Catalog of State Actions
Agriculture Working Group

A catalog of state-level, GHG-reducing actions and policy options based on actions undertaken or considered by state, local and private actors.

Key to Future Rankings of Options in the Tables that Follow:

Potential GHG Emission Reductions 1/	Potential Cost or Cost Savings 1/ 2/
High (H): At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current WA emissions)	**High (H)**: $50 per metric ton CO_2e (tCO_2e) or above
Medium (M): From 0.1 to 1.0 MMtCO_2e per year by 2020	**Medium (M):** $5-50/t$CO_2$e
Low (L): Less than 0.1 MMtCO_2e per year by 2020, or 1 MMtCO2e by 2050	**Low (L):** Less than $5/t$CO_2$e
Uncertain (U): Not able to estimate at this time	**Negative (Neg):** Net cost savings
	Uncertain (U): Not able to estimate at this time

1/ Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.
2/ Costs are denoted by a positive number. Cost savings (i.e., "negative costs") are denoted by a negative number.

Definition of "Priorities for Analysis":

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.

Notation of Options:

* **Options marked in bold an asterisk (*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. TWG members are encouraged to provide information on other relevant actions.

Agriculture and Waste Management (AW)

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
AW-1	**PRODUCTION OF FUELS AND ELECTRICITY IN AGRICULTURE**					
1.1	Expanded Use of Woody Biomass Feedstocks for Electricity, Heat and Steam Production*	M-H	L-M	Level of reductions dependent on whether crop residue is targeted or purpose-grown crops, or both. Costs are primarily dependent on distance to end user. • Increases WA jobs; • Reduces WA fuel imports. Combustion for electricity creates ash that requires further waste management. Application of Beyond Waste and sustainable principles to biomass materials requires systematic full lifecycle benefits. Other energy conversion technologies (gasification, pyrolysis) could yield greater overall benefits, but probably at higher initial costs.		Senate Bill 6001 "Mitigating the impacts of climate change": Establishes state goals to reduce GHG emissions and establishes a GHG performance standard for electric utilities operating in Washington; Restatement of the Governor's order (w/ fuel import and job goals); performance standard for base load electrical generation, relevant to options 1.1, 1.3, and maybe 7.2 and 8.3 because all forms of energy production from renewables would be deemed as being in compliance with this standard. House Bill 1303: Encourages the use of cleaner energy through a number of processes; creation of the Energy Freedom Program, with requirement that by 2015 all

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						state agencies will use biofuels exclusively; also relevant to 1.2. The 2006 Energy Independence Act established renewable portfolio standards. Related to F-1.1
1.2	In-state Liquid Biofuels Production*	H	M-H	Level of reduction is dependent on volumes produced, feedstocks and production methods utilized. Costs are dependent on the structure of the incentives program. • Increases WA jobs; • Reduces WA fuel imports (when fuels are consumed in-state).		Biomass for ethanol, methanol, or butanol may yield process system results where in non-fuel remainders become process system inputs for other valuable co-products. Current pyrolysis technologies have great potential for a balanced refinery system creating liquid fuels and chemical feedstocks, energy recovery to drive the process and a char product for soils fertility applications WA passed into several requirements/incentives supporting an in-state biodiesel and ethanol industry Current biodiesel production in the State, 15 facilities on line or in serious planning/development,

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						about 270.5 million gallons per year. Biodiesel sold at 35 stations in WA. Ethanol production is about 435 million gallons per year from seven facilities in the permitting/planning stage. There are four E-85 fueling stations in the State. Related to F-1.2
1.3	Manure Digesters/Other Waste Energy Utilization*	L-M	M	Nominal ratings are based on methane conversion to electricity using standard engine/generator technology. Costs for conversion to compressed gas for vehicle use likely to be much higher. • Increases WA jobs; • Potential to reduce WA fuel imports.		Methane as a source for turbine power is a low energy return process. With our relatively low electrical power rates and gasoline approaching $3.50 a gallon, methane for internal combustion engines appears to be a much higher beneficial application. Three anaerobic digester projects were awarded state loans in 2006
AW-2	**AGRICULTURE – LIVESTOCK**					
2.1	Manure Management (handling and storage, and improve application methods; includes hobby-farm and pet waste)	L	L-M	Reductions are limited due to fairly small manure management emissions in the livestock sector.		There is a non-ag activity that is related regarding hobby farm and pet waste. King County documented the amount of hobby farm-produced organic waste and manure. There are also significant concerns about pet waste and water quality. TWG member suspects that

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						if calculations were done, pet waste might be a more significant factor than one would intuitively believe.
2.2	Changes in Animal Feed (optimize nitrogen for N_2O reduction and/or use supplements to reduce CH4 from enteric fermentation)	L	U	Reductions limited by fairly low emissions in WA for enteric fermentation and manure management.		
2.3	Rotational Grazing/Improve Grazing Crops and/or Management	U	U	The extent of poorly managed grazing lands in WA is unclear.		
AW-3	**AGRICULTURE CROP PRODUCTION & URBAN/SUBURBAN LANDSCAPES**					
3.1	Agricultural Soil Carbon Management	L-M	L	Significant opportunities beyond current practice (e.g. conservation tillage/no-till)?		DNR and WESTCARB produced an inventory of terrestrial carbon sequestration opportunities in WA
3.2	Agricultural Nutrient Management	L-M	L	Significant opportunities beyond current practice (e.g. nutrient management plan requirements)?		
3.3	Agricultural Water Management	L-M	U	Reductions dependent on the extent that pumping can be reduced.		
3.4	Carbon Sequestration in Perennial Systems	L-M	L	Reductions based on increasing WA orchard acreage by 10% by 2020 (17,200 acres).		WA orchards estimated to sequester CO_2 at a rate of 35 lbs CO_2/tree/yr or 28,000 lb CO_2/ac/yr (estimate provided by Alan Lakso via Keith Goehner)
3.5	Urban/Suburban Soil	U	U	Level of net reductions driven		Recent Actions in WA:

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	Carbon Management: DESCRIPTION: The amount of carbon stored in urban/suburban soils can be increased by the adoption of practices such as deep incorporation of compost and other organics in soils undergoing development and the use of organic mulches in new and established landscapes. Other benefits include increased plant health and vigor, reduced need for irrigation, fertilizers and pesticides and less stormwater run-off.			by the amount of urban/suburban land targeted and the GHG emissions associated with incorporating organic material (e.g. compost).		Washington State Department of Ecology's Stormwater Management Manual for Western Washington (WDOE website), used by local jurisdictions for stormwater design, now requires soil protection or restoration (Volume V, Chapter 5, BMP T5.13). A soil depth of 8 inches is required with 10% organics by weight for planting beds and 5% for lawns. For more information see http://www.soilsforsalmon.org/how.htm .
3.6	Urban/Suburban Nutrient Management	L-M	Neg-L	Reductions depend on aggressiveness of policy to achieve land use change or change in fertilization practices; Costs assumed to be low due to the savings associated with avoided fertilizer use.		
AW-4	**AGRICULTURE – LAND USE MANAGEMENT**					
4.1	Land Use Management that Promotes Grassland Cover (e.g., convert cropland to grassland or prevent conversion of grassland to croplands)	M	U	Reductions dependent on the: levels of soil carbon; GHG emissions associated with each land cover type. Costs dependent on the level of incentives required to achieve the desired land use management.		

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4.2	Preserve Open Space/Agricultural Land	L-M	M-H	Reductions dependent on levels of above and below ground carbon on the agricultural land vs. developed land; additional indirect benefits of supporting smarter growth in some cases (and the associated GHG reductions). Costs dependent on the cost of conservation easements.		Senate Bill 5248 "Preserving the viability of agricultural lands": Counties and cities may not amend or adopt critical areas ordinances as they specifically apply to agricultural activities until July 1, 2010. House Bill 1636; creation of a regional transfer of development rights: Subject to amounts appropriated, CTED is required to fund a process to develop a regional TDR program. The program must encourage King, Pierce, Snohomish, and Kitsap counties, and the cities within these counties, to participate in the development and implementation of a regional framework to make TDR viable.
AW-5	**AGRICULTURE – FARMING PRACTICES**					
5.1	Reductions In On-Farm Energy Use and Improvements in Energy Efficiency*	M	U	Level of reduction assumes that the agricultural industry consumes 25% of industrial petroleum and that 50% reduction could be achieved via the policy. Additional GHG emissions would also come from electricity consumption in the ag sector.		Renewable Energy System Cost Recovery (RCW 82.16.110) and Tax on Manufacturers or Wholesalers of Solar Energy Systems: provides incentives for the purchase of locally-made renewable energy products. Incentive payments are

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						provided by electric utilities to customers generating renewable energy (i.e., solar, wind) on their property. The federal Energy Policy Act of 2005 provided several renewable energy incentives.
5.2	Organic Farming	U	U	Reductions are dependent on the net difference in lifecycle GHG emissions between the organic cultivation systems implemented and conventional cultivation systems.		
5.3	Programs to Support Local Farming/Buy Local	L	L-M	Reductions based on those quantified in other states (e.g. AZ, NM). These may only capture a portion of the total benefit due to difficulties in quantification. Costs dependent on implementation mechanisms (e.g. incentive programs for processing or distribution systems).		Transportation accounts for ~20% of food system wide energy use . . . Alternative options for improving efficiencies in transportation need to be explored (ie. rail, etc.).
AW-6	**WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES**					
6.1	Significantly Expand Source Reduction, Reuse, Recycling and Composting DESCRIPTION: includes a broad range of actions, i.e., increase and expand existing programs, develop new programs, increase participation and recovery rates,	M-H	L-M	Given WA's current high levels of diversion, incremental benefits may tend to be toward the lower end of the range; costs likely to be toward the higher end of the range, as many of the less costly alternatives have been exploited.		Under current state strategy (see below), WA has already achieved a recycling and diversion rate of slightly over 47% in 2005. Recent Actions in WA: Department of Ecology

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	expand infrastructure, reduce the toxicity and increase the recyclability of products, develop markets for recyclable materials, and encourage and utilize tools and techniques such as product stewardship, closed loop recycling and cradle-to-cradle manufacturing. Full implementation of the State's Beyond Waste Plan and incentives and partnerships with the private sector and local governments will be elements of implementing this action.					issued the Beyond Waste plan in November 2004. It is a long-term strategy for systematically eliminating wastes and the use of toxic substances. For more information, see http://www.ecy.wa.gov/beyondwaste/about.html. Washington State Legislature recently passed two laws related to this activity: Washington's Electronic Products Recycling Law (2006) http://www.ecy.wa.gov/programs/swfa/eproductrecycle/ establishes a product stewardship system for the recycling of computers and televisions in 2009. HB 1024 http://apps.leg.wa.gov/billinfo/summary.aspx?bill=1024&year=2007 passed in 2007. It phases out the use of Polybrominated Diphnyl Ethers which will reduce the toxicity of certain products in the future, making them more recyclable.
6.2	Resource Management Contracting	U	U			Contract system can reward desired outcomes. Benefits to local waste management

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						include reduced need for fuel energy to haul material (see also 8.1). Systematic assessments can be used to create a resource model.
6.3	Waste Coal and Petroleum Coke Recapture	U	U	Reductions depend on the volumes of material available and the net difference in lifecycle GHG emissions for its use versus virgin coal or petroleum		
6.4	Divert Organic Waste from Landfill Disposal	M	M	Reductions based on landfill methane emissions levels in the draft I&F and assuming 50% control statewide. • Could be an increase in jobs associated with composting or energy conversion technologies; • Could reduce WA energy imports, if organics are used to generated energy.		One of the five major initiatives of Beyond Waste Plan "Organics" is not limited to yard debris or food waste in the municipal solid waste stream and includes all biomass materials such as landclearing, construction and demolition debris, wood waste, food waste, fabric, and paper (in some cases carbon-based plastics)
6.5	Establish Local Reuse, Recycling/Processing and Organics Management Businesses and Facilities DESCRIPTION: Currently much of the State's waste is moved long distances by truck or train for disposal. Materials destined	M	U	Costs dependent on the level of incentives required to establish these businesses.		

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	for recycling are also often transported long distances. Establishing local businesses and industries that can refurbish, remanufacture and process reusable and recyclable products and materials creates a market for those items and reduces the transportation GHG emissions related to long distance movement of waste and recyclables. Incentives and other actions can be taken to establish local markets and local businesses.					
6.6	Solid Waste Collection Efficiencies	U	U	Reductions dependent on the level of transportation reduction that can be achieved. Costs dependent on implementation mechanisms selected.		There is an issue with emissions from trucks, trains and other equipment utilized to transport and process waste. Some examples of actions include reducing diesel emissions through techniques covered in the Transportation TWG and more waste industry specific actions. For instance, establishing weekly collection of organics and every other week collection of garbage and recyclables will likely result in GHG emission reductions and increased diversion of organics from landfilling. May also include reducing

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						the amount of materials that need to be transported (potential link to 6.1, in terms of source reduction).
AW-7	**WASTE MANAGEMENT – LANDFILL GAS STRATEGIES**					
7.1	Flare Landfill Methane at non-NSPS (smaller) Sites	L	H			Federal and State performance criteria; regulations set emissions standards and gas control requirements for landfills that pass a threshold of waste amounts. Most landfills in WA have installed gas collection systems with flares or electrical generation. Implementation on small landfills is not feasible due to low emissions and high costs.
7.2	Methane & Biogas Energy Programs	U	U	Reductions dependent on industries/municipal processes targeted and technologies employed. • Potential for additional in-state job creation; • Potential for reducing WA energy imports.		Linked to Options 1.3 (Manure Digesters) but directed at municipal/industrial waste streams
7.3	Landfill Methane Energy Programs	L	U	Appears to be limited potential for new LFGTE projects. Reductions and costs dependent on technologies employed and end use of methane.		For anaerobic digesters to be added to an operating landfill, the landfill would also need a MRF to separate out the organic fraction. In WA, there has been a focus

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				• Potential for additional in-state job creation; • Potential for reducing WA energy imports.		on developing collection programs that divert materials rather than building MRF facilities to process mixed waste. Other relevant technologies that can capture and use methane gas include microturbines or production of liquid biofuels.
7.4	Use of Bioreactor Technology	L	U			Refers to a in-landfill degradation activity to achieve rapid stabilization of food, greenwaste, and paper-waste Bioreactor landfill approach works against source separation and processing of organics that are clean of other waste materials and contaminants.
AW-8	**WASTE MANAGEMENT – WASTEWATER ACTIVITIES**					
8.1	Energy Efficiency Improvements	L-M	L	Reductions assume that WW treatment consumes 10% of commercial sector electricity and that 25% improvement could be achieved. Costs are assumed to be low due to avoided electricity costs over the life of the improvement.		
8.2	Programs to Lower Waste Water Processing Needs	L	L	Similar assumptions to the emission reductions and costs		

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				for the option above, although only assuming a 10% reduction in water consumption statewide.		
8.3	Install Digesters and Energy Conversion Technologies	U	U	Reductions and costs are dependent on the incremental gains in efficiency above current practice and the costs associated with new/retrofit technology.		see also comments for 7.3 Wastewater facilities across the state operate digesters to treat waste solids. There is large opportunity to create higher power outputs, upgrade digestion capability and facilities to higher efficiency gas generators.

Brief Descriptions of Catalog Items
Agriculture Technical Working Group

(Recently enacted policies and programs in Washington State are listed where relevant (see italics). Note that this listing is incomplete and will be fleshed out during the TWG process; working group members are encouraged to provide input to the TWG facilitators on existing policies and programs, where relevant.)

AW-1 PRODUCTION OF FUELS AND ELECTRICITY

1.1 Expanded Use of Biomass Feedstocks for Electricity

Increase the amount of biomass available for generating electricity and displacing the use of fossil energy sources.

Recent Actions in WA: The 2006 Energy Independence Act (Initiative 937) established renewable portfolio standards. Large utilities (25,000 customers and over) are required to obtain 15% of their electricity from new renewable resources such as solar and wind by 2020 (3% in 2012 -- 9% in 2016 -- and 15% in 2020) and undertake cost-effective energy conservation. The RPSs affect 95% of the electric generation in the State.

1.2 In-state Liquid Biofuels Production

Increase production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks (raw materials) to displace the use of fossil diesel. Promote the development of cellulosic ethanol technologies and ethanol production systems that use renewable fuels to improve the embedded energy content of ethanol. Increased production and consumption in state give the highest benefits.

Recent Actions in WA: Washington State has passed into law several requirements and incentives supporting an in-state biodiesel and ethanol industry: HB 1240 to 1243, tax and use incentives to encourage production and use of biodiesel and ethanol; EO 04-06, Sustainability and Efficiency Goals for the State Operations; ESSB 6508, establishing minimum renewable fuel content requirements and fuel quality standards; HB 2939, appropriated $17 million for the Energy Freedom Loan Program to develop bioenergy R&D, crops, and markets

Currently the biodiesel production in the State, from 15 facilities on line or in serious planning/development, is about 270.5 million gallons per year. Biodiesel is sold at 35 stations in Washington.

Ethanol production is about 435 million gallons per year from seven facilities in the permitting/planning stage. Ethanol is a fuel derived from grain, usually corn, sugarcane or other biomass sources. E-85 can be used in the new Flexible Fuel Vehicles is an 85-percent ethanol/15-percent gasoline blend. There are four E-85 fueling stations in the State.

1.3 Manure Digesters/Other Waste Energy Utilization

Reduce the amount of methane emissions from livestock manure by installing manure digesters on livestock operations. Energy from the manure digesters is used to create heat or power, which offsets fossil fuel-based energy production and the associated Greenhouse Gas (GHG) emissions.

Recent Actions in WA: Three anaerobic digester projects were awarded state loans in 2006; the projects are sponsored by the Port of Sunnyside, Tulalip tribes and Mason County, respectively. The projects will convert livestock waste into methane fuel and energy.

AW-2 AGRICULTURE – Livestock

2.1 Manure Management

Implement manure management practices that reduce GHG emissions associated with manure handling and storage. Potential practices include but are not limited to manure composting (to reduce methane emissions) and improved methods for application to fields (for reduced nitrous oxide emissions). Application improvements include incorporation into soil, instead of surface spray/spreading.

2.2 Changes in Animal Feed

Livestock emit methane directly as a result of digestive processes (enteric fermentation). Research suggests that changes in the energy content of feed and other dietary changes can reduce methane emissions from enteric fermentation. By optimizing nitrogen (protein) utilization in the feed, nitrogen levels in the manure can be reduced, which in turn reduce the potential for nitrous oxide emissions.

2.3 Rotational Grazing/Improve Grazing Crops and/or Management

Heavy grazing can cause significant soil disturbance and result in carbon losses from soils. Rotational grazing where animals are moved from field-to-field on a regular basis reduces soil disturbance and maintains soil carbon levels. Rotational grazing also can improve plant vigor and enhances soil carbon levels.

AW-3 AGRICULTURE – CROP PRODUCTION

3.1 Soil Carbon Management

The amount of carbon stored in the soil can be increased by the adoption of practices such as conservation and no till cultivation. Reducing summer fallow and increasing winter cover crops are complimentary practices that reduce the need for conventional tillage. In addition, the application of biochar (i.e., charcoal) may also increase soil carbon content and stabilize soil carbon. By reducing mechanical soil disturbance, these practices reduce the oxidation of soil carbon compounds and allows more stable aggregates to form. Other benefits include reduced wind and water erosion, reduced fuel consumption, and improved wildlife habitat.

Recent Actions in WA: The Washington Department of Natural Resources (DNR) has been working collaboratively with various stakeholders to build on the 2005 West Coast Carbon

Sequestration Partnership[1] (WESTCARB). DNR and WESTCARB produced an inventory of terrestrial carbon sequestration opportunities in Washington State.

3.2 Nutrient and Water Management

Improve the efficiency of fertilizer use and other nitrogen-based soil amendments through implementation of management practices. Excess nitrogen not metabolized by plants can leach into groundwater and/or be emitted to the atmosphere as N_2O. By managing and improving water consumption and nutrients spread on crops, there will be a minimal loss of carbon from the soil. Reduced water consumption can result in lower energy use for water pumping. Better nutrient utilization can lead to lower nitrous oxide emissions from run-off.

AW-4 AGRICULTURE-LAND USE CHANGE

4.1 Land Use Management that Promotes Grassland Cover

Convert marginal agricultural land used for annual crops to permanent cover such as grassland/rangeland , orchard, or forest, where the soil carbon and/or carbon in biomass is higher under the new land use. Includes opportunities to keep CRP lands in permanent cover. Increased demand for corn-based ethanol and biodiesel feedstocks can act as an incentive for converting grassland to cropland. Adopt mechanisms to prevent theses acres from either returning to conventionally tilled production or to suburban/urban development.

4.2 Preserve Open Space/Agricultural Land

Reduce the rate at which agricultural lands are converted to developed uses, while protecting private property rights and responsibilities. This retains the above- and below-ground carbon on these lands, as well as the carbon sequestration potential of these lands. Transportation emissions will be reduced indirectly through more efficient development and lower vehicle use.

AW-5 AGRICULTURE-FARMING PRACTICES

5.1 Reductions in On-Farm Energy Use

Renewable energy can be producing and used on-site at agriculture operations. For example, installation of solar or wind power, use of hydro-powered generators for irrigation, and converting diesel farm equipment to LNG/CNG or hybrid technology will reduce carbon dioxide emissions by displacing the use of fossil based fuels.

Recent Actions in WA: Renewable Energy System Cost Recovery (RCW 82.16.110) and Tax on Manufacturers or Wholesalers of Solar Energy Systems: provides incentives for the purchase of locally-made renewable energy products.

Incentive payments are provided by electric utilities to customers generating renewable energy (i.e., solar, wind) on their property. For example, the Chelan County PUD Sustainable Natural Alternative Power Producers Program encourages customers to install power generators such as solar panels and wind turbines and connect them to the PUD distribution system.

[1] For more information, go to the WESTCARB website: www.westcarb.org

The federal Energy Policy Act of 2005 provided several renewable energy incentives.

5.2 Organic Farming

Provide incentives to farmers for growing organic products. Organic farming may result in reduced GHG emissions compared to conventional farming, depending on the specific practices implemented (e.g., use of no-till cultivation and fewer chemical inputs).

5.3 Programs to Support Local Farming/Buy Local

Promote the production and consumption of locally-produced agricultural commodities, which displace the consumption of commodities transported from other states or countries. GHG reductions occur from reduced transportation-related emissions.

AW-6 WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES

6.1 Advanced Recycling and Composting

Increase recycling and reduce waste generation in order to limit greenhouse gas emissions associated with landfill methane generation and with the production of raw materials.

Increase recycling programs, create new recycling programs, provide incentives for the recycling of construction materials, develop markets for recycled materials, and increase average participation/recovery rates for all existing recycling programs.

6.2 Promotion of Bioreactor Technology

Municipal solid waste can be composted and processed with bioreactor technology. Composting has advantages over land-filling and incineration because of lower operational costs, less environmental pollution, and beneficial use of the end product. Bioreactor technology is also used to accelerate waste stabilization rates, enhance gas production, facilitate leaching, reduce volume, and minimized long-term liability of waste.

6.3 Source Reduction Strategies

Reduce the volume of waste from residential, commercial, and government sectors by including recycling, reuse, and composting. Reduction of generation at the source reduces both landfill emissions as well as upstream production emissions

6.4 Resource Management Contracting

Unlike traditional solid waste service contracts, resource management (RM) compensates waste contractors based on performance in achieving an organization's waste reduction goals rather than the volume of waste disposed. As a result, RM aligns waste contractor incentives with the goals to explore innovative approaches that foster cost-effective resource efficiency through prevention, recycling, and recovery.

6.5 Waste Coal Recapture

Promote research and implementation of recovering waste coal. Waste coal is a usable material that is a byproduct of previous coal processing operations. Emissions are reduced relative to the mining of new coal.

6.6 Prevent Landfilling of Unprocessed Organic Material

Reduces methane emissions associated with landfilling by reducing the biodegradable fraction of waste emplaced.

AW-7 WASTE MANAGEMENT – LANDFILL GAS STRATEGIES

7.1 Flare Landfill Methane at non-NSPS (smaller) sites

Encourage smaller landfills that do not fall under strict environmental protection regulations to capture and flare methane gas. Flares are used to safely combust toxic and volatile gases from landfills and they convert methane gas, which has a relatively high global warming potential, to carbon dioxide.

7.2 Methane and Biogas Energy Programs

Encourage and promote the use of anaerobic digesters and energy recapture for waste materials other than municipal solid waste at landfills (e.g. food processing waste). These projects will help prevent the emission of methane while producing clean energy. Anaerobic digesters make a two-fold contribution to climate protection: the usual unchecked discharge of methane into the atmosphere is prevented, and the burning of fossil fuels is replaced with an unlimited supply of clean, renewable energy (biogas).

7.3 Landfill Methane Energy Programs

Use the clean, renewable energy created at landfills by anaerobic digesters to make electric power, space heat, and liquified natural gas.

AW-8 WASTE MANAGEMENT – WASTE MANAGEMENT STRATEGIES

8.1 Energy Efficiency Improvements

Provide incentives for efficiency improvements. Encourage the set up of energy policies, energy audits, and energy cost tracking. Identify and implement energy improvements such as using energy efficient equipment and generating on-site power (e.g. solar power).

8.2 Lower Waste Processing Needs

Develop and implement best practices for lowering water consumption and lowering waste production at the industrial, commercial, and residential levels. Encourage and create incentives for research and development on reducing water consumption and waste production. Provide education to reduce water consumption and waste production. Lower water consumption, waste production lead to lower GHG emissions.

8.3 Install Digesters and Turbines or Engines

Provide incentives to install anaerobic digesters to treat municipal waste and create methane. Install turbines or reciprocating engines to generate electricity from the methane. Reductions occur via methane control and offsetting fossil energy use.

Catalog of State Actions
Forestry Working Group

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- **Low**: Low priority options will be analyzed last, time and resources permitting.

Notation of Options:

* **Options marked in bold an asterisk (*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. TWG members are encouraged to provide information on other relevant actions.

Forestry (F)

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
F-1	**PRODUCTION OF FUELS AND ELECTRICITY IN FORESTRY**					
1.1	Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production*	M-H	L	Approximate amount of forest biomass available in WA: 8 million dry tons (generating approx. 8 billion kWhrs) (WSU 2005).		The 2006 Energy Independence Act (Initiative 937) established renewable portfolio standards. Related to AW 1.1
1.2	In-state Liquid Biofuels Production*	M-H	M-H			WA passed into several requirements/incentives supporting an in-state biodiesel and ethanol industry Current biodiesel production in the State, 15 facilities on line or in serious planning/development, about 270.5 million gallons per year. Biodiesel sold at 35 stations in WA. Ethanol production is about 435 million gallons per year from seven facilities in the permitting/planning stage. There are four E-85 fueling stations in the State. Related to AW 2.3
1.3	Improved Energy Capture from Wood Waste Combustion	L-M	L-M			
1.4	Improved Commercialization of	M-H	U			For more efficient production of fiber

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
	Advanced Lignocellulosic Processes (hydrolysis, gasification, pyrolysis or other)					products, transportation fuels, petrochemical replacements, heat and power
F-2	**FORESTRY – BIOMASS PROTECTION AND MANAGEMENT**					
2.1	Reduce Conversion to Nonforest Cover	H	L-M	Should also consider intermediate processes that increase the likelihood of conversion, e.g., fragmentation and parcelization		Applies to 2.1-2.4: Recent Actions in WA: DNR and WESTCARB produced an inventory of terrestrial carbon sequestration opportunities in Washington State.
2.2	Urban Forestry	L-M	M-H	GHG reductions and cost/cost savings can be enhanced if policy targets shade planting to reduce heating/cooling demands		
2.3	Afforestation/Restoration	L-M	L-M			
2.4	Enhanced Carbon Sequestration in Forests	M-H	L-M			Includes a variety of options for management actions and does not specify a single approach.
2.5	Enhanced Carbon Sequestration in Harvested Wood Products	M-H	L-M	Revenue from increased production of harvested wood products can lead to cost-savings.		Includes a variety of options for management actions and does not specify a single approach. Potential link to 3.3 in terms of increasing the amount of durable wood products available for use in building materials
2.6	Improved Forest Health	M-H	L-M			Includes a variety of options for management actions and

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						does not specify a single approach.
F-3	**FORESTRY - WOOD PRODUCTS AND WASTE**					
3.1	Improved Mill Biomass Recovery	L	L			
3.2	Improved Logging and Other Residue Recovery	L	U			There was discussion about removing this option on the last TWG call. A follow-up email from WA Ecology indicated there might be opportunities to improve logging residue recovery as the state continues to issue burning permits for wood waste on forest parcels.
3.3	Expanded Use of Wood Products for Building Materials	M	U			

Brief Description of Catalog Items
Forest Management Technical Working Group

(Recently enacted policies and programs in Washington State are listed where relevant (see italics). Note that this listing is incomplete and will be fleshed out during the TWG process; working group members are encouraged to provide input to the TWG facilitators on existing policies and programs, where relevant.)

F-1 FORESTRY – PRODUCTION OF FUELS AND ELECTRICITY IN FORESTRY

1.1 Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production

Increase the amount of biomass available for generating electricity and displacing the use of fossil energy sources.

Recent Actions in WA: The 2006 Energy Independence Act (Initiative 937) established renewable portfolio standards. Large utilities (25,000 customers and over) are required to obtain 15% of their electricity from new renewable resources such as solar and wind by 2020 (3% in 2012 -- 9% in 2016 -- and 15% in 2020) and undertake cost-effective energy conservation. The RPSs affect 95% of the electric generation in the State.

1.2 In-state Liquid Biofuels Production

Increase production of ethanol and/or biodiesel fuel from agriculture and/or forestry feedstocks (raw materials) to displace the use of fossil diesel. Promote the development of cellulosic ethanol technologies and ethanol production systems that use renewable fuels to improve the embedded energy content of ethanol. Increased production and consumption in state give the highest benefits.

Recent Actions in WA: Washington State has passed into law several requirements and incentives supporting an in-state biodiesel and ethanol industry: HB 1240 to 1243, tax and use incentives to encourage production and use of biodiesel and ethanol; EO 04-06, Sustainability and Efficiency Goals for the State Operations; ESSB 6508, establishing minimum renewable fuel content requirements and fuel quality standards; HB 2939, appropriated $17 million for the Energy Freedom Loan Program to develop bioenergy R&D, crops, and markets (Agriculture only); RCW 82.08.020, Sales of machinery, equipment, vehicles, and services related to wood biomass fuel blend, in 2003, a sales tax exemption covering the purchase of machinery, equipment, and buildings used for retailing wood biomass fuel blend (containing at least 20% wood biomass fuel by volume) was passed (exemption expires June 30, 2009)

Currently the biodiesel production in the State, from 15 facilities on line or in serious planning/development, is about 270.5 million gallons per year. Biodiesel is sold at 35 stations in Washington.

Ethanol production is about 435 million gallons per year from seven facilities in the permitting/planning stage. Ethanol is a fuel derived from grain, usually corn, sugarcane or other biomass sources. E-85 can be used in the new Flexible Fuel Vehicles is an 85-percent ethanol/15-percent gasoline blend. There are four E-85 fueling stations in the State.

1.3 Improved Energy Capture from Wood Waste Combustion

Reduce emissions and increase heat efficiency from heat sources such as wood burning stoves and furnaces.

1.4 Improved Commercialization of Biomass Gasification and Combined Cycle

Improve the rate of technology development and market deployment of biomass gasification and combined cycle (BGCC) technologies. These technologies expand the application of renewable fuels derived from biomass.

F-2 FORESTRY – BIOMASS PROTECTION AND MANAGEMENT

2.1 Forest Protection – Reduced Clearing and Conversion to Nonforest Cover

Reduce the rate at which existing forest are cleared and converted to developed uses. Much of the carbon stored in forest biomass and soils can be lost as a result of such a land use conversion.

2.2 Urban Forestry

Maintain and improve the health and longevity of trees in urban and residential areas to protect and enhance the carbon stored in tree biomass. Indirect emissions reductions may also occur by reducing heating and cooling needs as a result of planting shade trees.

2.3 Afforestation/Reforestation

Establish forests on land that has not historically been forested (e.g., agricultural land) ("afforestation"). Promote forest cover and associated carbon stocks by regenerating or establishing forests in areas with little or no present forest cover ("reforestation"). In addition, implement practices such as soil preparation, erosion control, and stand stocking to ensure conditions that support forest growth.

2.4 Forest Management for Carbon Sequestration

Forest management activities that promote forest productivity and increase the rate of carbon dioxide sequestration in forest biomass and soils and in harvested wood products. Practices may include: increased stocking of poorly stocked lands, age extension of managed stands, thinning and density management, fertilization and waste recycling, expand short rotation woody crops (for fiber and energy), expanded use of genetically preferred species, modified biomass removal practices, fire management and risk reduction, pest and disease management.

Applies to 2.1-2.4: Recent Actions in WA: The Washington Department of Natural Resources (DNR) has been working collaboratively with various stakeholders to build on the 2005 West

Coast Carbon Sequestration Partnership[1] (WESTCARB). DNR and WESTCARB produced an inventory of terrestrial carbon sequestration opportunities in Washington State.

F-3 FORESTRY – WOOD PRODUCTS AND WASTE

3.1 Improved Mill Waste Recovery

Improve treatment and cleaning of waste materials from paper mills, which can then be re-used to manufacture additional wood products. Ensure that sawmill byproducts are recycled.

3.2 Improved Logging Residue Recovery

Use more efficient logging methods to fully utilize harvested trees, which will minimize carbon losses from wood damaged during harvesting and maximize the potential for carbon sequestration in harvested wood products. Process the logging remains efficiently.

3.3 Expanded Use of Wood Products for Building Materials

Increase the amount of renewable wood products used for residential and commercial building. The use of wood products in place of other building materials can increase carbon sequestration in wood products and displace GHG emissions associated with processing high-energy input materials such as steel and concrete. Reduction potential is enhanced by promoting the use of locally-grown wood.

[1] For more information, go to the WESTCARB website: www.westcarb.org

Catalog of State Actions
Residential, Commercial and Industrial (RCI) Technical Working Group

A catalog of state-level, GHG-reducing actions and policy options based on actions undertaken or considered by state, local and private actors. Brief descriptions of these options, and some of the related state actions underway, are available in a companion document.

Key to Future Rankings of Options in the Tables that Follow:

Potential GHG Emission Reductions 1/	Potential Cost or Cost Savings 1/ 2/
High (H): At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current WA emissions)	**High (H)**: $50 per metric ton CO_2e (tCO_2e) or above
Medium (M): From 0.1 to 1.0 MMtCO_2e per year by 2020	**Medium (M):** $5-50/t$CO_2$e
Low (L): Less than 0.1 MMtCO_2e per year by 2020, or 1 MMtCO_2e by 2050	**Low (L):** Less than $5/t$CO_2$e
Uncertain (U): Not able to estimate at this time	**Negative (Neg):** Net cost savings
	Uncertain (U): Not able to estimate at this time

1/ Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.
2/ Costs are denoted by a positive number. Cost savings (i.e., "negative costs") are denoted by a negative number.

Definition of "Priorities for Analysis":

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.

Notation of Options:

* **Options marked in bold with an asterisk (*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. TWG members are encouraged to provide information on other relevant actions.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
RCI-1	**ENERGY EFFICIENCY PROGRAMS, FUNDS, AND GOALS**					
1.1	**Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Electricity** (including expansion of same)*	H	Neg			Initiative 937 requires that "Each qualifying utility shall pursue all available conservation that is cost-effective, reliable, and feasible." should provide incentives for consumers to adopt energy efficiency measures
1.2	Demand-Side Management (DSM) Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil	H	Neg			*TWG comments:* Could include I-937-like requirements for gas utilities to acquire all cost effective conservation; should provide incentives for consumers to adopt energy efficiency measures
1.3	Business Energy Tax Credit	U	U			*TWG comments:* Could be applied to business and occupation taxes; perhaps similar to Oregon program. Consider focus on tax credits to promote energy efficiency, renewable energy investments. Impact on government revenues a consideration, but stimulation of economy though market creation, re-spending of energy cost savings may offset revenue loss.
1.4	**Regional Market Transformation Alliance***	M	Neg			WA utilities are already members of the Northwest Energy Efficiency Alliance. *TWG Comments:*

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						Consider more aggressive investment with manufacturers, bulk purchasing needed. Include using certification programs such as Energy Star by retailers and institutional purchasers.
1.5	Private/Public Efficiency Funds	U	U			*TWG Comments* Could provide low interest energy-efficiency loans and other services, support for neighborhood energy strategies; could be patterned after initiatives in other jurisdictions (Cambridge/London)
1.6	Appliance/Equipment Performance Requirements Linked to Property Sales	M	Neg to L			*TWG Comments:* Require heating, cooling, and water heating equipment to meet code when buildings are sold.
RCI-2	**BUILDINGS**					
2.1	**Advanced Building Codes for Energy Efficiency***	H	Neg to L			WA Building Code Council has adopted rules addressing min. efficiency requirements to comply with state/federal mandates. *TWG comments*: Could include consideration of embodied energy, life-cycle emissions of building materials, and the inclusion of renewable energy in building codes. Consider basing residential building energy codes for application on a per capita basis rather than per square foot. Could include lighting efficiency

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						and controls. Consider aggressively improve existing codes. Consider requiring PV and passive solar as part of the code in key heating degree zones. Consider including natural ventilation strategies in codes. Support enforcement of energy codes and/or reestablish special plans examiner program for non-residential energy code. Consider adding GHG impacts to State Building Code Council's charter or scope of responsibilities.
2.2	**Promotion and Incentives for Improved Design and Construction** (e.g. LEED, green buildings, Architecture 2030, and other guidelines) **in the Private Sector**	M to H	Neg to H			City of Seattle's LEED Incentive for commercial projects; Seattle's Built Green Incentive for residential single and multi-family projects. *TWG Comments:* Could include consideration of embodied energy, life-cycle cost/impacts, renewability of building materials, capture of waste heat from power generation and industrial processes for use in homes and commercial buildings, lighting efficiency and controls. Establish aggressive energy consumption goal. Business assistance program to help identify and achieve GHG goals.
2.3	**Improved Design and**	M	Neg			Executive Order 05-01, directing adoption of green building practices

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
	Construction*, "Government Lead-by-example"		to H			in construction of new, some renovated existing state buildings (>25,000 ft_2); High-Performance Public Buildings bill (Chapter 39.35D RCW), requires all new state-funded facilities over 5,000 square to meet green building standards; Executive Order 05-01 mandates 10% reduction in State Agency energy purchases from 2003 levels by 9/1/2009; LEED silver standards for WA public buildings. *TWG Comments:* Apply integrated "whole system" or "clean sheet" design (across multiple issues), ensure that government procurement processes provide incentives to construct high-performance buildings. Require consideration of greenhouse gas emissions, and of options to reduce emissions, where and when government environmental review of projects takes place. Consider meeting Architecture 2030 goals for all government-owned buildings, providing incentives for improvement of government-leased space.
2.4	Support for Energy Efficient	L to M	U	Significant		*TWG Comments:* Could ensure that building codes

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
	Communities Planning, "Smart Growth"			potential contribution to 2035/2050 goals.		support these goals over the long term. Consider administrative changes to enhance integrated design of communities and transport systems, options to reduce urban "heat island" effects. Condition hook-ups to city, county, and utility services on submission of GHG emissions reduction plans. Consider location to be part of a building's GHG "footprint".
2.5	Establish Goals, Policies and/or Codes to Reduce Electricity Use for Heating/Drying	U	U			*TWG Comments:* Target improvement in fuel-cycle efficiency of supplying heating and drying energy
2.6	Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations	M to H	Neg. to L			*TWG Comments:* Consider incentives for improvement of the energy efficiency of the existing building stock. Focus on building operations, maintenance, and occupant behavior. Could include requirements for upgrading of buildings at time of resale. For medium to large business or agency, require a full time resource conservation manager on premises.
2.7	Reduction of Water Use	L to M	U			*TWG Comments:* Strategies to reduce water use and related energy consumption for water provision and treatment, with possible linkage to the Agriculture and Wastes TWG

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
2.8	Low Income Energy Programs	M to H	Neg. to M			General fund to supplement state's weatherization and low-income home energy assistance program.
RCI-3	**APPLIANCE AND EQUIPMENT (INCLUDING LIGHTING) STANDARDS**					
3.1	**More Stringent Appliance/Equipment Efficiency Standards***	M	Neg			2005 Legislature adopted minimum efficiency standards for 12 products (RCW 19.260.040). State standards for four of these products were eliminated in 2006 legislation after stricter federal standards were established for those products. State standards for 8 types of products remain. *TWG Comments:* Encourage national manufacturers to invest in improvements, and help to create markets. Consider other environmental impacts of efficient devices.
3.2	Ban the Sale of Incandescent Bulbs	M	Neg			
RCI-4	**EDUCATION AND OUTREACH**					
4.1	Consumer Education Programs	U	U			*TWG Comments:* Could include linkages of consumer education programs with retail sales organizations, requirement of consumer education at the time of sale, use of materials on environmental impacts education by governments to engage small businesses on GHG emissions reduction, promote lean

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						manufacturing by industry
4.2	Energy Efficiency and Environmental Impacts Awareness in School Curricula	U	U			*TWG Comments:* Could include preparation of new curricula, including integrated design curricula.
4.3	Post-secondary Specialist Education and Certification for Building Energy Efficiency Experts and Related Trades	U	U			*TWG Comments:* Could begin with investment in pilot program at one or two leading schools – UW and/or WSU. Develop programs for integrated design.
4.4	Post-secondary College and University Programs	U	U			*TWG Comments:* Could begin with investment in pilot program at one or two leading schools – UW and/or WSU. Develop programs for integrated design.
RCI-5	**PRICING AND PURCHASING**					
5.1	Green Power Purchasing for Consumers	M	L to M			*TWG Comments:* Consider flexibility for end-use customers to purchase Green Power without geographical restrictions Create statewide stakeholder advisory group for utility programs.
5.2	Net-metering for Distributed Generation and Combined Heat and Power	U	U			*TWG Comments:* Consider incentives, elimination/reduction of financial, regulatory, and other barriers to implementation of systems including avoided cost barriers for

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						CHP; simplification and standardization of permitting and prescreening of projects. Consider increase in existing capacity cap to 1 MW., allow aggregation if appropriate in commercial and/or agricultural applications.
5.3	Rate structures and Technologies to Promote Reduced GHG Emissions	U	U			*TWG Comments:* Consider interaction of green building programs and rate structures. Could include different types of rate structures and bases (per occupant versus per square foot, for example) for rate structures, and metering/billing strategies and technologies to facilitate consumer decisions.
5.4	Bulk Purchasing Programs for Energy Efficiency or Other Equipment	M	Neg.			*TWG Comments:* Consider encouraging public sector to invest to create markets, offer sales tax exemption for bulk purchase of Energy Star equipment.
5.5	Sales tax credits	U	U			*TWG Comments:* Consider eliminating sales tax for certain energy-efficient products, Increasing taxes for products with efficiencies below specific baselines.
RCI-6	**CUSTOMER-SITED DISTRIBUTED ENERGY AND COMBINED HEAT AND POWER**					
6.1	**Provide Incentives to Promote and Reduction of Barriers to**	M to H	L to M			Executive Order 05-01 mandates 10% reduction in State Agency energy purchases from 2003 levels

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
	Implementation of Renewable Energy Systems*					by 9/1/2009, including through use of renewable energy. *TWG Comments:* Consider incentives and barrier elimination, including avoided cost barriers for CHP For solar PV, consider expanded incentives to include commercial systems, offer B&O tax credits for commercial-scale systems, and offer low- or no-interest loans for commercial and residential systems. Could simplify and standardize permitting for industrial and large commercial systems; support land use prescreening efforts to support siting.
6.2	Provide Incentives and Resources to Promote and Reduction of Barriers to Implementation of Combined Heat and Power (CHP, or "cogeneration") and Waste Heat Capture	M to H	Neg. to M			*TWG Comments:* Could include incentives and barrier elimination, including avoided cost barriers for CHP; include options for capture of waste heat from power generation and industrial processes for use in homes and commercial buildings. Simplify and standardize permitting for industrial and large commercial systems; support land use prescreening efforts to support siting. Require fossil-fueled generation to be CHP. Encourage increasing overall on-site energy efficiency.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
6.3	Enhance and Expand Thermal Energy Infrastructure for GHG Emissions Reduction	M	Neg. to H			*TWG Comments:* Could include expanded district heating, district-level planning for apace conditioning, water heating, and process heating in general
6.4	Smart Electrical Grid	U	U			*TWG Comments:* Consider promoting a "smart electrical grid" that accommodates interconnection of distributed power generation, charging/accepting power from hybrid cars, electricity demand management via the grid, and other functions. Could also include issues related to ownership of distributed generation—municipal PV ownership. Spans RCI, ES TWGs, likely others. Collaboration on pilot development underway in WA.
RCI-7	**GHG EMISSIONS-SPECIFIC GOALS AND POLICIES, INCLUDING PROCESS EMISSIONS**					
7.1	GHG Cap and Trade Program (for RCI Sectors)	U (depends on cap level)	U			A number of considerations apply (see Summaries)
7.2	GHG or Carbon Tax	U (depends on tax level)	U			*TWG Comments:* Need to consider impacts of taxes on different groups, investment; implementation for fairness

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
7.3	Switching to Lower GHG Fuels	M	L to M			*TWG Comments:* Switching to lower overall fuel-cycle GHG emissions. Encourage RD&D for cellulosic-based fuels
7.4	Policies and/or Programs Specifically Targeting Non-energy GHG Emissions	U	U			*TWG Comments:* Consider performance standards as an alternative to more prescriptive standards. Standards to require inclusion of fly ash in cement, and encourage use of innovative low-GHG cement fillers.
7.5	Negotiated/Voluntary Emissions or Energy Savings Agreements	U	U			*TWG Comments:* Consider incentives for voluntary reductions. Business assistance program to help identify and achieve GHG goals.
7.6	Research and Development - Carbon Sequestration and Removal for RCI Energy End-users	U	U			*TWG Comments:* Could include biomass gasification with use of resulting activated carbon
7.7	Identify GHG Emissions Impacts and Reductions for All Projects Requiring Government Review	U	U			*TWG Comments:* Consider requiring [SEPA] review to quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for projects requiring government review.
RCI-8	**PRODUCT CONSUMPTION AND DISPOSAL PRACTICES FOR REDUCED GHG EMISSIONS**					
8.1	Appliance and Lighting Product Recycling and Design	M	U			Overall goal is reduction of GHG footprint of products and packaging; additional benefits

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						include reduction of non-GHG pollutants, savings of materials. Could include design of product/packaging for use as clean fuel if not reused or recycled.
8.2	Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings	U	U			

Brief, Generic Descriptions of Catalog Items

Residential, Commercial and Industrial (RCI) Technical Working Group

RCI-1 ENERGY EFFICIENCY PROGRAMS, FUNDS, AND GOALS

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

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

The policy design includes two key and linked dimensions: achievable/desirable energy savings and policy/administrative mechanisms to achieve these savings. In order to implement expanded DSM programs, a number of mechanisms should be considered. Candidate mechanisms include revising existing statutes to enable utility investments in energy efficiency at the levels indicated above, to consider as potentially eligible programs that are cost-effective taking into account the valuation of for CO_2 emissions. Policy and administrative mechanisms that might be applied include regulator-verified savings targets, public benefit charges, portfolio standards, "energy trusts," integrated resource planning, performance-based incentives, decoupling of rates and revenues, and appropriate rate treatment for efficiency. Elements that might be considered in designing this option might include:

- Implementation/administration by utility (including municipal utilities and cooperatives), state agency, or third-party actors.
- Subsidized energy audits for homeowners, businesses, industries.
- Low-cost loans for efficiency improvements.
- Incentives for customer-sited renewable electricity and heat including solar photovoltaic (PV), passive solar space heat, and solar water heat (SWH).
- Incentives for specific technologies, potential including (but not limited to) white roofs/rooftop gardens/ landscaping, ground-source heat pumps, lighting, water heating, plug loads, networked personal computer management, power supplies, motors, pumps, boilers, customer-side transformers, water use reduction, and others.
- Appliance recycling/pick-up programs.
- Energy efficiency reinvestment funds to provide funding for efficiency improvements in specific sectors.
- Focus on specific market segments (low income residential, small and medium businesses).

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

Initiative 937 requires that "Each qualifying utility shall pursue all available conservation that is cost-effective, reliable, and feasible."

1.2 Demand-Side Management (DSM)/Energy Efficiency Programs, Funds, or Goals for Natural Gas, Propane, and Fuel Oil (including expansion of same)

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

1.3 Business Energy Tax Credit

A business energy tax credit can provide incentives for businesses to invest in energy efficiency and/or customer-sited renewable energy systems. Washington lacks an income tax, but has business and occupations taxes, typically on gross receipts, that apply to a number of different categories of businesses; a business energy tax credit would be applied to these taxes[1].

Strategies to raise government revenues to support greenhouse gas emissions reduction programs are an important consideration. Tax credits applied to energy efficiency or renewable energy may generate additional government revenues through increased local market activity and job creation, and through re-spending of energy cost savings.

1.4 Regional Market Transformation Alliance

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

[1] The State of Oregon has a program of business energy tax credits applied to business income taxes. Information on Oregon's program is available at http://oregon.gov/ENERGY/CONS/BUS/BETC.shtml.

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

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

Potential elements of a market transformation program include:

- Target specific measures, including ground-source heat pumps, solar WH/PV, other technologies important for Washington.
- Target specific market segments (residential low-income, for example, or commercial offices).
- Support for commercialization of promising technologies.
- Bulk purchasing programs (public/private) or arrangements with retailers.
- More aggressive investment with manufacturers, and broader and more aggressive bulk purchasing programs.
- Continued and expanded use of certification programs such as Energy Star by retailers and institutional purchasers.

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

1.5 Public/private Efficiency Funds

"Public/private efficiency funds", possibly implemented statewide, would provide zero- or low-interest energy efficiency loans for both retrofit energy efficiency and new construction energy efficiency, ESCO strategies, modeled after Clinton Climate Initiative Energy Efficiency Building Retrofit Program, and other services (including, for example, support for neighborhood energy strategies), and would be patterned after initiatives in other jurisdictions (Cambridge MA, London UK, and others[2]). These funds would help to provide financing for projects that go beyond energy-efficiency improvements that are cost-effective in today's markets to provide very low or no-carbon goods, buildings, and services.

1.6 Appliance/Equipment Performance Requirements Linked to Property Sales

This option would target energy consumption in existing buildings by requiring, when buildings are sold, that heating, cooling, and water heating equipment meet standards established in building codes in force at the time of sale.

[2] See, for example, Cambridge Energy Alliance: http://www.cambridgeenergyalliance.org/ and London Energy Partnership: http://www.london.gov.uk/mayor/environment/energy/partnership-steering-group/index.jsp.

RCI-2 ENERGY EFFICIENCY PROGRAMS, FUNDS, AND GOALS

2.1 Advanced Building Codes for Energy Efficiency

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

Potential elements of a policy to include building codes include:

- Training of building code and other officials in energy code enforcement.
- Training and Education for Builders and Contractors (for example, in HVAC[3] sizing, duct sealing, and evaluation of building energy efficiency).
- Require high-efficiency appliances in new construction and retrofits.
- Consider basing residential building energy codes for application on a per capita basis rather than per square foot.
- Use the Northwest Power Planning Council's "best of the best" analysis to identify code improvements for Washington.
- Consider requiring PV and passive solar as part of the code in key heating degree zones.
- Consider including natural ventilation strategies in codes.
- Support enforcement of energy codes and/or reestablish special plans examiner program for non-residential energy code.
- Amend rules to add consideration of the GHG impacts of building codes to the State Building Code Council's charter or scope of responsibilities.

Potential measures supporting this option can include consumer and policymaker education, improved enforcement of building codes, development of a clearinghouse for information on and to provide access to software tools to the calculate impact of energy efficiency and solar technologies on building energy performance. This option could also include consideration of the concepts of embodied energy in and "renewability" of building materials[4], and of life-cycle cost analysis of buildings and building components. The inclusion of renewable energy in building codes is also a possibility.

Recent changes in the Washington building energy code are summarized in http://www.energy.wsu.edu/code/code2006.cfm.

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[3] Heating, ventilation, and air conditioning.

[4] See, for example, CORRIM (Consortium for Research on Renewable Industrial Materials), Life-Cycle Environmental Performance of Renewable Building Materials in the Context of Residential Construction, available from http://www.corrim.org/reports/2005/final_report/index.htm.

2.2 Promotion and Incentives for Improved Design and Construction (e.g. LEED[5], green buildings, Architecture 2030, and other guidelines) in the Private Sector

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

Additional Potential elements of this option include:

- Target new, renovated, and/or existing buildings (retrofits).
- Set a cap on consumption of energy per unit area of floorspace for new buildings.
- Encourage building commissioning and recommissioning, including energy tracking and benchmarking.
- Set up a "feebate" program to encourage energy efficiency in building design.
- Provide incentives, in the form of tax credits, DSM program support, financing incentives (such as "green mortgages), or other inducements for retrofit of existing residential and commercial buildings.
- Include encouragement for the use of alternative and local building materials and practices.
- Target reduction of emissions from diesel engines used in new construction developments.
- Encourage capture of waste heat from power generation and industrial processes for use in homes and commercial buildings.
- Encourage improved lighting design, including integrated lighting, daylighting, high-efficiency lighting components, controls (including occupancy sensors, photocells), windows.
- Encourage design that considers energy use in and energy end-uses in buildings in an integrated fashion.
- As possible goals for this option, consider going beyond LEED to Architecture 2030-level goals, providing energy consumption performance (energy intensity) that is 50% of the regional average for each building type.

[5] Leadership in Energy and Environmental Design; see U.S. Green Building Council, http://www.usgbc.org. Note, however, that LEED is only one of many design standards that could be drawn upon in promoting improved design. Others options include guidelines offered by Architecture 2030 (http://www.architecture2030.org/home.html), NAHB (National Association of Home Builders) Green Homebuilding guidelines, Green Globes (http://www.greenglobes.com/fitup/Non-Flash/index.htm) and SFI (Sustainable Forestry Initiative), and the recognition of the use of CSA-certified wood in construction.

Potential supporting measures for this option include training and certification of building professionals (see 4.3, 4.4), consumer and primary/secondary education, performance contracting/shared savings arrangements, and setting up of a clearinghouse for information on and access to software tools to calculate the impacts of energy efficiency and solar technologies for buildings. Measures included as a part of this option could also include consideration of concepts of embodied energy in and "renewability" of building materials[6], provision of a business assistance program to help identify and achieve GHG goals, and life-cycle cost analysis of buildings and building components.

2.3 Improved Design and Construction, "Government Lead-by-example"

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

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

- Municipal Energy Management systems and initiatives, as well as audits of energy performance and operations of State and other government buildings (in tandem with an audit program), Audit results could be used to target and prioritize investments in improving government building energy efficiency.
- Improvement and review of efficiency goals over time, and development of flexibility in contracting arrangements to encourage integrated energy-efficient design and construction.
- Recommendations that the infrastructure for implementation (meters, bookkeeping systems, staff, etc.) be established as soon as possible.
- State bulk-purchase of appliances and equipment with higher-than-standard energy efficiency for public facilities.
- Establishing "retained savings" policies whereby government agencies are able to retain funds saved by reducing energy bills for further energy efficiency/renewable energy investments or other uses.
- Promote the application of integrated "whole system" or "clean sheet" design (across multiple issues, including issues such as GHG emissions, other pollutant emissions, transport, community planning, and the environmental footprint of materials used.

[6] See, for example, CORRIM (Consortium for Research on Renewable Industrial Materials), Life Cycle Environmental Performance of Renewable Building Materials in the Context of Residential Construction, available from http://www.corrim.org/reports/2005/final_report/index.htm.

- Ensure that government procurement processes provide incentives to construct high-performance buildings.
- Require consideration of greenhouse gas emissions, and of options to reduce emissions, where and when government environmental review of projects takes place.
- Meet Architecture 2030, LEED platinum, or other suitably aggressive goals for specific fractions of new and/or existing government-owned buildings by specific target years.
- Provide incentives for improvement of building energy efficiency in government-leased space.
- Encourage improved lighting design, including integrated lighting, daylighting, high-efficiency lighting components, controls (including occupancy sensors, photocells), windows.
- Include green power goals for state buildings.
- Address lack of funding for design of energy-efficient/low-GHG emission state facilities and university campuses
- Require bicycle storage, locker rooms and showers for all facilities to encourage use of no-fossil-fuel commuting.
- Locate government facilities within Urban Growth Area as first priority, in areas well served by public transportation, bike lanes, paths or trails and for UGA-sited facilities achieving minimum LEED Gold ND or similar target building certification level. Consider location to be part of a building's GHG "footprint".

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

2.4 Support for Energy Efficient Communities Planning, "Smart Growth"

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

Other potential elements of this option include:

- The conditioning of approval of hook-ups to city, county and utility services upon GHG emissions reduction plans.

- Administrative changes to enhance integrated design of communities and transport systems.
- Measures to reduce urban "heat island" effects through integrated strategies, including - green roofs, white roofs, plantings.
- Reinforce importance of Growth Management, conservation easements linked to Transfer of Development Rights.
- Implement or adjust hookup fees for new developments to provide incentives for smart growth.
- Move from State Dept. of Transportation to State Department of Urban, Rural, and Regional Mobility.
- Establish State Department of Urban Design.

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

2.5 Establish Goals, Policies and/or Codes to Reduce Electricity Use for Heating/Drying

Producing heat by burning natural gas directly to dry clothes or cook food is nearly 100% efficient, and natural gas boilers and hot water heaters are typically 80 to 90% efficient, depending on the size and type. Relative to electric resistance heaters or dryers using electricity generated in natural gas-fired power plants (which are at most 55 to 60% efficient) and coal-fired power plants (40 to 45% efficient), the use of natural gas or propane instead of electricity in these end-uses reduces greenhouse gas emissions. This option would provide goals, policies, and/or codes to encourage the conversion of existing electric resistance heating loads, where applicable and practical, to equipment fueled with natural gas or a similar fuel.

2.6 Energy Efficiency Improvement in Existing Buildings, with Emphasis on Building Operations

Existing buildings will continue to use the bulk of the energy used in the residential and commercial sectors in Washington for many years. This option would promote and provide incentives for the improvement of the energy efficiency of the existing building stock. Key to reducing energy use and GHG emissions in existing buildings are building operations, maintenance, and occupant behavior (for example, via total resource management systems). This option could include:

- Requirements for upgrading the energy efficiency of buildings at the time of resale.
- For any medium to large business or agency, requirement that a full time resource conservation manager be located on the premises.

2.7 Reduction of Water Use

Provision of water to, and treatment of wastewater from, homes, businesses, institutions, industries and related facilities, requires energy and, indirectly and (in the case of wastewater treatment) directly produces greenhouse gases. Strategies to reduce water use and related energy consumption for water provision and treatment, including water-conserving appliances, reuse of "greywater", can reduce water and energy use. This option has possible linkage to the Agriculture and Wastes TWG.

2.8 Low Income Energy Programs

Establish a general fund to supplement the state's weatherization assistance program and low-income home energy assistance program. The fund would provide low-cost energy efficiency measures and energy education to eligible households, provide the means to purchase and install high-efficiency heating systems and other high-efficiency appliances to eligible households, and would provide for increased participation in the weatherization assistance program.

RCI-3 APPLIANCE AND EQUIPMENT (INCLUDING LIGHTING) STANDARDS

3.1 More Stringent Appliance/Equipment Efficiency Standards

Appliance efficiency standards reduce the market cost of energy efficiency improvements by incorporating technological advances into base appliance models, thereby creating economies of scale. Appliance efficiency standards can be implemented at the state level for appliances not covered by federal standards, or where higher-than-federal standard efficiency requirements are appropriate.[7] Regional co-ordination for state appliance standards can be used to avoid concerns that retailers or manufacturers may (1) resist supplying equipment to one state that has advanced standards or (2) focus sales of lower efficiency models on a state with less stringent efficiency standards.

Potential elements of an appliance efficiency standards policy include:

- Establishment and enforcement of higher-than-federal state-level appliance and equipment standards (or standards for devices not covered by federal standards).
- Provide support for the development and implementation of higher federal-level efficiency standards.
- Joining with other states in adopting higher standards.
- Requiring high-efficiency appliances in new construction and retrofits.

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

- Working with national and other manufacturers to encourage them to invest in the production of higher-efficiency appliances and equipment, and to help to create markets for the higher-efficiency devices.
- Consumer education (see below) is a potential supporting measure for this option.
- In formulating more stringent standards, consider potential shifts in the use of toxic materials (such as mercury in fluorescent lamps) that could inhibit consumer demand for the efficient appliances and create costly disposal issues. For example, efficiency standards policies could be linked to manufacturer "takeback" requirements, toxics reduction standards, or incentives for development and use of non-toxic technologies.

3.2 Ban the Sale of Incandescent Bulbs

This option would ban the sale of incandescent light bulbs in the state by the year [2012].

RCI-4 EDUCATION AND OUTREACH

4.1 Consumer Education Programs

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

Potential elements of consumer education programs include:

- Truth-in-advertising campaign
- In-home energy displays
- Provide tools and information for residents, businesses and communities to perform GHG inventories, and to evaluate and act upon inventory results.
- Linkages of consumer education programs with retail sales organizations.
- Require retail education (that is, on packaging or on a handout provided at the time of purchase), that will inform consumers about the energy consumption of the products they buy and how to operate or use the products in the most energy efficient manner.
- Engage community leaders and community-based organizations (for example, institutions, municipalities, service clubs, businesses and business organizations, social and affinity groups, non-governmental organizations, and others) to recognize leadership; share success

stories and role models; and expand climate involvement and participation within communities.

- Use existing models for education of businesses in the environmental impacts of their activities to have state agencies/local governments promote improvements within small business sectors and trade associations.
- Engage industrial firms to promote LEAN manufacturing techniques and other practices to reduce unnecessary energy and material consumption.

4.2 Energy Efficiency and Environmental Impacts Awareness in School Curricula

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

4.3 Post-secondary Specialist Education and Certification for Building Energy Efficiency Experts and Related Trades

In order to effectively implement buildings-related and other GHG-reduction policies, specific and targeted education, outreach, and licensing requirements will be required for professionals in a variety of building-related trades in order to ensure that those professionals have the expertise to support aggressive State building energy efficiency policies.

Potential elements of this policy include:

- Training of building code and other officials in energy code enforcement.
- Training and education for builders and contractors (for example, HVAC sizing, duct sealing, and incorporation of renewable energy systems into buildings).
- Energy management training and training of building operators.
- Continuing education programs and/or requirements for building professionals.
- Establishment or extension of professional licensing requirements related to energy efficiency and/or GHG emissions assessment.
- Targeted community college/university programs (see below).
- Establishment of integrated design programs.

Implementation of the policy could begin with investment in a pilot program or programs at one or two leading schools – such as UW and/or WSU.

4.4 Post-secondary Specialist Education and Certification for Building Energy Efficiency Experts and Related Trades

This policy would encourage and support the creation and/or expansion of post-secondary programs designed to increase the capacity of the States' engineers, architects, technicians, and others in building energy and related trades to implement GHG emissions mitigation activities. These programs could be established/expanded at the community college, college/university, and post-graduate levels, and could cover topics ranging from performance and interpretation of energy audits and installation of energy-efficiency measures and renewable energy systems to design of low- or "net zero" emissions buildings and low-GHG/integrated community design.

Implementation of the policy could begin with investment in a pilot program or programs at one or two leading schools – such as UW and/or WSU.

RCI-5 PRICING AND PURCHASING

5.1 Green Power Purchasing for Consumers

Green power purchasing comprises a variety of consumer-driven strategies to increase the production and delivery of low-GHG power sources, above and beyond levels achieved through Renewable Portfolio Standards and other mandatory programs, such as the existing Washington requirement that the largest utilities offer a green rate tariff (RCW 19.29A.090).

Possible elements of green power programs include:

- A definition of what power sources qualify as green power source by a relevant authority.
- Regulatory encouragement for utilities to develop green power tariff structures.
- Implementation of regulatory requirements that power sources and emissions data be reported in consumer utility bills.
- State goals or mandates for green power purchases, or for the renewable fraction of standard purchased electricity, that would apply to all non-federal government buildings, including local government buildings, public schools, and public universities. This could also be a part of State "Lead-by-example" programs.
- Promotion by the State and/or other entities of voluntary purchasing of green power through provision of information and promotional materials.
- Create statewide stakeholder advisory group to monitor utility green power programs, share information, and coordinate marketing if appropriate.

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

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

Potential elements of this option include:

- Review existing net-metering policies in Washington (Chapter 80.60 RCW), including policies that affect electricity consumers who install on-site combined heat and power or distributed generation fueled with renewable or fossil fuels. Consider the impact of NO_x and power factor requirements on net-metering and availability of information for small customers. Consider increasing the current net-metering cap from 25 kW to 1 MW, and allow aggregation if appropriate in commercial and/or agricultural applications.
- Review rate issues, including decoupling of utility revenues from sales, and consider a specific focus on the impacts of rate design on greenhouse gas emissions. This could include an exploration of the impacts of time-of-use rates on GHG emissions.
- Review and consider utility and other technical rules related to the interconnection of consumer-sited power sources to the electricity grid to assure that they offer equitable treatment of potential distributed generation hosts while providing adequate safeguards for the public and for power sector workers.
- Eliminate/reduce financial, regulatory, and other barriers to implementation of systems.
- Simplify and standardize permitting and prescreening of projects.

5.3 Rate structures and Technologies to Promote Reduced GHG Emissions

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

Potential elements of this option include:

- Time-of-use rates, which typically price electricity higher at times of higher power demand, and thus better reflect the actual cost of generation. Time-of-use rates may or may not have a significant impact on total GHG emissions, but do affect on-peak power demand and thus both the need for peaking capacity and fuel for peaking plants.
- Tiered (increasing block) rates for electricity and natural gas use, which provide affordable base usage rates for consumers, but which increase with increasing consumption.

- "Smart metering"—implementation of consumer meters showing real-time pricing, and the level of GHG emissions related to consumption at any given time. Smart meters are described as providing consumers with the information needed to make consumption choices, and can include the capability for consumers to adjust the type of power (for example, "green" versus conventional power) "on the fly".
- Different types of rate structures and bases for rate structures, including rates based on the number of occupants of a home rather than its size.

5.4 Bulk Purchasing Programs for Energy Efficiency or Other Equipment

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

Potential elements of this option include:

- Municipal or State government programs, possibly including training in the use of existing bulk-purchasing tools[8].
- Programs for schools.
- Private-sector programs (possibly in coordination with market transformation programs).
- Offer sales tax exemption for all companies that purchase Energy Star equipment and appliances in bulk (target market is hotels, chains, large companies, private universities and colleges, large commercial building developers)

5.5 Sales Tax Credits

Eliminate sales tax for certain energy-efficient products certified as Energy Star® by the U.S. Department of Energy or Environmental Protection Agency. Increase taxes for products with energy use efficiencies below specific minimum baselines.

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[8] For example, the EnergyStar bulk purchasing tool—developed by the U.S. Department of Energy, in collaboration with the Department of Housing and Urban Development and the U.S. Environmental Protection Agency—is designed to make it easy to comparison shop for energy-efficient products. The tool provides a simple way to obtain bids on EnergyStar-qualified products such as appliances, compact fluorescent light bulbs, and light fixtures.

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

6.1 Provide Incentives to Promote and Reduction of Barriers to Implementation of Renewable Energy Systems

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

Potential elements of this option include:

- Solar roofs (roofing materials with built-in solar photovoltaic cells, or solar PV panels erected on roofs).
- Solar water heating/space heating systems.
- Wind power systems, particularly for rural areas.
- Biomass-fired generation, space, or water heating systems.
- Programs targeted at specific customer sectors (residential, commercial, industrial), or specific markets within sectors.
- Tax credits, and/or utility or other incentives to lower the first cost of distributed energy systems to users. This could include expanding incentives offered under the existing law to residential consumers to include commercial systems, offering B&O tax credits for commercial-scale systems, and offer low- or no-interest loans for commercial and residential systems.
- Simplify and standardize permitting for industrial and large commercial DG systems. Support County and city land use prescreening efforts to support siting.
- Address lack of funding for design of renewable energy systems associated with state facilities and university campuses

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

6.2 Provide Incentives and Resources to Promote and Reduction of Barriers to Combined Heat and Power (CHP, or "cogeneration") and Waste Heat Capture

Combined heat and power (CHP) systems reduce fossil fuel use and greenhouse gas emissions, both through the improved efficiency of the CHP systems, relative to separate heat and power technologies, and by avoiding transmission and distribution losses associated with moving power from central power stations that are located far away from where the electricity is used. Implementation of CHP systems by residential, commercial, institutional, and industrial energy consumers could be encouraged through a combination of regulatory changes and incentive programs.

Potential elements of this option include:

- Promotion of the use of gas-fired CHP systems
- Promotion of the use of biomass-fired CHP systems
- Creation/expansion of markets for, and incentives designed to promote implementation of, CHP units in capacities suitable for residential, commercial, and industrial users.
- Leveraging of attractive financing arrangements, tax benefits such as the existing sales and use tax incentive for machinery and equipment used for cogeneration facilities (RCW 82.08.02565 and RCW 82.12.02565), and other incentives to promote CHP technologies.
- Simplify and standardize permitting for industrial and large commercial CHP systems. Support County and city land use prescreening efforts to support siting.
- Encourage increasing overall on-site energy efficiency through CHP and use of waste heat.
- Implement State Policy that all new non-renewable energy electrical energy generation power plants in WA State must be CHP plants.
- Address lack of funding for design of CHP and waste heat utilization systems associated with state facilities and university campuses
- Encourage capture of waste heat from power generation and industrial processes for use in homes and commercial buildings. Opportunities to recover ("recycle") thermal energy from local waste heat or renewable energy sources include recovery of waste heat from power generation (through combined heat and power or CHP), industrial processes, or municipal operations, and tapping local renewable resources such as bio-energy, geothermal and natural sources of air conditioning such as cold lake or ocean water. District energy systems provide the infrastructure for conveying this energy from the sources to energy consumers.

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

Elements of this option related to waste heat recycling could include establishing a Washington State inventory of waste heat resources, evaluating the full renewable thermal energy potential in the State, providing incentives for new or existing waste heat generators to (re)locate adjacent or close by to heat users, provide information/education/outreach programs to address barriers to

district energy development, and provide financial incentives to implement district energy, waste heat recovery and renewable thermal energy systems through a variety of programs.

6.3 Enhance and Expand Thermal Energy Infrastructure for GHG Emissions Reduction

This option would focus on encouraging the building of thermal energy infrastructure to allow the more efficient use of fuel for heating, cooling, and power generation through creation and expansion of district energy (heating and cooling) systems, and through the institution of district-level planning in general for combined energy infrastructure.

6.4 Smart Electrical Grid

This option, which could be placed in section 5, above, as well as this section, relates to the creation of a "smart electrical grid" that accommodates functions such as interconnection of distributed power generation, plugging in hybrid cars (for charging and/or sending power to the grid from vehicle-based power sources), and electricity demand management via the grid, among many other functions. Possibly also included here include issues related to ownership of distributed generation—municipal PV ownership, or ownership by third parties, for example. This option spans at least the RCI and Energy Supply TWGs, and likely others (including transport and land use) as well. Several utilities in Washington are currently collaborating on developing pilot tests of "smart grid" concepts and technologies.

RCI-7 CUSTOMER-SITED DISTRIBUTED ENERGY AND COMBINED HEAT AND POWER

7.1 GHG Cap and Trade Program (for RCI Sectors)

A cap-and-trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and capped entities can trade permits (a permit is an allowance to emit one ton of CO_2e). In principle, trading lowers the overall costs of meeting a given emission target, as participants with lower costs of compliance can choose to over-comply and sell their additional reductions to participants for whom compliance costs are higher.

Among the important considerations with respect to a cap-and-trade program are: the sources and sectors to which it would apply ("upstream" at the fuel extraction or import level vs. "downstream" at points of fuel consumption); whether electricity is dealt with from a load-based or generation-based perspective; the level and timing of the cap; how allowances would be distributed (e.g. via grandfathering and/or auctioning) and how new market entrants would be accommodated; what, if any, offsets would be allowed; over what region the program would be implemented (e.g., nationally, regionally, etc.), and potential "leakage" for sub-national programs; which GHGs are covered; whether price caps (e.g. safety valves) are included; whether there is linkage to other trading programs; whether banking and/or borrowing among time periods is allowed; early reduction credit; what, if any, incentive opportunities may be

included; use of any revenue accrued from permit auctions; the impacts of cap-and-trade programs on different sectors and consumers; recognition of the "carbon neutrality" of biomass; and provisions for encouraging energy efficiency, if relevant. The principal example of a GHG cap-and-trade system in the US is the Northeast States' Regional Greenhouse Gas Initiative: http://www.rggi.org/. For the RCI sectors, a Cap and Trade program may be considered primarily for large (usually industrial) sources of greenhouse gases, or may include other sectors as well.

7.2 GHG or Carbon Tax

A carbon or GHG tax is typically a tax on each ton of CO_2 or CO_2e emitted from an emissions source covered by the tax. A GHG tax could be imposed upstream based on the carbon content of fuels (for example, imposed at the level of fossil fuel or electricity suppliers) or at the point of combustion and emission (this approach would typically be applied for large point sources of emissions such as large industrial plants). Taxed entities may pass some or all of the cost on to consumers, change production processes to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of GHG emissions in products and services, and could adjust their behavior to purchase substitute goods and services that result in lower GHG emissions. GHG tax revenue could be used in a number of ways, from income tax reduction to policies and programs to support GHG reductions or technology innovation. GHG tax revenue could also be directed to helping the competitiveness of industries or assisting communities or groups most affected by the tax. Carbon taxes have been in place in a number of European countries since the early 1990s.

7.3 Switching to Less Carbon-intensive Fuels

A number of the energy services provided by fuels use in the RCI sectors can be met through the use of different fuels. Prime examples here are water and space heating, as well as industrial process heat, which can be provided by burning coal, oil, gas, biomass, and perhaps hydrogen, or by using electricity or solar heat. Alternatives also exist for air conditioning, where absorption air conditioning units using heat from combustion of fuels or from solar heat can substitute for electric units. Moving to less carbon-intensive fuel/technology combinations in some end uses can be achieved through a combination of promotion and incentive programs, market creation/expansion (for biomass fuels or for equipment not common in the market, for example). Fuel switching covered under this option would be designed to lead to lower overall fuel-cycle GHG emissions.

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

GHG emissions from RCI sources not directly associated with energy use include emissions of both major GHGs such as carbon dioxide, but also a number of specialty gases—such as refrigerants, fire retardants, and solvents—that are emitted in relatively small quantities but have proportionately much larger impacts on climate. A combination of voluntary agreements with

industries and of new specifications for key equipment can be used to reduce the emissions of process gases that have high global warming potentials (GWP, a measure of the potential impact of different gases on climate in terms of "CO_2-equivalent").

Potential elements of this option include:

- Increased use of blended cement (substituting fly ash or other pozzolans for clinker—the chief ingredient of cement—reduces CO_2 emissions associated with clinker production from limestone).
- Promotion and funding for leak reduction/capture, recovery and recycling of high-GWP process gases.
- Promotion and funding for process changes/optimization that reduce GHG emissions.
- Use of alternative gases (other HFCs, hydrocarbon coolants/refrigerants, etc.) with lower GWPs in key applications.
- Reorganizing production to reduce/use wastes, reduce inputs.
- Support for voluntary programs and public-private partnerships.
- Support DOT and other government agencies' adoption of performance standards as an alternative to more prescriptive standards where applicable--for example, for building materials production processes that emit carbon, base emissions standards on the structural capacity of a product, rather than its mass alone—so manufacturers have the flexibility to shift to more low-energy products and encourage substitution.
- Require cement users (or contractors working under building permits) to have a certain percentage of fly ash or other material in the concrete they pour. This reduces the amount of cement used. Provide financial and or market incentives to change the way cement is made (for example, where appropriate to switch to environmentally innovative fillers such as sewage.) Another option is to change from prescriptive to performance based mix designs,

7.5 Negotiated/Voluntary Emissions or Energy Savings Agreements

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

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

emissions, and to use inventory results to set reduction targets, can also be an element of this option (possibly through a Business assistance program).

7.6 Research and Development - Carbon Sequestration and Removal for RCI Energy End-users

This option would encourage research and development on methods of carbon sequestration and removal associated with systems for RCI energy users. An example of such a system currently in the testing and commercialization phase is a downdraft gasifier technology that converts biomass into a combustible gas, and also captures carbon in the form of activated carbon. Such a system is being developed and built in Prosser, Washington for the FruitSmart Company. Burning the biomass-derived gas produced by the gasifier reduces the need for standard fossil fuels, and the activated carbon from the process can be used to create other value added products. Potential applications of activated carbon particularly relevant to the reduction of greenhouse gas emissions included pre-treatment of landfill gas and methane-rich gas from wastewater treatment systems to produce a fuel suitable fore use in combustion turbines, use as a "biochar" soil amendment[9], or in the EPRIDA[10] process of combining activated carbon and ammonia to remove additional CO_2 from fossil fuel exhaust to create ammonium bicarbonate for use as a value-added soil enhancement/fertilizer.

7.7 Identify GHG Emissions Impacts and Reductions for All Projects Requiring Government Review

This option would require SEPA review to quantify GHG emissions and identify measures to avoid, minimize or mitigate emissions for:

- All state-funded or proposed projects
- Privately-funded projects that require a state air quality permit
- Privately-funded projects that result in more than 3000 vehicle-mile trips/year.

A similar requirement has recently been put in place in Massachusetts[11].

The review of the energy intensity of the production of building materials used in projects could also be a part of the program, in order to provide incentives for use of low greenhouse gas building products.

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[9] See, for example, the see Cornell University study on "Terra Preta", of which http://www.css.cornell.edu/faculty/lehmann/biochar/Biochar_home.htm and http://www.georgiaitp.org/carbon/PDF%20Files/CSteinerpres.pdf provide brief summaries.

[10] EPRIDA stands for "Earth . People . Research . Innovation . Development . Acknowledgement". See, for example, http://www.eprida.com/home/index.php4, or http://www.eprida.com/hydro/ecoss/presentations/ACS_phil/index_files/v3_document.htm for a more specific description of the carbon capture proposal using "biochar".

[11] See http://www.boston.com/news/local/articles/2007/04/22/mass_steps_up_climate_rules_for_developers/ for a news summary of the MA requirement.

RCI-8 PRODUCT CONSUMPTION AND DISPOSAL PRACTICES FOR REDUCED GHG EMISSIONS

8.1 Appliance and Lighting Product Recycling and Design

The overall goal this option is to reduce the life-cycle greenhouse gas (and other) emissions "footprint" of products and their packaging. This option would include appliance and lighting products recycling; design issues including inclusion in products of "smart chips", design of products to make them easy to recycling, and designs to improve product longevity. The option could also include:

- Incentives or requirements/standards to reduce packaging and related GHG emissions.
- Incentives for the use of recycled content in new products.
- Incentives for switching to lower-energy manufacturing processes.
- Consideration of "waste-to-fuel" issues in product and packaging design, with the goal of reducing the life-cycle greenhouse gas (and other) emissions "footprint" of products and their packaging by assuring that the product/packaging can be easily converted to a clean-burning fuel (if not reused or recycled) by eliminating impurities.

8.2 Labeling of Embodied Life-cycle Energy and Carbon Content of Products and Buildings

This option would include elements to estimate the embodied life cycle energy use and carbon emissions associated with products and buildings, to label products and buildings being sold so as to provide feedback to consumers on their "carbon footprint", and to encourage the use of lower-carbon products and building materials.

Catalog of State Actions
Energy Supply Technical Working Group

A catalog of state-level, GHG-reducing actions and policy options based on actions undertaken or considered by state, local and private actors. Brief descriptions of these options, and some of the related state actions underway, are available in a companion document.

Key to Preliminary Rankings of Options in the Tables that Follow:

Potential GHG Emission Reductions 1/	Potential Cost or Cost Savings 1/ 2/
High (H): At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current WA emissions)	**High (H)**: $50 per metric ton CO_2e (tCO_2e) or above
Medium (M): From 0.1 to 1.0 MMtCO_2e per year by 2020	**Medium (M):** $5-50/t$CO_2$e
Low (L): Less than 0.1 MMtCO_2e per year by 2020, or 1 MMtCO2e by 2050	**Low (L):** Less than $5/t$CO_2$e
Uncertain (U): Not able to estimate at this time	**Negative (Neg):** Net cost savings
	Uncertain (U): Not able to estimate at this time

1/ Several measures may overlap in terRems of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.
2/ Costs are denoted by a positive number. Cost savings (i.e., "negative costs") are denoted by a negative number.

Definition of "Priorities for Analysis":

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.

Notation of Options:
* **Options marked in bold with an asterisk (*)** indicate some of the related state actions that are approved or underway, as described further in the companion options description document. TWG members are encouraged to provide information on other relevant actions.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
ES-1	**EMISSIONS POLICIES AND OVERARCHING ITEMS**					
1.1	GHG cap and trade	U – depends on cap level	U – depends level and design			WA is part of the Western Regional Climate Action Initiative (2007), which will consider market-based mechanisms for GHG reduction goals. Market mechanisms and the WRCAI will be addressed broadly at the CAT level, as will be discussed at the June 5 meeting. *See option descriptions for TWG comments.*
1.2	Carbon (GHG) tax	U	U – depends on tax design			
1.3	**Generation performance standards** and/or **mitigation requirements for electricity *(S)**	H	L-M			SB6001 (2007) includes emissions performance standard for long-term financial commitments for baseload power HB 3141 (2004), EFSEC, Ecology establish rules for mitigation or offsetting of new power plant emissions
1.4	**Integrated resource planning (IRP) *(S)**	U	U			Electric Utility Planning Act (2006) requires IRPs by large utilities *TWG comments* Consider ways of accounting for the risk of climate regulation in order to factor the cost of GHGs in to all resource decisions.
1.5	Voluntary GHG commitments	L-M	Neg-L			*TWG comments*: Several companies in WA State have set aggressive voluntary GHG reduction goals.
1.6	Technology Research & Development	U	U	Contributions to long-term goals		*TWG comments*: R&D incentives could include the use of investment and production tax credits, government loan guarantees or low interest loans, and through the use of public-private partnerships.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
1.7 (NEW)	Climate Change Education Initiatives	U	U	Contributions to long-term goals		A comprehensive education effort on climate change that would be additional to focused education components of individual options
ES-2	**RENEWABLE ENERGY AND ENERGY EFFICIENCY**					
2.1	**Renewable and/or Environmental Portfolio Standard (RPS/EPS)*(S)**	H	L-M			2006 Energy Independence Act (Initiative 937) establishes RPS/EPS; rule-making currently underway *TWG comments*: Consider increasing the current standard above the 15% qualifying renewable energy for years beyond 2020.
2.2	Grid-based **renewable energy incentives** and/or barrier removal***(S)**	L-M	U			Incentives provided through Renewable Energy System Cost Recovery (RCW 82.16.110) and Tax on Manufacturers or Wholesalers of Solar Energy Systems. *TWG comments:* Strategies include: encouraging increased rates of return for investor-owned utilities for renewable energy development beyond the requirements of existing law; providing tax incentives for public utilities to go beyond existing law.
2.3	Distributed **renewable energy incentives** and/or barrier removal***(S)**	L-M	U			See 2.2 above. *TWG comments:* Extend M&E tax credits for low-carbon technologies beyond 2009 Link to RCI TWG. Support consistent interconnections and pricing at the utility level.
2.4	Green power purchases and marketing	L-M	Neg-L			Washington State RCW 19.29A.090 directs larger electric utilities to offer their customers a green power electricity product *TWG comments:* Consider requiring all agencies of the state to purchase green power from their local utility

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
						starting at 20% and ramping up every two years. Consider requiring all new electric utility customers to opt-out of minimum green power requirement.
2.5	Combined Heat and Power (CHP) and Thermal Energy Recovery and Use	M-H	Neg-M			*TWG comments* Provide incentives and eliminate barriers, especially avoided cost barriers for CHP Barrier removal includes: improved interconnection policies, improved rates and fees policies, streamlined permitting, recognition of the emission reduction value provided by CHP and clean DG, financing packages and bonding programs, power procurement policies, education and outreach, Potential link to RCI TWG.
2.6	Pricing strategies to promote renewable energy and/or CHP (e.g. **net metering**)*****(S)	L-M	L-M			State net metering law passed in 2006. *TWG Comments:* Provide incentives and eliminate barriers, especially avoided cost barriers Focus on resource acquisition pricing.
2.7	Renewable energy development issues (zoning, siting, etc.)	L-M	U			*TWG Comments:* Include need for changes to reduce legal problems for achieving federal incentives Two potential strategies (with some contradiction) for streamlining zoning are: a) bump renewable projects over 25 MW to state jurisdiction for permitting; b) encourage/provide incentives for energy overlays in county zoning[1]

[1] Klickitat County "has proposed developing an Energy Overlay in which energy uses would be permitted outright following State Environmental Policy Act (SEPA) review and compliance with federal, state, and local regulations" as a means to encourage renewable energy development in areas that are most amenable to this development. http://www.klickitatcounty.org/Planning/ContentROne.asp?fContentIdSelected=2119658607&fCategoryIdSelected=948111261

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
2.8	Technology-focused initiatives (biomass co-firing, energy storage, fuel cells, etc.)	U	U	Contributions to long-term goals		*TWG Comments:* Include wave power, tidal, low-heat geothermal, concentrating solar, biomass technologies, spent pulping liquor to gas. Incentives include the use of investment and production tax credits, government loan guarantees or low interest loans, and through the use of public-private partnerships.
2.9 (NEW)	Efficiency improvements at existing renewable energy (hydro, wind, other) plants	U	U			Similar to option 3.3 but for renewables
2.10 (NEW)	Use carbon offsets markets to promote additional renewable energy development	U	U			*TWG Comments:* Consider ways to avoid double counting
ES-3	**FOSSIL FUEL AND NUCLEAR ELECTRICITY**					
3.1	Advanced fossil fuel technology incentives, support, or requirements					*TWG Comments:* Split this option into two sub-options of technology groups (see 3.1a and 3.1b below)
3.1a	Advanced fossil fuel generation and pre-combustion sequestration technologies	H/U	M	Contributions to long-term goals		
3.1b	Post-combustion sequestration technologies	H/U	M	Contributions to long-term goals		
3.2	Nuclear power support and/or incentives	U	U			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
3.3	Efficiency improvements and repowering existing plants	L-M	Neg-L			*TWG comments:* Incentives could take form of investment and production tax credits, government loan guarantees or low interest loans.
3.4	Technology-focused initiatives	U	U	Contributions to long-term goals		*TWG comments:* Incentives could include investment and production tax credits, government loan guarantees or low interest loans, and through the use of public-private partnerships.
ES-4	**FUEL PRODUCTION, PROCESSING AND DELIVERY**					
4.1	Oil and gas production: GHG emission reduction incentives, support, or requirements	L	Neg-L			
4.2	Natural gas transmission and distribution	L-M	Neg-L			
4.3	Oil Refining: GHG emission reduction incentives, support, or requirements	L-M	Neg-L			
4.4	Coal Production: GHG emission reduction incentives, support, or requirements	L	U			
4.5	Coal-to-energy Production: GHG emission reduction incentives, support, or requirements					*TWG Comments:* Split this option into two sub-option by type of process (see 4.5a and 4.5b below)
4.5a	Coal to liquids production	U	U			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
4.5b	Coal-to-gas production	U	U			*TWG Comments:* Could also include Pet coke-to-gas and asphalt-to-gas
4.6	Low-GHG Hydrogen production incentives and support	U	U			*TWG Comments*: Utilities could provide incentives to use fuel cells in various industrial, commercial and home applications. Industrial plants could be provided with rate incentives and tax credits to consider projects to reform gas into hydrogen.
4.7	LNG policies and infrastructure	U	U	Could lead to increased fuel imports to WA		
ES-5	**CARBON CAPTURE AND STORAGE OR REUSE**					
5.1	CCSR incentives, requirements and/or enabling policies (administration, regulation, liability, incentives)	H/U	U			*TWG Comments* Identify potential carbon sequestration reservoirs (permanent geological storage and other permanent capture opportunities) CO_2 pipeline transmission issues (from source to reservoir) Policies for CO_2 sequestration - including state permitting, issues regarding short and long term liability Need for comprehensive legal and regulatory framework for CCSR Consider modifying traditional least-cost/least risk regulatory standard for IGCC and CCSR Consider tax credit plus accelerated depreciation as incentive Consider timely cost recovery standard (such as “pay as you go”)
5.2	R&D for CCSR	U	U	Contributions to long-term goals		

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
ES-6	**OTHER ENERGY SUPPLY OPTIONS**					
6.1	Transmission system access, planning and incentives	U (enabling)*	U			*TWG Comments*: Provide incentives and eliminate barriers, for CHP through planning and access. One example would be conditional firm pricing for clean energy
6.2	Improve transmission and distribution system efficiency	L-M	U			*TWG Comments*: Could also include reductions in use and leakage of SF6 from distribution system transformers Plus efficient transformers and other materials and equipment.
6.3	General distributed generation support (interconnection rules, net metering, etc.)	U (enabling)[t]	U			
6.4	Environmental (GHG emissions) disclosure	U (enabling) [t]	U			House Bill 2565 (Fuel Mix Disclosure Law) requires retail electricity suppliers in Washington to provide a disclosure label to their retail customers. *TWG Comments*: Goal of transparency without excess burden from reporting. GHG disclosure could be added to consumer information. .
6.5	Support and/or promotion of smart grid development	U	U			

NOTES:
[t] *Enabling* – these options could increase the effectiveness of other options, rather than directly reducing GHG emissions.

Brief, Generic Descriptions of Catalog Items

Energy Supply Technical Working Group

(Recently enacted policies and programs in Washington State are listed where relevant. Note that this listing is incomplete and will be fleshed out during the TWG process; working group members are encouraged to provide input to the TWG facilitators on existing policies and programs, where relevant.)

Many aspects of Senate Bill 6001 (April 2007), *Mitigating the Impacts of Climate Change*, relate to the Energy Supply TWG catalog. The descriptions of items below indicate the relevant provisions and the bill can be viewed at: http://www.leg.wa.gov/pub/billinfo/2007-08/Pdf/Bills/Senate%20Passed%20Legislature/6001-S.PL.pdf.

ES-1 EMISSIONS POLICIES AND OVERARCHING ITEMS

1.1 GHG cap and trade

A cap-and-trade system is a market mechanism in which GHG emissions are limited or capped at a specified level, and capped entities can trade permits (a permit is an allowance to emit one ton of CO_2e). In principle, trading lowers the overall costs of meeting a given emission target, as participants with lower costs of compliance can choose to over-comply and sell their additional reductions to participants for whom compliance costs are higher.

Among the important considerations with respect to a cap-and-trade program are: the sources and sectors to which it would apply ("upstream" at the fuel extraction or import level vs. "downstream" at points of fuel consumption); whether electricity is dealt with from a load-based or generation-based perspective; the level and timing of the cap; how allowances would be distributed (e.g. via grandfathering and/or auctioning) and how new market entrants would be accommodated; what, if any, offsets would be allowed; over what region the program would be implemented (e.g., nationally, regionally, etc.); which GHGs are covered; whether price caps (e.g. safety valves) are included; whether there is linkage to other trading programs; whether banking and/or borrowing among time periods is allowed; early reduction credit; what, if any, incentive opportunities may be included; use of any revenue accrued from permit auctions; and provisions for encouraging energy efficiency, if relevant. An example of existing implementation of a GHG cap-and-trade system in the US is the Northeast States' Regional Greenhouse Gas Initiative: http://www.rggi.org/.

TWG Comments (from May 24, 2007 TWG meeting and individual TWG member submissions)

> Policy features to consider include: generation vs. load-based emissions; upstream vs. downstream emissions; interactions with a potential federal program; allowance allocation; sectors covered; leakage; biomass GHG accounting; supporting RD&D; cap levels; legal requirements.

Recently enacted policies in Washington: In February 2007 Washington - along with California, Oregon, Arizona, New Mexico (and British Columbia, as of April 2007) - signed the Western Regional Climate Action Initiative.

"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."

http://www.ecy.wa.gov/climatechange/docs/07Mar_WesternRegionalClimateActionInitiative.pdf

See also Senate Bill 6001 (April 2007), section 4a, (a weblink to SB6001 is included at the beginning of this document).

1.2 Carbon (GHG) tax

A carbon or GHG tax is be a tax on each ton of CO_2 or CO_2e emitted from an emissions source covered by the tax. A GHG tax could be imposed upstream based on carbon content of fuels (e.g. fossil fuel suppliers) or at the point of combustion and emission (e.g., typically large point sources such as power plants or refineries). Taxed entities may pass some or all of the cost on to consumers, change production to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of GHG emissions in products and services, and could adjust their behavior to purchase substitute goods and services that result in lower GHG emissions. GHG tax revenue could be used in a number of ways from income tax reduction to policies and programs to support GHG reductions or technology innovation. GHG tax revenue could also be directed to helping the competitiveness of industries or assisting communities most affected by the tax. Carbon taxes have been in place in a number of European countries since the early 1990s.

TWG Comments (from May 24, 2007 TWG meeting and individual TWG member submissions)

Consider impacts of taxes on different income groups; economic impacts; impact on investment in new technologies; which sectors will be included; use of revenue recycling to invest funds in improving energy efficiency.

1.3 Generation Performance Standards and/or Mitigation Requirements for Electricity

A generation performance standard (GPS) can take several forms. An emissions performance standard (as adopted recently in California) can require that load serving entities (LSE) to acquire electricity with an emission rate (e.g., X lbs CO_2/MWh) below a specified mandatory standard. This type of standard was adopted for WA in recently approved SB6001. Another type of standard holds power plant developers to build and operate new generation with emissions below a specified standard, an approach adopted in OR and WA. Finally, performance standards can be applied to existing power plants, as adopted in MA.

GHG offsets or fee payments can be used for compliance in comes cases, such as the OR and WA new power plant standards. GHG offsets are GHG emission savings from project-based activities in sectors or regions not covered by the standard or regulations, which typically need to meet specific criteria laid out in the regulation.

Recently enacted policies in Washington: In 2004, the Legislature passed HB 3141, establishing a policy requiring mitigation for 20 percent of the CO_2 emissions produced by a power plant over a period of 30 years, from any new fossil-fueled thermal power plant with a generating capacity of 25 MW or more and existing plants seeking site certification or an order of approval after July 1, 2004. Ecology developed rules for the mitigation of CO_2 from power plants under its jurisdiction. EFSEC is in the process of adopting CO_2 rules consistent with Ecology's, as well as provisions addressing the list of independent qualified organizations and changing the rate that must be paid per ton of CO_2 emissions to be mitigated.
See also Senate Bill 6001 (April 2007), sections 5, 7, 8 and 9, (a weblink to SB6001 is included at the beginning of this document).

1.4 Integrated Resource Planning

Integrated Resource Planning, or IRP, is planning process that strives to meet needs for electricity services in a manner that meets multiple objectives, including evaluation all options, from both the supply and demand sides, in a fair and consistent manner, minimizing costs to all stakeholders, building in flexibility to account for future uncertainties. IRP processes have increasing considered the environmental risks, and the potential costs associated with future regulation of GHGs.

Recently enacted policies in Washington: In 2006, the Legislature passed the Electric Utility Planning Act (ESHB 1010). This Act requires each consumer-owned or investor-owned electric utility with more than 25,000 customers to develop or update an integrated resource plan by September 2008. The resource plan must include, among other requirements:

- an assessment of conservation and efficiency, and recommendations for new policies and programs needed to obtain the conservation and efficiency resources, and
- an assessment and comparative evaluation of renewable and nonrenewable generation.

Plans are reviewed by CTED.

1.5 Voluntary GHG commitments

Numerous US companies and organizations, including many utilities, have taken on voluntary GHG reduction commitments, many through USEPA's Climate Leaders program. These commitments can be based on total GHG emissions in a given year or on an intensity basis (tCO2e per MWh generated or delivered). Some entities with voluntary commitments also engage in the Chicago Climate Exchange (CCX), a self-regulating pilot program for reducing and trading emissions in North America.

1.6 Technology R&D

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. For example, an agency can be

established with a mission to help develop and deploy energy storage technologies. R&D funding can also be made available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use. Funding could be provided to increase collaboration between existing institutions for R&D on technologies.

Recently enacted policies in Washington: See Senate Bill 6001 (April 2007), various sections, (a weblink to SB6001 is included at the beginning of this document).

1.7 Cimate Change Education Initiatives

Explicitly articulated education and outreach can support GHG emissions reduction efforts at all levels in the context of emissions reduction programs, policies, or goals. Education and outreach can foster a broad awareness of climate change issues and effects related to Energy Supply (including co-benefits, such as clean air and public health). Such awareness engages citizens both in direct actions to reduce GHG emissions and in support of actions by government, industry or civil society. Education and outreach efforts should integrate with and build upon existing outreach efforts involving climate change and related issues in the state.

ES-2 RENEWABLE ENERGY[1] AND ENERGY EFFICIENCY

2.1 Renewable and/or Environmental Portfolio Standard

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

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

Recently enacted policies in Washington: The 2006 Energy Independence Act (Initiative 937) established renewable portfolio standards. Large utilities (25,000 customers and over) are required to obtain 15% of their electricity from new renewable resources such as solar and wind by 2020 (3% in 2012 -- 9% in 2016 -- and 15% in 2020) and undertake cost-effective energy conservation. The RPS affects 95% of the electric generation in the State.

[1] See attachment at the end for a brief listing of renewable energy projects in the State.

See also Senate Bill 6001 (April 2007), section 4e), (a weblink to SB6001 is included at the beginning of this document).

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

This policy option reflects financial incentives to encourage investment in renewable energy sources by businesses that sell power commercially. Financial incentives for grid-based renewables could include, among others: (1) direct subsidies for purchasing/selling distributed renewable technologies given to the buyer/seller (e.g. via a public benefit fund); (2) tax credits or exemptions for purchasing distributed renewable technologies given to the buyer/seller, (3) feed-in tariffs, which provide direct payments to renewable generators for each kWh of electricity generated from a qualifying renewable facility; (4) tax credits for each kWh generated from a qualifying renewable facility; and (5) regulatory policies that provide incentives and/or assurance of cost recovery for utilities that invest in renewable energy systems.

Recently enacted policies in Washington: See 2.3 below. See Senate Bill 6001 (April 2007), section 4d) and 4e), (a weblink to SB6001 is included at the beginning of this document).

2.3 Distributed Renewable Energy Incentives and/or Barrier Removal

This option is focused on renewable energy located on-site at consumer facilities, i.e. on the "customer side of the meter". There are numerous barriers to distributed renewable energy, including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles. Policies to remove these barriers include: improved interconnection policies, improved rates and fees policies, streamlined permitting, recognition of the emission reduction value, financing packages and bonding programs, power procurement policies, education and outreach, etc.

Note this option may also be considered by the RCI TWG group.

Recently enacted policies in Washington: See also 2.6 below. In 2005, the Legislature enacted the Renewable Energy System Cost Recovery (RCW 82.16.110) and Tax on Manufacturers or Wholesalers of Solar Energy Systems (RCW 82.04.294). The legislation provides incentives for the purchase of locally-made renewable energy products and provides a preferential rate under the business and occupation tax. Furthermore, tax exemptions under RCW 82.08.02567 and RCW 82.12.02567 incent the purchase and use of machinery and equipment used directly to generate electricity using fuel cells, wind, sun, or landfill gas. Similarly, RCW 82.08.835 and RCW 82.12.835 incent the purchase and use of solar hot water systems.

Incentive payments are provided by electric utilities to customers generating renewable energy (i.e., solar, wind) on their property. For example, the Chelan County PUD Sustainable Natural Alternative Power Producers Program encourages customers to install power generators such as

solar panels and wind turbines and connect them to the PUD distribution system; Avista Utilities provides a production credit of 14 cents per KWh for one year; Bonneville Environmental Foundation Green buys "tags" for five cents per KWh for up to five years.

2.4 Green Power Purchases and Marketing

Green power refers to electricity from environmentally-preferred sources such as renewables. These programs allow consumers to purchase "green tags" along with their electricity ensuring that a quantity of electricity equal to their purchase was produced from renewable resources. Government efforts can help to enable such programs, provide incentives or marketing support, or even create purchasing requirements. Several states (e.g. New York, Maryland, and New Jersey) have adopted requirements for fraction of electricity purchased by state agencies that must come from renewable energy sources.

Note this option may also be considered by the RCI TWG group.

Recently enacted policies in Washington: Washington State RCW 19.29A.090 directs larger electric utilities to offer their customers a green power electricity product. See Green Power Programs in Washington: 2006 Report to the Legislature.[2]

2.5 Combined Heat and Power (CHP) and Thermal Energy Recovery and Use Incentives and/or Barrier Removal

Combined heat and power and thermal energy recovery and distribution can reduce GHG emissions by increasing the overall efficiency of fuel use. There are opportunities to recover thermal energy from CHP, waste heat or renewable energy sources. District energy systems provide a key infrastructure for conveying this "recycled" energy from the sources to energy consumers. Key opportunities include:

- recovery ("recycling") of waste heat from power generation (through combined heat and power or CHP),
- recovery (recycle) of waste heat from industrial processes or municipal operations; and
- tapping local renewable resources such as bio-energy, geothermal

However, there are numerous barriers to CHP and thermal energy recovery and use including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles. Policies to remove these barriers can include:

[2] http://www.cted.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&ItemID=3909&MId=863&wversion=Staging

1. improved interconnection policies, improved rates and fees policies, streamlined permitting, recognition of the emission reduction value provided by CHP and clean DG, financing packages and bonding programs, power procurement policies, education and outreach, etc.
2. establishing a Washington State inventory of waste heat resources, identifying how much and where waste heat exists, how much of the heat is useable (of high enough quality) and how much is feasible to recover (near enough users of heat);
3. evaluate the full renewable thermal energy potential of the State including a comprehensive assessment of bioenergy resources, the potential to use natural sources of air conditioning from cold deep surface water, and geothermal heating; provision of incentives for new or existing waste heat generators to (re)locate adjacent or close by to heat sinks;
4. provide information/education/outreach programs to address barriers to district energy development, including inadequate information, institutional barriers, lack of integrated community energy planning and lack of financial sector understanding of these systems; provision of financial incentives to implement district energy, waste heat recovery and renewable thermal energy systems through a variety of programs including:
    a. Low-cost bonding or loan guarantee programs;
    b. Incentives for buildings to connect to district energy systems established to use or convert to renewable energy or recover waste energy; and
    c. Incentives to upgrade existing steam district energy systems to hot water district energy distribution to enhance system performance and improve efficiencies.

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

Note this option may also be considered by the RCI TWG group.

Recently enacted policies in Washington: Washington State RCW 82.08.02565 and 82.12.02565 provide tax exemptions for the sale and use of machinery and equipment used for CHP facilities.

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

Pricing and metering strategies can provide consumers with price signals to encourage energy efficiency, CHP, renewable energy, and overall reductions in greenhouse gas emissions. Pricing strategies provide electricity consumers with a greater opportunity to manage their electricity consumption in response to price signals encouraging consumers to adjust demand (e.g. turning

off lighting or appliances when the price reaches a threshold set by the consumer). Net metering is a policy that allows owners of grid-connected distributed generation (generating units on the customer side of the meter, often limited to some maximum kW level) to generate excess electricity and sell it back to the grid, effectively "turning the meter backward."

Pricing strategies can take many forms including:

- real-time pricing in which utility customer rates are not fixed, but reflect the varying costs that utilities themselves pay for power; especially during peak times.
- "time-of-use" rates, which are fixed rates for different times of the day and/or for different seasons;
- "increasing block" rates that are defined by blocks of consumption;
- green pricing whereby customers are given the opportunity to purchase electricity with a renewable or cleaner mix than the standard supply mix offered by the utility; and
- advanced metering to allow electricity consumers much greater opportunity to manage their electricity consumption.

Net metering provides several incentives for renewable DG by reducing transaction costs (e.g., no need to negotiate contracts for the sale of electricity back to the utility) and increasing revenue by setting compensation at retail electricity rates rather than at utility avoided costs.

Recently enacted policies in Washington: In 2006, the Legislature amended the net metering law originally passed in 1998 (HB 2352 amended Chapter 80.60 RCW). The law directs large electric utilities to make net metering available to eligible customers-generators on a first-come, first-served basis until the cumulative generating capacity of net metering systems equals 0.25 percent of the utility's peak demand during 1996. On January 1, 2014, the cumulative generating capacity available to net metering systems will equal 0.5 percent of the utility's peak demand during 1996. Not less than one-half of the utility's 1996 peak demand available for net metering systems shall be reserved for the cumulative generating capacity attributable to net metering systems that generate renewable energy.

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

Policies can be developed to help overcome barriers and increase incentives for renewable energy development. Commercialization and market barriers such as price distortions, failure of the market to value the public benefits of renewables and the social cost of fossil fuel technologies, inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk can be overcome through a suite of financial and regulatory incentives for renewable energy development.

Financial incentives can include property tax exemptions, exclusions, and credits; personal income tax credits or deductions to cover the expense of purchasing and installing renewable energy equipment; loan programs to aid in financing the purchase of renewable energy equipment; and grant programs designed for research and development or to help a project achieve commercialization.

Regulatory policies can include solar or wind easements of access rights; development guidelines at the local level to enhance renewable energy generation (e.g. requiring proper street orientation); requirements that utilities provide information and utility leasing programs for renewable energy production to customers in remote regions.

Recently enacted policies in Washington: See Senate Bill 6001 (April 2007), section 4d), (a weblink to SB6001 is included at the beginning of this document).

2.8 Technology-focused initiatives (biomass co-firing, fuel cells, energy storage, etc.)

States can undertake initiatives focused on developing, promoting, and/or implementing one or more specific technologies that show promise for reducing GHG emissions. Technologies could include, among others, fuel cells (to increase efficiency, create markets for hydrogen, etc.), energy storage such as compressed air systems (to enable greater penetration of intermittent renewable technologies such as wind), or biomass co-firing. Biomass co-firing can be a low-cost, near-term means of converting biomass to electricity and displacing coal use by adding up to 15% biomass in high-efficiency coal boilers.

2.9 Efficiency improvements at existing renewable energy plants

Efficiency improvements refer to increasing generation efficiency at generation stations through incremental improvements at existing hydro, biomass or wind plants (e.g., more efficient turbines, improved control systems). Policies to encourage efficiency improvements could include incentives or regulations as described in other options, with adjustments for financing opportunities and efficiency rates of existing plants.

2.10 Using carbon offset markets to promote additional renewable energy

Carbon offsets markets provide an opportunity for entities undertaking actions that reduce GHG emissions to sell the credit for these reductions to other entities (who may be purchasing the reduction credits – or offsets – in order to meet mandatory or voluntary GHG emission reduction goals). Most offsets programs include require participants to prove that the GHG reductions are “additional” reductions (in other words, the actions leading to the GHG reductions would not have occurred for other financial or regulatory reasons). Entities that produce energy from renewable sources, rather than fossil fuel-based sources, can claim carbon offsets (if they meet the Offset Programs requirements). Initiatives to encourage the use of the carbon offsets markets by renewable energy generators include providing additional technical assistance (including bundling several small entities into a single mass of GHG emission reductions) or financial incentives to renewable energy providers.

ES-3 FOSSIL FUEL AND NUCLEAR ELECTRICITY

3.1 Incentives, support and/or requirements for Advanced fossil fuel technologies

Recently enacted policies in Washington: See Senate Bill 6001 (April 2007), section 7, (a weblink to SB6001 is included at the beginning of this document).

Note the ES TWG (at their second meeting) members request separate consideration of pre-combustion and post-combustion technologies, and this option has been split as follows.

3.1a Advanced fossil fuel generation and pre-combustion carbon capture and storage technologies

Advanced fossil technologies include more efficient and thus lower emitting generation technologies. Several advanced fossil technologies, such as Integrated Gasification Combined Cycle (IGCC) power plants, also allow for more cost-effective collection of CO_2 emissions for sequestration. Policies for advanced fossil and pre-combustion technologies may include mandates or incentives to use advanced coal technologies for new coal plants. A mandate might require that new fossil fuel-fired power plants achieve a certain CO_2 emission rate that is only achievable with advanced technology. Alternatively, a mandate might require that all new coal plants be of a certain type, e.g., IGCC. A mandate might also be a requirement that a certain percentage of new coal plants employ IGCC or other advanced fossil technologies. Incentives may be in the form of direct subsidies or assistance in securing financing and/or off-take agreements. A combination of mandates and incentives is also possible.

3.1 b Post-combustion carbon capture and storage technologies

Pre-combustion technology is largely associated with IGCC or other gasification technologies that can separate CO2 from the gasified fuel prior to combustion. Other hand, post-combustion (and oxyfuel) systems separate CO2 from the flue gases after the fuel is combusted. These technologies can thus be applied to conventional coal (and other combustion) plants, whether existing or new. Policy options could be similar to those noted for the previous option, noting that post-combustion technology might more readily enable retrofitting of existing plants.

3.2 Nuclear power support and/or incentives (e.g. relicensing, uprating)

Nuclear power presents a low-GHG source of electricity. As of the end of last year, there were 104 commercial nuclear generating units, licensed by the U.S. Nuclear Regulatory Commission (NRC) with an electric capability of 97,400 MW. No new commercial reactor has come on line in the US since 1996. The current Administration has been supportive of nuclear expansion, emphasizing its importance in maintaining a diverse energy supply and its potential for producing electricity with negligible greenhouse gas emissions during operation.

Nuclear plant relicensing allows a nuclear power plant to extend the life of the facility for twenty years past its original 40-year license term. The Nuclear Regulatory Commission (NRC), the nation's regulatory authority for nuclear power, considers the relicensing program one of its major cornerstones of current regulatory activity. A nuclear power plant uprating is a process whereby a licensee receives approval from the NRC to operate a plant at a higher power level than the level authorized in the original license.

3.3 Efficiency Improvements and Repowering Existing Plants

Efficiency improvements refer to increasing generation efficiency at power stations through incremental improvements at existing plants (e.g., more efficient boilers and turbines, improved

control systems, or combined cycle technology). Repowering existing power plants refers to switching to lower or zero emitting fuels at existing plants, or for new capacity additions. This includes use of biomass or natural gas in place of coal or oil. Policies to encourage efficiency improvements and repowering of existing plants could include incentives or regulations as described in other options, with adjustments for financing opportunities and emission rates of existing plants.

Recently enacted policies in Washington: See Senate Bill 6001 (April 2007), sections 4c) and 11, (a weblink to SB6001 is included at the beginning of this document).

3.4 Technology-focused initiatives

States can undertake initiatives focused on developing, promoting, and/or implementing one or more specific fossil fuel or nuclear technologies that show promise for reducing GHG emissions. Technologies could include, among others, carbon capture and storage (to sequester carbon dioxide emissions from power plants, oil and gas operations, and/or refineries); biomass blending in coal power plants; implementation of equipment in oil and gas operations that increases efficiency and reduces losses (e.g. remote sensors of leaks).

ES-4 Fuel Production, Processing, and Delivery

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

There are a number of ways in which methane (CH_4) and CO_2 emissions can be reduced in the oil and gas production. Natural gas consists primarily of methane, a potent greenhouse gas; therefore, any reducing leaks during production, processing, and transportation/distribution leads to direct GHG emissions savings. In addition to reducing GHG emissions, stopping these leaks may be economically beneficial because it can prevent the waste of valuable product. The EPA Natural Gas STAR program offers numerous methods of preventing leaks, including preventive maintenance: (improving the overall efficiency of the gas production and distribution system), reducing flashing losses (releases when pressure drops at storage tanks, wells, compressor stations, or gas plants), and changing and replacing parts and devices to reduce leaks and improve efficiency, among others. This option could also include incentives for use of carbon capture and storage (CCSR) technologies during oil and gas production.

4.2 Natural Gas Transmission and Distribution

There are a number of ways in which natural gas emissions during transmission and distribution can be reduced. Natural gas consists primarily of methane, a potent greenhouse gas; therefore, any reduction of leaks during production, processing, and transportation/distribution leads to direct GHG emissions savings. In addition to reducing GHG emissions, stopping these leaks may be economically beneficial because it can prevent the waste of valuable product. The EPA Natural Gas STAR program offers numerous methods of preventing leaks, including preventive

maintenance: (improving the overall efficiency of the gas production and distribution system), reducing flashing losses (releases when pressure drops at storage tanks, wells, compressor stations, or gas plants), and changing and replacing parts and devices to reduce leaks and improve efficiency, among others.

4.3 Oil Refining: GHG Emission Reduction Incentives, Support, or Requirements

There are a number of ways in which CH_4 and CO_2 emissions can be reduced in the production of liquid fuels at oil refineries. These options include various efficiency measures including enhanced combined heat and power along with carbon capture and storage. Regulations, incentives, and/or support programs can be applied to achieve these reductions.

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

There are a number of ways in which CH_4 and CO_2 emissions can be reduced in the production of coal. These options include various efficiency measures including enhanced combined heat and power along with carbon capture and storage. Regulations, incentives, and/or support programs can be applied to achieve these reductions.

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

4.5 a Coal-to-liquids Production

Coal-to-liquids (CTL) plants are energy-intensive, and produce about 10 times more CO_2 emissions than conventional oil refineries in order to produce liquid fuels; however, with carbon capture and storage (and co-production of electricity and liquid fuels) such emissions can be substantially reduced.[3] Regulations, incentives, and/or support programs can be applied to achieve these reductions.

4.5 b Coal-to-gas Production

Technologies that convert coal-to-syngas are also being considered for alternative energy production for gaseous. These gasification plants are energy-intensive compared with natural gas production but can offer opportunities to capture and store carbon. Regulations, incentives, and/or support programs can be applied to achieve these reductions.

4.6 Low-GHG Hydrogen production incentives and support

Hydrogen is not an energy source, but rather an energy carrier (like electricity). It must be produced from other energy resources, such as fossil fuels (coal, oil, gas), renewable electricity (wind, solar), renewable fuels (biofuels, LFG), or nuclear power. The net greenhouse gas implications of producing hydrogen depend on the energy resource from which it is produced. Hydrogen can be produced from renewable fuels or nuclear energy with low greenhouse gas emissions. In order to produce hydrogen from fossil fuels with low greenhouse gas emissions, it

[3] International Energy Agency, 2006. *Energy Technology Perspectives.* Well-to-wheel GHG emissions from coal liquids are approximately twice those of conventional oil products. Cogeneration and carbon capture and storage can reduce those emissions to levels similar to, or slightly below, those of conventional oil products.

would be necessary to do it in conjunction with CCS. Policies in support of this option would provide incentives to projects that help develop or deploy low-GHG hydrogen production technologies.

4.7 Liquefied Natural Gas Policies and Infrastructure

Improving the infrastructure for LNG imports into Washington State can help reduce GHG emissions in two ways:

1. Policies requiring efficient transportation infrastructure (ports and pipelines) can reduce leaks and improve the energy efficiency of transportation, leading to emission reductions relative to a case with LNG imports and less efficient transportation infrastructure
2. Use of LNG rather than coal or gasoline would lead to emission reductions since LNG has lower carbon intensity per BTU.

In general, the Energy Supply sector would count the emissions reductions from the former but not the latter activities (the emission reduction associated with LNG consumption would be counted under the energy consuming sectors). To the extent that this option leads to increases levels of LNG imports, relative to the reference case, it could lead to increased GHG emissions *in this sector*. The emission reductions in the energy consuming sectors would likely be much greater than the increases to the Energy Supply sector.

However, one of the goals of the CAT process is to reduce fuel imported to Washington State. Any net increases in LNG imports will need to be countered by decreased imports of other fuels.

ES-5 Carbon Capture and Storage or Reuse

5.1 CCSR incentives, requirements, and/or enabling policies (including R&D, administration, regulation, liability, incentives)

Carbon dioxide (CO_2) capture and storage or reuse (CCSR) is a process consisting of the separation of CO_2 from industrial and energy-related sources, transport to a storage location and long-term isolation from the atmosphere. The CO_2 from large point sources can be compressed and transported for storage in geological formations, in the ocean, in mineral carbonates, or for reuse in industrial processes. Captured carbon can be reused for enhanced recovery of oil and gas extraction or as a feedstock for industrial processes. The net reduction of emissions to the atmosphere through CCSR depends on the fraction of CO_2 captured, the increased CO_2 production resulting from loss in overall efficiency of power plants or industrial processes due to the additional energy required for capture, transport and storage, any leakage from transport and the fraction of CO_2 retained in storage over the long term. The most viable of these technologies today appears to be Integrated Gasification Combined Cycle (IGCC) combined with carbon capture and storage and reuse (CCSR) technology. There are also emerging CCSR technologies that show promise for capturing carbon emissions from traditional pulverized coal fired boilers. These emerging technologies include chilled ammonia scrubbing and oxy-fuel combustion. Carbon capture technologies have the potential to remove approximately 90 percent of a coal plant's CO2 emissions.

Technological and financial barriers exist to implementation of CCSR. While separation, capture and transport of CO2 are mature technologies only three industrial-scale storage projects are currently in operation: the Sleipner project in an offshore saline formation in Norway, the Weyburn EOR project in Canada, and the In Salah project in a gas field in Algeria. Further R&D funding to improve CCSR technologies and evaluation studies to identify geologically sound reservoirs will be needed.
Policies to encourage CCSR could include a state agency or department within an existing agency tasked with promoting CCSR, financial incentives to capture and store carbon or to capture and reuse it, and/or mandates – coupled with cost and investment recovery mechanisms, if appropriate – to capture and store carbon or capture and reuse it.

TWG Comments (from May 24, 2007 TWG meeting and individual TWG member submissions)

- Identify potential carbon sequestration reservoirs (permanent geological storage and other permanent capture opportunities)
- CO_2 pipeline transmission issues (from source to reservoir)
- Policies for CO_2 sequestration - including state permitting, issues regarding short and long term liability

Other policy initiatives include:

a. Development of a Comprehensive Legal and Regulatory Framework for CCS.
CCSR raises new legal and regulatory risks associated with siting and permitting projects, CO2 transportation, injection and storage.[4] These risks are not yet fully understood, nor are uniform standards or government regimes in place to address and mitigate them.
Among the key questions to be addressed in the development of a consistent regulatory framework for CCSR are: immunity from potentially applicable criminal and civil environmental penalties; property rights, including the passage of title to CO2 (including to the government) during transportation, injection and storage; government-mandated caps on long-term CO2 liability, insurance coverage for short-term CO2 liability; the licensing of CO2 transportation and storage operators, intellectual property rights related to CCS, and monitoring of CO2 storage facilities.

b. Modification of the Traditional Least-Cost/Least Risk Regulatory Standard to Allow Development of CCS-Equipped IGCC and Pulverized Coal Resources.
An option for this is to adopt a "reasonable and necessary" standard for IGCC and CCS technologies used to serve Washington customers, in place of a least cost/least risk standard. Indiana adopted a similar approach, requiring the Indiana Utility Regulatory

[4] Robertson, K., Findsen, J., Messner, S., Science Applications International Corporation. June 23, 2006. "International Carbon Capture and Storage Projects Overcoming Legal Barriers", prepared for the National Energy Technology Laboratory (see http://www.netl.doe.gov/energy-analyses/pubs/CCSregulatorypaperFinalReport.pdf)

Commission to encourage the development of IGCC and CCS as long as it concludes that the projects are reasonable and necessary.[5]

c. Enact Tax Incentives to Help Bridge the Cost Gap Between IGCC and CCSR Technologies and Traditional Uncontrolled Coal.

One effective option for IOU development of IGCC and CCS technologies is a tax credit plus accelerated depreciation.

d. Use Assured, Timely Cost recovery to mitigate the Added Risks and Financing Challenges of IGCC and CCS

The developmental nature of IGCC and CCS technologies creates added risk and cost during the pre-construction phase, in construction of the plant and in the plant's performance.

The added risk and cost create financing challenges for an IGCC or CCS investment. Assured, timely cost recovery, typically achieved by "pay as you go" proposals, can help mitigate these challenges.

Recently enacted policies in Washington: See Senate Bill 6001 (April 2007), section 4b, (a weblink to SB6001 is included at the beginning of this document).

5.2 Research and Development for Carbon Capture Storage or Reuse

R&D for the CCSR technologies is also vital for their larger scale commercialization. R&D funding can also be made available to CCSR technologies through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use. Funding could be provided to increase collaboration between existing institutions for R&D on these technologies.

ES-6 Other Energy Supply Options

6.1 Transmission System Access, Planning, and Incentives

Distributed, small-scale and other clean energy technologies for electricity generation often face barriers in accessing the power grid. Since selling excess power to the grid allows these generators to help recoup the costs of the systems, grid access improves the cost-effectiveness of these systems. Initiatives include conditional firm pricing for clean/distributed energy and planning for additional intermittent (wind) generation.

6.2 Improve Transmission and Distribution System Efficiency

There are several energy efficiency measures that can be implemented to reduce the transmission and distribution line losses of electricity. Utilities use a variety of components throughout the

[5] IC 8-1-8.8-11(a), provides that "The Commission shall encourage clean coal and energy projects by creating the following financial incentives for clean coal and energy projects, if the projects are found to be reasonable and necessary."

transmission and distribution system to reduce losses. Increasing the efficiency of these components can further reduce losses. Vermont State, for example, offers a rebate to encourage users to install energy efficient transformers. Regulations, incentives, and/or support programs can be applied to achieve greater efficiency of transmission and distribution system components.

Measures to improve transmission systems to reduce bottlenecks and enhance throughput may be required to satisfy long-term electricity demands. Opportunity exists to increase transmission line carrying capacity as much as threefold through the implementation of new construction and retrofit activities on the transmission grid including incorporating advanced composite conductor technologies, capacitance technologies, and grid management software. Siting new transmission lines can be a difficult process given their cost and their actual or perceived impact on health, environment, and the use, enjoyment, and value of property. Policy measures in support of this option could provide incentives to utilities to upgrade transmission systems and reduce barriers to siting of new transmission lines. This option could also include reductions in use and leakage of SF6 from distribution system transformers, plus efficient transformers and other materials and equipment

6.3 General Distributed Generation Support (Interconnection Rules, Net Metering, etc.)

A standard interconnection rule will ensure that distributed power products meet minimum requirements for performance, safety, and maintenance and will significantly advance the commercialization of these new technologies. Standardized interconnection rules, which are generally developed and administered by a state's public utility commission, establish clear and uniform processes and technical requirements for connecting DG systems to the electric utility grid. Interconnection standards will reduce barriers to connection of DG systems to the grid identified by policy options 2.3, 2.5, and 2.6. Connecting to the grid enables the facility to: a) purchase power from the grid to supply supplemental power as needed, for example, during periods of planned system maintenance, b) sell excess power to the utility, c) maintain grid frequency and voltage stability, as well as utility worker safety. This topic is of particular interest as the Energy Policy Act of 2005 (EPAct 2005) directs states to consider upgrading their standards for interconnecting small generators within one year of enactment. (http://www.epa.gov/chp/pdf/interconnection_factsheet.pdf)

Recently enacted policies in Washington: Chapter 480-180 of the Washington Administrative Code sets uniform interconnection standards for small distributed generation. The Federal Energy Regulation Commission adopted regulations that would govern interconnection standards for large investor-owned utilities.

6.4 Environmental (emissions) Disclosure

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

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

Recently enacted policies in Washington: In 2001, Washington House Bill 2565 (Fuel Mix Disclosure Law) was enacted which requires retail electricity suppliers in Washington to provide a disclosure label to their retail customers, at least semi-annually. While not requiring "emissions disclosure", the information collected through this bill has allowed Washington to estimate GHG emissions associated with electricity sales.

6.5 Smart Grid

Use of technology to optimize the electricity grid through devices that control electricity demand and supply based on events throughout the grid. Can involve devices that "turn off" non-essential power when demand, and subsequent electricity prices, are high. Also co-ordinate a range of small scale distributed generation (including electric vehicles) and/or intermittent power, such as wind.[6]

[6] climatesolutions.org/pubs/pdfs/Poweringthe**SmartGrid**.pdf

Attachment: Status of renewable electricity projects in Washington State

Renewable projects (not including hydropower and solid biomass) in operation or at a serious planning stage include the following:

- **Wind** energy projects. As of December 31, 2006, Washington State had 818 MW (megawatts) total installed wind capacity. This capacity is the result of seven projects (Stateline Phase I and II, Nine Canyon Phase I and II, Hopkins Ridge, Big Horn, and Wild Horse). There are several proposed projects under consideration by Washington State's Energy Facility Site Evaluation Council (EFSEC) or County governments (Kittitas Valley, Desert Claim and others). According to the American Wind Energy Association, wind energy potential in Washington is estimated at 3,740 MW.

- **Wave and tidal energy.** Preliminary permits were filed with the Federal Energy Regulatory Commission (FERC) in Washington State. Snohomish Public Utility District (PUD) applied to FERC for seven Tidal energy projects with estimated 100 aMW capacity: Deception Pass, Rich Passage, Spieden Channel, Admiralty Inlet, Agate Passage, San Juan Channel, and Guemes Channel. Tacoma Power is sponsoring the Tacoma Narrows Tidal Energy project; an application was submitted to FERC in September 2005. A preliminary permit was issued in February 2006. Tacoma Power and the Electric Power and Research Institute selected Point Evans to install a test generating unit to evaluate the suitability of the site and the impacts of tidal power generation. Other applications were filed for tidal and wave power along the Columbia River, and in Wallapa Bay and Makah Bay. Potential sites have a draft programmatic environmental impact statement to enable leasing of federal waters for renewable energy development. According to EPRI, wave energy potential in four coastal counties (Jefferson, Pacific, Clallam, and Grays Harbor) is about 500 MW.

- **Solar**: Solar panels have been installed on the roof of the newly renovated legislative building, Ecology's Padilla Bay and Manchester lab offices, and in some parks.

- **Biogas:** Biogas is typically produced from feedstocks such as sewage sludge, livestock manure, and wet organic materials. Three anaerobic digester projects were awarded state loans in 2006; the projects are sponsored by the Port of Sunnyside, Tulalip tribes and Mason County, respectively. The projects will convert livestock waste into methane fuel and energy.

Catalog of State Actions
Transportation Working Group

A catalog of state-level, GHG-reducing actions and policy options based on actions undertaken or considered by state, local and private actors.

Key to Future Rankings of Options in the Tables that Follow:

Potential GHG Emission Reductions 1/	Potential Cost or Cost Savings 1/ 2/
High (H): At least 1.0 million metric tons (MMt) carbon dioxide equivalent (CO_2e) per year by 2020 (~1% of current WA emissions)	**High (H)**: $50 per metric ton CO_2e (tCO_2e) or above
Medium (M): From 0.1 to 1.0 MMtCO_2e per year by 2020	**Medium (M):** $5-50/t$CO_2$e
Low (L): Less than 0.1 MMtCO_2e per year by 2020, or 1 MMtCO2e by 2050	**Low (L):** Less than $5/t$CO_2$e
Uncertain (U): Not able to estimate at this time	**Negative (Neg):** Net cost savings
	Uncertain (U): Not able to estimate at this time

1/ Several measures may overlap in terms of emissions reductions and/or cost impacts. Estimates assume measures would be implemented independently from other measures.
2/ Costs are denoted by a positive number. Cost savings (i.e., "negative costs") are denoted by a negative number.

Definition of "Priorities for Analysis":

- **High:** High priority options will be analyzed first.
- **Medium:** Medium priority options will be analyzed next, time and resources permitting.
- **Low**: Low priority options will be analyzed last, time and resources permitting.

Table-3 Transportation (T)

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
T-1	**VEHICLE TECHNOLOGY**					
1.1	Clean Car Program ("Pavley" GHG standards for autos)	H	Neg			Beginning January 1, 2009, new cars and light trucks sold in the State must meet the California Clean Car vehicle emissions standards.
1.2	Fuel-Efficient Tires	M	Neg			
1.3	Freight Vehicle Fuel Efficiency Improvements	L	Neg			
1.4	Black Carbon Control for Freight Vehicles (e.g., particulate traps)	L	M	New EPA emission standards for truck engines take effect in 2007		In 2005, Legislature authorized $2 million (and an additional $2.3 million in 2007) to retrofit 20% diesel engines owned by public entities. Prior funding can also be used to retrofit privately-owned diesel vehicles.
1.5	Vehicle Purchase or Registration Incentives (registration fees, tax credits, feebates, etc.)	L/M	U	Federal Tax Code provides tax credits for alternative fuel vehicles		Clean alternative fueled vehicles and hybrid passenger vehicles with a fuel economy of at least 40 mpg on the highway are exempted from state sales and use taxes starting in 2009, under SB 5916. HB 1303 supports the use of plug-in hybrid vehicles by the state and provision of plug-in capability at state locations. Tax and fee incentives can be provided to encourage individual and fleet purchases of plug-in hybrid vehicles.
1.6	Operational Incentives for Low-GHG Vehicles (preferential parking, etc.)	L	U			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
1.7	Incentives to Retire or Improve Older High-GHG Vehicles (passenger or freight)	L	M/H			
1.8	Incentives for Low Emission Transit Vehicles	L	M/H			
T-2	**VEHICLE OPERATION**					
2.1	Lower and/or Enforce Speed Limits	M	U			
2.2	Driver and Alternative Transportation Education	L	U			
2.3	Vehicle Idling Regulations and/or Alternatives (e.g., electrification)	L/M	Neg			A business and occupation state tax deduction is provided from the sale, lease, or rental of auxiliary power to heavy duty diesel vehicles through on-board or stand-alone electrification systems. HB 1303 supports the provision of incentives to encourage the use of plug-in truck auxiliary power units and truck stop electrification.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
T-3	**ALTERNATIVE FUELS**					
3.1	Low Carbon Fuel Standard	H	M			
3.2	Renewable Fuel Standard (ethanol and/or biodiesel)	M/H	M			Beginning in November 30, 2008, fuel suppliers must ensure a minimum of 2% of total annual diesel and 2% of total annual gasoline sold in the State must be biodiesel or ethanol.
3.3	Alternative Fuel Mandates for State/Local Fleets	L	M			An Executive Order directs agencies to reduce 20% petroleum use in the operation of state vehicles and privately-owned vehicles used for state business, by September 1, 2009. By that date, standard diesel must be replaced with 20% biodiesel blend, and as soon as practical, agencies must begin using a minimum 5% biodiesel blend.
3.4	Alternative Fuel Production Incentives (reduced fuel taxes, production tax credits, loans, etc.)	U	U			Legislature passed four bills which provide various tax and use incentives to encourage the development, distribution, and sale of biodiesel and ethanol fuels.
3.5	Alternative Fuel Infrastructure Development	U	U			2006 Legislature appropriated $17 million for the Energy Freedom Loan Program to develop a viable bioenergy industry, promote research, and develop bioenergy sources and markets to support growth of bioenergy crops. 2007 Legislature authorized a bill to create a vehicle electrification grant program. The bill also authorizes state agencies to provide electricity at state facilities for operation of state electric vehicles and privately-owned electric vehicles used for state business.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
T-4	**SMART GROWTH**					
4.1	Promote Infill and Brownfield Development	L/M/H	Neg			Washington's Brownfield Coalition offers low-interest loans to local governments and property owners to clean up brownfields through the Brownfield Loan Fund.
4.2	Limit Urban Growth Areas	L/M/H	Neg			Washington adopted the Growth Management Act in 1990 that requires state and local governments to manage Washington's growth by identifying and protecting critical and natural resource areas, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations.
4.3	Promote Transit-Oriented Development	L/M	Neg			Washington adopted the Growth Management Act in 1990 that requires state and local governments to manage Washington's growth by identifying and protecting critical and natural resource areas, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
4.4	Designate Employment and Housing Centers for Investment Planning	L/M/H	Neg			Washington adopted the Growth Management Act in 1990 that requires state and local governments to manage the state's growth by protecting critical and natural resource areas and designating urban growth areas. Additionally, the Commute Trip Reduction Efficiency Act, adopted in 2006, created the Growth and Transportation Efficiency Center (GTEC) program. This allows for the creation of GTECs by local jurisdictions where land use designation, transit facilities, bike and pedestrian infrastructure, and employer and/or residential programs are in place to decrease drive-alone trip rates by at least 10% and VMT by at least 13%. The legislature appropriated $2.4 million to this program in 2007.
4.5	Targeted Open Space and Rural Land Protection	L/M	Neg			
4.6	VMT/GHG Mitigation Requirements for Large Developments	L/M	U			
4.7	Multimodal Concurrency	L/M	U			The State Growth Management Act requires that adequate street capacity is provided concurrently with development to handle the projected increased traffic.
4.8	Enabling Legislation Allowing Local Governments and/or Transit Agencies to Implement Transit/TDM Impact Fees	L/M	U			RCW 82.02.050 allows for impact fees for public facilities narrowly defined as roads, schools, parks, and open space.

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
4.9	VMT and GHG Reduction Goals in Comprehensive Planning	L/M/H	U			The Commute Trip Reduction Efficiency Act, adopted in 2006, created the Growth and Transportation Efficiency Center (GTEC) program. This allows for the creation of GTECs by local jurisdictions where land use designation, transit facilities, bike and pedestrian infrastructure, and employer and/or residential programs are in place to decrease drive-alone trip rates by at least 10% and VMT by at least 13%. The legislature appropriated $2.4 million to this program in 2007.
T-5	**SYSTEM EFFICIENCY AND DEMAND MANAGEMENT**					
5.1	Transportation System Management (signal timing, roundabouts, HOV lanes, intelligent transportation systems, etc.)	L/M	M/H			
5.2	Ridesharing (carpool and vanpool programs, park-and-ride, etc.)	L/M	M/H			The Legislature passed SB 5412 in 2007, requiring Washington to develop a plan to reduce per capita vehicle miles traveled. The State must commit to a series of aggressive VMT reduction goals.
5.3	Expand Transit Infrastructure (rail, BRT) and/or Improve Existing Service (frequency, quality, etc.)	L/M	M/H			
5.4	Transit Marketing, Promotion, and Pricing Incentives	L	M/H			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
5.5	Bike and Pedestrian Infrastructure Improvements	L	M/H			Seattle's and Kirkland's "Complete Streets" ordinances establishes principals for street design to support and encourage walking, bicycling, and transit use while promoting safe operations for all users.
5.6	Additional Financing Tools to Invest in Local Transportation Infrastructure	U	U			
5.7	Commuter Choice Programs (pre-tax transit, telecommute, parking cash-out, etc.)	U	L			Legislature passed the Commute Trip Reduction Efficiency Act that uses partnerships among employers, local jurisdictions, transit systems, and the State to discourage traveling by single-occupant vehicles to the work place.
5.8	Expand Roadway Pricing (e.g., tolling)	U	U			PSRC recently conducted a pilot test of an in-vehicle taxi-like metering device to assess roadway user charges. This Traffic Choices Study involved 500 vehicles from more than 300 households. The Legislature passed SB 5412 in 2007, which requires WSDOT to consider efficiency tools including system-wide pricing. The Washington State Transportation Commission also conducted a thorough tolling study which outlines their vision for the role of tolling and pricing in the near future.
5.9	Increase Motor Fuel Taxes	L/M	U			
5.10	Parking Management	U	U			

Option No.	GHG Reduction Policy Option	Potential GHG Emissions Reduction	Cost per Ton	Other Considerations: Contribution to 2035/2050 goals, Job Creation, Fuel Imports, Externalities, Feasibility	Priority for Analysis	Notes / Related Actions in WA State
5.11	State VMT Reduction Plan	U	U			The Legislature passed SB 5412 in 2007, which would commit the state to development of a plan to gradually reduce per capita vehicle miles traveled. The Commute Trip Reduction Efficiency Act that uses partnerships among employers, local jurisdictions, transit systems, and the State to discourage traveling by single-occupant vehicles to the work place.
5.12	Quantification of GHG Impacts of Transportation Plans, Programs, and Projects	L	L			
5.13	Pay-as-You-Drive Automobile Insurance	M/H	Neg			King County has a significant demonstration underway.
T-6	**NON-ROAD OPTIONS**					
6.1	Rail Improvements for Freight	L/M	H			
6.2	Intercity Rail or High-Speed Rail Corridors	L	H			
6.3	Aircraft GHG Reductions	L/M	U			
6.4	Airport Operations and Ground Equipment	L	M/H			
6.5	Harbor Craft GHG Reductions (ferries, tugs, etc.)	L/M	H			
6.6	Port Electrification	L/M	H			HB 1303 supports port electrification through the use of plug-in shore power and cargo and cruise ship terminals, shipside technology, and use of electric power alternatives for port-related operations and equipment.
6.7	Off-Road Vehicle GHG Reductions (construction, recreational, etc.)	U	U			

DRAFT
Transportation Sector
Brief Descriptions of Potential State Actions

T-1 VEHICLE TECHNOLOGY

1.1 Clean Car Program

A clean car program is also known as the "Pavley" standards or the California GHG Emissions Standards. These standards can be adopted to reduce GHG emissions from new light-duty vehicles. New cars and light trucks in all states must comply with federal emission standards, and, generally speaking, states have the choice of adopting a stronger set of standards applicable in California. The standards require manufacturers to meet a declining fleet-wide average standard for GHG emissions per mile. A state can also include other smog- and soot-forming pollutants in this plan. If the California standards are made more stringent, Washington could adopt these as well.

This option could also involve state action to encourage an increase in the federal Corporate Average Fuel Economy (CAFE) standards for light duty vehicles. King County's "Cool Counties" recommendation for the National Association of Counties recommends a 35 mpg standard for CAFE. The state could adopt a similar recommendation.

WA Action: In 2006, Washington adopted the California Clean Car Program standards requiring new cars and light trucks sold in the State to meet strict vehicle emissions standards starting January 1, 2009.

1.2 Fuel-Efficient Tires

Fuel-efficient tires may also be referred to as low rolling resistance tires. Fuel economy can be improved on light-duty vehicles by setting minimum energy efficiency standards for replacement tires. Typically, energy efficient tires are used on new models. But lower rolling resistant replacement tires may not be readily available to consumers and there is little information regarding the fuel economy of replacement tires.

1.3 Freight Truck Fuel Efficiency Improvements

The fuel efficiency of freight trucks can be improved using a variety of equipment modifications (e.g., aerodynamic devices, wide-base tires, fuel efficient lubricants) as well as driver training. Government agencies can promote truck fuel efficiency improvements with incentives and outreach.

1.4 Black Carbon Control for Freight Vehicles

Diesel particulate matter includes black carbon aerosols, which are thought to contribute to global warming through positive radiative forcing. Diesel particulate emissions can be reduced through the use of several types of exhaust retrofit devices.

WA Action: In 2005, the Legislature authorized $2 million to be used to retrofit diesel engines owned by public entities. The goal is to retrofit 20% of local government diesel engine vehicles to reduce highly toxic diesel emissions. An additional $2.3 million was authorized by the 2007 Legislature to retrofit public-sector diesel vehicles, and allows a portion of existing diesel retrofit funding to be used for privately-owned diesel vehicles.

1.5 Vehicle Purchase or Registration Incentives

The state could adopt a variety of programs to increase purchase of fuel-efficient or low-GHG vehicles (including pure electric, hybrid, plug-in hybrid, and other alternative fuel vehicles). State incentives could include registration fees, feebates, and/or tax credits. Higher vehicle registration fees can be charged for vehicles that have lower fuel economy, and/or vehicles that use alternative fuels or hybrid vehicles could be charged a lower vehicle registration fee. Vehicle licensing fees could be based upon vehicle weight, with use of a dollar per vehicle-ton multiplier instead of the present broad categories of vehicle weight. “Feebates” would provide incentives for reduced GHG emissions by creating: (1) fees on relatively high emissions/lower fuel economy vehicles and (2) rebates or tax credits on low emissions/higher fuel economy vehicles. Tax credits can be offered for the first time purchase of a hybrid, alternative fuel vehicle, or other set of specifications that incorporate low-GHG emission standards. The state could also adopt other programs to more broadly promote flexible-fuel strategies to support a range of alternative vehicle types as opposed to those that currently operate on petroleum-based fuels.

WA Action: Legislature enacted SB 5916 in 2005 providing tax exemptions for new vehicles that use clean alternative fuels. Clean alternative fueled vehicles and hybrid passenger vehicles which have a fuel economy of at least 40 mpg on the highway are exempted from state sales and use taxes starting in 2009.

HB 1303 supports the use of plug-in hybrid vehicles by the state and the provision of plug-in capability at state locations.

1.6 Operational Incentives for Low-GHG Vehicles

Incentives can be offered to drivers of low-GHG vehicles. Depending on effectiveness, these could include preferential vehicle access to metered parking spaces.

1.7 Incentives to Retire or Improve Older High-GHG Vehicles

Black carbon emissions can be reduced from heavy-duty diesel vehicles by developing and implementing an incentives program to accelerate the replacement and/or retirement of the highest-emitting diesel vehicles. Starting with the 2007 model year, stringent new federal emission standards for new heavy-duty diesel vehicles take effect. Incentives can be offered to the owners of older vehicles to retire their vehicles early and replace them with vehicles meeting the 2007 emission standards.

Alternatively, incentives can be used to retire older passenger vehicles with poor fuel economy. Because of the energy input required for manufacture of new vehicles, keeping low-GHG emitters in the fleet longer will provide benefits if well maintained.

1.8 Incentives for Low Emission Transit Vehicles

This option would provide incentives for or discounts to transit agencies for the purchase of hybrid and/or other cleaner-technology buses as well as electric trolley buses and electric rail vehicles.

T-2 VEHICLE OPERATION

2.1 Lower and/or Enforce Speed Limits

Reduced vehicle speeds improve fuel economy, reduce CO2 emissions, and improve safety. This could be implemented by requiring interstates, freeways, and major arterials to be signed with a maximum speed that is lower than the current speed. Significant enforcement resources may be needed for this measure to achieve the expected reductions.

2.2 Driver and Alternative Transportation Education

Better consumer information and education can lead to a gain in fuel efficiency. Consumer education could promote the use of “best in class” vehicle guides that provide comparative fuel efficiency information and could also provide associated vehicle GHG emissions. Drivers also need to be aware of maintenance issues that cause an increase in pollution and vehicle operating cost. Additionally, education could be geared to encourage energy-efficient driving habits as well as encourage the use of alternative modes of transportation (e.g., how to use public transportation; how to commute to work by bike, etc.).

2.3 Vehicle Idling Regulations and/or Alternatives

Vehicle idling can be reduced by adopting anti-idling ordinances and/or encouraging the use of alternatives. Many states and local governments have adopted idling regulations for trucks and buses. Idling reductions could also be considered for other vehicle types and fleets, such as taxis.

Alternatives to long-term truck idling include the use of technologies such as automatic engine shut down/start-up system controls, direct-fired heaters, auxiliary power units, and truck stop electrification. Truck idling time can also be reduced through the pre-clearance at highway truck weigh stations and expanded use of weigh-in-motion systems.

WA Action: To minimize idling of heavy duty diesel vehicles, a business and occupation state tax deduction is provided from the sale, lease or rental of auxiliary power to heavy duty diesel vehicles through on-board or stand-alone electrification systems.

HB 1303 supports the provision of incentives to encourage the use of plug-in truck auxiliary power units and truck stop electrification.

T-3 ALTERNATIVE FUELS

3.1 Low Carbon Fuel Standard

This option seeks to reduce GHG emissions by decreasing the carbon intensity of all passenger vehicle fuels sold in Washington. The Low Carbon Fuel Standard (LCFS) would require all fuel providers in Washington to ensure the mix of fuel they sell into the Washington market meet, on average, a declining standard for GHG emissions measured in CO2 equivalent gram per unit of fuel energy sold. The State should regulate quality standards for low carbon fuels. Low carbon fuels include, but are not limited to, biodiesel, cellulosic ethanol, hydrogen, compressed natural gas, liquefied petroleum gas, electricity, and low carbon blends such as E10 or E85.

The standard would be measured on a lifecycle basis in order to include all emissions from fuel production to consumption. Options for compliance may include: blending or selling increasing amounts of lower carbon fuels, using previously banked credits, and purchasing credits from fuel providers who earned credits by exceeding the standard.

This option could also promote R&D related to biofuels production, such as the use of enzymes for breaking down cellulose to produce ethanol (as opposed to corn-based ethanol, which has a lower life cycle benefit).

3.2 Renewable Fuel Standard

The state can adopt standards that require a certain amount or percentage of fuel sold within the state to be a renewable fuel (e.g., ethanol or biodiesel). This percentage can gradually increase

over time. The State can help facilitate transition to renewable fuels by regulating quality standards for fuel blends.

This option could also promote R&D related to biofuels production, such as the use of enzymes for breaking down cellulose to produce ethanol (as opposed to corn-based ethanol, which has a lower life cycle benefit).

WA Action: In 2006, the Legislature adopted ESSB 6508 establishing minimum renewable fuel content requirements and fuel quality standards. Beginning in November 30, 2008, fuel suppliers must ensure a minimum of 2% of total annual diesel and 2% of total annual gasoline sold in the State must be biodiesel or ethanol.

3.3 Alternative Fuel Mandates for Fleets

Governments can mandate that public and private vehicle fleets include alternative fuel vehicles, typically targeting a certain percentage of penetration within a certain period of time. These mandates could be used to require pure electric vehicles and/or plug-in electric vehicles for fleets.

WA Action: In 2005 an Executive Order was signed directing agencies to reduce 20% petroleum use in the operation of state vehicles and privately-owned vehicles used for state business, by September 1, 2009. By that date, standard diesel must be replaced with 20% biodiesel blend, and as soon as practical, agencies must begin using a minimum 5% biodiesel blend.

3.4 Alternative Fuel Production Incentives

Various incentives can encourage companies to continue or begin producing alternative fuels. The incentives can come in many different forms, such as granting state tax credits based on the amount of alternative fuel produced, reduced taxes for alternative fuel production facilities, or providing loans or grants to companies that are producing or want to produce alternative fuel. Additionally, the state can organize a public/private fuel-buying consortium that enters a long-term contract with a supplier to help overcome the risk of producing fuel. Application of these incentives should consider the full cycle of energy and GHG impacts. The State will need to regulate quality standards for alternative fuels.

This option could also promote R&D related to biofuels production, such as the use of enzymes for breaking down cellulose to produce ethanol (as opposed to corn-based ethanol, which has a lower life cycle benefit).

WA Action: In 2003, the Legislature passed four bills (HB 1240 to 1243) which provide various tax and use incentives to encourage the development, distribution, and sale of biodiesel and ethanol fuels.

3.5 Alternative Fuel Infrastructure Development

The development of an alternative fuel infrastructure can aid in the promotion of alternative fuel usage. The expense of equipment and installation costs can be offset by creating an infrastructure. The convenient locations of stations offering alternative fuels at competitive prices can increase the usage of the fuel.

WA Action: The 2006 Legislature established the Energy Freedom Program in the State Department of Agriculture and appropriated $17 million for the Energy Freedom Loan Program to develop a viable bioenergy industry, promote research and development in bioenergy sources and markets and to support an agriculture industry to grow bioenergy crops. The 2007 Legislature authorized a bill to create a vehicle electrification grant program. The bill also authorizes state agencies to provide electricity at state facilities for operation of state electric vehicles and privately-owned electric vehicles used for state business.

T-4 SMART GROWTH

(Note: All Smart Growth options will need to also consider how to promote the development of affordable housing.)

4.1 Promote Infill and Brownfield Development

Residential and commercial development on infill typically results in less vehicle travel and emission as compared to development on lower density exurban or "greenfield" locations. Households and workers in areas with higher density and mixed uses typically take shorter trips and have more alternatives to automobile travel. "Brownfields" are one type of infill location – commercial or industrial properties that are abandoned or are not being fully used because of actual or perceived environmental contamination.

WA Actions: Washington's Brownfield Coalition, a partnership of the Department of Ecology, King County, the Environmental Coalition of Seattle (ECOSS), Seattle, Spokane, Tacoma and CTED, offers low-interest loans to local governments and property owners to clean up brownfields through the Brownfield Loan Fund: http://www.cted.wa.gov/site/789/default.aspx

4.2 Limit Urban Growth Areas

More efficient development patterns reduce VMT and help conserve natural resource land and natural areas. This strategy aims to limit the urban growth areas while increasing residential density. Residents living in neighborhoods with higher population density tend to drive less than those living in lower density neighborhoods. This is a result of both shorter trips (because housing and commercial uses are in closer proximity to one another in higher density neighborhoods) and use of alternative travel models (because higher density neighborhoods tend to offer better walking, bicycling, and transit options). Governments can promote increases in

residential density through a number of planning activities, incentives, and/or regulatory changes.

WA Action: The Legislature adopted the Growth Management Act in 1990 that requires state and local governments to manage Washington's growth by identifying and protecting critical and natural resource areas, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations: http://www.gmhb.wa.gov/index.html

4.3 Promote Transit-Oriented Development

Transit oriented development enables shifts to lower emitting transportation modes by building compact, mixed-use development clustered around transit stops. This option would promote transit oriented development through incentives and/or regulation. Governments could require that planning/zoning for transit oriented development accompany new high capacity transit investments.

WA Action: The Legislature adopted the Growth Management Act in 1990 that requires state and local governments to manage Washington's growth by identifying and protecting critical and natural resource areas, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations: http://www.gmhb.wa.gov/index.html

4.4 Designate Employment and Housing Centers for Investment Planning

The state could encourage or require local governments to designate centers for employment and housing, and then encourage or require that new infrastructure planning and investments reflect these growth nodes. This option would need to account for the fact that people are living farther from places of employment, which can lead to an increase in VMT per capita. Promoting employment centers near residential growth, as well as company-sponsored transit options (also included under 5.7), are strategies for responding to the job/housing imbalance.

WA Actions: The Legislature adopted the Growth Management Act in 1990 that requires state and local governments to manage Washington's growth by identifying and protecting critical and natural resource areas, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations: http://www.gmhb.wa.gov/index.html

The Commute Trip Reduction Efficiency Act, adopted in 2006, created the Growth and Transportation Efficiency Center (GTEC) program. This allows for the creation of GTECs by local jurisdictions where land use designation, transit facilities, bike and pedestrian infrastructure, and employer and/or residential programs are in place to decrease drive-alone trip rates by at least 10% and VMT by at least 13%. The legislature appropriated $2.4 million to this program in 2007.

4.5 Targeted Open Space & Rural Land Protection

Targeted open space protection includes programs designed to protect and conserve State lands and other open spaces, and develop and improve neighborhood, community, and regional parks in ways that encourage location-efficient growth and broader mode choice. This option could also include policies to discourage the expansion of urban growth areas or urban growth boundaries. Policies that increase the value of rural resource lands for agricultural or forestry uses to serve local markets can promote these objectives.

4.6 VMT/GHG Mitigation Requirements for Large Developments

This option would require the identification of GHG emissions and mitigation measures as part of the environmental review process for large developments. Emissions from automobiles, freight trucks, and heavy machinery during development can be offset by a plan that reduces emissions. These offsets can include preserving open spaces and converting to alternative fuel energy sources, for example. Additionally, mitigation requirements could involve the use of a one-to-one VMT reduction measure for large developments, whereby developers would be required to invest in strategies that would reduce VMT by the amount expected to be created by a large new development.

4.7 Multimodal Concurrency

The State Growth Management Act requires that adequate street capacity is provided concurrently with development to handle the projected increased traffic. New development has to demonstrate sufficient transportation infrastructure to support growth, and development patterns need to be consistent with GHG reduction goals. Multimodal concurrency would allow developers to meet concurrency requirements through investments in a range of other actions that reduce GHG emissions, including transit capital and operating investments, demand management tools to promote alternative travel modes, mixed-use development, and non-motorized enhancements to encourage pedestrian and bicycle connections.

4.8 Local Government Transit/TDM Impact Fees

This option would promote transit in developing areas. Currently, RCW 82.02.050 allows for impact fees for public facilities narrowly defined as roads, schools, parks, and open space. This option would involve state enabling legislation that allows local jurisdictions and/or transit agencies to adopt impact fees from new development to fund transit and TDM programs. Impact fees can be used to discourage growth in inappropriate areas, while local jurisdictions could subsidize growth in areas that promote transit and alternative transportation.

4.9 VMT and GHG Reduction Goals in Comprehensive Planning

The state would require local governments to adopt a schedule for VMT and/or GHG emission reductions as part of the comprehensive planning process. Local governments would be provided with guidance for achieving these goals. This option would ensure that local government planning decisions are consistent with VMT and/or GHGs reductions to which they have committed. This option would complement a state VMT reduction plan (see option 5.11), which would commit the state to development of a plan/schedule to gradually reduce per capita VMT.

WA Action: The Commute Trip Reduction Efficiency Act, adopted in 2006 created the Growth and Transportation Efficiency Center (GTEC) program. This allows for the creation of GTECs by local jurisdictions where land use designation, transit facilities, bike and pedestrian infrastructure, and employer and/or residential programs are in place to decrease drive-alone trip rates by at least 10% and VMT by at least 13%. The legislature appropriated $2.4 million to this program in 2007.

T-5 SYSTEM EFFICIENCY AND DEMAND MANGEMENT

5.1 Transportation System Management

Transportation system management improves vehicle flow on the roadway system, which can reduce fuel use and GHG emissions. Coordinated operation of the regional transportation network can improve system efficiency, reliability, and safety. Tools to reduce traffic congestion include HOV lanes, roundabouts at intersections, synchronized signals, incident management, variable message signs, and other firms of intelligent transportation systems (ITS).

5.2 Ridesharing

Ridesharing programs are designed to reduce vehicle trips and vehicle miles traveled by providing assistance and encouragement to individuals and employers to use carpools and vanpools. Government agencies can establish and expand ridesharing programs, provide incentives or assistance for others to do so, and provide supportive infrastructure (e.g., park and ride lots).

WA Action: The Legislature passed SB 5412 in 2007, requiring Washington to develop a plan to reduce per capita vehicle miles traveled. The State must commit to a series of aggressive VMT reduction goals.

5.3 Expand Transit Infrastructure and/or Improve Existing Service

Greater use of public transit and reduction in automobile travel can be achieved by expanding public transit infrastructure (e.g., rail lines, bus rapid transit routes) and improving existing

transit service (e.g., expanded hours or coverage of bus service, higher frequency bus routes. This option also could include expansion of intercity bus service. Use of WSDOT data on travel origins and destinations could help determine if there are intercity regional routes that need prioritization.

5.4 Transit Marketing, Promotion, and Pricing Incentives

Greater use of public transit and reduction in automobile travel can be achieved by enhanced promotion and marking of transit, or through reduction in transit fares.

5.5 Bike and Pedestrian Infrastructure Improvements

Improving, adding, and promoting sidewalks and bikeways can increase the pedestrian and bicycle activity and reduce automobile use. Infrastructure improvements could include bicycle parking and shower/locker amenities at places of employment. Local government "complete streets" policies would help to achieve these improvements.

WA Action: Seattle's "Complete Streets" ordinance establishes principals for street design to support and encourage walking, bicycling, and transit use while promoting safe operations for all users. The ordinance design includes street and sidewalk lighting, pedestrian and bicycle safety improvements, public transit facilities accommodation, and street trees.

5.6 Additional Financing Tools to Invest in Local Transportation Infrastructure

Local governments have few remaining tools for funding local infrastructure needs like sidewalks, bike lanes, potholes, and other neighborhood improvements. Under this option, local governments would be granted additional revenue sources, and that authorization would prioritize low-GHG uses including those investments that would fund the retrofit of existing infrastructure for all users, including transit, bicycles, and pedestrians. This option could also include a revision to formulas for revenue distribution in order to fund transportation projects and services that are more likely to reduce GHGs.

5.7 Commuter Choice Programs

Commuter Choice Programs encourage employers to provide options such as telecommuting, transit subsidies, pre-tax transit fare program, parking cash-out, and guaranteed ride-home service in order to reduce automobile commutes. The telecommuting option includes the development and utilization of neighborhood telecommuting centers that offer office-type services in locations close to commuters' residences. As an incentive to develop and provide such services, a tax credit can be offered to companies. Government spending to encourage commuter choice can stimulate a large private-sector match (17 dollars of private incentives per dollar of public incentive, according to one source).

WA Action: In 2006, the Legislature passed the Commute Trip Reduction Efficiency Act that uses partnerships among employers, local jurisdictions, transit systems and the State to discourage traveling by single-occupant vehicles to the work place.

5.8 Expand Roadway Pricing

Roadway tolling can be used to discourage single-occupant automobile use and provide revenue for alternative modes. If tolls or other user charges vary with congestion levels (congestion pricing), they can also be particularly effective at reducing congestion. Various forms of VMT-based user fees can also help to discourage unnecessary automobile use. Roadway pricing revenues can help fund needed highway improvements and help manage system-wide demand. In addition, pricing revenues can be used to fund transit and other transportation alternatives within a corridor or region.

WA Action: PSRC recently conducted a pilot test of an in-vehicle taxi-like metering device to assess roadway user charges. This Traffic Choices Study involved 500 vehicles from more than 300 households.

The Legislature passed SB 5412 in 2007, which requires WSDOT to consider efficiency tools including system-wide pricing. The Washington State Transportation Commission also conducted a thorough tolling study which outlines their vision for the role of tolling and pricing in the near future.
http://www.leg.wa.gov/pub/billinfo/2007-08/Pdf/Bills/Senate%20Passed%20Legislature/5412-S.PL.pdf
http://www.wstc.wa.gov/Tolling/WS_TollStudy_FinalReport_V1.pdf

5.9 Increase Motor Fuel Taxes

Increasing the state tax on conventional fuels can reduce consumption and travel while encouraging the use of lower emissions vehicles, alternative fuels, and public transit.

5.10 Parking Management

Automobile use is strongly influenced by the location, supply, and pricing of parking. Local governments can encourage reduction in automobile use by eliminating minimum parking supply requirements, establishing parking supply caps, encouraging higher parking prices, and other mechanisms. Parking ratios for the maximum number of spaces allowed can be set based on the level of transit service an area has. Smart parking ID systems can help inform drivers of parking availability and reduce excessive circling and searching.

5.11 State VMT Reduction Plan

This option would allow the state to establish a schedule of goals for reducing statewide VMT (or GHGs from vehicle use). This schedule of goals could then be used by local governments to set their own goals and track progress.

WA Actions: The Legislature passed SB 5412 in 2007, which would commit the state to the development of a plan to gradually reduce per capita vehicle miles traveled.

The Commute Trip Reduction Efficiency Act, adopted in 2006, created the Growth and Transportation Efficiency Center (GTEC) program. This allows for the creation of GTECs by local jurisdictions where land use designation, transit facilities, bike and pedestrian infrastructure, and employer and/or residential programs are in place to decrease drive-alone trip rates by at least 10% and VMT by at least 13%. The legislature appropriated $2.4 million to this program in 2007.

5.12 Quantification of GHG Impacts of Transportation Plans, Programs, and Projects

Transportation agencies (WSDOT and RTPOs) could be required to quantify the GHG emissions resulting from long-range transportation plans and transportation programs. This could include very long-term (e.g., 50-year) forecasting in order to assess the long terms implications of transportation and land use planning decisions. In addition to plans and programs, quantification of impacts would be determined for projects, corridors, and construction/options.

5.13 Pay-as-You-Drive Automobile Insurance

The state would encourage and support the provision of pay-as-you-drive auto insurance, possibly including state support for additional pilot programs. This would also require the state commission to conduct an active review of possibilities. King County has a significant demonstration underway, and if the pilot will have any meaning for how it can be replicated, it will need support from the state.

T-6 NON-ROAD OPTIONS

6.1 Rail Improvements for Freight

This option focuses on the improvements to railroad infrastructure and other strategies to encourage more use of freight rail. For example, transport of freight can be shifted from the roadway system to rail. In many cases, carrying freight by railroads rather than truck can reduce emissions and fuel consumption while reducing congestion on major roadways.

6.2 Intercity Rail or High-Speed Rail Corridors

Intercity rail provides express train passenger services covering longer distances than commuter trains (e.g., from Vancouver, BC to Portland, OR), which can reduce automobile use and possibly aircraft activity.

6.3 Aircraft GHG Reductions

More efficient operation of aircraft could reduce GHG emissions. This can include idle time at the gate, on the runway, and research and development of emission-reducing technologies.

6.4 Airport Operations and Ground Equipment

Airports can reduce emissions from ground equipment by using alternative fuels and electrification of gates. This option could also include better runway management.

6.5 Harbor Craft GHG Reductions

Emissions from harbor craft (including tugs, dredges, and ferries) can be reduced by improving vessel fuel efficiency, use of alternative fuels such as biodiesel, or electrification. This option could also include small marine engine efficiency standards. Quality standards for marine biofuels, especially for ferries, would need to be considered in efforts to reduce GHGs from harbor craft.

6.6 Port Electrification

Shore power, or cold ironing, enables ships to shut down their (diesel) auxiliary engines and run off electrical power supplied at the dock for refrigeration, electricity, and other needs. To enable shore power, the port or terminal operator must install the necessary shore-side infrastructure, while ship owners must retrofit their ships to accommodate shore power. Other options for port electrification include expanded use of electric powered equipment such as cranes and forklifts.

WA Action: HB 1303 supports port electrification through the use of plug-in shore power and cargo and cruise ship terminals, shipside technology, and use of electric power alternatives for port-related operations and equipment.

6.7 Off-Road Vehicle GHG Reductions

Off-road vehicles include construction vehicles, machinery used for mining and agriculture, recreational vehicles such as all-terrain vehicles, snowmobiles, jet skis, and boats. Incentives could be provided to companies and individuals to encourage retrofits, alternative fuel use, and replacing old, highly polluting equipment with new equipment. Specifically, strategies for

reducing GHG emissions from highway construction can be achieved by idle reduction requirements for construction equipment; use of alternative fuels in construction equipment; and, use of alternative highway construction materials that reduce GHGs (such replacing cement with fly ash in concrete).