, electrical generation, and transmission;
- **Forestry**, including forest restoration, sustainable forest management, wood energy and carbon sequestration;
- **Residential, Commercial and Industrial**, including energy efficiency and conservation, industrial process, and "customer side" of the energy meter; and
- **Transportation**, including vehicle efficiency, alternative fuels and demand reduction programs.

The TWGs met regularly during 2007 to identify, refine and analyze options, and to estimate the impact of each option on reducing emissions, its costs, and other factors if implemented. The complete list of 45 options recommended by the TWGs and affirmed by the CAT are listed in Table 4 at the end of this report, and the complete description of each option is contained in Appendices F through J. The CAT assessed the 45 options that the TWGs analyzed, and affirmed that these options highlight a credible path forward to accomplish the specific transformations needed in these sectors of the economy and society in order to meet Washington's goals. An overview of the reductions from the specific actions recommended follows; a detailed discussion of how they accomplish this is in Section V.

Reducing Emissions and Meeting the State's Goals is Achievable

As illustrated in Figure 4, the 45 options, together with recent actions already underway in Washington, appear capable of enabling the State to turn the corner on otherwise increasing emissions, to begin a long-term path of declining emissions, and to achieve – and perhaps even exceed – the State's goal of reducing GHG emissions to 1990 levels by 2020. Overall, assuming full and timely implementation, these strategies could yield almost 50 million metric tons carbon dioxide equivalent (MMtCO₂e) in annual emission reductions by 2020.²⁰ This would represent a reduction of nearly 40% below business-as-usual projections for that year (122 MMtCO₂e) and reduce the state's emissions below the 1990 levels (88 MMtCO₂e) by approximately 17%.²¹

²⁰ The strategies were analyzed for their net GHG reduction potential in million metric tons carbon dioxide equivalent (MMtCO₂e) using IPCC 100 yr global warming potential, reported for 2012, 2020, and cumulatively 2008-2020 (where applicable, longer-term reduction potential was noted as an additional benefit, but not quantified due to uncertainties associated with extended projections of reductions). Details of additional benefits that are likely to accrue from each strategy are with the complete policy options documents in Appendices F-J.

²¹ For a summary of the key elements of the recommended methodology for quantifying the GHG impacts and costs for those TWG policy options that were considered amenable to Quantification, see Appendix K.

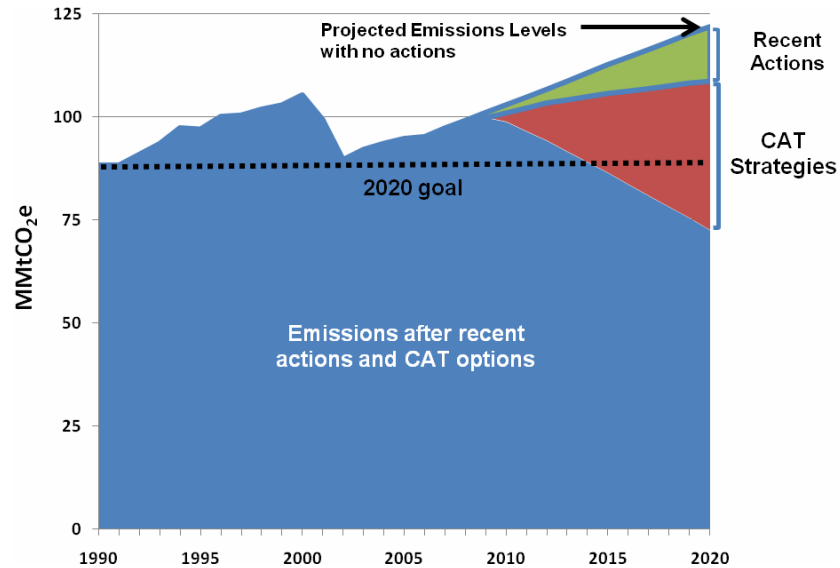


Figure 4: Projected GHG Emissions from Business-as-Usual and Anticipated Reductions from Recent Actions and CAT Strategies

The depth of potential reductions identified here appears quite significant for several reasons. First and foremost, this analysis presumes, as noted, that these strategies can be put into place in the timely and often quite ambitious fashion envisioned by the TWGs. Since many of these strategies may prove challenging to enact, or follow a slower implementation path, the CAT recognizes that reaching the nearly 50 MMtCO₂e in reductions by 2020 will be very hard to achieve and should in no way be seen as any form of ‘mission accomplished’ at this time. At the same time, this realization that a sufficient reduction of emissions is possible from these strategies argues for the serious pursuit of a broad suite of strategies to ensure our emission goals can be met.

Furthermore, this estimated reduction potential may appear quite large—on a percentage basis compared with what has been found possible in other states or regions—because of several factors specific to Washington State. Most notably, the State’s sizeable and productive agriculture and forestry sectors could provide particularly large carbon sequestration benefits as well as potentially produce substantial quantities of low-carbon fuels. In addition, the fact that much of the state’s electricity needs are met by hydroelectric resources means that additional energy efficiency, renewable energy and other low-carbon electricity resources could displace a larger percentage of the state’s more limited reliance on fossil fuel-based electricity sources.

All five of the TWG sectors present significant opportunities for emissions reductions and removals, as shown in Figure 5. Some highlights are outlined here, and more discussion is provided in Section V. Not surprisingly, the transportation sector, which accounts for nearly half the State’s emissions, offers significant emissions reduction potential through increasing vehicle and transportation system efficiency, and reducing vehicle travel from transit, community design, and other measures. Alternative vehicle fuels can also play a major role in the transportation sector by 2020, through a low carbon fuel standard and plug-in hybrid electric vehicle incentives, as well as through the agriculture and forestry sector, where the CAT recommends goals for

producing 250 million gallons of liquid fuels from biomass by 2020. Another major contributor to potential emissions savings in the agriculture and forestry sectors by 2020 is avoiding the conversion of farm and forest lands, and the resulting loss of carbon stored in trees and soil. Expanding recycling, reuse, and source reduction of municipal waste accounts for about half the emissions reductions in the agriculture/waste column shown. Improvements in building energy efficiency and community design, increasing natural gas efficiency programs, and increasing efficiency standards account for a significant fraction of the emissions reduction shown for the residential, commercial, and industrial sectors. In the energy supply sector, increasing the contribution of renewable and combined heat and power sources are the principal sources of quantified emission reductions shown.

Many of the strategies affirmed by the CAT are overlapping and reinforcing, as in the example case of the various transportation, agriculture, and forestry initiatives that support biofuel use as well as production.²² The last bar in Figure 5 illustrates the overlap *between* sectors – and reflects the results of interactions with biofuel initiatives, combined heat and power and other strategies.²³

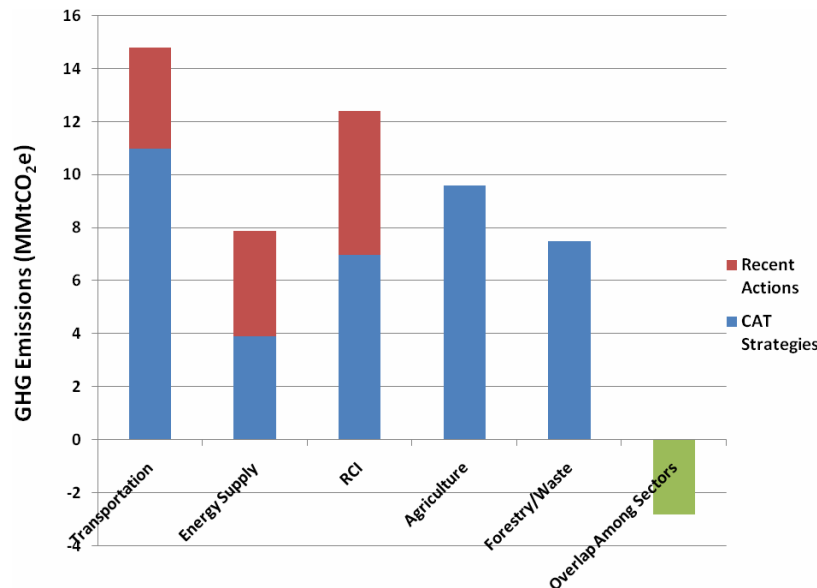


Figure 5: GHG Emissions Savings in 2020 from Recent Actions and CAT Strategies, and Overlap in Reductions Among Sectors

Figure 6 depicts the emissions reduction potential and cost impacts for the full suite of quantified strategies, as calculated for the strategies individually (i.e. not fully accounting for overlaps). Strategies below the x-axis are those that are projected to yield cost savings, while those above

²² While most strategies were separately assessed in terms of emission and cost implications as if they were implemented alone, their combined impact was also analyzed and overlapping emission reduction were subtracted to avoid double counting.

²³ Overlaps among options *within* sectors are included in the overall sectoral results shown. The total estimated emissions reduction shown in Figure 5 for 2020 thus represents the sum of all the bars shown in Figure 5.

the line are those with projected direct costs.²⁴ As illustrated, there is a mix of strategies with net cost savings (below the line), largely those involving energy efficiency or resource conservation, and those with net costs (above the line). As well, there are a handful of policy strategies – in particular transit, pricing, and other VMT reduction strategies – that are typically difficult to quantify in terms of incremental cost (and are not often shown in cost curves of this nature).²⁵

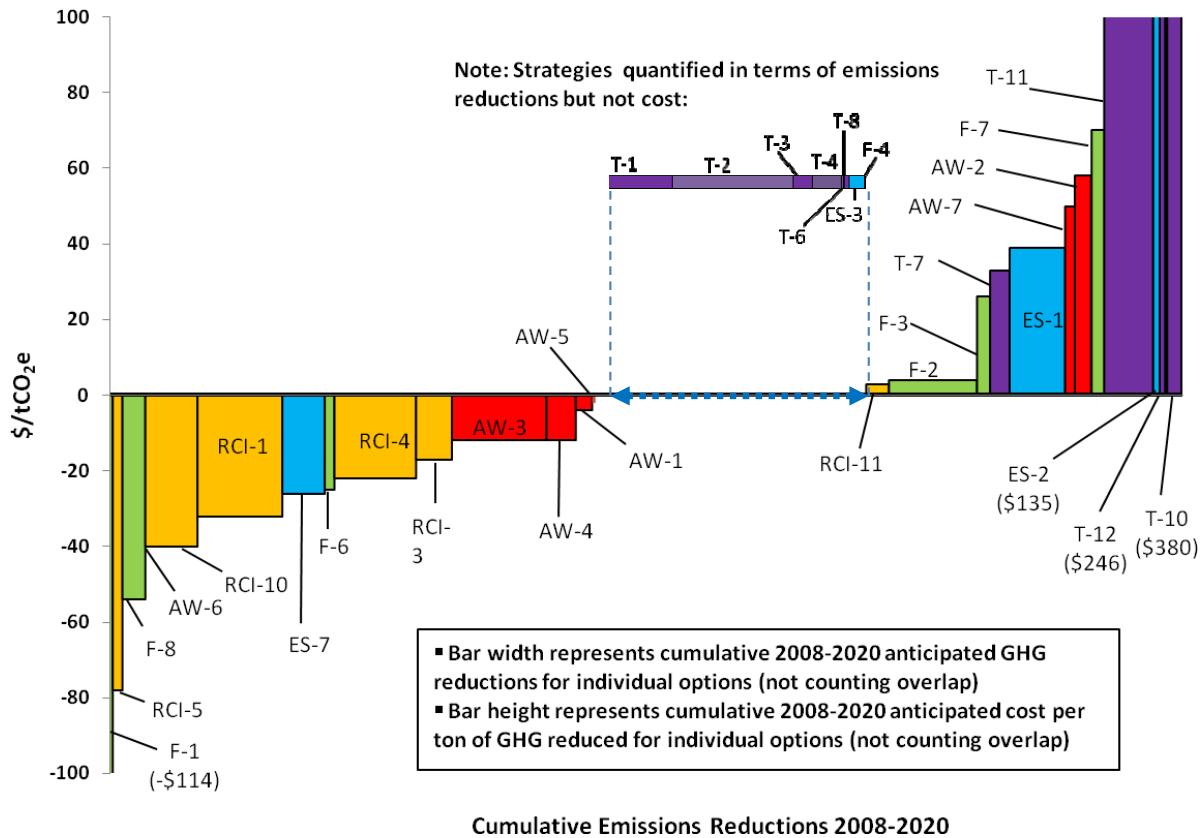


Figure 6: Anticipated GHG Emissions Reductions (MMtCO₂e) and Cost Impacts for Quantified Strategies (as calculated for the strategies individually, from 2008-2020)

While some strategies present net direct costs and others create net savings, they could provide an overall economic benefit to Washington residents and businesses, especially if recent actions are taken into account, and are assumed to be fully implemented. As shown in more detail in Tables 3.3-3.8 at the end of this report, the strategies and recent actions combined could yield a net cumulative benefit of over \$900 million by 2020 (Net Present Value 2008–2020, in \$2006).²⁶ However, even if the actual suite of strategies ultimately pursued and implemented bears a net cost, it is essential to bear in mind that this cost analysis does not include what are in many cases

²⁴ The height of each bar indicates its cost per ton of CO₂e reduced or removed, while the width represents its cumulative emissions savings through 2020. The area is equivalent to its net present value cost to 2020, or “cost savings” if below the axis.

²⁵ A recent report from McKinsey & Company (2007) does a similar analysis of the U.S. as a whole and this analysis correlates well with what the CAT found regarding its strategies.

²⁶ All net present value estimates are calculated using a 5% real discount rate.

very significant co-benefits, such as improved transportation choices, reduced local air pollution and improved public health, functioning natural systems, or hedges against energy price volatility, to name a few. Furthermore, this cost analysis does not consider the indirect and macroeconomic impacts that that would arise as energy savings are “re-spent” on local goods and services, as consumers and businesses respond to changes in energy prices, and as investments and jobs shift towards lower-emission (or carbon sequestering) products and services.

In addition, these strategies contribute to the other State goals to create clean energy jobs and reduce expenditures on fuel imports.²⁷ The jobs creation goal for Washington is to increase the number of specifically defined clean energy sector jobs to 25,000 by 2020, which is a three-fold increase from the 8,400 jobs this sector had in 2004. The combination of TWG strategies and recent actions appears capable of increasing the number of clean energy sector jobs to over 30,000 by 2020, as illustrated in Figure 7 and Table 3. Because of how this goal was defined, and because the clean energy sector is a narrower subset of the broader Clean Economy, the total does not include additional indirect jobs created that support these sub-industries, direct jobs arising from GHG policy strategies in agriculture, forestry and transportation (see the example of added transit jobs shown in Figure 7), or indirect job gains or losses due to increased consumer spending (resulting from energy and other cost savings) and shifting away from emissions-intensive activities and products, or changes in energy or other prices that might occur.

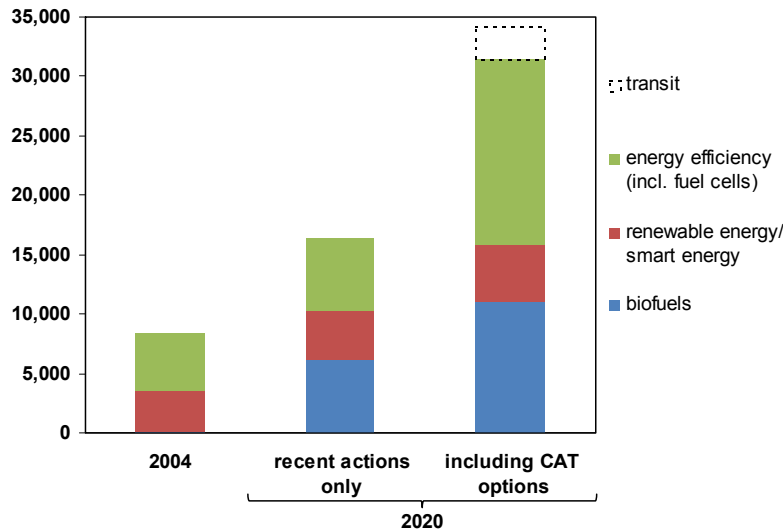


Figure 7: Anticipated Growth in WA Clean Energy Jobs

Table 3: Direct Clean Energy Jobs from CAT Policy Measures, as of 2020

Totals may not equal sums due to rounding

sector	jobs
RCI	
recent actions	1,300
CAT strategies	7,300
Energy Supply	
recent actions	700
CAT strategies	3,000
Transportation	
recent actions	6,000
CAT strategies	--
Forestry	
recent actions	--
CAT strategies	1,900
Agriculture/Waste	
recent actions	--
CAT strategies	3,000
total	23,100
existing jobs	8,400
grand total	31,500

²⁷ See Appendix L for additional information on the fuel and jobs goals methodology and analysis.

Washington’s energy independence goal is to reduce expenditures by 20% on fuel imported into the state by 2020. The contribution of the CAT’s recommendations, along with recent actions, to the overall fuel expenditure savings goal is \$4.9 billion avoided expenditures achieved by recent actions and TWG strategies, as illustrated in Figure 8 (based on estimates that Washington residents and businesses would have otherwise, under business-as-usual, spent \$13.3 billion on fossil fuel imports in 2020, with the 20% reduction goal corresponding to \$2.6 billion of avoided expenditures).

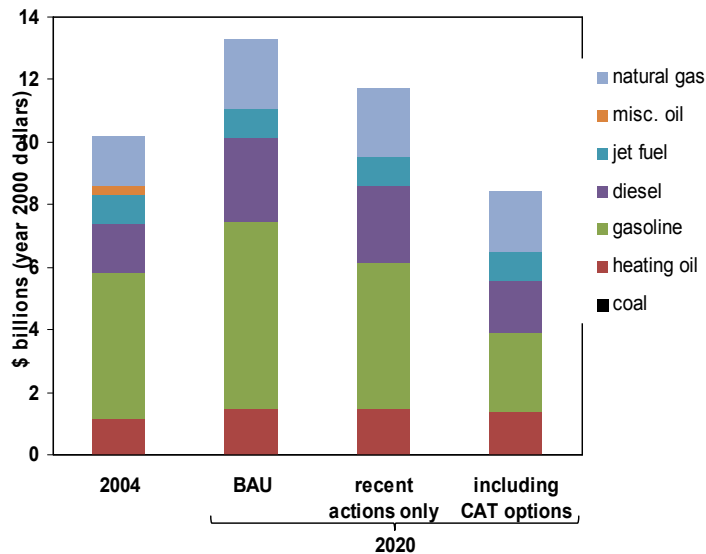


Figure 8: Washington Fuel Expenditures²⁸

How Soon Will These Strategies Actually Be Implemented?

The potential emissions reductions from these strategies, their contributions to the other goals, and any additional benefits they would produce needs to be considered in light of one critical consideration: whether these strategies will actually be implemented in time to have achieved the emissions reductions impacts that the TWGs estimated they might have by 2020. The actual design and other factors associated with implementation of these strategies still need, in many cases, further development. The actual decision to implement many of them will take significant leadership, courage and foresight. Implementation will have, in some cases, significant intermediate costs. Thus the tons of GHG emissions reductions or carbon storage that will actually occur from these strategies are, at this time, highly speculative.

²⁸ Fuels that are technically imported into the state for the purpose of generating electricity are not necessarily energy imports into the state, since electricity generated in Washington State is often delivered outside the state. Segregating fuel imports used for in-state electric delivery versus out-of-state electric delivery is extremely difficult and hence changes in the electric generation sector cannot be tracked; these fuel imports are hence omitted from the analysis.

The good news is that the work of the CAT and TWGs demonstrates that Washington can meet its goals if we have the political will and make the deliberate commitment to do so. The CAT believes that the specific recommendations and strategies detailed in Section V, next, represent the best thinking at this time as to what Washington can and should do as it takes the threat of global warming seriously and charts what the transformation to a Low Carbon Economy entails.

V. Meeting the Climate Challenge: 12 Powerful, Directional Recommendations

The CAT offers the following twelve powerful, directional recommendations that together comprise the Comprehensive Climate Approach, a coherent and systematic strategy for Washington to minimize its contributions to global warming from GHG emissions and maximize its opportunities in the emerging Clean Economy.

The CAT emphasizes that there is a full range of actions and policies encompassed within these twelve ‘headlines’. Some need legislative authorization in order to become operative; others can be accomplished by rule-making. Many need public investment in order to be effective, often of a significant magnitude. Others will become part of an overall market-based approach and still others will be implemented because of their eventual price advantage over ‘business as usual’ choices. Some entail new programs; others build on what is already happening.

Taken as a whole the overall effort to transform to a Clean Economy is a huge undertaking. Progress on reducing GHG emissions will be done ‘a ton at a time’, in many different places and in many different ways throughout the economy. The changes that these recommendations represent, particularly for the sector-specific strategies, often look like they are at the margin of business-as-usual: reduce VMT by 20%, increase efficiency by 15%; add another 5% to the renewable power mix, increase forest productivity so that carbon stock levels increase by 0.3 tons of carbon/acre/year, etc. While those kinds of reductions might appear incremental in light of the overall amount of emissions from a particular source, achieving the targeted amount may actually require a transformational approach to accomplish it. This tension between seeking ‘tons’ from many places and realigning our economy and behaviors to lower the release of carbon throughout the economy is one that the CAT has been acutely aware of.

The CAT’s recommendations are organized into ‘headline’ directives to show the diversity of effort and change that will be needed, and to emphasize the results that are imperative to achieve. Through the identification of the ‘most promising’ of the specific strategies, we chart the ways that these changes are likely to occur in the most productive manner. Accomplishing what each headline describes will significantly contribute to success; fulfilling them all guarantees that the State’s goals will be met.

Headlines and ‘Most Promising’ Strategies

The CAT identified specific policy options that appear to be ‘most promising’ at this time, and organized and sorted these to create powerful ‘headline’ challenges that articulate the direction the State can take by implementing specific action recommendations.

Most promising is used to denote those options that have significant GHG reduction potential, contribute to the jobs growth and fuels expenditure reduction goals, have lower cost and/or positive net present value, have significant additional benefits, are politically feasible, and/or are ‘ripe’ for action. Options that the CAT felt were advanced by other recommendations are not explicitly included in this categorization (e.g. several specific options include changes to SEPA, which the CAT addressed in Recommendation 3). These most promising options are briefly discussed under each headline, below.

1. Build Market-based Mechanisms to Unleash Investment in the Creativity and Innovation of Washington's Economy to Deliver Cost Effective Emission Reductions.

By creating a market for carbon, over time the creativity and innovation of, and investment in, the Washington economy can become the prime driver of many of the decisions that need to be made in order to reach the State's goals. The 2020 goal for Washington State – to return to the 1990 GHG emissions level – established by Executive Order 07-02 and codified in SB 6001, is the limit of the amount of carbon to be released into the atmosphere from all sources of emissions in Washington State by 2020. The CAT strongly supports building market-based mechanisms as a key strategy to achieve this target. Both public and private leadership to prepare our citizens and businesses for this market, and an institutional framework, to ensure that this market functions as intended will be needed in order for this potential within Washington's economy to become a significant part of the solution.

In particular, the CAT recommends that the State:

- Continue to participate and provide leadership in the Western Climate Initiative and emerging national efforts to develop market mechanisms

The CAT supports the regional and collaborative approach being taken by Washington to develop a regional cap-and-trade mechanism through the WCI, and recommends that Washington continue to play a leading role in its successful development. In addition, Washington should actively participate in the development of national climate change legislation and emissions-trading markets in order to allow the State to take advantage of emerging opportunities, and position Washington to maximize our competitive advantages.

Market Mechanisms: Cap-and-Trade and Emission Taxes

A cap-and-trade, or "emissions trading" system establishes an overall limit on the amount of emissions in regulated sectors (e.g. electricity or industry). Regulated emission sources must hold sufficient emission permits or allowances to cover their allowed emissions. Emissions allowances are allocated – freely to specific entities and/or through auction – and can then be traded. In addition, "offset" allowances may be generated by verified emission reduction activities outside the capped entities. The economic rationale for emissions trading is that it enables emissions reductions to occur where costs are lowest, yielding an economically efficient approach to achieving a given emissions target. For over two decades, emission trading systems have functioned in the US for local and regional air pollutants. In recent years, the European Union, and a consortium of states in the eastern US, have established among the first emission trading systems for GHG emissions. Furthermore, emissions trading provides the basis for the Kyoto Protocol, and for the most widely supported climate legislation being proposed in the current US Congress.

Emissions trading is not the only market-based mechanism that can be used to address GHG emissions. Emissions or "carbon" taxes are widely discussed mechanisms, often favored by economists, that can achieve many of the same innovation-driving, economic efficiency benefits as emissions trading. Implemented in a number of European countries, carbon taxes, as the name implies, involve the collection of revenue typically based on the carbon content of fossil fuels (coal, oil, natural gas) supplied.

The State of Washington is a founding partner in the Western Climate Initiative (WCI), which was established in February 2007 by the governors of Washington, Oregon, Arizona, California and New Mexico. WCI has formally expanded to include several other partner and observer states and Canadian provinces.²⁹

WCI partners have developed regional GHG emission reduction goals, and are currently designing a multi-sector market mechanism to achieve the regional goals. WCI partners also agree to participate in a multi-state registry to enable tracking, management, and crediting for entities that reduce their GHG emission (Washington is meeting this WCI commitment as a charter member of The Climate Registry, discussed further in Recommendation 2, below).

The market-based mechanism that WCI partners have chosen to design is a regional cap-and-trade system. While carbon taxes and emissions trading can be implemented in tandem (as in Norway and Sweden, for example), they are commonly viewed as competing policy instruments with a mix of advantages and disadvantages. Generally speaking, an emissions trading system provides greater certainty for achieving a given emissions reduction, while an emissions tax provides greater certainty regarding the price signal that a unit of carbon costs.

To the extent emission trading systems and programs can be linked across state and national boundaries, an emissions trading system can enable a coordinated, cross-border strategy to address this global problem. While effective linkage requires that different emission trading systems have similar rigor and design features – not a simple task – carbon taxes are generally viewed as more difficult to coordinate among regions. A carbon tax is, in principle, simpler to design and implement than cap-and-trade, although both require rigorous monitoring of emissions, tracking and reporting. Enacting a tax can face significant political hurdles, while allowing trading of emission allowances can raise complex design issues.

While the pros and cons of emissions trading vs. emission taxes continue to be actively debated, Washington is proceeding with the design of a regional cap-and-trade system through the WCI since it provides a potent mechanism for achieving many of the objectives articulated here, most notably economic efficiency, innovation, and achievement of near-term and long-term emission targets. Furthermore, through its participation with WCI, Washington can influence the design of regional (and eventually participate in and influence, national and international emission trading systems). The CAT strongly believes that Washington should participate to the fullest extent possible in larger emission trading markets in order to maximize the potential for cost-effective emission reductions.

- Develop and institute the legal, technical, and institutional infrastructure that will make a carbon market real and operational as soon as possible.

A market will allow different entities in society to work together in expanding our options and choices. The state should establish the infrastructure to support market-based approaches that are efficient in stimulating and supporting the investments, business practices and behavioral changes needed to reduce GHG emissions. The market should be reliable and transparent for all participants so that choices become obvious and apparent. The market should also be equitable,

²⁹ See Appendix M and the WCI website for more information: www.westernclimateinitiative.org/

and avoid creating artificial financial windfalls within and across sectors, and between producers and consumers. The State should not be disinterested in technology development, but should be as technology-neutral as possible by directing market-based approaches at performance targets.

- Establish binding limits on GHG emissions.

By demonstrating that achieving significant carbon reduction targets is a certainty, not merely an aspiration, binding limits on GHG emissions are essential to form a market for carbon. Legally established limits on GHG emissions will allow market participants to plan and invest with confidence. This is a necessary intersection between regulation and innovation: by constraining carbon and establishing the parameters for a market-mechanism, government provides the private sector the certainty necessary to spur investment and innovation in solutions.

2. Establish Emissions Reporting so that Progress in Emission Reductions Can be Tracked and Acknowledged

Ensuring emissions releases and reductions are measured is critical to any GHG reduction effort, regardless of the policy instrument used to achieve those reductions. Common and consistent ways of measuring will ensure that “a ton is a ton is a ton”, and whether that ton of GHG emissions is still being emitted or has been eliminated as an emission.

In addition to the biennial emissions inventory estimates reporting already required of Ecology and CTED, the CAT recommends that the State support GHG emission reduction efforts by establishing mandatory GHG emissions reporting by appropriate sources. By developing a reliable emissions reporting system that allows for a common way of reporting across all parts of the ‘system’, the State can track progress towards meeting the GHG emission reduction goals and provide a platform that supports a common way to communicate the progress being made. In addition, a common approach to reporting will allow Washington to prepare to participate in carbon markets by supporting emissions trading, enabling the potential pursuit of verifiable offsets, and documenting early voluntary reduction actions in order to reward early responders.

The Climate Registry (TCR)

Washington is a charter member of TCR, a national collaborative effort formed in May, 2007, to develop and manage a common GHG emissions reporting system that enables tracking, management, and crediting for reductions. TCR is scheduled to begin accepting data early in 2008, and has growing membership from many states, provinces, and tribes. Emerging support appears to be growing in Congress around America’s Climate Security Act of 2007 (S 2192, introduced by Senators Lieberman and Warner). S 2192 would establish a national cap-and-trade system, and references TCR to be used for the national GHG registry and for mandatory federal GHG reporting. For more information on TCR, see www.theclimateregistry.org

While emissions reporting information can support the implementation and success of market-based mechanisms, the manner in which information about emissions is collected should not be allowed to serve as a surrogate for, unduly influence, or preempt, market-mechanism design decisions.

The CAT supports participation with The Climate Registry (TCR), of which Washington State is a founding member, as a promising and cost-effective way to help Washington accomplish these goals for emissions reporting and application, as long as TCR is designed and implemented as publicized.

3. Analyze Greenhouse Gas Emissions and Mitigation Options Early in Decision-Making, Planning Processes, and Development Projects

The CAT recommends that the State clarify application of the State Environmental Policy Act (SEPA) in order to ensure that climate change considerations are fully incorporated into governmental decision-making, resource and development planning, permitting and approval. In this way, SEPA, as the primary way of assessing environmental impact on state approved rules decisions, plans and projects, can support the early identification of GHG emissions reduction opportunities. SEPA can be applied to evaluate emissions, and to consider mitigation options early in the planning phases for significant private and public development activities, regulatory required plans and decisions, and transportation projects. The CAT believes SEPA should be focused on those decisions and projects that are of sufficient magnitude that, if properly analyzed and designed, they can contribute towards significant GHG emission reductions.

SEPA is the state policy that requires state and local agencies to consider the likely environmental consequences of a proposal before approving or denying the proposal.³⁰ SEPA environmental review is required for any proposal which involves a defined government "action," and is not otherwise categorically exempt. This can include specific projects such as transportation projects or decisions on private development projects, as well as non-project actions such as government regulation, decisions on policies, issuance of plans, and program development. "Elements of the environment" that must be assessed for impact include both the natural environment (earth, air, water, plants and animals, energy and natural resources) and the build environment (environmental health, land and shoreline use, transportation, public services and utilities).

In order to learn from and avoid challenges experienced in other states over the use of procedures like SEPA to include examination of climate change impacts, the CAT proposes clarifying SEPA requirements. The State should explain that SEPA can and should be used to identify and analyze climate change impacts. Climate change is currently identified as an element of the environment that must be assessed under SEPA, but how to do that is not explicit in the SEPA guidance. The State can also provide guidance to implementing agencies by sharing existing methods for quantifying emissions, and share existing approaches other states have begun to use to mitigate environmental impacts from GHG emissions associated with the decision, plan or project under review. In addition, the State should begin the process to amend the SEPA

³⁰ Chapter 43.21C RCW. Enacted in 1971, SEPA provides the framework for agencies to consider the environmental consequences of a proposal before taking action. It also gives agencies the ability to condition or deny a proposal due to identified likely significant adverse impacts. The Act is implemented through the SEPA Rules, Chapter 197-11 WAC.

checklist to better address climate change, develop state guidance on impacts analysis, and identify what is required and possible in terms of effective mitigation through the SEPA review.

4. Invest in Worker Training for The Emerging Clean Economy to Ensure Having the Skilled Workforce and to Provide Meaningful Employment Opportunities Throughout the State.

The State should invest in worker training and education to prepare Washington's companies and workforce to take advantage of opportunities in the Clean Economy. In addition to investing in Washington's human capital, preparing the Clean Energy workforce by providing appropriate education and training at all levels (K-12 curriculum, vocational education, internship and apprenticeship programs, and university research and training) enhances the likelihood of success for existing clean energy industries in Washington and attracts more energy technology development and manufacturing investment opportunities to the State by having a well-qualified and robust work force available.

The CAT has heard evidence that an aging workforce in the trades and ongoing strong economic development has combined to produce serious skilled labor shortfalls. Significant opportunities for high wage employment in the trades now exist, and will increase in the future as the Clean Economy develops. Training needs to occur at all levels of Washington's educational system to produce a skilled workforce prepared to meet this opportunity. The CAT believes this perspective is consistent with the findings of Washington Learns³¹ that our current education system was designed for the previous economy, and "as our economy and the world around us changes ever more dramatically, we must transform our education system in order to better prepare our children."³²

Job gains in the Clean Economy are anticipated to be significant. The development of clean, renewable energy technologies and associated jobs in research, industry and manufacturing is anticipated to bring this decade's new wave of high-quality, "green collar" jobs. Several of the Comprehensive Climate Approach strategies directly increase the number of Clean Economy jobs.³³

An opportunity exists to create jobs for nontraditional environmental and energy workforce participants as well. A key concern to the CAT is ensuring that the poor and disenfranchised members in our communities who are often also the most vulnerable to climate change impacts

³¹ SB 5441 passed by the 2005 Legislature created the Washington Learns Steering Committee, which was chaired by Governor Gregoire, and after a year of intensive study, developed a final report with comprehensive, long-term recommendations for Washington's education system. www.washingtonlearns.wa.gov/

³² 2006. Washington Learns Final Report: World Class, Learner Focused, Seamless Education. Available at: www.washingtonlearns.wa.gov/ourwork.htm

³³ The estimates developed for the CAT on job creation from its strategies (see Section IV) are based on aggregate information about clean energy activity and jobs, and implicitly assume that the same relationship between jobs and expenditures as witnessed historically will hold through 2020. Actual deployment of changing technologies and production practices will inevitably produce a different outcome, but the promise of significant skilled labor employment appears bright.

are protected from negative consequences related to either climate change impacts or policy responses to limit these impacts. People of lower socio-economic means often have lower-earning potential, poorer quality housing, limited transportation options, and lower resilience to changing economic conditions. All citizens in Washington should be prepared to succeed in the Clean Economy; special consideration should be given in the design of educational opportunities and worker training programs to reach those who live on the margins of society. “Give the work that most needs to be done to the people who most need the work”, and take on two pressing problems – pollution and poverty – at once.³⁴ Retrofitting our buildings and our cities, restoring our watersheds, farmlands and forests can provide meaningful work for many people in their own communities.

5. Build and Continue to Redesign Communities that Offer Real and Reliable Alternatives to Single Occupancy Vehicles.

The ‘most promising’ strategies under this recommendation are:

- New Funding Mechanisms (T-0)
- Transit, Ridesharing, and Commuter Choice Programs (T-1)
- State, Regional, and Local VMT Reduction Goals and Standards (T-2)
- Transportation Pricing (T-3)
- Promotion of Compact and Transit-Oriented Development (T-4)
- Improvements to Freight Railroads and Intercity Passenger Railroads (T-6).
- Promotion and Incentives for Improved Community Planning and Improved Building Design and Construction in the Private and Non-State Public Sectors (RCI-3)

Transportation is Washington’s largest contributor to GHG emissions, representing approximately half of all of the State’s GHG emissions. In order to significantly reduce these emissions, growth patterns and long-term infrastructure choices that result in compact walkable, bikable and transit-friendly communities must be supported, funded and implemented. Cleaner cars and fuels alone will not sufficiently reduce Washington’s transportation-related emissions’ challenge, nor will improved business practices and more efficient energy use alone. Compounding the challenge, most cap-and-trade market mechanisms being considered throughout the world at this time do not directly reduce transportation-related emissions. To put it bluntly, without reductions in vehicle miles travelled (VMT) by single occupancy vehicles, we are unlikely to meet the State’s goals for emission reductions. And people will not – in fact, cannot – get out of their cars in sufficient numbers if they do not have realistic viable options for conducting the trips and travels needed and desired for daily life. The strategies deemed ‘most promising’ here by the CAT are designed to tackle this challenge head on. To implement them

³⁴ Quote from Van Jones, a Yale-educated lawyer who founded the Ella Baker Center for Human Rights in Oakland. Jones believes that green-collar jobs are exactly what unemployed residents of cities like Oakland need. Walsh, Bryan. *Bring Eco-Power to the People*. November 21, 2007. Time Magazine. www.time.com/time/magazine/article/0,9171,1686811,00.html Accessed December 18, 2007.

will require significant political leadership from all sectors of society and will depend on the willingness of our citizens to invest, one way or another, in creating this set of transportation alternatives and community development patterns. If we are successful in doing so, GHG emissions achieved through reductions in VMT can be achieved; if not, emissions from ever increasing VMT will likely grow through 2020 despite our best efforts to improve vehicle efficiency and provide alternative fuel sources.

The CAT realizes that the entire question of community growth patterns, transportation infrastructure and financing for transit and other transportation alternatives is a complex, controversial and expensive endeavor. We are not naïve about the difficulty of accomplishing what we are recommending here. In assessing recent attempts to move ahead with the CAT's vision of what is needed to reduce GHG emissions by reducing VMT, we can see 'steps forward and steps backward'. The CAT hopes that the reality of global warming will coalesce the political leadership from all sectors and the support of the public to see the strategies outlined below (and in the next two headlines also addressing transportation related emission reductions) as critical necessities whose time has come, and not as merely personal choices that can be accepted or rejected with no real consequences for Washington's future beyond more or less traffic congestion or urban sprawl, etc. The debate regarding how Washington provides the human and freight mobility necessary for our dynamic economy and high quality of life to which our citizenry rightly aspires has reached a new intensity and a new imperative due to global warming. The CAT strongly believes that the strategies outlined below, many of which are already happening and are indeed expanding in some important ways, must be seen as key drivers in the future growth-related and transportation policies and investments by the State and local governments if transportation-related GHG emissions are to be reduced to the extent necessary to meet the State's goals. In particular, strategies that can successfully raise the funding necessary to make some of the other transportation strategies viable is absolutely essential. While only briefly summarized below, the appendix has much greater detail on this crucial, daunting task. The CAT believes that the question of transportation infrastructure funding is a major issue needing additional work in 2008.

The following strategies, working in concert, are intended to reduce VMT from a variety of fronts:

Promotion of Compact and Transit-Oriented Development (T-4) would reduce VMT and GHG emissions by encouraging development patterns that facilitate travel by transit, walking, and bicycling. Such actions would involve new incentives and requirements, including amendments to the State's Growth Management Act, and would be designed to reduce urban area VMT by 7-15% in 2020 and by 25-50% in 2050, compared to baseline levels. **Transit, Ridesharing, and Commuter Choice Programs (T-1)** provides leadership and resources necessary to help create a transit and ridesharing system that connects activity centers on both an intra- and an inter-regional basis. **State, Regional, and Local VMT Reduction Goals and Standards (T-2)**, establishes a schedule of targets for reducing statewide per capita VMT and working alongside with local governments and regional planning organizations to achieve those targets. Compared to a business-as-usual baseline, these goals would target a reduction in statewide annual per capita VMT 18% by 2020, 30% by 2035, and 50% by 2050.

A number of the other policy strategies appear most promising in contributing to reducing VMT emissions. **Promotion and Incentives for Improved Community Planning and Improved Building Design and Construction in the Private and Non-State Public Sectors (RCI-3)** uses a combination of financial and other incentives, plus regularly-revised performance targets, to induce the owners and developers of buildings and the communities in which they are located to produce and operate new and substantially-renovated buildings and communities that produce markedly lower GHG emissions than existing buildings and communities (reductions of 50% or more by 2020 are anticipated).

Additional strategies to support reductions in VMT include **Transportation Pricing (T-3)**, which seeks to reduce vehicle travel through pricing mechanisms that raise the cost of single-occupant vehicle travel, and **Improvements to Freight Railroads and Intercity Passenger Railroads (T-6)**, which targets the improvement of efficiency and increase in capacity of Washington's railroad system. Efforts would be undertaken to improve Sounder and Amtrak capacity and service to shift intercity travelers and commuters from road to rail.

New Funding Mechanisms (T-0) identifies new flexible and reliable long-term funding mechanisms, as well as makes better use of existing revenue sources, in order to fund these other transportation strategies. Revenue tools for immediate consideration include User Fees, Local Option Taxes, and Statewide Revenue Sources.

6. Ensure Washington has Vehicles That Are as Efficient as Possible and Use Non-Carbon or Lower Carbon Intensity Fuels Developed Sustainably from Regional Resources.

The 'most promising' strategies under this recommendation are:

- New Funding Mechanisms (T-0).
- Improvements to Freight Railroads and Intercity Passenger Railroads (T-6)
- Diesel Engine Emission Reductions and Fuel Efficiency Improvements (T-7)
- Acceleration and Integration of Plug-In Hybrid Electric Vehicle Use (T-10)
- Low Carbon Fuel Standard (T-11)
- In-State Production of Biofuels and Biofuels Feedstocks (AW-2)
- Improved Commercialization of Advanced Lignocellulosic Processes (F-7)

In addition to VMT reductions, cleaner vehicles and fuels will also be needed to help Washington meet the transportation-related reductions needed to meet the State's goals. While 'headline' challenge number 5, above, is how to achieve 'less car', this recommendation is about how to get 'cleaner cars' (and other vehicles).

Strategies for clean, lower-carbon fuel includes the **Low Carbon Fuel Standard (T-11)** for transportation fuels (gasoline and diesel) sold in WA, which would reduce carbon intensity of fuels by at least 10% by 2020. Carbon intensity (GHG emissions per unit of energy) would be

measured on a lifecycle (“well-to-wheels”) basis. A Low Carbon Fuel Standard would establish the demand for lower carbon fuels such as biofuels, hydrogen, CNG, LPG and electricity. **In-State Production of Biofuels and Biofuels Feedstocks (AW-2)** would maximize GHG emission benefits from these biofuels and further contribute to reducing fuel imports, as would **Improved Commercialization of Advanced Lignocellulosic Processes (F-7)**, which increases utilization of waste biomass for biofuels. Together these last two options target the production of 250 million gallons of biofuels per year by 2020.

Strategies for cleaner vehicles include **Diesel Engine Emission Reductions and Fuel Efficiency Improvements (T-7)**, which seeks to reduce diesel emissions and the use of diesel fuel in the public and private sectors, both on- and off-road, through promotion and deployment programs for a variety of technologies and practices. These technologies and practices include, among others, anti-idling and fuel efficiency technologies for trucks, use of biodiesel in public and private fleets, replacement of freight handling equipment with battery electric and hybrid electric equipment, reduced fuel use in ferries through engine modifications, positive restraints, shore power, and waste heat recovery.

Acceleration and Integration of Plug-In Hybrid Electric Vehicle (PHEV) Use (T-10) speeds up the deployment of PHEV technology, removes barriers to more rapid adoption, creates initial incentives, and provides for the integration of PHEVs with other energy systems. This strategy aims for PHEVs to account for 10% of cars, SUVs and small trucks’ VMT statewide by 2020.

Improvements to Freight Railroads and Intercity Passenger Railroads (T-6) includes expanded use of anti-idle technologies and practices would reduce locomotive idling.

In order to fund strategies that reduce emissions from transportation sources, flexible and reliable long-term **New Funding Mechanisms (T-0)**, and better use of existing revenue sources, are needed.

7. Invest in Washington's Existing Transportation Infrastructure to Move People and Goods Cleanly and Efficiently.

The ‘most promising’ strategies under this recommendation are:

- New Funding Mechanisms (T-0)
- Transit, Ridesharing, and Commuter Choice Programs (T-1).
- Transportation Pricing (T-3)
- Improvements to Freight Railroads and Intercity Passenger Railroads (T-6)
- Transportation System Management (T-9)

We need to invest differently in transportation infrastructure in order to move people and goods, not just more cars, and we need to use this vital infrastructure in a manner that moves people and goods as efficiently as possible. Re-envisioning our transportation goals, systems and infrastructure in this manner is essential to demonstrating to the public that the investments in

infrastructure are both efficient and effective, and thus worthy of the financial support needed to build, operate and maintain them. **Transportation Pricing (T-3)** seeks to reduce vehicle travel through pricing mechanisms. Such mechanisms include implementation of system-wide variable roadway pricing in major urban areas. They would also include a 15% parking surcharge in the Puget Sound region that increases over time expansion of parking cash-out programs, and a mileage-based automobile insurance program to cover 20% of WA drivers by 2020.

To increase the efficiency of our existing infrastructure, **Transit, Ridesharing, and Commuter Choice Programs (T-1)** provides leadership and resources necessary to help create a transit and ridesharing system that connects activity centers on both an intra- and an inter-regional basis. Specific components include operating support for public transportation, grants for capital programs, subsidized transit fares, traveler information systems, commute trip reduction programs, and VMT reduction innovation grants. **Improvements to Freight Railroads and Intercity Passenger Railroads (T-6)** targets the improvement of efficiency and increase in capacity of Washington's railroad system. Efforts would be undertaken to maximize the amount of freight that can be moved by rail and to improve Sounder and Amtrak capacity and service to shift intercity travelers and commuters from road to rail. **Transportation System Management (T-9)** involves active management of the transportation system to increase operational efficiency, thereby minimizing fuel use and GHG emissions. Strategies include, among others, traveler information and dynamic re-routing, traffic management centers, traffic signal synchronization, managed lanes, incident response efficiency, and optimization in ferry systems.

Again, **New Funding Mechanisms (T-0)** identifies new flexible and reliable long-term funding mechanisms, as well as makes better use of existing revenue sources, in order to fund these other transportation strategies. Revenue tools for immediate consideration include User Fees, Local Option Taxes, and Statewide Revenue Sources

8. Design, Build, Upgrade and Operate New and Existing Buildings and Equipment to Maximize Energy Efficiency.

The 'most promising' strategies under this recommendation are:

- Demand-Side Management (DSM), Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil (RCI-1)
- Targeted Financial Incentives and Instruments to Encourage Energy Efficiency Improvements (Business Energy Tax Credit and Private/Public Efficiency Funds) (RCI-2)
- Promotion and Incentives for Improved Community Planning and Improved Building Design and Construction in the Private and Non-State Public Sectors (RCI-3)
- Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations (RCI-4)
- Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings (RCI-8)

- More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design (RCI-10)
 - Transmission System Capacity, Access, Efficiency, and Smart Grid (ES-6)
 - Combined Heat and Power and Thermal Energy Recovery and Use (ES-7).
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Several strategies support this recommendation to reduce GHG emissions from both the built environment as well as new buildings. While significant progress has been made in the design and construction of new buildings, equipment, appliances, lighting systems, etc.(and more is needed and possible), the existing stock of buildings and equipment hold great promise for often cost effective emission reductions through various retrofit strategies. Key strategies involve channeling the funding for these efficiency improvements. **Demand-Side Management (DSM), Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil** (RCI-1) addresses the non-electric side of the energy efficiency savings, employing a number of different program, funding, and incentive mechanisms. These provide significant emission savings and are generally quite cost-effective due to short pay back periods based on the energy costs that efficiency investments save over time. These DSM activities can work in concert with other RCI strategies to encourage energy efficiency gains across the residential, commercial and industrial sectors, including **Targeted Financial Incentives and Instruments to Encourage Energy Efficiency Improvements (Business Energy Tax Credit and Private/Public Efficiency Funds)** (RCI-2), which establishes targeted financial incentives and instruments to encourage energy efficiency in the development, design, and construction of new and existing energy-using building and building systems.

Two primary mechanisms suggested—business energy tax credits and private/public efficiency funds – also support implementation of programs to improve energy efficiency in new and existing buildings, as described in **Promotion and Incentives for Improved Community Planning and Improved Building Design and Construction in the Private and Non-State Public Sectors** (RCI-3) and **Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations** (RCI-4).

Greater gains can typically be achieved by focusing on efficiency considerations during the initial design of communities and new construction, when it is easier to take advantage of opportunities like **Combined Heat and Power (CHP) and Thermal Energy Recovery and Use** (ES-7). By increasing the overall efficiency of fuel use and by reducing energy losses where facilities are located near heat and power demands, CHP and Thermal Energy Recovery and Use can provide significant GHG emission reductions and energy cost savings.

Supporting strategies include education and certification programs for professionals involved in delivering services in support of RCI and other policy strategies, as well as “carbon labeling” of products and buildings: **Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings** (RCI-8). Another supporting strategy for this recommendation are **More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design** (RCI-10), which increases energy efficiency and saves on energy costs through strengthened standards for new lighting, equipment, appliances and consumer electronic products and

encourages product recycling and reuse. **Transmission System Capacity, Access, Efficiency, and Smart Grid** (ES-6) includes improving efficiency and reducing line losses in the electric transmission and distribution system, and providing support to “smart grid” technologies that optimize the electricity grid and integrate innovative electricity choices such as smart meters for buildings and plug-in hybrids.

9. Deliver Energy from Lower or Non-Carbon Sources and More Efficient Use of Fuels.

The ‘most promising’ strategies under this recommendation are:

- Grid-based Renewable Energy Incentives and/or Barrier Removal (ES-1)
- Distributed Renewable Energy Incentives and/or Barrier Removal (ES-2)
- Efficiency Improvements at Existing Renewable and Power Plants (ES-3)
- Transmission System Capacity, Access, Efficiency, and Smart Grid (ES-6)
- Combined Heat and Power and Thermal Energy Recovery and Use (ES-7)
- In-State Production of Biofuels and Biofuels Feedstocks (AW-2)
- Improved Commercialization of Advanced Lignocellulosic Processes (F-7)
- Rate Structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues) (RCI-5)

Washington needs to continue to maximize efficiency and increase the level of renewable and alternative energy that can be delivered to Washington’s electric grid. **Grid-based Renewable Energy Incentives and/or Barrier Removal** (ES-1) pursues a variety of strategies to increase the level of renewable generation that can be delivered to the Washington State electric grid, taking into account the economic, environmental impacts and system reliability constraints. These strategies aim to assist in integrating intermittent resources (e.g. wind) into the grid, reduce regulatory uncertainty regarding cost recovery, overcome barriers to non-utility generation, and address high transmission costs. The strategies also consider financial incentives for grid-based renewable energy generation that exceeds legal requirements, such as the State’s renewable energy portfolio standard adopted as part of the Energy Independence Act (Initiative I-937). The I-937 standard requires 15% of electricity sales in the year 2020 to be met by renewable energy sources; quantification of this policy strategy considers the emission and cost implications if these strategies are able increase this level to 20%. A complementary strategy, **Distributed Renewable Energy Incentives and/or Barrier Removal** (ES-2) establishes targets for, and helps to overcome specific barriers faced by, distributed renewable energy systems, and thereby spur markets and job creation in Washington State. Sited at, and directly serving, residences and commercial and industrial facilities, distributed renewable energy technologies include, among others, solar photovoltaic systems, solar water heating and space heating systems, wind power systems in rural areas, and geothermal and biomass heat and generation systems. Additional lower and non-carbon sources for delivering energy include **Improved Commercialization of Advanced Lignocellulosic Processes** (F-7) and **In-State Production of Biofuels and Biofuels Feedstocks** (AW-2).

Rate Structures and Technologies to Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues) (RCI-5) supports other RCI strategies by implementing cost recovery rules that “decouple” the level of sales from net revenues earned by investor-owned utilities. The goal is to remove disincentives for utilities to investment in energy efficiency, while not ‘penalizing’ demand side investments made by energy users by not enabling them to recoup investments through lower energy costs. Other recommendations focus on other elements of utility rate design and related technologies—such as tiered (increasing block) rates for electricity and natural gas use and “smart metering”—that are geared toward reducing GHG emissions, often with other benefits as well, such as reducing peak power demand. **Transmission System Capacity, Access, Efficiency, and Smart Grid** (ES-6) calls for a report, based on input from an advisory group, to investigate potential incentives and/or barrier removal to expanding transmission capacity, and how that can maximize or enable emission reductions. General objectives include 1) increasing transmission system capacity for, and access to the grid by, clean energy technologies; 2) improving efficiency and reducing line losses in the electric transmission and distribution system; and 3) providing support to “smart grid” technologies that optimize the electricity grid (and unlock additional renewable resource alternatives) through devices that help manage electricity demand and supply.

Additional actions that support efficiency improvements include **Efficiency Improvements at Existing Renewable and Power Plants** (ES-3), which spurs increased electricity generation at existing renewable projects (e.g. hydro, biomass, solar or wind) and fossil-fueled power plants by supporting operational and equipment changes that result in more electric energy output without increasing the amount of fuel combusted. Policies to encourage improvements at existing plants include policies and principles, new laws and regulations, market-driven incentives, and further study of opportunities for gains in the federal hydro system. **Combined Heat and Power (CHP) and Thermal Energy Recovery and Use** (ES-7) promotes incentives, communications, and permitting procedures to capture the efficiency and emissions benefits of CHP and thermal energy recovery and use in the State. By increasing the overall efficiency of fuel use and by reducing energy losses where facilities are located near heat and power demands, CHP and thermal energy recovery and use can provide significant GHG emission savings.

10. Restore and Retain the Health and Vitality of Washington’s Farms and Forest Lands to Increase Carbon Sequestration and Storage, Reduce the Greenhouse Gas Emissions and Support the Provision of Biomass Fuels.

The ‘most promising’ strategies under this recommendation are:

- In-State Production of Biofuels and Biofuels Feedstocks (AW-2)
- Preservation of Open Space/Agricultural Land (AW-7)
- Agricultural Carbon Management (AW-4)
- Improved Forest Health (F-1)
- Reduced Conversion to Non-forest Cover (F-2)

- Improved Commercialization of Advanced Lignocellulosic Processes (F-7)
 - Expanded Urban and Community Forests (F-8)
-

Washington needs to keep its forests and farms working, healthy, and productive in both storing carbon and producing biofuels. To do so involves strategies to reverse the current trends of degradation of natural systems in both agriculture and forest lands. By protecting agricultural areas from development and utilizing crop management techniques, the carbon in biomass and soils can be maintained and additional release of CO₂e to the atmosphere can be avoided.

Preservation of Open Space/Agricultural Land (AW-7) calls for a 50% reduction by 2020 in the number of acres of agricultural land converted to urban or developed uses each year, relative to historical trends. A complementary strategy is **Agricultural Carbon Management** (AW-4), which increases implementation of farming practices such as no-till/direct seeding, cover cropping, high-residue retention, organic residuals application, improved grazing management, and increased perennial cropping. These actions increase the amount of carbon sequestered and stored in agricultural soils and biomass as a result of increased biomass inputs (either through production, translocation, or residue management strategies) coupled with reduced soil disturbance.

The CAT identified improvements to the health of Washington's forests as a critical first step in capturing numerous GHG emission storage and biomass energy benefits from forests, as well as reducing GHG emissions from catastrophic fires. Forests store relatively large amounts of carbon in biomass and soils originating from atmospheric carbon dioxide. When forests are converted to development or urban uses, the stored carbon is emitted as a result of tree and vegetation removal and soil disturbance. Subsequent developed or urban land uses generally contain lower carbon storage levels than the original forested land, resulting in a net loss of carbon to the atmosphere. **Reduced Conversion to Non-forest Cover** (F-2) calls for a 70% reduction by 2020 in the number of acres of forestland expected to be converted to urban or developed uses each year. **Expanded Urban and Community Forests** (F-8) enables Washington's local governments, utilities and large urban landowners to protect, plant and maintain an additional 3 million urban or community trees by 2020. Tree planting and maintenance in urban and suburban areas have multiple benefits, including avoided GHG emissions due to energy conservation (primarily reduced demand for cooling in hot weather) and enhanced carbon sequestration in trees. To the extent that urban and community forests increase the desirability of more dense urban living, they may also contribute to reducing transportation related emissions. Other benefits of urban and community forests include improving air quality, reducing storm water runoff, and aesthetics. **Improved Forest Health** (F-1) implements fuel reduction treatments on 25% of forest acres identified as being at high-risk of catastrophic wildfires by 2020, with the long term aim of treating all such acres by 2050. An estimated 3 million acres of Washington's forests are at risk of catastrophic wildfires as a result of unnaturally high fuel loads (i.e., live and dead biomass). Forest fire mitigation to improve forest health reduces fuel loads through thinning and prescribed burns. The biomass removed during treatment can be used to produce bio-energy or durable wood products, leading to avoided fossil fuel emissions or long-term storage of carbon in wood products. The potential for either of these benefits is lost when forest biomass instead is burned during wildfires.

Healthy farms and forests can provide the feedstocks to support increased production of 250 million gallons of biofuels per year by 2020. Both agricultural and forestry feedstocks would be used to meet that level of production. **Improved Commercialization of Advanced Lignocellulosic Processes** (F-7) details specific steps and opportunities for using feedstocks from the forestry sector and calls for the construction of both a pilot and commercial scale bio-refinery within 10 years. **In-State Production of Biofuels and Biofuels Feedstocks** (AW-2) targets the increased utilization of waste biomass for biofuels from agricultural sources, increased production of high biomass perennial feedstock crops (80,000 acres by 2020) and sustainable production practices on of corn and oil seed crops (at least 200,000 acres by 2020).

11. Reduce Waste and Washington's Emissions of GHGs through Improved Product Choices and Resource Stewardship.

The 'most promising' strategies under this recommendation are:

- Significant Expansion of Source Reduction, Reuse, Recycling and Composting (AW-3)
- In-State Production of Biofuels and Biofuels Feedstocks (AW-2).
- Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings (RCI-8)
- More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design (RCI-10)

The CAT strongly supports **Significant Expansion of Source Reduction, Reuse, Recycling and Composting** (AW-3) because most Washington cities now have strong recycling programs that can be enhanced, there is a low cost/ton for reductions and many co-benefits, and this is a also significant opportunity to engage the public in combating global warming at the household level. This strategy sets targets to reduce the total amount of household and business waste by 15%, recycle at least 50% of the waste remaining, and compost over 90% of compostable organics through expanded source reduction, reuse, recycling, and composting of household, business, industrial, agricultural, and construction-related waste streams. In addition to traditional recycling programs, this strategy proposes to take advantage of market and business-based activities.³⁵

In order to provide consumers with a better understanding of the impacts of their choices and be empowered to make better choices, enhanced public education and outreach to support the long-

³⁵ A partial list of these approaches includes: source reduction (waste prevention) initiatives; expanding existing and encouraging more reuse, recycling, composting and processing in businesses; establishing product stewardship programs; using environmentally preferable procurement practices; encouraging cradle-to-cradle design and manufacturing; facilitating safe byproduct "synergy" strategies; achieving a reduction of toxics in packaging and products to make them safer to manufacture, use and recycle while increasing their value and use in the market place; increasing closed-loop recycling and the percentage of recycled-content in products, and expansion of disposal bans. Additional detail on this and all strategies is available in Appendix **XX**.

term success of Washington's mitigation actions should be provided through **Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings** (RCI-8). Education and certification programs for professionals involved in delivering services in support of RCI and other policy strategies considered by the CAT should also be developed and implemented. "Carbon labeling" of products and buildings should be considered and evaluated as to their potential effectiveness and how this might be done in a consistent and verifiable manner, possibly on a regional or federal level.

Additional ways to support improved product choices is **More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design** (RCI-10), which increases energy efficiency through strengthened standards for new lighting, equipment, appliances and consumer electronic products and encourages product recycling and reuse, thus avoiding the generation of solid waste and the production and emissions of toxic materials. Increased utilization of waste is accomplished through **In-State Production of Biofuels and Biofuels Feedstocks** (AW-2), which targets waste biomass for biofuels.

12. Give the State Sufficient Resources to Stay a Leader Regionally and Nationally and to Fulfill Its Responsibilities for Structuring and Guiding Implementation of Emission Reduction Strategies

There is a critical need for adequate financial resources for the State to fulfill its responsibilities associated with these recommendations. The transformation to the Clean Economy will involve considerable investment and other expenses for many sectors of the economy as well. Adapting to the impacts from climate change will be also be expensive, and the costs of inaction in reducing the emissions that cause these impacts will raise the cost of adapting to climate change ever more dramatically. Accepting the urgency to tackle global warming requires reprioritizing budgets, raising new revenues, and appropriating the funding necessary to accomplish the important work required by both governments and businesses to respond meaningfully and successfully.

The CAT recognizes that its recommendations call for significant work to be accomplished by the State, and that the State requires sufficient resources to further develop, implement, and maintain this Comprehensive Climate Approach, and to provide and sustain the critical institutional infrastructure and analytic support needed to continue to lead regionally and nationally.

Therefore, the CAT recommends that the State should have the resources to accomplish these functions and tasks:

- Use incentives modestly and standards judiciously to jump-start, accelerate, and sustain change

For those areas of the economy that emissions trading markets will not reach, the State should investigate how modest incentives might accelerate the business case for change towards the Clean Economy, and to leverage larger private investments in innovative and promising approaches. The State should also have the capacity to develop and use standards and regulations judiciously, along with incentives to promote and sustain this change as businesses, investors, and individuals respond to the need to reduce emissions.

While State ‘start-up’ support to accelerate the initial transition away from a carbon-based economy is crucial, this does not necessarily mean the State’s role might not change over the long-term. Once the initial governmental support described above accomplishes its aims, market-based approaches can take over and drive many of the choices and investments which will reduce carbon throughout the economy over the long term. The role of the State could then be transformed once the market is up and functioning, and incentives have done their job as well. While it is premature to describe precisely how the State will need to support reductions past 2020 at this time, remaining flexible about the State’s evolving role can only help ensure the State is learning and adapting as this Comprehensive Approach is implemented.

- **Commit sufficient resources to understand how best to integrate regional and national carbon-control programs into Washington’s overall economy**

The State must commit sufficient resources to understand how to best integrate the regional cap-and-trade program being designed through the WCI, and emerging federal proposals, into Washington’s overall economy. Decisions are required in 2008 and 2009 to build the market system; the window of opportunity to influence the development of the regional cap-and-trade program is now. As work products emerge from WCI, the State should undertake robust in-state stakeholder outreach and engagement in order to understand perspectives on critical design elements of the regional cap-and-trade program.

- **Support capacity building for local and tribal governments**

Many actions of the Comprehensive Climate Approach will require local implementation or site-specific attention to be successful. The State should support capacity building for local and tribal governments to fulfill their responsibilities in assessing emissions, identifying emission reductions opportunities and integrating adaptation and emissions reduction efforts in current development and transportation planning and/or natural resource systems restoration.

- **Support research, technology transfer and commercialization of promising technologies and applications.**

The State should be technology-neutral in its establishment of performance targets, but not disinterested in technology development. Promising technologies and applications can benefit from state-support of research, technology transfer, and commercialization, which can stimulate University-level participation and help private sector ventures compete in a global marketplace for solutions that are applicable not just for Washington, but are competitive for export elsewhere as well.

- Commit sufficient resources to further develop the Climate Change Challenge recommendations

The State must commit sufficient resources to further develop these recommendations for a Comprehensive Climate Approach, support education, workforce training and public outreach, and begin to incorporate climate considerations into State operations. The CAT recommends that it continue its work throughout 2008 to refine the most promising strategies in this comprehensive road map into policy instruments for consideration by the Legislature or State agencies in 2009 and beyond.

How Expensive Will Meeting the Goals be and How Might These Costs be Covered?

The CAT recognizes that there are often significant public and private investments associated with many of its recommendations listed above. Some of these investments are to support development of essential government functions and programs; others are to provide incentives to jump-start investments in promising and proven technologies, and to stimulate changes in business practices or alter consumer behaviors; others are to invest in necessary human and physical infrastructure without which neither the economy nor the climate will benefit. As well, significant private investments will be needed to invent, provide and actually deploy the new technologies, develop and supply the alternative power options, create the new communities and otherwise pay for that which must be accomplished to build the Low Carbon Economy and reduce GHG emissions. The payback on these private and public investments and choices will often be accompanied by energy savings and other significant co-benefits. The investments are crucial to combat global warming and to compete in the global Clean Energy economy.

The CAT has estimated the net present value costs and benefits of many of the TWG strategies and finds that many of them, seen in this light, are relatively inexpensive or even have positive financial returns. Others are not so easily quantified or, like building appropriate transportation infrastructure and providing alternative transportation options, or changing community development patterns, can involve large amounts of public and private funding. Securing this up-front investment funding is generally a daunting exercise, and while estimating the funding needs can be done to some degree, as the CAT has done, doing so does not imply that this funding will be easy to secure and deploy. Determining how to finance initiation of and support for this economic transition will be an important key to success. There are several models to consider in assessing funding sources, mechanisms, and what might be the best approach for Washington. The transition itself will create wealth and can generate revenue, and there may be ways to channel that revenue and/or reprogram existing revenue to support and accelerate the transition. Reductions in GHG emissions will come more quickly once market forces, revenue reallocation approaches and revenue-investment generating systems have been determined and aligned. Washington needs to take the first step of identifying and then selecting among these different approaches.

The CAT has just begun its conversation regarding how these funds might be raised. Several of the TWG strategies, such as T-0 (New Funding Mechanisms) and T-3 (Transportation Pricing) are expressly concerned with using prices to change behavior and raise funds for needed

investments. The CAT realizes that this discussion is essential to provide policy makers with information and strategies on how to raise necessary public funds, how to most effectively leverage private funding and how to use pricing to support meeting the State's goals. The CAT believes that continuing this investigation is a critical component of what needs to be accomplished in 2008.

VI. Through Immediate and Sustained Action, Continued Learning, and a Flexible Approach, Washington Can Meet the Climate Change Challenge

In order to achieve the emissions reductions, economic opportunities and other significant additional benefits from this Comprehensive Climate Approach, Washington must maintain sustained action over time to meet its goals in 2020, 2035 and 2050. The CAT has identified some fundamental principles that can help ensure that we will continue moving in the right direction and be able to sustain these comprehensive efforts to mitigate emissions and adapt to the inevitable impacts of climate change successfully.

- Washington should emphasize its **'historic economic strong suits, comparative advantages, and natural landscapes'** when deciding where to invest and what to support in seeking reductions, pursuing efficiencies and developing alternative technologies. These could include solar, tidal, and bio energy; information technology, intellectual property and smart grid design, etc. Washington is a national leader in international trade and should consider any investments in technology and energy solutions with a eye on providing them to the world, not just within our borders.
- Washington will need to **'leverage going quickly with going smartly'**. In order to act as quickly as possible to the threat that global warming represents to Washington, the State should aggressively implement those strategies deemed viable now while being cognizant of the uncertainties and potentially unintended consequences that may be associated with them. When dealing with something as complex as transforming to a Low Carbon Economy, the Legislature and the Governor should make being both "quick and smart" a priority as they strike a balance between the unavoidable tension that arises between moving forward immediately or waiting until additional information is available. As long as we seize each substantive opportunity to act in the present that builds out this comprehensive approach, we have the time and now, with this report, the road map, to move forward in the future in a thoughtful and deliberate manner. The CAT sees this thoughtful decision-making as a means to improve our decisions, not a pretext for delay.
- Like managing intentional interventions in any complex system, Washington needs to have **'an adaptive management attitude and a long term commitment'** in order to continue learning about what still needs to be done, to increase understanding from what has been previously implemented, and to change direction or programs as necessary over time to achieve substantive results. Reducing GHG emissions and adjusting to the impacts of climate change will be a long-term effort. We will not build the low carbon economy with one set of recommendations or programs and then be done with it. The CAT also realizes that it has not identified nor analyzed all of the possible strategies through which each of the major sectors of the economy could change in order to reduce emissions; nor has it identified all the potential partnerships and opportunities that will emerge to accomplish the State's goals; nor has it estimated, with whatever degree of accuracy broader economic models may be able to display, the overall interactions within

the economy of attempting to reduce carbon emissions sufficient to meet the State's goals in this comprehensive way.

The CAT has also not quantified beyond the work done to date by the State of the costs of delay or inaction in implementing these strategies; such delay would inevitably contribute to even greater impacts from global warming. The study commissioned by the Departments of Ecology and Community, Trade and Economic Development on the Economic Impacts of Climate Change (2006) suggests that every aspect of Washington's \$268 billion economy stands to be impacted by climate change.³⁶ All of this underscores that those of us engaged in and committed to reaching the State's goals will need to continually learn from the actual changes that occur in the economy, from the evolving science regarding climate stabilization, and the desires of future generations for productive and meaningful lives in order to keep on the right track for the multi-decade effort this will take. Informed decision-making can maximize our chances for short, mid and long-term emission reduction and economic success, and minimize the avoidable disruption that such a dramatic change in the economy could otherwise represent, provided that continued analysis does not become a substitute for significant and meaningful action to reduce as many emissions as possible as quickly as possible.

Implementing what is called for in this report – in light of these principles – will help Washington do its share of emissions reductions needed to stabilize the climate worldwide, and can thus contribute to keeping the unavoidable impacts, and costs, of global warming to as small as possible.

Next Steps for 2008 and Beyond

In this interim report, the CAT has laid out a comprehensive path for Washington to address its part of the Climate Change Challenge declared in the Governor's Executive Order. The CAT has recommended several major actions that should be initiated immediately and others that will need to be implemented over the longer term. The CAT has identified the specific implementation pathways for some, but not all, of the policies and programs that it has recommended in this report. The next phase of work for the State will be act on those that are ready for it to do so and to translate the others into specific policies and programs that, when authorized, can then be implemented.

The State is currently doing this for some of these recommendations at the present time and will continue to be extremely active in 2008 and 2009 both within the State, as well as regionally and nationally. Continued focused use of and support for the CAT through 2008 can help the State with this effort and, using this roadmap as a guide, can assist in the development of a much more specific blueprint that can drive implementation of this Comprehensive Climate Approach over the next several years. Development of this blueprint should entail further identifying the critical next steps, understanding the interactions among strategies and recommendations, sequencing implantation of the most promising strategies, and identifying their costs and benefits and

³⁶ The CAT recognizes that these costs, in light of how large they actually will become, underscore the compelling need for action to occur sooner rather than later in implementing these recommendations.

implementation mechanisms in a more rigorous manner. Given what will need to happen in 2008 and 2009 to keep the State moving aggressively and purposely forward on building the long term framework needed to reach its goals, a comprehensive package of substantive proposals will be needed for consideration by the Governor and the 2009 Legislature. Thus, given the importance of continued engagement in the coming year on determining the next round of specific actions that the State should take to best reduce GHG emissions, the CAT views this report as an interim report. The CAT believes that its interim report provides a strong foundation for this blueprint and urges the State to continue to make use of the CAT in 2008.

So that the specific work needed in 2008 can be identified, prioritized and accomplished, the CAT requests that Ecology and CTED develop an explicit workplan for the next phase of this work with action steps, a timeline, and assigned responsibilities for further developing and preparing for implementation the most promising strategies and recommendations of the CAT. The State should identify available resources and expertise to do this and direct them to get this work done in 2008. In addition, the CAT requests that the State continue assessing how adaptation to the inevitable impacts of global warming should proceed, and how mitigation and adaptation can best be linked together when appropriate to take advantage of the synergistic possibilities the work of the CAT and the PAWG's have created. The CAT is ready and willing to help as requested and supported by the State

As well, the State is going to be actively involved through the WCI in the actual design of a regional cap-and-trade market mechanism. The State will be engaging interested in-state parties on the approaches and decisions that effort will entail, which will surely help the State make better informed decisions. While the interests that the WCI process encompasses do not expressly overlap with the CAT's, the CAT recognizes the value of the State reaching out in 2008 to seek input from in-state interests on the design of the regional cap-and-trade system and encourages the State to do so in a structured and transparent manner. The CAT recognizes that Washington is one of many states and provinces at the negotiating table and any convergence of in-state opinion should be viewed as a way to inform the state's negotiators, not dictate the actual outcome of these negotiations.

Conclusion

Washington faces enormous risks and substantial opportunities from a warming climate and the urgent need to develop a Low Carbon Economy. In order to reduce that risk and seize this opportunity, we must act now decisively, and continue to act thoughtfully for many years to come. Our forests, our farms, our fish, our power supply, our marine and terrestrial ecosystems, our heritage and culture, our communities and indeed, in a most profound way, our entire quality of life depend on us doing so. The Climate Advisory Team believes that the people of the State of Washington, across all sectors, in all communities, and at all levels and types of governments, will demonstrate the vision, foresight and commitment to provide the leadership, take the actions, make the decisions and invest the resources to do our share of reducing GHG emissions, and build a vibrant Clean Economy as we do so. The CAT hopes that this interim report gives the people of Washington the road map for action that affirms what we need to do, and gives us all the confidence to know that by working together we will indeed be successful.

The members of the CAT appreciate the privilege that they have been given by the Governor to be on the CAT and remain committed as individuals and as a team to help further develop and advance these recommendations with the same spirit of cooperation and intellectual integrity in which they were developed. Our collective effort is surely a strong sign that, by working together, we can meet the climate challenge we face from global warming.

VII. Mitigation Strategies for Washington (Tables 4–4.5)

The following tables are referred to on page 17, above. The first is a summary of the integrated results of the complete suite of mitigation strategies, accounting for overlaps. The next five tables contain the complete summary list of strategies by sector, along with the GHG emission reduction and cost savings for each individual strategy, not including overlaps, where quantified and anticipated assuming full implementation. These strategies were developed by the TWGs and analyzed for their net GHG emission reduction potential in million metric tons carbon dioxide equivalent ((MMTCO₂e) using IPCC 100 yr global warming potential, reported for 2012, 2020, and cumulatively 2008-2020. The output of the collective strategies was aggregated; to avoid double counting of GHG emission reduction potential and cost, interactive effects were estimated and emission and cost totals reflect those overlaps; therefore, the total emissions reductions are lower than the sum of the results of individual strategies.

Net present value (NPV) costs (or cost savings) is reported for the period 2008-2020 in 2006 constant dollars, using a 5% real discount rate.³⁷ Positive numbers represent strategies with net costs; negative numbers represent numbers with net cost savings. Cost per metric ton of CO₂ equivalent emissions reduced (or removed) is calculated in units of \$/MTCO₂e. This figure represents the NPV cost divided by the cumulative emission reductions, both over the 2008-2020 period. Strategies which have net cost savings, as well as strategies noted as ‘most promising’ by the CAT, are noted in the tables, below.

Further detailed information about each strategy, including additional benefits and design details, is found in the Policy Option Document from each TWG found in the Appendix.

³⁷ The general approach of direct (NPV) cost and cost effectiveness analysis is used, as widely applied to GHG mitigation policy options. Included are the direct, economic costs from the perspective of the state as a whole (e.g. avoided costs of electricity rather than consumer electricity prices). In contrast to macroeconomic analysis, this bottom-up approach is relatively transparent and capable of reflecting the costs (and cost savings) associated with an individual policy option.

Table 4: Summary of Anticipated GHG Savings and Costs (or Cost Savings)

Sector/ Mitigation Option	GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008- 2020)	Net Present Value 2008- 2020
	(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)
Transportation	2.5	14.8	77.5	\$1,125
Recent Actions	0.7	3.8	21.9	-\$2,235
CAT Policy Options		11.0	55.6	\$3,360
Energy Supply	1.1	7.9	38.2	\$792
Recent Actions	0.0	4.0	15.9	\$582
CAT Policy Options	1.1	3.9	22.3	\$210
RCI	4.6	12.4	86.1	-\$2,278
Recent Actions	2.6	5.4	43.9	-\$1,400
CAT Policy Options		7	42.2	-\$878
Agriculture / Waste	2.0	8.8	52.4	-\$77
CAT Policy Options	1.97	8.84	52.42	-\$77
Forestry	2.0	7.5	46.4	\$298
CAT Policy Options	2.0	7.5	46.4	\$298
Overlap among sectors	-0.2	-2.8	-28.3	-\$809
Biofuels (AW-2, F-7, T-11)	0.0	-2.4	-8.3	-\$907
Net electricity supply/demand interactions between ES, RCI, and Transportation (T-10 hybrid-electric vehicle) options	0	0.2	-16.5	
Combined Heat and Power in Forest industries (F-6) and Overall (ES-7)	-0.13	-0.6	-3.4	\$85
Urban forestry (F-8) and Residential/Community energy efficiency (RCI)	-0.01	-0.02	-0.1	\$13
Totals	12.0	48.7	272.3	-\$949

Table 4.1: Transportation Sector Policy Strategies

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Transportation Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Transportation		2.5	14.8	77.5	\$1,125	
Recent Actions		0.7	3.8	21.9	-\$2,235	
Motor Vehicle Emissions Standards Act			3.4	18.3	-\$2,600	
Biofuels (Fuel Quality Standards Act)†			0.1	1.2	\$307	
State Fleet Efficiency			0.0	0.6	\$58	
Cleaner Energy Act			0.2	1.8		
CAT Policy Options (after adjusting for overlaps)			11.0	55.6	\$3,360	
T-0	New Funding Mechanisms ‡			Not quantified		
Develops new flexible and reliable long-term funding mechanisms, as well as makes better use of existing revenue sources, in order to fund strategies that reduce emissions from transportation sources, such as many of those noted below. Revenue tools for immediate consideration include User Fees, Local Option Taxes, and Statewide Revenue Sources.						
T-1	Transit, Ridesharing, and Commuter Choice Programs ‡	1.2	3.6	23.6	Not quantified	
Provides leadership and resources necessary to help create a transit and ridesharing system that connects activity centers on both an intra- and an inter-regional basis. Specific components include operating support for public transportation, grants for capital programs, subsidized transit fares, traveler information systems, commute trip reduction programs, and (vehicle miles traveled) VMT reduction innovation grants.						
T-2	State, Regional, and Local VMT and GHG Reduction Goals and Standards ‡	1.3	6.8	36.7	Not quantified	
Establishes a schedule of targets for reducing statewide per capita VMT and working alongside local governments and regional planning organizations to achieve those targets. Compared to a business-as-usual baseline, these goals would target a reduction in statewide annual per capita VMT 18% by 2020, 30% by 2035, and 50% by 2050. A number of the other policy options would contribute to meeting these goals.						
T-3	Transportation Pricing ‡	0.1	1.0	6.2	Not quantified	
Seeks to reduce vehicle travel through pricing mechanisms. Such mechanisms include implementation of system-wide variable roadway pricing in major urban areas and a 15% parking surcharge in the Puget Sound region, increasing to 20% by 2009. They would also include expansion of parking cash-out programs, and a mileage-based automobile insurance program to cover 20% of WA drivers by 2020.						
T-4	Promotion of Compact and Transit-Oriented Development ‡	0.3	1.6 / 3.8	8.9 / 20.8	Not quantified	
Ensures that growth management plans promote compact and transit-oriented development to reduce VMT and GHG emissions. Such actions would involve new incentives and requirements, including amendments the Growth Management Act, and would be designed to reduce urban area VMT by 7%-15% in 2020 and by 25-50% in 2050, compared to baseline levels.						
T-5	Quantification of GHG Impacts of Transportation Plans, Programs, & Projects			Not quantified		
Requires that all significant transportation system plans, programs, and projects be evaluated for their contribution to GHG emissions. Current models would be improved, and new models developed, to provide more accurate estimates of changes in GHG emissions resulting from proposed plans, programs, and projects.						
T-6	Improvements to Freight Railroads and Intercity Passenger Railroads ‡	0.0	0.1	0.7	Not quantified	

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness	
Transportation Sector Policy Options		(MMtCO _{2e} /yr)	(MMtCO _{2e} /yr)	(MMtCO _{2e})	(Million \$)	(\$/tCO _{2e})	
Targets the improvement of efficiency and increase in capacity of Washington's railroad system. Efforts would be undertaken to improve freight railroad systems to maximize the amount of freight that can be moved by rail and to improve Sounder and Amtrak capacity and service to shift intercity travelers and commuters from road to rail. Expanded use of anti-idle technologies and practices would reduce locomotive idling.							
T-7	Diesel Engine Emission Reductions and Fuel Efficiency Improvements ‡	0.2	1.0	5.1	\$170	\$33	
Seeks to reduce diesel emissions and the use of diesel fuel in the public and private sectors, both on- and off-road, through promotion and deployment programs for a variety of technologies and practices. These technologies and practices include, among others, anti-idling and fuel efficiency technologies for trucks, use of biodiesel in public and private fleets, replacement of freight handling equipment with battery electric and hybrid electric equipment, reduced fuel use in ferries through engine modifications, positive restraints, shore power, and waste heat recovery.							
T-8	Bicycle and Pedestrian Infrastructure Improvements	0.1	0.2	1.3	Not quantified		
Prioritizes funding for transportation facilities that support biking and walking, and provides significant new taxing authority for local government to support these priorities. Additional policies at the state and local level would require that projects are designed to encourage biking and walking needs. Overall, this policy targets an increase in the bicycle and walking mode share (all trips) in WA urban growth areas to 15% by 2020.							
T-9	Transportation System Management ‡					Not quantified	
Involves active management of the transportation system to increase operational efficiency, thereby minimizing fuel use and GHG emissions. Strategies include, among others, traveler information and dynamic re-routing, traffic management centers, traffic signal synchronization, managed lanes, incident response efficiency, and optimization in ferry systems.							
T-10	Acceleration and Integration of Plug-In Hybrid Electric Vehicle Use ‡	0.2	1.0	5.3	\$2,007	\$380	
Speeds up the deployment of PHEV technology, removes barriers to more rapid adoption, creates initial incentives, and provides for the integration of PHEVs with other systems. This strategy aims for PHEVs to account for 10% of light-duty VMT statewide by 2020.							
T-11	Low Carbon Fuel Standard	0.4	3.6	15.2	\$1,801	\$119	
Creates a Low Carbon Fuel Standard for transportation fuels (gasoline and diesel) sold in WA that would reduce carbon intensity of fuels by at least 10 percent by 2020. Carbon intensity (GHG emissions per unit of energy) would be measured on a lifecycle ("well-to-wheels") basis.							
T-12	Zero Emission Vehicle Standards	0.1	0.4	1.8	\$446	\$246	
Involves adopting the Zero Emission Vehicle (ZEV) standard, a component of the California vehicle emission standards that require large vehicle manufacturers to produce and sell zero emitting vehicles. Expected technology is either battery electric or fuel cell vehicles. In addition, this strategy would promote alternatives to HFC 134a, the standard refrigerant used in vehicle air conditioning systems and a greenhouse gas with high global warming potential.							
Overlap among Transportation options		-1.8	-8.2	-49.3	-\$1,064		
Key	(*) denotes an option with net cost savings						
	(‡) denotes an option determined to be most promising						

Table 4.2: Energy Sector Policy Strategies

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Energy Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Energy Supply		1.1	7.9	38.2	\$792	n/a
Recent Actions		0	4.0	15.9	\$582	
GHG Performance Standards (SB 6001)			0	0		
Energy Independence Act (I-937) RPS			4.0	15.9	\$582	
CAT Policy Options			3.9	22.3	\$210	
ES-1	Grid-based Renewable Energy Incentives and/or Barrier Removal ‡		3.1	17.2	\$668	\$39
<p>Pursues a variety of strategies to increase the level of renewable generation that can be delivered to the Washington State electric grid, taking into account the economic, environmental impacts and system reliability constraints. These strategies aim to assist in integrating intermittent resources (e.g. wind) into the grid, reduce regulatory uncertainty regarding cost recovery, overcome barriers to non-utility generation, address high transmission costs, and consider financial incentives for grid-based renewable energy generation that exceeds legal requirements, such as the state's renewable energy portfolio standard adopted as part of the Energy Independence Act (Initiative I-937). The I-937 standard requires 15% of electricity sales in the year 2020 to be met by renewable energy sources; quantification of this policy option considers the emission and cost implications if these strategies are able increase this level to 20%.</p>						
ES-2	Distributed Renewable Energy Incentives and/or Barrier Removal ‡		0.3	2.3	\$135	\$135
<p>Establishes targets for, and helps to overcome specific barriers faced by, distributed renewable energy systems, and thereby spur markets and job creation in Washington State. Sited at, and directly serving, residences and commercial and industrial facilities, distributed renewable energy technologies include, among others, solar photovoltaic systems, solar water heating and space heating systems, wind power systems in rural areas, and geothermal and biomass heat and generation systems.</p>						
ES-3	Efficiency Improvements at Existing Renewable and Power Plants ‡		0.7	4.9	Not quantified	
<p>Spurs increased electricity generation at existing renewable projects (e.g. hydro, biomass, solar or wind) and fossil-fueled power plants by supporting operational and equipment changes that result in more electric energy output without increasing the amount of fuel combusted. Policies to encourage improvements at existing plants include policies and principles, new laws and regulations, market-driven incentives, and further study of opportunities for gains in the federal hydro system.</p>						
ES-4	Technology Research & Development, Plus Technology-Focused Initiatives		Not quantified			
<p>Drives advances in technologies that provide cleaner energy supplies and lowers emissions from existing fossil fuel energy sources and encourages deeper investment in implementation opportunities for these new technologies. The core element of this strategy is the establishment of an emerging energy technology program by strengthening an existing program, such as the Washington Technology Center, or by creating a new stand-alone entity.</p>						
ES-5	CCSR (including pre and post-combustion) Incentives, Requirements and/or Enabling Policies Plus R&D		Not quantified			
<p>Calls for a report, by one or more advisory groups, to either the Governor or the legislature identifying the various regulatory and/or legal barriers to the commercialization of carbon dioxide (CO₂) capture and storage or reuse (CCSR) projects (i.e., for coal, natural gas, and biomass) and estimating the potential for GHG reductions in Washington through these technologies and practices. CCSR is a process consisting of the separation of CO₂ from industrial and energy-related sources, transport to a storage location and long-term isolation from the atmosphere. This effort builds upon the rulemaking underway pursuant to Engrossed Substitute Senate Bill 6001 (ESSB 6001), which created a process for developing regulatory requirements for carbon capture and sequestration plans for new electricity generation.</p>						

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Energy Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
ES-6	Transmission System Capacity, Access, Efficiency, and Smart Grid ‡					Not quantified
Calls for a report, based on input from an advisory group, to investigate potential incentives and/or barrier removal to expanding transmission capacity, and how that can maximize or enable emission reductions. General recommendations include 1) increasing transmission system capacity for, and access to the grid by, clean energy technologies; 2) improving efficiency and reducing line losses in the electric transmission and distribution system; and 3) providing support to “smart grid” technologies that optimize the electricity grid (and unlock additional renewable resource alternatives) through devices that help manage electricity demand and supply.						
ES-7	Combined Heat and Power (CHP) and Thermal Energy Recovery and Use *‡		2.1	12.1	-\$317	-\$26
Promotes incentives, communications, and permitting procedures to capture the efficiency and emissions benefits of CHP and thermal energy recovery and use in the State. By increasing the overall efficiency of fuel use and by reducing energy losses where facilities are located near heat and power demands, CHP and thermal energy recovery and use can provide significant GHG emission savings. Policies can be adopted to encourage these resources through streamlined permitting (without compromising other environmental goals), by ensuring that the full cost (including related electric energy transmission and distribution infrastructure costs plus transmission losses) of the alternative technology generation is compared to the cost of generating electricity at a CHP site. Other policies include financial incentives, such as loan guarantees and tax credits; Oregon’s Business Energy Tax Credit (BETC) program and recent updates to Oregon’s UM1129 provide useful examples for Washington to consider.						
Overlap among ES options (and with recent actions)			-2.3	-14.2	-\$276	
Key	(*) denotes an option with net cost savings					
	(‡) denotes an option determined to be most promising					

Table 4.3: Residential, Commercial and Industrial Sector Policy Strategies

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Residential, Commercial and Industrial Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Residential, Commercial and Industrial		4.6	12.4	86.1	-\$2,278	
Recent Actions		2.6	5.4	43.9	\$1,400	
RCI-1: Existing Gas Utility DSM Spending			0.2	1.7		
State Green Building Standard			0.2	1.3		
Building Codes			0.5	4.5	TBD	
Appliance Standards			0.5	5.1	TBD	
Energy Independence Act (I-937) - Efficiency			3.9	31.3	-\$1,400	
CAT Policy Options (total after adjusting for overlap)		2.0	7.0	42.2	-\$878	-\$21
RCI-1	Demand-Side Management (DSM) Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil *‡	0.6	2.7	15.6	-\$498	-\$32
Employs a number of different program, funding, and incentive mechanisms to increase the investment in demand-side management programs for natural gas, propane, and fuel oil. Among the key recommendations are that gas utilities obtain 100 percent of cost-effective, achievable DSM savings in their service territories by the year 2020, and that DSM programs for LPG and fuel oil customers be instituted so as to achieve a similar level of performance. These DSM activities can work in concert with other RCI strategies to encourage energy efficiency gains across the residential, commercial and industrial sectors.						
RCI-2	Targeted Financial Incentives and Instruments to Encourage Energy Efficiency Improvements (Business Energy Tax Credit and Private/Public Efficiency Funds) ‡					Not quantified separately
Establishes targeted financial incentives and instruments to encourage energy efficiency in the development, design, and construction of new and existing energy-using buildings and building systems. Two primary vehicles are suggested—business energy tax credits and private/public efficiency funds—that support implementation of programs to improve energy efficiency in new and existing buildings (RCI-3 and RCI-4).						
RCI-3	Promotion and Incentives for Improved Community Planning and Improved Design and Construction in the Private and Non-State Public Sectors *‡	0.5	2.0	11.5	-\$193	-\$17
Uses a combination of financial and other incentives, plus regularly-revised performance targets, to induce the owners and developers of buildings and the communities in which they are located to build and operate new and substantially-renovated buildings and communities that produce markedly lower GHG emissions than existing buildings and communities (reductions of 50 percent or more by 2020). Education and other resources provided to building industry professionals can help achieve the desired level of building performance. A variety of policy and administrative levers should be used to promote and provide incentives for community planning that incorporates GHG emissions considerations, and to discourage the construction of communities that do not support GHG emissions reduction goals.						
RCI-4	Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations *‡	1.0	4.2	24.2	-\$529	-\$22
Promotes and provides incentives for the improvement of the resource (energy, water, and other) efficiency of the existing building stock, emphasizing both retrofitting of existing systems and building operations, maintenance, and occupant behavior. A variety of approaches to measuring, monitoring, and providing information on the efficiency of buildings are used in this option, together with incentives for building owners and others, in order to induce a reduction in GHG emissions of an average of 20 percent in 50 percent of Washington buildings by 2020.						
RCI-	Rate structures and Technologies to	0.1	0.4	2.9	-\$226	-\$78

Residential, Commercial and Industrial Sector Policy Options		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
5	Promote Reduced GHG Emissions (including Decoupling of Utility Sales and Revenues) *‡					
Supports other RCI options by implementing cost recovery rules that “decouple” the level of sales from net revenues earned by investor-owned utilities. The goal is to remove disincentives for utilities to investment in energy efficiency. Other recommendations focus on other elements of utility rate design and related technologies—such as tiered (increasing block) rates for electricity and natural gas use and “smart metering”—that are geared toward reducing greenhouse gas emissions, often with other benefits as well, such as reducing peak power demand.						
RCI-6	Provide Incentives to Promote and Reduction of Barriers to Implementation of Renewable Energy Systems			Quantified in coordination with ES TWG. See ES-2.		
[See ES-2]						
RCI-7	Provide Incentives and Resources to Promote and Reduction of Barriers to Implementation of Combined Heat and Power and Waste Heat Capture			Quantified in coordination with ES TWG. See ES-7		
[See ES-7]						
RCI-8	Consumer Education Programs, Including Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings ‡			Not quantified		
Provides for enhanced public education and outreach to support the long-term success of Washington’s mitigation actions. Education and certification programs for professionals involved in delivering services in support of RCI and other policy options considered by the CAT should also be developed and implemented. “Carbon labeling” of products and buildings should be considered and evaluated, including consideration of how this might be done in a consistent and verifiable manner, possibly on a regional or federal level.						
RCI-9	Identification of GHG Emissions Impacts and Measures to Avoid, Minimize, or Mitigate them for Projects Requiring Government Review, and in Designing Government Rules and Regulations			Not quantified		
Requires identification of the net impacts on GHG emissions of new government rules and regulations, and the identification of measures to avoid, minimize or mitigate increases in emissions. This option would additionally require SEPA (State Environmental Policy Act) review to quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for state-funded and/or privately funded projects, and would emphasize the incorporation of GHG emissions consideration in community planning and zoning decisions.						
RCI-10	More Stringent Appliance/Equipment/ Lighting Efficiency Standards, and Appliance and Lighting Product Recycling and Design *‡	1.7	3.2	26.6	-\$1,075	-\$40
Increases energy efficiency through strengthened standards for new lighting, equipment, appliances and consumer electronic products and encourages product recycling and reuse, thus avoiding the generation of solid waste and the production and emissions of toxic materials. New energy-efficiency standards are included for devices not covered by existing federal or state standards, or in some cases to provide standards higher than current federal standards.						
RCI-11	Policies and/or Programs Specifically Targeting Non-energy GHG Emissions	0.3	1.5	7.8	\$5	\$1
Combines voluntary industry agreements with new equipment specifications to reduce the emissions of greenhouse gases from industrial processes and specialized uses (refrigeration, insulation, etc.). A variety of implementation mechanisms are suggested						

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Residential, Commercial and Industrial Sector Policy Options						
to achieve reduction of process emissions of carbon dioxide from the cement and aluminum industries, emissions of products used in refrigeration applications (hydrofluorocarbons), and emissions of sulfur hexafluoride used in electricity transmission and distribution equipment.						
Overlap among RCI options (and with recent actions)		-2.2	-6.9	-46.2	\$1,637	
Key	(*) denotes an option with net cost savings					
	(‡) denotes an option determined to be most promising					

Table 4.4: Agriculture/Waste Sector Policy Strategies

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Agriculture/Waste Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Agriculture / Waste (totals after adjustments for overlaps)		2.0	8.8	52.4	-\$77	
CAT Policy Options		2.0	8.8	52.4	-\$77	-\$1
AW-1	Manure Digesters/Other Waste Energy Utilization *	0.2	0.9	5.1	-\$20	-\$4
Establishes goals for the use of anaerobic digesters to treat manure from cows and to process food waste. The resulting biogas would be captured and used to generate electricity or produce compressed liquefied biomethane. Anaerobic digestion of manure and wet organic wastes is a commercially available technology. Capture and recovery of “biogas” from anaerobic digestion directly reduces emissions of methane to the atmosphere.						
AW-2	In-State Production of Biofuels and Biofuels feedstocks ‡	0.0	1.5	4.6	\$264	\$58
Targets the increased utilization of waste biomass for biofuels, about half of which would come from agricultural sources (the other half would come from forest-based sources, see also F-7). In addition, this policy aims to increase production of high biomass perennial feedstock crops (80,000 acres by 2020) and encourages sustainable production practices on corn and oil seed crops (at least 200,000 acres by 2020). A Low Carbon Fuel Standard (see T-11) would establish the demand for lower carbon fuels such as biofuels, and in-state production of biofuels would maximize GHG benefits and further contribute to reducing fuel imports. Agricultural processing, field, and animal wastes are among the largest potential sources for in-state biofuels feedstocks. In addition, research has demonstrated that potential perennial biofuel crops, such as switchgrass, hybrid poplars, and other crops may be far more productive in Washington State than in other areas of the country.						
AW-3	Significant Expansion of Source Reduction, Reuse, Recycling and Composting *	1.3	4.8	29.2	-\$353	-\$12
Sets targets to reduce the total amount of household and business waste by 15%, recycle at least 50% of the waste remaining, and compost over 90% of compostable organics through expanded source reduction, reuse, recycling, and composting of household, business, industrial, agricultural, and construction-related waste streams. In addition to traditional recycling programs, this option proposes to take advantage of newer market and business-based activities. A partial list of these approaches includes: source reduction (waste prevention) initiatives; expanding existing and encouraging more reuse, recycling, composting and processing in businesses; establishing product stewardship programs; using environmentally preferable procurement practices; encouraging cradle-to-cradle design and manufacturing; facilitating safe byproduct “synergy” strategies; achieving a reduction of toxics in packaging and products to make them safer to manufacture, use and recycle while increasing their value and use in the market place; increasing closed-loop recycling and the percentage of recycled-content in products, and expansion of disposal bans.						
AW-4	Agricultural Carbon Management *	0.2	1.1	9.0	-\$110	-\$12
Increases implementation of farming practices such as no-till/direct seeding, cover cropping, high-residue retention, organic residuals application, improved grazing management, and increased perennial cropping. These actions increase the amount of carbon sequestered and stored in agricultural soils and biomass as a result of increased biomass inputs (either through production, translocation, or residue management strategies) coupled with reduced soil disturbance.						
AW-5	Agricultural Nutrient Management *	0.0	0.2	0.9	-\$2	-\$2
Reduces nutrient application rates and thus nitrous oxide (N ₂ O) emissions through statewide soil testing, increased implementation of practices such as precision farming (i.e., precise identification of nutrient demands, resulting in targeted application rates and locations), application of existing sources of nutrient concentrated biomass, and the use of biologically fixed nitrogen. Agriculture is the primary source of N ₂ O emissions in the US, resulting from low nutrient use efficiencies in agricultural systems, the consequence of biological, technological and management factors. Improving on-farm nutrient use efficiencies, using alternative, biological sources of nutrients, and enhanced recovery/relocation of nutrients will substantially reduce ag-related greenhouse gas emissions, improved economic returns for farmers, and reduced fossil energy use.						
AW-6	Reductions In On-Farm Energy Use	0.0	0.1	0.3	-\$23	-\$74

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008–2020	Cost-Effectiveness
Agriculture/Waste Sector Policy Options		(MMtCO _{2e} /yr)	(MMtCO _{2e} /yr)	(MMtCO _{2e})	(Million \$)	(\$/tCO _{2e})
	and Improvements in Energy Efficiency *					
Targets the reduction of on-farm energy use and associated GHG emissions through reducing liquid fuel consumption, improving electrical and thermal energy use efficiencies in agricultural facilities, reducing the amount of irrigation –related energy use, and producing renewable energy on-farm. A large fraction of energy consumption occurs on-farm through the material and fuel consumption needed to produce crops and livestock.						
AW-7	Preservation of Open Space/Agricultural Land ‡	0.2	0.4	3.3	\$167	\$50
Calls for a 50% reduction by 2020 in the number of acres of agricultural land converted to urban or developed uses each year, relative to historical trends. By protecting agricultural areas from development, the carbon in biomass and soils can be maintained and additional emissions of CO _{2e} to the atmosphere can be avoided. It is estimated that approximately 23,000 acres of Washington farmland are converted out of agriculture every year (USDA, 1997 Natural Resource Inventory), contributing significant CO _{2e} emissions through the loss of stored carbon in biomass and soils.						
AW-8	Support for an Integrated Regional Food System		Not quantified			
Provides guidance on developing a regional food system that integrates the whole food supply chain (production, processing, packaging, distribution, purchase, preparation, and waste management) in strategies to reduce GHG emission. The policy calls for life cycle assessment research that addresses food production practices, transportation method (boat, truck, plane), vehicle fuel used in transportation, etc., to identify and provide incentives for production and use of low carbon footprint food products.						
Overlap among AW options			0	0	\$0	0
Key	(*) denotes an option with net cost savings					
	(‡) denotes an option determined to be most promising					

Table 4.5: Forestry Sector Policy Strategies

Forestry Sector Policy Options		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008– 2020	Cost- Effective- ness
		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
Forestry (totals after adjustments for overlaps)		2.0	7.5	46.4	\$298	
CAT Policy Options		2.0	7.5	46.4	\$298	-\$93
F-1	Improved Forest Health *†	0.5	0.5	7	-\$376	-\$54
<p>Implements fuel reduction treatments on 25% of forest acres identified as being at high-risk of catastrophic wildfires by 2020, with the long term aim of treating all such acres by 2050. An estimated 3 million acres of Washington's forests are at risk of catastrophic wildfires as a result of unnaturally high fuel loads (i.e., live and dead biomass). Forest fire mitigation to improve forest health reduces fuel loads through thinning and prescribed burns. The biomass removed during treatment can be used to produce bio-energy or durable wood products, leading to avoided fossil fuel emissions or long-term storage of carbon in wood products. The potential for either of these benefits is lost when forest biomass instead is burned during wildfires.</p>						
F-2	Reduced Conversion to Nonforest Cover	1.1	4.7	26.8	\$556	\$4
<p>Calls for a 70% reduction by 2020 in the number of acres of forestland expected to be converted to urban or developed uses each year. Forests store relatively large amounts of carbon in biomass and soils originating from atmospheric carbon dioxide. When forests are converted to developed or urban uses, the stored carbon is emitted as a result of tree and vegetation removal and soil disturbance. Subsequent developed or urban land uses generally contain lower carbon storage levels than the original forested land, resulting in a net loss of carbon to the atmosphere.</p>						
F-3	Enhanced Carbon Sequestration in Forests	0.2	0.6	4	\$107	\$26
<p>Increases the amount of carbon stored in Washington's forests through changes in forest management. The following forest management practices have the potential to increase and maintain overall forest carbon stocks in Washington: improved restocking of under-stocked areas; reforestation; increased harvest rotation length; silvicultural techniques such as stand fertilization, using genetically improved trees, and changes in stocking and thinning practices; and riparian/watershed restoration. The policy envisions the potential to, at a minimum, improve productivity on half of the existing low-productivity Douglas Fir forest acres by 2020. Periodic reporting of Washington's forest carbon baseline, in conjunction with development of forest accounting protocols, could allow emerging carbon markets to enable such changes in forest management.</p>						
F-4	Enhanced Carbon Sequestration in Harvested Wood Products	0.0	0.01	0.1	Quantified in coordination with F-3	
<p>Increases the amount of carbon sequestered and stored in harvested wood products through the forest management practices described in option F-3. In particular, native Douglas-fir forests of Washington have high productivity rates and extremely desirable structural characteristics for long-lived wood products. Increasing the productivity of these forests (where the potential exists) can result in larger volumes of carbon being transferring to and stored in harvested wood products.</p>						
F-5	Expanded Use of Wood Products for Building Materials			Not quantified		
<p>Supports the substitution of wood products in place of other energy intensive materials (e.g., steel and concrete), to store of carbon (as addressed in F-4) as well as to avoid higher GHG emissions from the production of alternative materials. The GHG benefits of using wood products as opposed to substitute materials have been documented in numerous life cycle assessments. The potential level of implementation of this option is difficult to assess and may be limited by building codes and safety standards.</p>						
F-6	Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production *	0.1	0.6	3.4	-\$85	-\$25
<p>Achieves additional combined heat and power (CHP) production at Washington State forest products facilities (paper and lumber/wood), in conjunction with option ES-7. The potential to expand CHP in Washington has been documented and this goal would achieve roughly 50% of the identified technical potential. The expanded use of CHP can reduce greenhouse gas emissions by displacing the use of fossil energy in two ways: using waste heat or steam that is a combustion by-product, and</p>						

		GHG Savings in 2012	GHG Savings in 2020	Cumulative GHG Savings (2008-2020)	Net Present Value 2008– 2020	Cost- Effective- ness
Forestry Sector Policy Options		(MMtCO ₂ e/yr)	(MMtCO ₂ e/yr)	(MMtCO ₂ e)	(Million \$)	(\$/tCO ₂ e)
powering CHP with woody biomass. Using biomass from forest fuel reduction treatments will help to achieve the goals identified in F-1.						
F-7	Improved Commercialization of Advanced Lignocellulosic Processes ‡	0.0	0.9	3.7	\$261	\$70
Increases utilization of waste biomass for biofuels and targets the production of 250 million gallons of biofuels per year by 2020. While both agricultural and forestry feedstocks would be used to meet that level of production, this option details specific steps and opportunities for using feedstocks from the forestry sector (see AW-2 for opportunities to produce feedstocks in the agricultural sector) and calls for the construction of both a pilot and commercial scale bio-refinery within 10 years. While advanced lignocellulosic technology for wood biomass conversion to biofuels and chemicals is believed to be feasible, further research and development are needed for full-scale commercialization of these conversion processes.						
F-8	Expanded Urban and Community Forests *‡	0.1	0.2	1.4	-\$165	-\$114
Enables Washington's local governments, utilities and large urban landowners to protect, plant and maintain an additional 3 million urban or community trees by 2020. Tree planting and maintenance in urban and suburban areas have multiple benefits, including avoided greenhouse gas emissions due to energy conservation (primarily reduced demand for cooling in hot weather) and enhanced carbon sequestration in trees. To the extent that urban and community forests increase the desirability of urban living, they may also contribute to reducing transportation related emissions. Other benefits of urban and community forests include improving air quality, reducing storm water runoff, and aesthetics.						
Overlap among F options			0	0	0	0
Key	(*) denotes an option with net cost savings					
	(‡) denotes an option determined to be most promising					

Appendices

- A. Executive Order 07-02
- B. SB 6001: An act relating to mitigating the impacts of climate change; adding a new section to chapter 80.50 RCW; adding a new chapter to Title 80 RCW; and creating a new section.
<http://www.leg.wa.gov/pub/billinfo/2007-08/Pdf/Bills/Session%20Law%202007/6001-S.SL.pdf>
- C. Climate Advisory Team Charter
- D. Washington State Greenhouse Gas Inventory and Reference Case Projections, 1990-2020 (December 2007)
http://www.ecy.wa.gov/climatechange/docs/WA_GHGInventoryReferenceCaseProjections_1990-2020.pdf
- E. TWG Member List
- F. Transportation Sector TWG Policy Option Descriptions
http://www.ecy.wa.gov/climatechange/CATdocs/122107_TWG_trans.pdf
- G. Energy Supply Sector TWG Policy Option Descriptions
http://www.ecy.wa.gov/climatechange/CATdocs/122107_TWG_es.pdf
- H. Residential, Commercial and Industrial Sector TWG Policy Option Descriptions
http://www.ecy.wa.gov/climatechange/CATdocs/122107_TWG_ri.pdf
- I. Agriculture Sector TWG Policy Option Descriptions
http://www.ecy.wa.gov/climatechange/CATdocs/122107_TWG_agr.pdf
- J. Forestry Sector TWG Policy Option Descriptions
http://www.ecy.wa.gov/climatechange/CATdocs/122107_TWG_for.pdf
- K. Memo: Methods for quantification of draft greenhouse gas (GHG) mitigation policy options
- L. Memo: Fuel import and job goals in the Washington State climate action process.
- M. Memorandum of Understanding directing the states of California, Oregon, Washington, New Mexico and Arizona to pursue a cap and trade program under the title of the Western Regional Climate Action Initiative

CHRISTINE O. GREGOIRE
Governor



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EXECUTIVE ORDER 07-02

WASHINGTON CLIMATE CHANGE CHALLENGE

WHEREAS, there is scientific consensus that increasing emissions of greenhouse gases are causing global temperatures to rise at rates that have the potential to cause economic disruption, environmental damage, and a public health crisis;

The drivers of climate change are global, but the effects of climate change on Washington are local and unique, including our dependence on snowpack for fresh water, our reliance on hydropower for energy, and our significant amount of shoreline;

According to the University of Washington's Climate Impacts Group, the effects of climate change are already being felt in the state of Washington in the form of average yearly temperatures rising faster over the 20th Century than the global average, mountain glaciers in the North Cascades losing up to a third of their area since 1950, snow pack in the Cascades declining by 35%, peak spring river runoff occurring 10 to 30 days earlier and the proportion of stream flow that arrives in summer decreasing as much as 34% in sensitive river basins; and

WHEREAS, Washington has taken significant actions to address climate change, including:

- Adopting the 2005 Clean Car Act requiring certain automobiles to meet tougher emissions standards beginning with 2009 models;
- Retrofitting 50% of school buses and 20% of local government diesel engine vehicles to reduce highly toxic diesel emissions;
- Leading the nation in requiring fuel suppliers to ensure that 2% of the fuel they sell is biodiesel or ethanol;
- Leading the nation in adopting high performance green building standards and having one of the most energy efficient building codes in the nation;
- Implementing the best energy efficiency standards for appliances;
- Passing a clean energy initiative to increase the amount of energy efficiency and renewable resources in our state's electricity system;

- Purchasing hybrid and low emission vehicles for state agency use;
- Adopting the Columbia River Water Management Act, which will work toward meeting the water storage needs for agriculture, communities, and salmon; and

WHEREAS, Washington has tremendous opportunities to build a healthier and more prosperous future by embracing the challenge of climate change through expanding our clean energy economy;

Washington's rural communities can gain economic benefit through the production of renewable fuels, keeping more of the money Washington residents spend on imported fuels here at home; and

WHEREAS, Washington has worked closely with California and Oregon in establishing the West Coast Governors' Global Warming Initiative and is working with other western states to address climate change in a coordinated effort and through the Western Governors Association; and

WHEREAS, Washington's vast hydroelectric system must be taken into account in any regional or national climate program; and

Washington State must continue its work to be prepared for the inevitable impacts of climate change.

NOW, THEREFORE, I, Christine O. Gregoire, Governor of the state of Washington declare the state's commitment to address climate change by:

1. Establishing the following greenhouse gas emissions reduction and clean energy economy goals for Washington State:
 - By 2020, reduce greenhouse gas emissions in the state of Washington to 1990 levels, a reduction of 10 million metric tons below 2004 emissions;
 - By 2035, reduce greenhouse gas emissions in the state of Washington to 25% below 1990 levels, a reduction of 30 million metric tons below 2004;
 - By 2050, the state of Washington will do its part to reach global climate stabilization levels by reducing emissions to 50% below 1990 levels or 70% below our expected emissions that year, an absolute reduction in emissions of nearly 50 million metric tons below 2004;
 - By 2020, increase the number of clean energy sector jobs to 25,000 from the 8,400 jobs we had in 2004; and

- By 2020, reduce expenditures by 20% on fuel imported into the state by developing Washington resources and supporting efficient energy use.
2. Implementing the significant policy actions taken in 2005 and 2006 to reduce greenhouse gas emissions. These actions will move Washington State to at least 60% of the 2020 goal and grow the clean energy economy by:
 - Working to ensure cars sold in Washington meet stringent emission standards beginning with 2009 models;
 - Retrofitting the most polluting diesel engines in school buses and local government vehicles;
 - Working with farmers, entrepreneurs, fuel distributors and retailers to assure that biofuel feedstocks are grown in Washington; that refiners, blenders and distributors of biofuels create family wage jobs in Washington; and that the public can purchase fuel blends that reduce our dependence on imported fuel;
 - Constructing high performance green buildings;
 - Maintaining the highest levels of efficiency in our state's energy code and regularly updating and enhancing those standards;
 - Examining compliance with appliance efficiency standards and updating and enhancing those standards;
 - Implementing the requirements of the Energy Independence Act by adopting rules that help utilities to succeed in meeting their renewable energy targets;
 - Pursuing new water resources in Eastern Washington, including water conservation projects, developing new storage and new creative water management alternatives; and
 - Reducing energy use by state agencies by achieving the goals established in Executive Order 05-01, Establishing Sustainability and Efficiency Goals for State Operations.
 3. Achieving at least the remaining 40% toward the 2020 goal for Washington State and planning for our future, **I, FURTHER**, order and direct:
 - A. The Director of the Department of Ecology and the Director of the Department of Community, Trade and Economic Development in consultation with a broad range of stakeholders to develop a climate change initiative, Washington Climate Change Challenge, to achieve the goals of this Executive Order. Executive Cabinet agencies

are directed to provide their full assistance and support in developing Washington Climate Change Challenge. I invite the Office of the Insurance Commissioner, the Commissioner of Public Lands, institutions of higher education, and members of the Legislature to assist in this effort.

- B. The Director of the Department of Ecology and the Director of the Department of Community, Trade and Economic Development shall include representatives from business, including transportation, forestry and energy sectors, agriculture, local, county and regional governments, institutions of higher education, labor unions, environmental groups and other interested residents as appropriate in the development of Washington Climate Change Challenge.
- C. Washington Climate Change Challenge shall address the following elements and process steps:
 - i) Consider the full range of policies and strategies for the state of Washington to adopt or undertake to ensure the economic and emission reductions goals are achieved, including policy options that can maximize the efficiency of emission reductions including market-based systems, allowance trading, and incentives;
 - ii) Determine specific steps the state of Washington should take to prepare for the impact of global warming, including impacts to public health, agriculture, the coast line, forestry, and infrastructure;
 - iii) Assess what further steps the state of Washington should take to be prepared for the impact of global warming to water supply and management;
 - iv) Initiate active involvement by the state of Washington in the development of regional and national climate policies and coordination with British Columbia;
 - v) Recommend how the state of Washington, as an entity, can reduce its generation of greenhouse gas emissions;
 - vi) Work with the state of Washington's local governments to maximize coordination and effectiveness of local and state climate initiatives; and
 - vii) Inform the general public of the process, solicit comments and involvement and develop recommendations for future public education and outreach.

D. The Director of the Department of Ecology and the Director of the Department of Community, Trade and Economic Development shall submit Washington Climate Change Challenge to the Office of the Governor within one year of the signing of this Executive Order.

This Executive Order shall take effect immediately.

Signed and sealed with the official seal of the state of Washington, on this 7th day of February 2007, at Olympia, Washington.

By:

Christine O. Gregoire
Governor

BY THE GOVERNOR:

Secretary of State

Washington Climate Change Challenge Draft Climate Advisory Team Charter

Purpose

The Climate Advisory Team (CAT) will recommend to the Directors of the Washington Department of Ecology (Ecology) and Community, Trade and Economic Development (CTED) the range of policies and strategies for the state of Washington to adopt or undertake to ensure the economic and emission reduction goals in Executive Order 07-02¹ are achieved.

Process

- The CAT is comprised of participants from business, the energy sector, agriculture, forestry, local governments, tribes, environmental groups, state agencies, members of the state legislature, and other stakeholders. CAT members represent a wide range of experience and sectors, and demonstrate enthusiasm for devising the solutions to climate change that result in greenhouse gas emission reductions, increased energy security and sustainable prosperity for Washington communities. Members of the CAT will participate directly and fully in the entire process as detailed in this Charter.
- The Directors of Ecology and CTED will co-chair the process and oversee its facilitation and management. The CAT will recommend a nonbinding set of specific actions to achieve the goals of the Executive Order to the Directors of Ecology and CTED for their consideration in developing recommendations for the Governor. The CAT process will seek but not mandate consensus on specific recommended actions, and reach for convergence to deliver the most powerful collective statement possible. If consensus cannot be reached on specific proposals, opinions of individual members will be respected as they emerge and will be reflected in the final recommendations to the Directors of Ecology and CTED. The CAT will use voting to determine the strength of any recommendation that does not have full consensus. The results of voting and specific barriers to consensus for actions will be documented in the final report, as needed.
- In addition to recommendations on achieving the goals of the Executive Order, the CAT and TWGs will also be expected to analyze and make recommendations on how to ensure that Washington can fully implement policies already undertaken to reduce greenhouse gas emissions.²

¹ These goals were established through Executive Order 07-02, the Washington Climate Change Challenge announced by Governor Christine Gregoire on February 7, 2007:

- By 2020, reduce greenhouse gas emissions in the state of Washington to 1990 levels, a reduction of 10 million metric tons below 2004 emissions;
- By 2035, reduce greenhouse gas emissions in the state of Washington to 25% below 1990 levels, a reduction of 30 million metric tons below 2004;
- By 2050, the state of Washington will do its part to reach global climate stabilization levels by reducing emissions to 50% below 1990 levels or 70% below our expected emissions that year, an absolute reduction in emissions of nearly 50 million metric tons below 2004;
- By 2020, increase the number of clean energy sector jobs to 25,000 from the 8,400 jobs we had in 2004; and
- By 2020, reduce expenditures by 20% on fuel imported into the state by developing Washington resources and supporting efficient energy use.

² Many of these existing policy actions are enumerated in Section 2 of the Executive Order.

- A neutral and expert facilitation and technical analysis team by Ross & Associates Environmental Consulting and the Center for Climate Strategies will provide facilitation, information, analysis, and management necessary to support the CAT's deliberations.
- The CAT is supported by Technical Working Groups (TWGs). It is expected that members of the CAT will participate directly in one or more TWGs or designate staff to participate.
- The CAT will provide the Directors of Ecology and CTED with initial recommendations by October, 2007, and its final recommendations by December, 2007, and deliver a final report by January 2008 that details its recommendations for achieving the goals of the Executive Order.
- The process is anticipated to consist of approximately five one-day CAT meetings, and a sufficient amount of interim TWG meetings over the same time period.

Scope and Objectives

In developing its recommendations, the CAT will consider Washington's unique emission portfolio and economic opportunities, build on work done previously to address climate change in Washington, take into account relevant solutions that have been accomplished regionally and nationally, and give priority to policy actions that:

- Maximize the efficiency of emission reductions, including market-based systems, allowance trading, and incentives;
- Meet multiple goals both within and across sectors; and
- Make sense for Washington and for Washington's economy.

The CAT will not debate the science of climate change or the goals, but will instead focus on identifying actions that allow Washington to reach the goals, and provide leadership and a long-term vision for how Washington will rise to the challenges and opportunities of addressing climate change.

External and Internal Communication.

All meetings of the CAT and TWGs will be open to the public and announced in advance on the Ecology/CTED climate change website (www.ecy.wa.gov/climatechange). All of the meeting information and work products will be posted to the website, including agendas and minutes.

Technical Working Group Members

Agriculture TWG

Wade Alonzo, WA Department of Natural Resources
Cathy Baker, The Nature Conservancy
Vicky Carwein, Washington State University, Tri Cities
Tim Crosby, 21 Acres
Jim Davis, Douglas County Public Utility District (PUD)
Dan DeRuyter, D&A Dairy
John Ewald, American Beef Processing
Keith Goehner, Chelan County Commissioner
Sego Jackson, Snohomish County
Chad Kruger, Washington State University
Karl Kupers, Shepherds Grain
Patrick Mazza, Climate Solutions
John Parks, Teamsters, Local 760
Don Schramm, Sunnyside Irrigation
Terry Uhling, Simplot
Steven Wamback, Pierce County Solid Waste

Energy Supply TWG

Rod Brown, Washington Environmental Council
Gregg Carrington, Chelan Public Utility District (PUD)
Arlo Corwin, Horizon Wind
Kyle Davis, Pacificorp
Mike Davis, Pacific NW National Laboratory
Peggy Duxbury, Seattle City Light
Roger Garratt, Puget Sound Energy
Stan Gent, Seattle Steam Company
Bob Guenther, International Brotherhood of Electrical Workers (IBEW), Local 77
Nancy Hirsch, NW Energy Coalition
Tony Ifie, WA Department of Natural Resources
Doug Jackson, TransAlta
Sara Kendall, Weyerhaeuser
Bill Kidd, BP
Bill LaBorde, WashPIRG
Steve LaFond, Boeing
Kris Mikkelson, Inland Power
Patrick Oshie, Commissioner, WA Utilities & Transportation Commission
Janelle Schmidt, Bonneville Power Administration
Steve Silkworth, Avista Utilities
Brian Skeahan, Cowlitz Public Utility District (PUD)

Forestry TWG

John Floberg, Cascade Land Conservancy
Steve Fluke, International Association of Machinists (IAM), Woodworkers Dist. Lodge W1

Richard Gustafson, University of Washington, College of Forest Resources
Becky Kelly, WA Environmental Council
Llewellyn Matthews, NW Pulp & Paper Association
Dave McEntee, Simpson
Heath Grant Packard, Audubon
Craig Partridge, WA Department of Natural Resources
Denise Pranger, NW Natural Resources Group
Kevin Raymond, Earth Ministries & Pacific Forest Trust
Edie Sonne-Hall, Weyerhaeuser
Court Stanley, Port Blakely
Steve Stinson, Family Forest Foundation
Duane Vaagen, Vaagen Brothers Lumber
Mary Verner, Upper Columbia United Tribes
Terry Williams, Tulalip Natural Resources

Residential, Commercial & Industrial TWG

Aaron Adelstein, King & Snohomish Master Builders Association
Ash Awad, McKinstry Energy
Craig Campbell, La Farge Cement
Kim Drury, NW Energy Coalition
Tom Eckman, NW Power & Conservation Council
Amanda Eichel, Seattle Office of Sustainability and Environment
Chris Elwell, Building Construction Trades Council (BCTC), Seattle
Bert Gregory, Mithun Architects
Sara Kendall, Weyerhaeuser
Mo McBroom, WA Environmental Council
Sister Sharon Park, Washington State Catholic Conference
Michael Rawding, Microsoft
Rich Riazzi, Chelan County Public Utility District (PUD)
Mike Rousseau, Alcoa
Cal Shirley, Puget Sound Energy

Transportation TWG

Genesee C. Adkins, Transportation Choices Coalition
Dennis Antonellis, Amalgamated Transit Union (ATU), Local 1015
Dick Ford, WA Transportation Commission
KC Golden, Climate Solutions
Dennis Hession, Mayor of Spokane
Jemae Hoffman, Seattle Department of Transportation
Teresa Jones, Costco Wholesale
Jay Larson, Snohomish County
Jim Lopez, King County
Steve Marshall, Cascadia Center
Sue Mauermann, Port of Tacoma
Mary McCumber, Futurewise
Michael McGinn, Sierra Club
Dennis McLerran, Puget Sound Clean Air Agency
Dave Moore, Boeing
Larry Paulson, Port of Vancouver
Sister Sharon Park, Washington State Catholic Conference
Dan Sinks, Conoco Phillips
Megan White, WA Department of Transportation

MEMORANDUM

To: Washington State Climate Advisory Team and its Technical Working Groups

From: Michael Lazarus, Jeff Ang-Olson, Alison Bailie, Katie Bickel, David von Hippel, Stephen Roe, Tom Peterson, Center for Climate Strategies

Re: Methods for quantification of draft greenhouse gas (GHG) mitigation policy options

Date: September 25, 2007

This memo summarizes key elements of the recommended methodology for quantifying the GHG impacts and costs for those TWG policy options that are considered amenable to quantification. Feedback from CAT and TWG members is encouraged. As noted in previous CAT meetings, impacts on clean energy jobs and fuel import expenditures will be quantified for the full suite of policy options, once assembled.¹

- Common units and results reported:
 - **Net GHG reduction potential** in million metric tons carbon dioxide equivalent (MMTCO₂e) using IPCC 100 yr global warming potential, reported for 2012, 2020, and cumulatively 2008-2020. Where significant additional GHG reductions or costs occur beyond the project period as a direct result of actions taken during the project period, these will be indicated as appropriate.
 - **Net present value (NPV) cost** (or cost savings) for the period 2008-2020 in 2006 constant dollars, using a 5% real discount rate.² Positive numbers represent options with net costs; negative numbers represent options with net cost savings.
 - **Cost per metric ton of CO₂ equivalent** emissions reduced (or removed) in units of \$/MTCO₂e. This figure represents the NPV cost divided by the cumulative emission reductions, both over the 2008-2020 period.

- Consistent assumptions and methodologies: In order to ensure consistent results across options and TWGs, common factors and assumptions will be used for items such as:
 - **Electricity avoided costs and emissions:** Common values (\$/MWh and tCO₂/MWh) are being developed based on available studies, most notably those of the Northwest Power Planning Council. Once the full set of options is identified, an integrated analysis will be undertaken, and these values may be revised based on the total reduction in requirements for business-as-usual electricity resources.
 - **Fuel costs and projected escalation.** Fuel costs estimates will be based on common sources, wherever possible. For example, fossil fuel price escalation

¹ Input is currently being collected by CTED and CCS on analysis methodology.

² Capital investments with lifetimes longer than 2020 are represented in terms of levelized or amortized costs, in order to avoid "end effects".

will be indexed to USDOE projections as indicated in their most recent Annual Energy Outlook.

- **Emission increasing activities.** Some options may involve some increased demand for energy or other potential emission sources (e.g. plug-in electric vehicles). Such direct emissions increases will be factored into the analysis.³
- Aggregation of impacts: Options may overlap in terms of coverage, both within and across sectors. In order to avoid double counting of GHG reduction potential and cost (e.g. more than one option avoiding the same emissions source), interactive effects will be estimated where possible, and emission reduction totals will reflect these overlaps. In other words, the total emissions reductions for the state will be lower than the sum of the results for individual options.
- Geographic scope and lifecycle analysis:
 - **GHG impacts of policy options are estimated regardless of the physical location of emissions reductions.** For instance, a major benefit of recycling is the reduction in material extraction and processing (e.g. aluminum production). While a policy option may increase recycling in Washington state, the reduction in emissions may occur where this material is produced. Where significant emissions impacts are likely to occur outside the state, this will be clearly indicated. These emissions reductions are counted towards the achievement of the state's emission goal, since they result from actions taken by the state.
 - Related to the previous point, **lifecycle analysis** is applied wherever emissions impacts upstream (e.g., production, extraction) or downstream (e.g. waste disposal) from a specific activity constitute a significant fraction of a policy option's emissions impacts *and* studies are sufficient to enable estimation. For example, lifecycle analysis is used to estimate the emissions benefits of biofuels relative to the fossil fuels they might substitute for.
- Transparency: Data sources, methods, key assumptions, and key uncertainties are clearly indicated.
- Cost perspectives and inclusion: The general approach of direct (NPV) cost and cost-effectiveness analysis is used, as widely applied to GHG mitigation policy options.⁴ Included are the direct, economic costs from the perspective of the state as whole (e.g. avoided costs of electricity rather than consumer electricity prices). This bottom-up approach is relatively transparent and is capable of reflecting the costs (and cost savings)

³ Some policy options could also result in emissions leakage, either positive or negative. Negative leakage would occur if a policy leads emitting activities to shift to areas outside its target area, or increases activity as a result of lowering the cost of service (e.g. the rebound effect). For example, if not considered carefully, policies to protect forest lands could shift forest clearing activities to other regions or states. Conversely, some policy options could result in positive leakage, through replication outside the target area, e.g. by lowering the price or increasing access to lower-emitting technologies. Where such effects might be significant, these should be noted qualitatively.

⁴ See e.g. Section 2.4 of the IPCC Fourth Assessment Report, Working Group III, for more discussion of various economic analysis approaches. http://www.mnp.nl/ipcc/pages_media/AR4-chapters.html

associated with an individual policy option, in contrast to macroeconomic analysis, which aims to capture flows and interactions across all sectors of the economy. Potential macroeconomic impacts, costs or benefits that fall disproportionately on specific groups or actors, as well external costs and benefits, should be noted qualitatively, especially where studies or other information are available.

Examples of costs included:

- Capital costs levelized (amortized) where appropriate, e.g. for improved buildings, vehicles, equipment upgrades, new technologies, manure digesters and associated infrastructure, ethanol production facilities, mass transit investment and operating expenses (net of any saved infrastructure costs such as roads)
- Operation, maintenance, and other labor costs (or incremental costs relative to standard practice),
- Fuel and material costs, e.g. for natural gas, electricity, biomass resources, water, fertilizer, material use, electricity transmission and distribution
- Other direct costs administrative and other costs (where readily estimated), such as the grid integration costs for renewable energy technologies, or the costs of administering an energy efficiency project, or of implementing smart growth programs (net of saved infrastructure costs)

Examples of costs or benefits not included:

- External costs such as the monetized environmental or social benefits/impacts (value of damage by air pollutants on structures, crops, etc.), quality-of-life improvements, or improved road safety, or other health impacts and benefits
- Energy security benefits
- Macroeconomic impacts related to the impact of reduced or increased consumer spending, shifting of cost and benefits among actors in the economy
- Potential revenues from participation in a carbon market

Memo

Date: 28 November 2007

Re: Fuel import and job goals in the Washington State climate action process.

Introduction

Executive Order 07-02, Section 1, includes two goals that are not explicit reductions of greenhouse gases (GHGs). The *jobs goal* reads:

By 2020, increase the number of clean energy sector jobs to 25,000 from the 8,400 jobs we had in 2004;

and the *fuel imports goal* reads:

By 2020, reduce expenditures by 20% on fuel imported into the state by developing Washington resources and supporting efficient energy use.

This memo provides estimates of the extent to which recent climate policy actions, as well as options developed by the Washington Climate Advisory Team (CAT) process, satisfy the jobs and fuel imports goals.

The Jobs Goal

Background

Washington State clean energy sector jobs have been inventoried twice in the past. The first effort counted 3,802 jobs in fourteen subsectors, as of 1997 (ECONorthwest 1998). The second effort counted 8,373 jobs in a set of ten subsectors, as of 2004 (Suter 2005). The ten subsectors in the 2005 study were defined to encompass a broader definition of the clean energy industry than the fourteen narrower subsectors defined for the 1998 study.

- | |
|----------------------|
| 1. renewables |
| 2. fuel cells |
| 3. PV/solar |
| 4. geothermal |
| 5. small-scale hydro |
| 6. wind |
| 7. biomass |
| 8. efficiency |
| 9. smart |
| 10. unidentified |

Methodology

In order to assess progress towards the Executive Order goal, a clear definition of the “clean energy sector” is needed. Since the Executive Order goal refers explicitly to the “the 8,400 jobs we had in 2004” in this sector, the most straightforward and consistent interpretation of this sector definition is to base it on the study from which this estimate was derived, i.e. the report by Suter in 2005. Suter (2005) defines the clean energy sector as consisting of the ten sub-industries listed in Table 1. This characterization of the clean energy sector places a focus on direct jobs

Table 1 – Clean energy sub-industries identified by Suter.

created by the expansion of renewable energy generation, “smart” energy systems, and energy efficiency.

It is important to underscore the limitations of this definition. It leaves uncounted the indirect jobs that support the listed sub-industries as well as the direct jobs arising from most of the GHG policy options affecting the agriculture, forestry and transportation sectors. It also does not consider any indirect job gains due to increased consumer spending (resulting from energy and other cost savings) or indirect job losses due to shifting away from emissions-intensive activities and products or due to any price increases that might occur.

For those recent actions and CAT options for which an estimate of spending in calendar year 2020 was possible, the spending estimates were multiplied by a jobs-per-dollar factor derived from data in the Suter study. For options deploying renewable energy, but for which spending estimates were not available, the quantity of renewable energy forecast for 2020 was multiplied by a jobs-per-aMW factor derived from the Suter study and from the Northwest Power and Conservation Council’s database of power plants (NPCC 2007). For options inducing energy efficiency measures, but for which spending estimates were not available, the quantity of first-year energy efficiency forecast for 2020 was multiplied by a jobs-per-MWh factor derived from the Suter study and from Regional Technical Forum data on conservation (Regional Technical Forum 2007).

This methodology produced a jobs estimate for recent action I-937 larger than that reported in a Union of Concerned Scientists study specifically evaluating the economic impacts of I-937 (Deyette & Clemmer 2006).¹ In order to report the most conservative result here, the UCS result was favored.

Results

Jobs impacts were not calculable for all measures due principally to the absence of appropriate job factors in the published literature.

sector	jobs
RCI	

sector	jobs
RCI	
recent actions	1,300
CAT options	7,300
Energy Supply	
recent actions	700
CAT options	3,000
Transportation	
recent actions	6,000
CAT options	--
Forestry	
recent actions	--
CAT options	1,900
Agriculture/Waste	
recent actions	--
CAT options	3,000
total	23,100
existing jobs	8,400
grand total	31,500

Table 2 – Direct clean energy jobs after accounting for selected Washington Climate Challenge measures, as of 2020. Totals may not equal sums due to rounding.

¹ The methodology used by Deyette & Clemmer should count indirect jobs as well as direct, and report results only for 2025 (rather than 2020, the target year for the jobs goal), so the low numbers reported are particularly strongly in disagreement with the numbers derived from Suter’s work. See further discussion in Section *Tracking Progress* below.

recent actions	1,300
CAT options	7,300
Energy Supply	
recent actions	700
CAT options	3,000
Transportation	
recent actions	6,000
CAT options	--
Forestry	
recent actions	--
CAT options	1,900
Agriculture/Waste	
recent actions	--
CAT options	3,000
total	23,100
existing jobs	8,400
grand total	31,500

Table 2 shows jobs created by those recent actions and CAT options for which a reasonable estimate was possible.² All sectors contribute meaningfully to the job count, though RCI is the largest contributor, due in part to the fairly heavy job creation associated with manufacture and installation of energy efficiency-related equipment and construction practices.

Suter's definition of the clean energy industry did not include a public transportation subsector, so another 2,800 jobs that could be contributed by CAT options supporting public transportation do not appear in Table 2.

Also omitted from

sector	jobs
RCI	
recent actions	1,300
CAT options	7,300
Energy Supply	
recent actions	700
CAT options	3,000
Transportation	
recent actions	6,000
CAT options	--
Forestry	
recent actions	--
CAT options	1,900
Agriculture/Waste	
recent actions	--
CAT options	3,000
total	23,100
existing jobs	8,400

² All values reported in this document are rounded to two or three significant digits, except when they are quoted from other sources.

grand total	31,500
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Table 2 are up to 13,000 jobs that could be generated by Transportation option T-11, the low carbon fuel standard, *if* all biofuels used to satisfy this option were grown in Washington State. These jobs are not included in the table because the location of the biofuel crops is not guaranteed to be in the state.

All five sectors taken together could deliver about 23,100 direct, Washington State clean energy jobs, if all recent actions and CAT options are fully implemented. Together with the 8,400 jobs counted previously, Washington can hence expect to boast some 31,500 jobs in this sector by 2020, well beyond the Executive Order goal. Of course, these estimates are subject both to implementation uncertainty as well as the uncertainties related to the limitations of forecasting direct, clean energy jobs. The estimates developed here are based on rather aggregate information about clean energy activity and jobs. They implicitly assume the same relationship between jobs and expenditures, or energy savings/production, as witnessed historically will hold through 2020. Changing technologies and production practices could well imply a somewhat different outcome.

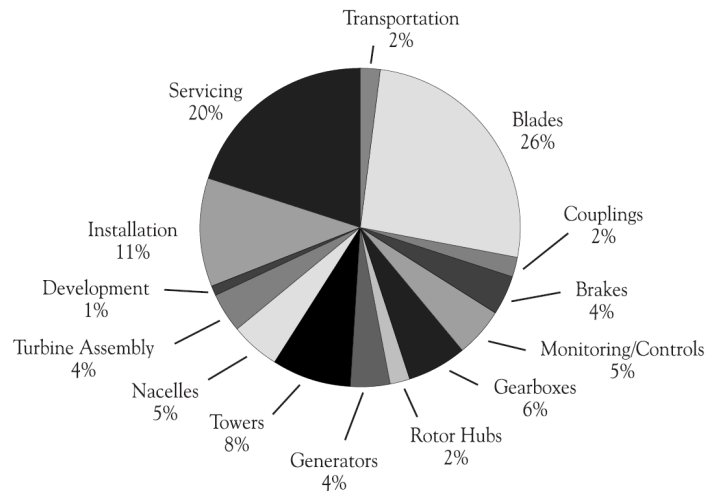


Figure 1 – Distribution of labor requirements for manufacture, installation and operation of new wind energy for ten years. From Singh (2001).

Other approaches

The simplified methodology used here was selected given the timing of the CAT process and the very specific jobs goals as defined by the Executive Order. This approach differs from the broader and more involved studies that have assessed the broader direct and indirect job impacts of clean energy or climate mitigation strategies. These studies tend to employ input-output (I/O) models or more sophisticated macroeconomic tools that combine I/O with computable general equilibrium, econometric, or other models, such as REMI. Examples include a recent nationwide jobs analysis of clean energy policy (Scott & Siu 2006) and studies in various states (*e.g.* Energy Resources Center 2005; Kushler, York & Witte 2005).

Special Note: Manufacturing versus O&M

An important, uniform outcome of prior work on jobs creation in the energy supply subsector is that new capacity generates labor requirements (jobs) principally during manufacture of the relevant systems, rather than as a result of their operation and maintenance (O&M). See for example Figure 1, demonstrating that even including the

first ten years of operation, merely 20% of the labor benefits from new wind energy arise from O&M (“servicing” in the figure).

Maximizing jobs from clean energy may require efforts beyond those envisioned during the Washington Climate Challenge process to date. In particular, attracting more energy technology development and manufacturing to the state enables more jobs to be generated from CAT options (note that some CAT options would spur this, e.g. ES-4 to develop R&D programs; this potential benefit is hard to quantify). Furthermore, jobs in existing Washington clean energy industries can be enhanced by increasing the regional and international demand for their products.

The Fuel Imports Goal

Background

The statement of the fuel imports goal in the Executive Order requires some clarification before it can be evaluated. First, it is important to understand that fuel imports are understood as *state* imports; that is, fuel produced domestically in the U.S. but in another state will also be an import, unlike the traditional understanding of *import* as being from another nation.

Second, the goal does not explicitly state that “fuel” is to be understood as fossil fuel, so it can be presumed that import (versus in-state production) of biofuels is also to be minimized, and that biofuels are to be included when progress toward the goal is tracked.

Third, fuels that are technically imported into the state for the purpose of generating electricity are not necessarily energy imports into the state, since electricity generated in Washington State is often delivered outside the state. Segregating fuel imports used for in-state electric delivery versus out-of-state electric delivery is extremely difficult and hence changes in the electric generation sector cannot be tracked; these fuel imports are hence omitted from the analysis.

Finally, “expenditures” are interpreted at the point of sale to the ultimate consumer, to be consistent with the price data available from the U.S. Department of Energy.³

Methodology

Unlike the absolute jobs goal (“25,000”) the fuel imports goal is relative (“...reduce...by 20%...”) so it must be calculated against a counterfactual, or a business-as-usual scenario. The counterfactual projections of fuel expenditures were generated by multiplying fuel consumption trendlines drawn from 1990 through 2004 actuals from the State Energy Data System (U.S. DOE 2007), with price forecasts from the U.S. Annual Energy Outlook (U.S. DOE 2007a).

³ The U.S. DOE calls prices at the point of sale to the ultimate consumer “retail.” U.S. DOE 2007b.

Projected, absolute reductions in fuel imports due to recent actions were extracted from prior estimates of the GHG impacts of recent actions (see draft memo dated 27 July 2007). Projected, absolute reductions in fuel imports due to CAT options were provided by the Technical Working Groups. Projected, absolute fuel expenditure reductions were calculated by multiplying the projected reductions in imports with the price forecasts from the Annual Energy Outlook. The simplifying assumption was made that all fossil fuel purchases in Washington State, except coal, are imports.

Results

Reductions in fuel imports are associated only with the RCI and Transportation sectors. The Forestry and Agriculture/Waste sectors are not associated with fossil fuel imports by definition, and the Energy Supply sector does not affect the fuel imports due to the explicit choice to exclude it from the tracked total.

sector	avoided fuel expenditures \$ million
RCI	
recent actions	67
CAT options	340
Transportation	
recent actions	1,500
CAT options	3,000
total	4,900

sector	avoided fuel expenditures \$ million
RCI	
recent actions	67
CAT options	340
Transportation	
recent actions	1,500
CAT options	3,000
total	4,900

Table 3 – Avoided expenditures on fossil fuel imports as of 2020, except in the energy supply sector. Year 2000 dollars. Totals may not equal sums due to rounding.

Table 3 lists avoided expenditures in the RCI and Transportation sectors.

The counterfactual calculation estimates that in 2020, Washington residents and businesses would have spent \$13.3 billion on fossil fuel imports under a business-as-usual scenario, excluding fuels being used for electric generation. A 20% reduction corresponds to \$2.6 billion of avoided expenditures. The recent actions and CAT options taken together achieve at least \$4.9 billion of avoided expenditures, as seen in Table 3, easily achieving the 20% target. However, this result is once again highly sensitive to the source of the biofuels used to replace the imported fossil fuels. Some of the options in the Transportation sector depend on displacement of fossil fuels with biofuels; if these biofuels are produced outside the state then fuel imports will simply be replaced with other fuel imports, and the goal may not be met.

Tracking Progress

Fuel prices are highly volatile, as shown in Figure 2. The drivers of change of fuel prices are beyond the control of state-level policy, so tracking the fuel imports goal will require real-time adjustment of the target expenditures in order to respond to the changing fuels market. Tracking this goal will also require augmenting the convenient and federally-administered State Energy Data System with careful tracking of the imports and in-state production of biofuels, neither of which is tracked as accurately in the State Energy Data System as the fossil fuel imports.

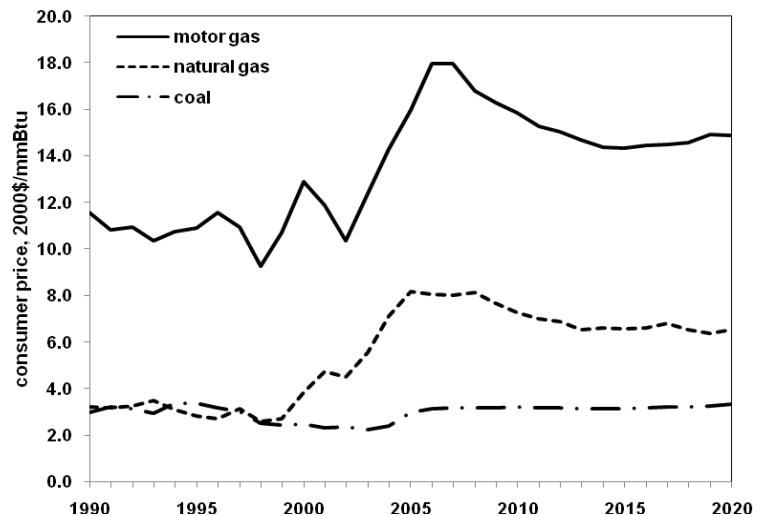


Figure 2 – Historical and forecast fossil fuel prices.

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Christine O. Gregoire



Theodore R. Kulongoski



Arnold Schwarzenegger



Janet Napolitano



Bill Richardson

WESTERN REGIONAL CLIMATE ACTION INITIATIVE

WHEREAS, western states are experiencing the effects of a hotter, drier climate, including prolonged droughts, excessive heat waves, reduced snow packs, increased snowmelts, decreased spring runoffs, altered precipitation patterns, more severe forest and rangeland fires, widespread forest diseases, and other serious impacts; and

WHEREAS, scientific consensus has developed that increasing emissions of human-caused greenhouse gases (GHGs), including carbon dioxide, methane and other GHGs, that are released into the atmosphere are affecting the Earth's climate; and

WHEREAS, the Western Governors Association (WGA) has declared that climate change could have severe economic and environmental impacts on the Western States in coming decades; and

WHEREAS, the WGA also has declared that action is needed to reduce GHG emissions and that many of these actions can have significant economic and environmental benefits for the Western States, including increased energy efficiency, increased renewable energy generation, improved air quality, cost savings, job growth, increased state revenues, and reduced water pollution; and

WHEREAS, we support the development of national, regional, tribal, state and local programs to reduce GHG emissions; and

WHEREAS, we support national, regional, tribal, state and local level policies on global climate change that are consistent with efforts to develop cost-effective alternative energy sources and more efficient use of energy; and

WHEREAS, we recognize the need for collaboration among states to develop climate change policies that provide consistent approaches to recognize and give credit for actions to reduce GHG emissions; and

WHEREAS, we have already adopted or committed to adopt clean tailpipe standards for passenger vehicles that will result in major reductions in GHG emissions and other pollutants; and

WHEREAS, we support market-based policies to reduce GHG emissions in the most cost-effective manner; and

WHEREAS, we have set goals to significantly reduce GHG emissions from our respective states; and

WHEREAS, we welcome expanding the partners to this initiative to other states, tribes, Canadian provinces and Mexican states and offer monitoring status to any state, tribe or province interested in observing the initiative;

NOW, THEREFORE, we, the undersigned Governors, jointly establish the Western Regional Climate Action Initiative and agree to collaborate in identifying, evaluating and implementing ways to reduce GHG emissions in our states collectively and to achieve related co-benefits. This collaboration shall include, but is not limited to:

- Setting an overall regional goal, within six months of the effective date of this initiative, to reduce emissions from our states collectively, consistent with state-by-state goals;
- Developing, within eighteen months of the effective date of this agreement, a design for a regional market-based multi-sector mechanism, such as a load-based cap and trade program, to achieve the regional GHG reduction goal; and
- Participating in a multi-state GHG registry to enable tracking, management, and crediting for entities that reduce GHG emissions, consistent with state GHG reporting mechanisms and requirements.

In addition, we commit to continue our independent and collaborative efforts to reduce GHG emissions through:

- Promoting the development and use of clean and renewable energy within the region;
- Increasing the efficiency of energy use within our jurisdictions;
- Advocating regional and national climate policies that reflect the needs and interests of western states, tribes and provinces; and
- Identifying measures in our states, tribes and provinces to adapt to the impacts of climate change.

We will direct our staffs and the appropriate state agencies to meet as soon as is practicable to develop a work plan to move forward with this initiative.

DONE, in five (5) duplicate originals, this 26th day of February, 2007, in Washington, D.C.

Governor Christine O. Gregoire
State of Washington

Governor Theodore R. Kulongoski
State of Oregon

Governor Janet Napolitano
State of Arizona

Governor Bill Richardson
State of New Mexico

Governor Arnold Schwarzenegger
State of California