EXHIBIT B2

STATEMENT OF WORK

Task 1: Project Management

A. Gather and Synthesize Interests and Expectations
   1) Interview members and alternates
   2) Interview staff
   3) Prepare synthesis

B. Organize Procedurally
   1) Work plan consultations and document preparation (Workgroup work plan)
   2) Procedural approach consultations and document preparation (operating procedures for Workgroup)

C. Coordinate Workgroup staff, evaluation/technical consultant's activities, and technical review activities by staff
   1) Manage Workgroup staff, technical contractor, and technical meetings as needed (particularly when Workgroup staff and technical contractor are preparing for direct participation in Workgroup's meeting presentations)
   2) Document and track joint action items

D. Contract management
   1) Progress reports (monthly)
   2) Contract administration (on-going)

Deliverables: Interests and Expectations Synthesis; Monthly Progress Reports

Cost: $15,000

Task 2: Workgroup Meeting Management

A. Prepare for and provide convening support to Workgroup member meetings
   a. Conduct pre- and post-meeting briefing and agenda development sessions with Workgroup staff.
   b. Prepare draft and final Workgroup agendas.
   c. Review and provide comment on meeting materials and review background materials as needed to prepare for Workgroup meeting.
   d. Attend and manage Workgroup meetings.

B. Document action items, key findings, and agreements for each Workgroup meeting
   a. Prepare staff review draft.
   b. Process comments and prepare workgroup member draft.
   c. Process comments and prepare final documentation.
   d. Conduct and track follow-up action items as dictated by meeting results.

Deliverables: Final Agendas for Each Workgroup Meeting; Action Items, Key Findings, and Agreements Summary for Each Workgroup Meeting.

Cost: $35,000

Task 3: Public Meeting Management

A. Prepare for and conduct three Workgroup public meetings
    1) Conduct pre- and post-meeting briefing and agenda development sessions with Workgroup staff.
    2) Prepare draft and final Workgroup public meeting agendas.
    3) Review and provide comment on meeting materials and review background materials as needed to prepare for Workgroup public meetings.
B. Attend and manage Workgroup public meetings.

Deliverables: Final Agendas for Each Workgroup Public Meeting
Summary of public comments

Cost: $15,000

Task 4: Workgroup Final Report Documentation Support

A. Draft 1: preliminary findings and recommendations - review and provide comments to Workgroup staff
B. Draft 2: refined findings and recommendations – review and provide comments to Workgroup staff
C. Draft 3: final review draft of findings and recommendations – review and provide comments to Workgroup staff
D. Draft 4: final document – review for completeness and accuracy before publication

Deliverables: Written Comments for Drafts 1 - 4

Cost: $10,000

Task 5: Communications and Consensus Building

A. Member Communications: conducted between meetings to clarify interests, perspectives, and establish opportunities for finding common ground – anticipated to be one-on-one discussions.
B. Alternate Communications: conducted to clarify directions and ensure understanding of work group progress is maintained – anticipated to be one-on-one discussions.
C. Staff Communications: conducted between meetings to clarify interests, perspectives, and establish opportunities for finding common ground.
D. Communications with the evaluation consultant and staff working on information in support of the Workgroup discussions: conducted between meetings to maintain

critical awareness of Workgroup developments, answer questions, and ensure analytical products are developed to address needs and interests expressed by Workgroup members on an objective basis.

Deliverables: Bi-Monthly Briefings on Communications and Consensus Building Activities
Cost: $25,000

Evaluation of Approaches to Reduce Greenhouse Gas Emissions in Washington State

Task 2.a – Identify and summarize GHG reduction policies

July 12, 2013

Identify and summarize comprehensive greenhouse gas emission reduction programs in the Pacific Northwest, on the West Coast, in neighboring provinces in Canada, in other region of the U.S. and in other countries. The selection of other countries' programs will be based on those that have policies and circumstances directly comparable to Washington State. A list of potential programs will be run through a technical screen to determine the final list of programs to analyze.

Table of Contents

Abstract

The following table summarizes policies that are proposed for further research. These policies, based on initial review, are expected to either address high emitting sources and sectors, or plug key gaps in Washington's current policy portfolio. A large number of policies and programs were eliminated for further review that could potentially be included but didn't meet our initial list of criteria. It is expected that this list may be changed based on feedback from Washington State, however it is important to understand that in the next phase of this task, the depth of analysis for each individual policy will be inversely proportional to the total number of policies included for further review.

Policy
Emissions Trading
1. California Cap-and-Trade Program
2. European Union Emissions Trading Scheme
3. New Zealand Emissions Trading Scheme
4. Quebec Cap-and-Trade System
Carbon Taxes
5. Australia Carbon Pricing Mechanism
6. British Columbia Carbon Tax
Electricity Sector
7. Public Benefit Fund
8. Appliance Standards
9. Electricity GHG Performance Standards
Residential, Commercial, and Industrial Sector
10. Property Assessed Clean Energy (PACE) Programs
Transportation Sector
11. Investments in Bicycle and Pedestrian Infrastructure
12. Investments in Public Transit Infrastructure
13. Vehicle Electrification – Vehicle Purchasing Incentives and Charging Infrastructure
14. Alternative Fueled Vehicles – Vehicle Purchasing Incentives and Fueling Infrastructure
15. Low Carbon Fuel Standard
16. Road Usage Pricing Policies
17. Reduce Vehicle Miles Traveled through Urban Planning
Industrial Processes
18. Management of High GWP Gases
Waste
19. Reductions to the Waste Stream
20. Landfill Methane Capture
Water Conservation
21. Residential/Commercial Water Conservation Policies
22. Irrigation Policies

1 Introduction

Policies and programs targeting reductions in greenhouse gas (GHG) emissions abound, and countless other policies have GHG reductions as a secondary effect. In total, these programs are far too numerous to consider in any depth as Washington evaluates potential policies to complement its existing GHG reduction efforts. In order to more efficiently utilize resources, SAIC has conducted a first-level screening exercise to identify a sub-set of GHG reduction policies for in-depth.

This document identifies programs that may be applicable to Washington, considering Washington's emission sources, efforts to date, and economic factors. Two broad categories are presented in the following pages: comprehensive carbon pricing efforts and sector-specific or technology-specific programs. For each, we include both a description of the program, and explanation of why it was or was not selected for further analysis.

The coverage of GHG emissions regulated in comprehensive carbon pricing programs ranges from a single sector to virtually the entire economy of the host jurisdiction. Additionally, these programs vary in how pricing is imposed, in some cases constraining the quantity of emissions under a cap, and in others directly setting the price of GHG emissions. Due to their limited number, each individual instance of these programs was considered in this analysis and evaluated to determine whether it warrants further consideration.

Sector-specific or technology-specific programs target discrete sources of emissions, or activities that drive emissions, and can together form a portfolio that is comprehensive in its entirety. In this memorandum, SAIC considers program categories – for example, vehicle electrification incentives and a low carbon fuel standard – rather than particular jurisdictional instances. This allows us to identify the types of policies that show greatest potential for Washington. In addition to identifying the types of policies, recommended lists of policy instances and jurisdictions in which they're implemented are also included. These instances will be further refined in the next phase of the project on the basis of applicability to Washington and quality and availability of data.

In each section, there is a summary of each policy or program that will be included for further analysis, accompanied by a justification and examples where that type of policy has been implemented elsewhere. Each section concludes with a table that summarizes the policies or programs that are being proposed for exclusion, as well as the basis for that exclusion. Many of the excluded policies may have potential for GHG reductions in Washington, and may be worth pursuing on the basis of other, non-GHG priorities.

2 Carbon Pricing Programs

Carbon pricing programs generally fall into two broad categories. First, emission trading systems or cap-and-trade programs dictate a maximum level of total GHG emissions for one or more sectors, and allow trading among market participants. This allows those participants with the lowest cost of abatement to reduce emissions at a price below the prevailing trading price, and those with higher cost of abatement

to purchase allowances at a price below their own costs of abatement. This type of system provides certainty around the quantity of emissions, but lets the market set the price of emissions. Second, carbon tax pricing schemes define a price for GHG emissions from one or more sectors and require covered entities to pay that tax for each unit of GHGs emitted. This type of system provides certainty on the cost (per unit) of GHG emissions, but may not have a mechanism for ensuring a specified level of overall reductions. Attaining the desired level of reductions is predicated on selecting the appropriate tax level.

2.1 Emissions Trading

2.1.1 California Cap-and-Trade Program

Program summary: Implemented as the centerpiece to California Assembly Bill 32, the Global Warming Solutions Act of 2006 (AB 32), the California Cap-and-Trade Program will regulate approximately 35 percent of California's GHG emission in the first compliance period (2013-2014), expanding to 85 percent of emissions in the second and third compliance periods (2015-2017 and 2018-2020) when transportation fuels and natural gas suppliers are included.[1][2] The California program has been designed in close collaboration with the Western Climate Initiative (WCI) and WCI partners, and from the beginning has been intended to link to other WCI cap-and-trade programs. Governor Jerry Brown formally approved linkage with Quebec, and linkage is expected to begin in 2014.[3]

Basis for inclusion: The California program likely provides the most directly applicable cap-and-trade model for a potential Washington program, and Washington's prior efforts in exploration of cap-and-trade were also conducted in the context of WCI. The California program has undergone several auctions, and while it is too early to assess the program's full success, it has several unique design elements representing mechanisms aimed at mitigating issues seen in other emission trading systems. These include price containment, allocation, and use of offsets.

2.1.2 European Union Emission Trading Scheme

Program summary: Launched in 2005, the European Union Emission Trading Scheme (EU ETS) operates in all 28 EU countries as well as Iceland, Liechtenstein and Norway, covering approximately 45 percent of GHG emissions in those countries. The third phase of the EU ETS runs from 2013-2020, and aims to lower emissions from covered sectors by 21 percent from 2005 levels by 2020. [4] The third phase has ushered in some significant structural changes. The default allocation method in the third phase will be

[1] California Environmental Protection Agency, Air Resources Board. April 2013. Article 5: California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms. Accessed July 2013 at: http://www.arb.ca.gov/cc/capandtrade/ct_rf_april2013.pdf

[2] ECOFYS. May 2013. Mapping Carbon Pricing Initiatives: Developments and Prospects. Prepared for the World Bank. Accessed July 2013 at: http://documents.worldbank.org/curated/en/2013/05/17751166/mapping-carbon-pricing-initiatives-developments-prospects

[3] California Environmental Protection Agency, Air Resources Board. April 2013. Air Resources Board sets date for linking cap-and-trade program with Quebec. Accessed July 2013 at: http://www.arb.ca.gov/newsrel/newsrelease.php?id=430

[4] European Commission. July 2013. The EU Emissions Trading System (EU ETS). Accessed July 2013 at: http://ec.europa.eu/clima/policies/ets/index_en.htm

auctions, though there will continue to be free allocation to manufacturing[5] and industries identified as at risk of leakage[6]. The EU ETS market has historically utilized the Clean Development Mechanism (CDM) and Joint Implementation (JI) to generate and obtain international offsets from developing and developed nations. In addition, the EU is pursuing sector-based offset crediting through a new market mechanism.[7] Finally, the EU ETS is pursuing linkage with the Australian system, beginning in 2015.[8]

Basis for inclusion: The EU ETS represents the largest, most studied GHG cap-and-trade system, and it has faced significant challenges and criticisms during its existence, including debates over offset eligibility, over-allocation, and backloading. Due to the large volume of analysis of the EU ETS, we propose to limit our analysis to eliciting lessons learned from the program's history in terms of program design or potential pitfalls.

2.1.3 New Zealand Emissions Trading Scheme

Program summary: Launched in 2008, the New Zealand Emissions Trading Scheme (NZ ETS) covers all six Kyoto gases, and like the California scheme, progressively covers more sectors, with an aim of covering all sectors.[9] One interesting design element of the NZ ETS is that it does not directly cover the electric sector, instead regulating the fuels upstream.[10] New Zealand's 2011 emissions were 72.8 million metric tons of carbon dioxide equivalent ($MtCO_2e$)[11], and with a population of 4.4 million[12], it has a per capita emissions intensity of 16.4 tCO_2e.[13] There are several mechanisms currently in effect to limit price exposure to New Zealand industries. First, compliance entities can purchase a New Zealand Unit at NZ$25[14], which effectively serves as a price ceiling. Second, there is currently a temporary rule that allows non-forestry participants to surrender only one allowance or offset for two tCO_2e of emissions.[15]

[5] European Commission. January 2013. Free allocation based on benchmarks. Accessed July 2013 at: http://ec.europa.eu/clima/policies/ets/cap/allocation/index_en.htm
[6] European Commission. January 2013. Carbon leakage. Accessed July 2013 at:: http://ec.europa.eu/clima/policies/ets/cap/leakage/index_en.htm
[7] European Commission. January 2013. International carbon market. Accessed July 2013 at: http://ec.europa.eu/clima/policies/ets/linking/index_en.htm
[8] European Commission. August 2012. Australia and European Commission agree on pathway towards fully linking emissions trading systems. Accessed July 2013 at: http://ec.europa.eu/clima/news/articles/news_2012082801_en.htm
[9] New Zealand Ministry of the Environment. November 2012. Participating in the New Zealand Emissions Trading Scheme (NZ ETS). Accessed July 2013 at: http://www.climatechange.govt.nz/emissions-trading-scheme/participating/index.html
[10] New Zealand Ministry of the Environment. December 2012. Energy's obligations: Reporting emissions and surrendering NZUs. Accessed July 2013 at: http://www.climatechange.govt.nz/emissions-trading-scheme/participating/energy/obligations/index.html
[11] New Zealand Ministry of the Environment. April 2013. New Zealand's Greenhouse Gas Inventory & Net Position Report 1990-2011. Accessed July 2013 at: http://www.mfe.govt.nz/publications/climate/greenhouse-gas-inventory-2013-snapshot/index.html
[12] International Monetary Fund (April 2012) World Economic Outlook Database. Accessed July 2013 at: http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/index.aspx
[13] New Zealand Ministry of the Environment. April 2013.
[14] New Zealand Ministry of the Environment. November 2012. 2012 Amendments to the New Zealand Emissions Trading Scheme (NZ ETS): Questions and answers. Accessed July 2013 at: http://www.climatechange.govt.nz/emissions-trading-scheme/ets-amendments/questions-answers.html
[15] Ibid.

Finally, entities are able to use an unlimited quantity of international offsets, which has driven the cost of compliance very low.[16] A comprehensive assessment of the NZ ETS was completed in 2011.[17]

Basis for inclusion: New Zealand's size, climate, and economy make it a good case study for a potential program in Washington. New Zealand's average income of U.S.$41,881 per year (NZ$53,632)[18] is comparable to Washington's $45,413[19], and its natural resources provide an energy mix very similar to Washington's. In New Zealand, 57.6 percent of electricity is derived from hydro, with only 23.1 percent coming from coal and natural gas combined.[20] This very closely approximates Washington's 60 percent hydro electricity, and 21 percent contribution of coal and natural gas combined.[21] Finally, having undergone a comprehensive review in 2011, there is a good likelihood that detailed information on the success, costs, and economic impact of the program are available.

2.1.4 Quebec Cap-and-Trade System

Program summary: The Quebec Cap-and-Trade System design is very similar to the California design. The Quebec program is currently in its first compliance period, where approximately 30 percent of total GHG emissions are covered. This number will increase to approximately 85 percent when the second compliance period commences in 2015 and fossil fuels are brought under the cap. As with California, 8 percent of each compliance entity's emissions can be met with GHG offsets in each compliance period. Similarly, the cost containment mechanisms are also very similar to its WCI counterpart, including a minimum auction price, price containment reserve, and combination of free allocation and auctions. An amendment in December 2012 formally allows the Quebec system to link with California. [22]

Basis for inclusion: The Quebec program is still in its early stages, and reliable data are unlikely to be available. However, it will be included because the process of developing a WCI-compliant program, and Quebec's experience linking with the much larger California market may provide insight into challenges that Washington would face in similar endeavors. Similarly, with an electric sector greater than 97 percent powered by hydro[23], Quebec's challenges in obtaining low cost reductions outside of the power sector may mirror Washington's.

---

[16] ECOFYS. May 2013.

[17] Emissions Trading Scheme Review Panel. 2011. Doing New Zealand's Fair Share. Emissions Trading Scheme Review 2011: Final Report. Wellington: Ministry for the Environment. Accessed July 2013 at: http://www.climatechange.govt.nz/emissions-trading-scheme/ets-review-2011/review-report.pdf

[18] Statistics New Zealand. Top Statistics. Accessed July 2013 at: www.stats.govt.nz/browse_for_stats/snapshots-of-nz/top-statistics.aspx

[19] Washington Office of Financial Management. June 2013. Washington and U.S. Per Capita Personal Income. Accessed July 2013 at: http://www.ofm.wa.gov/trends/economy/fig101.asp

[20] New Zealand Ministry of Business, Innovation & Employment. March 2013. Electricity. Accessed July 2013 at: www.med.govt.nz/sectors-industries/energy/energy-modelling/data/electricity

[21] U.S. Energy Information Administration. Electric Power Monthly. Accessed July 2013 at: http://www.eia.gov/state/?sid=WA#tabs-4

[22] Quebec Ministry of Sustainable Development, Environment, Wildlife and Parks. 2013. Regulation Respecting a Cap-and-Trade System for Greenhouse Gas Emission Allowances (C&T): Technical Overview. Accessed July 2013 at: http://www.mddefp.gouv.qc.ca/changements/carbone/SPEDE-description-technique-en.pdf

[23] Canadian Centre for Energy Information. Quebec – Statistics. Accessed July 2013 at: http://www.centreforenergy.com/FactsStats/Statistics.asp?Template=5,6

Table 1. Cap and Trade Programs Excluded from Further Analysis

Program	Basis for Exclusion
Kazakhstan Emissions Trading Scheme (KAZ ETS)	The KAZ ETS is beginning with a pilot phase in 2013, continuing into phase two in 2014. At this time, it is too early to assess the program's success or impacts. Additionally, the KAZ ETS covers only CO_2 emissions.
Regional Greenhouse Gas Initiative (RGGI)	RGGI will not be evaluated because it applies only to the electric sector in the northeast U.S., and because that sector varies significantly from Washington's electric sector.

2.2 Carbon Tax

2.2.1 Australia Carbon Pricing Mechanism

Program summary: Australia's Carbon Pricing Mechanism (CPM) is somewhat of a hybrid system, beginning in 2012 as a fixed price carbon tax, and then transitioning in 2015 to a flexible, cap and trade style scheme. The CPM covers approximately 60 percent of Australia's total emissions.[24] Allowances (including during the fixed price period) will be distributed on the basis of free allocation for industry assistance[25] and purchase from the Australian National Registry of Emissions Units. The Australian scheme allows for the use of domestic, land-based offsets covering up to 100 percent of the compliance obligation beginning in the flexible price period, and up to 12.5 percent from international offsets resulting from linkage with the EU ETS. [26]

Basis for inclusion: Although the program only began in 2012 and it is too early to judge its success, the hybrid nature of Australia's program and its transition from a tax to a cap is unique. This program will be considered for its program design implications.

2.2.2 British Columbia Carbon Tax Act

Program summary: British Columbia's revenue neutral carbon tax, implemented in 2008, collects a tax on the purchase and combustion of all fuels, capturing approximately 70 percent of total emissions.[27] The carbon price is applied to each fuel, including transportation fuels, on the basis of its carbon content to establish a set per unit price. For example, with a tax rate of CN$30 per tCO_2e[28], the current carbon

[24] Australian Government Clean Energy Regulator: About the carbon pricing mechanism. Accessed July 2013 at: http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Pages/default.aspx
[25] Australian Government Clean Energy Regulator: Industry assistance. Accessed July 2013 at:http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/Industry-Assistance/Pages/default.aspx
[26] Australian Government Clean Energy Regulator: Eligible emissions units. Accessed July 2013 at http://www.cleanenergyregulator.gov.au/Carbon-Pricing-Mechanism/About-the-Mechanism/Emissions-units/Pages/default.aspx
[27] British Columbian Ministry of Finance: Myths and Facts About the Carbon Tax. Accessed July 2013 at: http://www.fin.gov.bc.ca/tbs/tp/climate/A6.htm
[28] British Columbian Ministry of Finance: Carbon Tax Review. (June 2013). Accessed July 2013 at: http://www.fin.gov.bc.ca/tbs/tp/climate/Carbon_Tax_Review_Topic_Box.pdf

tax on one liter of gasoline is CN$0.0667, and for a liter of diesel is CN$0.0767.[29] British Columbia returns all revenue collected from the carbon tax to residents through reductions in other taxes.

Basis for inclusion: British Columbia is Washington's neighbor to the north, and the carbon tax has five years of implementation history available for review. Additionally, because the transportation sector is such a large portion of Washington's GHG emissions, the application of the carbon tax to transportation fuels in British Columbia may provide insight into consumer response. The revenue neutral nature of British Columbia's carbon tax may also highlight means of mitigating potential economic impacts.

Table 2. Carbon Tax Programs Excluded from Further Review

Program	Basis for Exclusion
Denmark Carbon Tax	These are complementary policies to EU ETS rather than a stand-alone tax. The interaction with the EU ETS would make it extremely difficult to differentiate impacts of the tax from impacts of the EU ETS.
Finland Carbon Tax	
Ireland (Multiple) Carbon Taxes	
Norway Carbon Tax	
Japan Carbon Tax	This tax was implemented beginning late 2012[30], and the current price is approximately $3.61 per tCO_2e[31]. It is too early to assess program impacts.
South African Carbon Tax	This tax will be introduced in 2015, and there are therefore no evaluation data to review at this time. Additionally, South Africa's energy sector, dominated by its large domestic coal supply, is unlike that of Washington.
Sweden Carbon Tax	Complementary policy to EU ETS rather than a stand-alone tax. The interaction with the EU ETS would make it extremely difficult to differentiate impacts of the tax from impacts of the EU ETS.
United Kingdom Carbon Price Floor	Started in 2013, and not a true tax. This program effectively establishes a minimum effective price for European Union Allowances.

3 Targeted Programs

SAIC conducted a review of current and projected Washington GHG emissions to identify potential policies and programs to help Washington meet its GHG reduction targets. The following analysis summarizes findings from this analysis, and identifies sectors deemed both significant and likely candidates for reductions.

SAIC identified potential targeted programs through several channels. First, policies and sectors recommended by members of the Washington State Climate Legislative and Executive Workgroup

[29] British Columbian Ministry of Finance Tax Bulletin: Tax Rates on Fuels: Motor Fuel Tax Act and Carbon Tax Act. (June 2013). Accessed July 2013 at: http://www.sbr.gov.bc.ca/documents_library/bulletins/mft-ct_005.pdf

[30] Ministry of the Environment, Government of Japan. October 2012. Details oon the Carbon Tax (Tax for Climate Change Mitigation. Accessed at: http://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf

[31] Ministry of the Environment, Government of Japan. August 2012. The Outline of Carbon Tax (Tax for Climate Change Mitigation. Accessed at: http://www.env.go.jp/en/policy/tax/env-tax/20120814b_ct.pdf

(CLEW) were considered to ensure that topics of interest to Washington State stakeholders were studied.[32] Second, SAIC analyzed the breakdown of emissions in Washington State's 2010 GHG inventory, flagging all sources that were greater than two percent of total emissions for further analysis, as shown in Table 3. For these flagged sources, SAIC analyzed the actions that Washington State has already taken to address emissions and investigated initiatives taken in other states and local governments targeted at reducing emissions from these sources. Policies that could be included in Washington State's suite of initiatives, or examples of policies similar to existing policies in Washington State that could provide substantial enhancements to realize additional GHG reductions, are included herein for consideration. Broadly, these sources include electricity (Section 3.1), the building sector (section 3.2), transportation (section 3.3), industrial processes (section 3.4), waste (section 3.5), and water (section 3.6). Carbon capture and storage (CCS) was considered, but it is being recommended that Washington State not pursue further analysis of that policy type (section 3.7). The agricultural sector is not included for further analysis because of its diverse emission sources, the complexity of managing livestock and soil emissions, and the potential for impacting productivity.

Table 3: Washington State 2010 GHG Inventory

Million Metric Tons CO2e	1990	2005	2010	2010 (%)	Flag
Electricity, Net Consumption-based	**16.9**	**18.8**	**20.7**	**22%**	
Coal	16.8	15.2	15.8	17%	●
Natural Gas	0.1	3.6	4.8	5%	●
Petroleum	0	0	0.1	0%	
Biomass and Waste (CH_4 and N_2O)	0	0	0	0%	
Residential/Commercial/Industrial (RCI)	**18.5**	**19.3**	**19.7**	**21%**	
Coal	0.6	0.1	0.3	0%	
Natural Gas	8.5	10.3	10.8	11%	●
Oil	9.2	8.7	8.4	9%	●
Wood (CH_4 and N_2O)	0.2	0.2	0.2	0%	
Transportation	**39.6**	**44**	**42.2**	**44%**	
Onroad Gasoline	20.9	23.9	21.9	23%	●
Onroad Diesel	4.2	7.1	8	8%	●
Marine Vessels	4	3.3	3	3%	●
Jet Fuel and Aviation Gasoline	9.2	7.7	8.1	9%	●
Rail	0.7	1.3	0.5	1%	
Natural Gas, LPG	0.6	0.7	0.7	1%	
Fossil Fuel Industry	**0.5**	**0.8**	**0.7**	**1%**	
Natural Gas Industry(CH_4)	0.5	0.7	0.7	1%	
Coal Mining (CH_4)	0	0.1	0	0%	
Oil Industry (CH_4)	0	0	0	0%	

[32] To date, only one Workgroup member provided input on policies to include for further analysis. If upon review of this interim deliverable, it is determined that a worthy policy type or example has been inadvertently omitted, it will be included for consideration.

Million Metric Tons CO2e	1990	2005	2010	2010 (%)	Flag
Industrial Processes	**7.2**	**3.8**	**3.8**	**4%**	
Cement Manufacture (CO_2)	0.2	0.4	0.3	0%	
Aluminum Production (CO_2, PFCs)	5.9	0.8	0.5	1%	
Limestone and Dolomite Use (CO_2)	0	0	0	0%	
Soda Ash	0.1	0.1	0.1	0%	
ODS Substitutes (HFCs, PFCs and SF_6)	0	2.1	2.5	3%	•
Semiconductor Manufacturing (HFCs, PFCs, SF_6)	0	0.1	0.1	0%	
Electric Power T&D (SF_6)	1	0.3	0.3	0%	
Waste Management	**2.6**	**2.5**	**2.8**	**3%**	
Solid Waste Management	2.1	1.9	2.1	2%	•
Wastewater Management	0.5	0.6	0.7	1%	
Agriculture	**5.6**	**5.7**	**5.2**	**5%**	
Enteric Fermentation	2.2	2.1	2	2%	
Manure Management	0.7	1.1	1.1	1%	
Agriculture Soils	2.7	2.5	2.1	2%	
Total Gross Emissions	**90.9**	**94.9**	**95.1**		

3.1 Electricity (Supply and Demand)

Electricity consumption represented 22 percent of Washington State's GHG emissions in 2010, for a total of 20.7 mmtCO_2e emissions. Emissions from this sector have grown 22 percent since 1990, with the majority of these emissions coming from coal (76 percent of emissions from electricity in 2010) and natural gas (23 percent of emissions from electricity in 2010).

Washington State has implemented several policies targeting the electricity sector, including building standards for State buildings, building codes for residential and commercial energy efficiency, net metering standards, and state appliance efficiency standards, among others. Local governments are another source of examples of policies targeting the power sector and energy efficiency. In addition, a variety of additional policies and policy improvements are available to target the electric sector. Below we review several categories of policies that target the electric sector – both supply and demand – and describe whether and why they may be good candidates for further assessment.

3.1.1 Public Benefit Fund

Program summary: A public benefit fund (PBF), is an account (often state-level) that funds initiatives, research and development or project demonstrations in energy efficiency, renewable energy, and/or alternative energy projects, most often implemented by utilities. These can include research and development into cross-cutting policies, like biomass power generation and locally grown fuel[33]. Funds

[33] Portland General Electric, Inc. Planning for Tomorrow's Energy Needs. (2010). Accessed July 2013 at: http://www.oregon.gov/oisc/docs/pdf/arundodonaxpge.pdf

are raised either through direct contributions from utilities, or through rate charges to utility customers. As part of a 2006 Ballot Initiative (Initiative 937), utilities in Washington are allowed to recover costs of their renewable portfolio standard (RPS) mandates through PBF-like charges to customers, though Initiative 937 set up no State-level PBF for use in incentivizing renewable energy or energy efficiency projects.[34]

Basis for inclusion: A PBF provides funding for energy-saving projects that reduce electricity consumption from traditional sources, which reduces GHG emissions from the electricity sector. If designed as such, a PBF program can also have the added co-benefit of providing low-income assistance by incentivizing deployment of residential-scale renewable energy technologies at low-income households, which lowers the cost of electricity for those households.

Program/policy examples for further review: Currently, 30 states and Washington, D.C. have a PBF or system benefit fund of some sort. Of those, the following provide examples of the most comprehensive mandatory programs with rigorous State-level oversight:

- California Public Benefits Fund[35]
- Connecticut Innovations[36]
- Delaware Energy Efficiency Investment Fund and Green Energy Fund[37]
- Washington, D.C.'s Green Energy DC[38]
- Illinois Public Benefits Fund [39]
- Michigan Low-Income and Energy Efficiency Fund[40]
- New Jersey Public Benefits Fund[41]
- Energy Trust of Oregon[42] and Clean Energy Works[43] (to include analysis of Seattle's Energy Upgrade Program)[44]

---

[34] U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE). Public Benefit Funds : Increasing Renewable Energy & Industrial Energy Efficiency Opportunities. (March 2010). Accessed July 2013 at: http://www1.eere.energy.gov/manufacturing/states/pdfs/publicbenefitfunds.pdf

[35] U.S. DOE EERE. Database of State Incentives for Renewables and Efficiency (DSIRE). California Incentives/Policies for Renewables & Efficiency. Accessed July 2013 at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA05R

[36] Connecticut Innovations. Accessed July 2013 at: http://www.ctinnovations.com/

[37] State of Delaware Division of Energy and Climate. Accessed July 2013 at: http://www.dnrec.delaware.gov/energy/Pages/default.aspx

[38] District of Columbia District Department of the Environment. Green Energy DC. Accessed July 2013 at: http://ddoe.dc.gov/node/9342

[39] Illinois Department of Commerce & Economic Opportunity. Advantage Illinois. Accessed July 2013 at: http://www.commerce.state.il.us/dceo/; and U.S. DOE EERE DSIRE: Illinois Incentives/Policies for Renewables & Efficiency. Accessed July 2013 at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IL10R

[40] U.S. Department of Health and Human Services, Administration for Children & Families. State PBF/USF History, Legislation, Implementation: Michigan. (February 2013). Accessed July 2013 at: http://liheap.ncat.org/dereg/states/michigan.htm

[41] New Jersey's Clean Energy Program. Program Budgets and Filings. Accessed July 2013 at: http://www.njcleanenergy.com/main/public-reports-and-library/program-budgets-and-filing/program-budgets-and-filing-0; and U.S. DOE EERE DSIRE: New Jersey Incentives/Policies for Renewables & Efficiency. Accessed July 2013 at:http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NJ04R&re=1&ee=1

[42] Energy Trust of Oregon. Accessed July 2013 at: http://energytrust.org/about/who-we-are/

[43] Clean Energy Works Oregon. Accessed July 2013 at: http://www.cleanenergyworksoregon.org/

[44] Seattle's Energy Upgrade Program. City of Seattle Partners with Clean Energy Works to Transition Energy Efficiency Pilot Program. (July 8 2013). Accessed July 2013 at: https://www.communitypowerworks.org/city-of-seattle-partners-with-clean-energy-works-to-transition-energy-efficiency-pilot-program/

3.1.2 Appliance Standards

Program summary: This policy sets efficiency standards for appliances that are either more stringent than the U.S. standards, or that apply to categories for which there is no U.S. standard[45]. The improved appliance efficiency translates into lower electricity consumption and associated GHGs.

Basis for inclusion: In addition to reducing GHG emissions, appliance efficiency can generate long-term economic benefits in the form of decreased utility bills. While Washington has implemented appliance standards covering eight product categories[46] there are additional products for which standards have been set in other states and which may warrant standards in Washington.

Program/policy examples for further review: California has been a historic leader in establishing and enforcing efficiency standards prior to U.S. adoption.[47] In addition, Washington and California's fellow members of the Multi-State Appliance Collaborative have issued appliance standards that will be reviewed.

- California Appliance Efficiency Regulations[48]
- Connecticut Regulations and Procedures for Establishing Energy Efficiency Standards for Certain Appliances and Products[49]
- New Hampshire Senate Bill 259[50]
- Oregon[51]
- Rhode Island Energy and Consumer Savings Act[52]

3.1.3 Electricity GHG Performance Standards

Program summary: The electricity generated within the State of Washington is dominated by hydroelectric power, making the fuel mix in the State relatively clean. However, electricity imported from other states may not have the same low carbon intensity, which increases the State's GHG emissions from purchased electricity. An electricity GHG standard would require all electricity, regardless of where it is purchased, to meet a predefined performance standard ensuring that out-of-

[45] U.S. DOE EERE. Building Technologies Office. Appliance and Equipment Standards Result in Large Energy, Economic, and Environmental Benefits. Accessed July 2013 at: https://www1.eere.energy.gov/buildings/appliance_standards/
[46] State of Washington Substitute Senate Bill 6840. (March 4, 2006). Accessed July 2013 at: http://www.leg.wa.gov/pub/billinfo/2005-06/Pdf/Bills/Senate%20Passed%20Legislature/6840-S.PL.pdf
[47] California Energy Commission. Energy Efficiency Standards in CA. (2012). Accessed July 2013 at: http://www.energy.ca.gov/appliances/documents/CAEnergyEfficiencyStandards.pdf
[48] California Energy Commission. 2007 Appliance Efficiency Regulations. (December 2007). Accessed July 2013 at: http://www.energy.ca.gov/2007publications/CEC-400-2007-016/CEC-400-2007-016-REV1.PDF
[49] State of Connecticut Regulation of Office of Policy and Management. (September 2005). Accessed July 2013 at: http://www.ct.gov/opm/lib/opm/pdpd_energy/regsproducteffstnds.pdf
[50] State of New Hanpshire Legislation. (January 2013). Accessed July 2013 at: http://www.gencourt.state.nh.us/rsa/html/XXXI/339-G/
[51] Oregon Chapter 469 — Energy; Conservation Programs; Energy Facilities. Accessed July 2013 at: http://www.leg.state.or.us/ors/469.html; and 77th OREGON LEGISLATIVE ASSEMBLY--2013 Regular Session, Senate Bill 692. Accessed July 2013 at: http://www.leg.state.or.us/13reg/measures/sb0600.dir/sb0692.en.html
[52] U.S. DOE EERE DSIRE. Rhode Island Incentives/Policies for Renewables & Efficiency. Accessed July 2013 at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=RI10R

state imports are as clean as in-state generation. Unlike a renewable portfolio standard, a GHG performance standard is applied to each unique resource rather than the system as a whole.

Basis for inclusion: A GHG emissions performance standard may encourage the development of cleaner resources, and could minimize or eliminate the likelihood of utilities entering into new long-term contracts for coal generated electricity. This policy may be promising in continuing to phase out Washington's reliance on out of state coal-generated electricity.[53]

Program/policy examples for further review:

- Oregon HB 3283[54] and SB 242[55]
- California AB 32[56] and California Public Utilities Commission (CPUC) GHG Emissions Performance Standard[57]

Table 4. Electricity Policies Excluded from Further Analysis

Policy Type	Basis for Exclusion
Renewable Portfolio Standard (RPS)	The State of Washington approved a ballot initiative in 2006 that applied an RPS to utilities serving more than 25,000 customers. The initiative imposed mandatory utility self-set targets for energy conservation (reaching their "achievable cost-effective conservation potential") and statewide targets for renewable resource use of 15 percent of load by 2020.[58,59] Washington's clean electricity mix exceeds even the most stringent RPS in the country (California RPS target is 33 percent by 2020[60]).
Solar Incentives	Washington has an aggressive solar policy, including an incentive for distributed solar electricity, with production incentives of up to $1.08/KWh. [61] Additionally, incentivizing solar investments will be considered within the public benefit fund and PACE policies.

[53] Climate Solutions. Historic agreement reached to phase out coal-burning in Washington. (March 5, 2011). Accessed July 2013 at: http://climatesolutions.org/press-room/press-releases/historic-agreement-reached-to-phase-out-coal-burning-in-washington

[54] 69th Oregon Legislative Assembly--1997 Regular Session House Bill 3282. (April 24, 1997). Accessed July 2013 at: http://www.leg.state.or.us/97reg/measures/hb3200.dir/hb3283.a.html; and 75th Oregon Legislative Assembly--2009 Regular Session Senate Bill 101. Accessed July 2013 at: http://www.leg.state.or.us/09reg/measpdf/sb0100.dir/sb0101.en.pdf; and The Oregonian. Senate Bill 306: Tracking Legislation. Accessed July 2013 at: http://gov.oregonlive.com/bill/2013/SB306/

[55] 77th Oregon Legislative Assembly--2013 Regular Session Senate Bill 242. Accessed July 2013 at: http://www.leg.state.or.us/13reg/measures/sb0200.dir/sb0242.en.html

[56] California Air Resources Board (ARB). Mandatory Greenhouse Gas Emissions Reporting Background. Accessed July 2013 at: http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm

[57] California Public Utilities Commission (CPUC). Greenhouse Gas Emissions Performance Standard. Accessed July 2013 at: http://www.cpuc.ca.gov/PUC/energy/Climate+Change/070411_ghgeph.htm

[58] Washington Ballot Initiative 937. Accessed July 2013 at: http://www.secstate.wa.gov/elections/initiatives/text/I937.pdf

[59] Washington Utilities and Transportation Commission (WUTC). Initiative Measure No. 937. Accessed July 2013 at: http://wutc.wa.gov/webimage.nsf/d60036703dbb408d88256efc00506bb4/135b5de81111f51a8825723b00690f67!OpenDocument

[60] California Energy Commission. Renewables Portfolio Standard (RPS) Proceeding. Docket # 11-RPS-01 and 03-RPS-1078. Accessed July 2013 at: http://www.energy.ca.gov/portfolio/index.html

[61] U.S. DOE EERE DSIRE. Washington Incentives/Policies for Renewables & Efficiency. Accessed July 2013 at: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA27F

Policy Type	Basis for Exclusion
Net Metering	Washington State has had a net metering policy in place since 1998.[62] While there is potential to benchmark this policy off of other similar policies, it is not a priority in this analysis.
Revenue Decoupling	In June 2013, Washington Utilities and Transportation Commission (WUTC) initiated an order allowing electric and natural gas decoupling mechanisms for Puget Sound Energy (PSE) to be deployed, ensuring that PSE would not have a perverse incentive to minimize their customers realizing energy efficiency gains.[63] The PSE system is one of the most comprehensive in the country and serves as a benchmark for other policies. As such, additional policies on decoupling will not be considered in this analysis.
Energy Efficiency as a Resource	This policy type requires utilities to prioritize energy efficiency as a top priority in meeting future demand. Washington already incorporates energy efficiency as a resource, and requires utilities to pursue all "achievable cost-effective conservation potential" [64]. In the Northwest, energy efficiency is expected to meet 50 percent of load growth from 2012 through 2024.[65]
Energy Codes	This GHG reduction policy already exists within the State of Washington and will be analyzed under Task 1. Any expansion or improvements to this policy will be included in that analysis.

3.2 Residential, Commercial, and Industrial

Stationary fuel combustion in the residential, commercial, and industrial (RCI) building sector accounted for 21 percent of the GHG emissions in Washington State in 2010, or 19.7 $mmtCO_2e$. Of those emissions, 10.8 $mmtCO_2e$ were from natural gas, 8.4 $mmtCO_2e$ from oil, 0.3 $mmtCO_2e$ from coal, and 0.2 $mmtCO_2e$ from wood.

3.2.1 Property Assessed Clean Energy (PACE) Programs

Program summary: Property assessed clean energy (PACE) programs incentivize deployment of energy efficient technologies and renewable energy at residential, commercial and industrial facilities by allowing the developers of the facilities to pay for energy saving improvements over time, avoiding the upfront investment cost. These programs are often conducted at the local level, but must be authorized by state law. Due to concerns raised by the Federal Housing Finance Agency (FHFA) regarding the

[62] Washington State Legislature. Chapter 80.60 RCW. Net Metering of Electricity. Accessed July 2013 at: http://apps.leg.wa.gov/RCW/default.aspx?cite=80.60&full=true

[63] Washington Utilities and Transportation Commission. Dockets UE-121697 and UG-121705 (June 25, 2013). Accessed July 2013 at: http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e/85c42dc561fcb62988257b9500764e21!OpenDocument; and Cavanagh, R. Natural Resources Defense Council Staff Blog. Washington State Utility Rate Order Sets National Energy Efficiency Precedent. (June 26, 2013). Accessed July 2013 at: http://switchboard.nrdc.org/blogs/rcavanagh/washington_state_utility_rate.html

[64] Washington Ballot Initiative 937. Accessed July 2013 at: http://www.secstate.wa.gov/elections/initiatives/text/I937.pdf

[65] American Council for an Energy-Efficient Economy (ACEEE). State Energy Efficiency Policy Database. Washington Utility Policies. Accessed July 2013 at: http://aceee.org/energy-efficiency-sector/state-policy/Washington/218/all/191#Energy%20Efficiency%20as%20a%20Resource

structure of loans used to finance PACE programs, many of the residentially-focused PACE programs are currently on hold.[66]

Basis for inclusion: Similar to a PBF, PACE programs incentivize non-fossil energy use, which reduces emissions from fossil energy consumption, and can provide co-benefits of low-income assistance in the residential sector, as well as air quality benefits.

Program/policy examples for further review: Currently, 29 states and the District of Columbia have legislation in place that allows municipalities to establish PACE funding programs to finance energy efficiency and renewable energy programs.[67] Of those states, some have municipal programs in development, some have state-level programs in development, and others have no planned programs. The following list represents state-wide programs that have been deployed:

- CaliforniaFIRST[68]
- District of Columbia PACE Commercial[69]
- Efficiency Maine[70]
- Florida PACE Funding Agency[71]
- Lean and Green Michigan[72]
- Energize New York[73]
- Efficiency Vermont[74]

Table 5. Building Sector Programs Excluded from Further Analysis

Policy Type	Basis for Exclusion
Appliance Standards (those already existing in Washington, apart from the expanded analysis discussed in Section 3.1.2)	These GHG reduction policies already exist within the State of Washington and will be analyzed under Task 1. Any expansion or improvements to these policies will be included in that analysis.
Energy efficiency and energy consumption requirement programs for public buildings	

[66] Federal Housing Finance Agency (FHFA). FHFA Statement on Certain Energy Retrofit Loan Programs. (July 6, 2010). Accessed July 2013 at: http://www.fhfa.gov/webfiles/15884/PACESTMT7610.pdf
[67] U.S. DOE EERE DSIRE. Property Assessed Clean Energy (PACE). (April 2013). Accessed July 2013 at: www.dsireusa.org/documents/summarymaps/PACE_Financing_Map.pptx
[68] California Statewide Communities Development Authority (CSCDA). PACE financing for commercial, industrial & multifamily projects. Accessed July 2013 at: https://californiafirst.org/overview
[69] Government of the District of Columbia. DC PACE Commercial. Accessed July 2013 at: http://www.dcpace.com/
[70] Efficiency Maine. Accessed July 2013 at: http://www.efficiencymaine.com/
[71] Florida PACE Funding Agency. Accessed July 2013 at: http://www.floridapace.gov/
[72] Levin Energy Partners. Lean & Green Michigan. Accessed July 2013 at: http://www.leanandgreenmi.com/governments.htm
[73] Energize New York: Energy Improvement Corporation. Accessed July 2013 at: http://energizeny.org/eic
[74] Efficiency Vermont. Accessed July 2013 at: http://www.efficiencyvermont.com/Index.aspx

3.3 Transportation

Fuel consumption in the transportation sector is the largest source of emissions in the State of Washington. Transportation activities resulted in 42.2 $mmtCO_2e$ of emissions, or 44 percent of total emissions in Washington in 2010. The largest share of emissions from this source resulted from consumption of on-road gasoline and diesel (21.9 and 8 $mmtCO_2e$, respectively) and from jet fuel and aviation gasoline (8.1 $mmtCO_2e$).

3.3.1 Investments in Bicycle and Pedestrian Infrastructure

Program summary: Investments in bicycle and pedestrian infrastructure increase transportation options for the population, decreasing reliance on motor vehicles, and therefore decreasing GHG emissions from transportation, as bicycling and walking are zero-emission activities. Washington has many bicycle and walking trails, but there is room for improvement in connecting trails and enhancing non-motor vehicle commute options to reduce transportation emissions.

Basis for inclusion: Washington has been debating a transportation package that includes funds for biking and walking projects, which would include increasing safety measures, improvements to existing facilities, filling gaps in trails, and constructing additional biking and walking trails. Understanding how other governments have handled pedestrian and bicycle infrastructure policy, and the successes and lessons learned that they have found may help to inform this discussion.

Program/policy examples for further review: In 2013, the League of American Bicyclists named the State of Washington the number 1 "Bicycle-Friendly State" in the country, for the sixth straight year.[75] The weakest areas of Washington's scoring criteria included "Infrastructure and Funding" and "Evaluation and Planning." Given that Washington is an example of a success story in the United States, it may be able to take lessons learned from other states, but it is likely that lessons learned and additional policy examples will come from other countries who have found success at the national level. The following countries were selected based on their national-level bicycle frameworks, and the following states were selected as being in the top five bicycle friendly states overall (behind Washington) in the League of American Bicyclists' ranking.[76]

- Netherlands[77]
- Denmark[78]
- Ireland's National Cycle Policy Framework[79]
- Colorado Bicycle and Pedestrian Program[80]

[75] Washington State Department of Transportation. 6-time champ Washington leads pack again as 'Bicycle-Friendly State'. (May 1, 2013). Accessed July 2013 at: http://www.wsdot.wa.gov/News/2013/05/2013WAnamedBikeFriendlyState_0501.htm
[76] The League of American Bicyclists. 2013 State Ranking. Accessed July 2013 at: http://www.bikeleague.org/content/ranking
[77] Pucher, J. and R. Buehler. Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, 2008. Accessed July 2013 at: http://www.cycle-helmets.com/irresistible.pdf
[78] Ministry of Foreign Affairs of Denmark. Strategies and Policies. Accessed July 2013 at: http://denmark.dk/en/green-living/strategies-and-policies/
[79] Ireland Department of Transport. Ireland's First National Cycle Policy Framework. Accessed July 2013 at: http://www.smartertravel.ie/sites/default/files/uploads/0902%2002%20EnglishNS1274%20Dept.%20of%20Transport_National_Cycle_Policy_v4%5B1%5D.pdf

- Oregon Bicycle and Pedestrian Design Guidelines[81]
- Minnesota[82]

3.3.2 Investments in Public Transit Infrastructure

Program summary: Public transit includes any means of mass transportation for the general public, which can include buses, trolleys, trains, metro systems, and ferries, among others. Public transit moves a larger number of people on less fuel, and often cleaner fuel, than traditional passenger motor vehicle travel, reducing fossil fuel consumption, and therefore GHG emissions.

Basis for inclusion: Public transit infrastructure in Washington State was given a "D+" (poor) grade by the Seattle Section of the American Society of Civil Engineers (ASCE) in their 2013 Report Card for Washington's Infrastructure, largely due to lack of maintenance, funding, and public transit options not keeping pace with population expansion.[83] This indicates an area for marked improvement that would contribute to emission reductions, with the co-benefit of quality-of-life improvements for Washington residents.

Program/policy examples for further review: The ASCE gave the United States a "D" (poor) grade for transit, due to lack of access, funding, and maintenance. ASCE noted that 45 percent of Americans do not have access to public transit, and those that do have access have increased ridership by 9.1 percent in the past ten years, meaning interest in public transit has increased, indicating an area for potential improvement in emission reduction.[84] As such, successful public transit programs in other countries may serve as the best programs to analyze for lessons learned.

- California – CalTrans Division of Mass Transportation[85] and State Transportation Improvement Program[86]
- Germany[87]
- United Kingdom[88]

---

[80] Colorado Department of Transportation. Bicycle and Pedestrian Program. Accessed July 2013 at: http://www.coloradodot.info/programs/bikeped

[81] Oregon Bicycle and Pedestrian Design Guidelines. Accessed July 2013 at: http://www.oregon.gov/ODOT/HWY/BIKEPED/Pages/planproc.aspx

[82] Minnesota Department of Transportation. Bicycling in Minnesota. Accessed July 2013 at: http://www.dot.state.mn.us/bike/

[83] American Society of Civil Engineers (ASCE) Seattle Section. 2013 Report Card for Washington's Infrastructure. Accessed July 2013 at: http://www.seattleasce.org/reportcard/2013ReportCardWA.pdf; and ACSE 2013 Report Card for America's Infrastructure State Facts: Washington. Accessed July 2013 at: http://www.infrastructurereportcard.org/a/#p/state-facts/washington

[84] ACSE 2013 Report Card for America's Infrastructure: Transit. Accessed July 2013 at: http://www.infrastructurereportcard.org/transit/

[85] CalTrans Division of Mass Transportation. State Transit Programs (STIP/TCRP/ Prop. 116/SLPP/Prop. 1A Urban and Commuter Transit Connectivity). Accessed July 2013 at: http://www.dot.ca.gov/hq/MassTrans/state_grants.html

[86] California Transportation Commission. State Transportation Improvement Program (STIP). Accessed July 2013 at: http://www.catc.ca.gov/programs/stip.htm

[87] About Germany. Getting around in Germany. Accessed July 2013 at: http://www.about-germany.org/life/gettingaround.php

[88] United Kingdom Department for Transport. Accessed July 2013 at: https://www.gov.uk/government/organisations/department-for-transport

3.3.3 Vehicle Electrification – Vehicle Purchasing Incentives and Charging Infrastructure

Program summary: Currently, the State of Washington offers certain tax exemptions and demonstration grants to incentivize the use of electric vehicles (EVs), and requires any regional planning organization containing a county with a population over 1 million within its jurisdiction to collaborate with the State and local governments to promote electric vehicle use.[89] Adoption of electric vehicles can be further incentivized through the use of grants and rebates for vehicle purchases and infrastructure development to minimize the investment cost of purchasing and using an EV for consumers.

Basis for inclusion: Because of the relatively clean electricity in Washington State due to the presence of hydropower, transferring transportation energy from fossil-based fuels to electric power will significantly aid in reducing GHG emissions from the transportation sector.

Program/policy examples for EV Purchasing Incentives for further review:

- California Clean Vehicle Rebate Project (CVRP)[90]
- Oregon Commercial Electric Truck Vouchers[91]; Drive Oregon [92]

Program/policy examples for EV Charging Infrastructure for further review:

- Delaware Vehicle-to-Grid Energy Credit[93]
- Electric Vehicles in Illinois[94]
- Texas River Cities [95]
- Drive Oregon[96]

3.3.4 Alternative Fueled Vehicles – Vehicle Purchasing Incentives and Fueling Infrastructure

Program summary: Alternative Fueled Vehicles (AFVs) are vehicles powered by energy that comes from sources other than traditional fossil fuels (petroleum and diesel). Currently, the State of Washington provides certain tax exemptions for AFVs, and provides loans and grants for research and development in the production of alternative fuels.[97] Market penetration of AFVs can be increased through

[89] U.S. DOE EERE. Alternative Fuels Data Center (Washington- and policy- specific database query). Accessed July 2013 at: http://www.afdc.energy.gov/laws/search?p=search&location[]=WA&tech[]=3270&search_button=y
[90] Center for Sustainable Energy California. Clean Vehicle Rebate Project (CVRP). Accessed July 2013 at: http://energycenter.org/index.php/incentive-programs/clean-vehicle-rebate-project
[91] Drive Oregon. Commercial Electric Truck Incentive Program. (August 30, 2012). Accessed July 2013 at: http://driveoregon.org/press/commercial-electric-truck-incentive-program/
[92] Drive Oregon. Accessed July 2013 at: http://driveoregon.org/
[93] State of Delaware Online Delaware Code. Accessed July 2013 at: http://delcode.delaware.gov/index.shtml
[94] Illinois Department of Commerce and Economic Opportunity. Electric Vehicles In Illinois. Accessed July 2013 at: http://ildceo.net/dceo/bureaus/energy_recycling/ev.htm
[95] Texas River Cities Plug-in Electric Vehicle Initiative. Accessed July 2013 at: http://texasrivercities.com/
[96] Drive Oregon. Accessed July 2013 at: http://driveoregon.org/
[97] U.S. DOE EERE. Alternative Fuels Data Center (Washington- and policy- specific database query). Accessed July 2013 at: http://www.afdc.energy.gov/laws/search?p=search&location[]=WA&search_button=y

incentivizing the purchase of vehicles using loans, grants and rebates, and providing similar funding mechanisms to reduce the upfront cost for AFV infrastructure development.

Basis for inclusion: Fuels powering AFVs are less carbon-intensive than traditional fossil fuels, which will reduce the GHG emissions from the transportation sector. Because there is space to increase the use of AFVs through incentive programs, this is a potential source of emission reductions in Washington State.

Program/policy examples for AFV Purchasing Incentives for further review:

- California Clean Vehicle Rebate Project (CVRP)[98]
- Illinois AFV and Alternative Fuel Rebates[99]
- New York Alternative Fuel and Advanced Vehicle Funding[100] and Heavy-Duty Alternative Fuel and Advanced Vehicle Purchase Vouchers[101]
- Oregon Alternative Fuel Loans[102]
- Utah AFV and Fueling Infrastructure Grants and Loans[103]

Program/policy examples for AFV Infrastructure Development for further review:

- California Alternative and Renewable Fuel and Vehicle Technology Program[104]
- Nebraska AFV and Fueling Infrastructure Loans[105]
- Oregon Alternative Fuel Loans[106]
- Texas Clean Transportation Triangle (CTT) Program (Natural Gas)[107]
- Utah AFV and Fueling Infrastructure Grants and Loans[108]

3.3.5 Low Carbon Fuel Standard

Program summary: A low carbon fuel standard (LCFS) requires a reduction in the carbon intensity of the transportation fuel mix, on average, over time, considering the entire lifecycle of the fuel. The standard is realized through the use of alternative fuels, such as biofuel blends, compressed natural gas (CNG) and liquefied petroleum gas (LPG).

---

[98] Center for Sustainable Energy California. Clean Vehicle Rebate Project (CVRP). Accessed July 2013 at: http://energycenter.org/index.php/incentive-programs/clean-vehicle-rebate-project

[99] Illinois Environmental Protection Agency. Illinois Green Fleets. Accessed July 2013 at: http://www.illinoisgreenfleets.org/

[100] New York State Energy Research & Development Authority (NYSERDA). Alternative Fuel Vehicle Program. Accessed July 2013 at: http://www.nyserda.ny.gov/BusinessAreas/Energy-Innovation-and-Business-Development/Research-and-Development/Transportation/Alternative-Fuel-Vehicles.aspx

[101] NYSERDA. New York Truck - Voucher Incentive Program (NYT-VIP). Accessed July 2013 at: https://truck-vip.ny.gov/index.php

[102] Oregon Department of Energy. Accessed July 2013 at: http://www.oregon.gov/energy/Pages/about_us.aspx

[103] Utah Department of Environmental Quality. Division of Air Quality, Mobile Sources and Transportation Section. Clean Fuel Vehicle Grant and Loan Program. Accessed July 2013 at: http://www.cleanfuels.utah.gov/grants/grantsintro.htm

[104] California Energy Commission. California's Alternative & Renewable Fuel & Vehicle Technology Program. Accessed July 2013 at: http://www.energy.ca.gov/drive/

[105] Nebraska Energy Office. Dollar and Energy Saving Loans. Accessed July 2013 at: http://www.neo.ne.gov/loan/index.html

[106] Oregon Department of Energy. Accessed July 2013 at: http://www.oregon.gov/energy/Pages/about_us.aspx

[107] Texas Commission on Environmental Quality. Clean Transportation Triangle (CTT) Program. Accessed July 2013 at: http://www.tceq.texas.gov/airquality/terp/ctt.html/

[108] Utah Department of Environmental Quality. Division of Air Quality, Mobile Sources and Transportation Section. Clean Fuel Vehicle Grant and Loan Program. Accessed July 2013 at: http://www.cleanfuels.utah.gov/grants/grantsintro.htm

Basis for inclusion: Reducing the carbon intensity of transportation fuels reduces emissions from transportation, by design. California and British Columbia have pursued LCFS, Oregon has an LCFS that is scheduled to "sunset" in 2015, and Washington has considered implementing an LCFS in the past, including an executive order from then-Governor Christine Gregoire in 2009 to investigate the potential for use of LCFS.[109] If Washington joins California and British Columbia in implementing an LCFS, and if Oregon's LFCS is not allowed to "sunset" in 2015, the western U.S. and Canada will have developed a "clean fuels" region to serve as an example for more broad implementation, potentially at a national level.

Program/policy examples for further review: California and Oregon are the only states in the U.S. to have accepted a LCFS, though many Northeastern and Midwestern states have examined the potential for a policy.

- California (cut carbon intensity of transportation fuels by at least 10 percent by 2020)[110]
- Oregon (cut carbon intensity in cars and trucks by 10 percent per gallon by 2025). As of a state Senate vote on July 8, 2013, this may be allowed to expire in 2015, but may be heard for reconsideration at a short session of the Senate in February 2014.[111]
- British Columbia[112]
- European Union[113]

3.3.6 Road Usage Pricing Policies

Program summary: Road usage pricing imposes a direct charge for the use of a road, which may include tolls, cordon pricing, congestion charge zones, or charges on certain vehicle classes. With pricing on road usage, some travelers will limit their trips, carpool, and investigate alternative modes of transportation, which limits fuel used for passenger motor vehicle travel and therefore emissions from transportation. As part of the 2012 Supplemental Transportation Budget to the Washington State Transportation Commission (WSTC), the State of Washington provided funding to investigate the potential for road usage fees as an alternative to gasoline taxes.[114]

---

[109] State of Washington Department of Ecology. Low Carbon Fuel Standards (LCFS). Accessed July 2013 at: http://www.ecy.wa.gov/climatechange/fuelstandards.htm

[110] California Energy Commission. Low Carbon Fuel Standard. Accessed July 2013 at: http://www.energy.ca.gov/low_carbon_fuel_standard/; and California Air Resources Board. Low Carbon Fuel Standard Program. Accessed July 2013 at: http://www.arb.ca.gov/fuels/lcfs/lcfs.htm

[111] Zheng, Y. The Oregonian. Oregon Senate rejects 'clean fuels' bill, a top priority for environmental lobby. (July 6, 2013). Accessed July 2013 at: http://www.oregonlive.com/politics/index.ssf/2013/07/oregon_senate_rejects_clean_fu.html#incart_river; and Greenwire. E&E Publishing. State Senate rejects clean fuels bill. (July 8, 2013). Accessed July 2013 at: http://www.eenews.net/greenwire/2013/07/08/stories/1059983987

[112] British Columbian Ministry of Energy and Mines. Renewable & Low Carbon Fuel Requirements Regulation. Accessed July 2013 at: http://www.em.gov.bc.ca/RET/RLCFRR/Pages/default.aspx

[113] European Commission on Environment: Transport & Environment. Fuel Quality Monitoring. Accessed July 2013 at: http://ec.europa.eu/environment/air/transport/fuel.htm

[114] Washington State Transportation Commission. Road Usage Charge Assessment. Accessed July 2013 http://www.wstc.wa.gov/StudiesSurveys/RUC2012/default.htm

Basis for inclusion: This policy is being included as a potential for behavior-based GHG reductions, with the co-benefit of road congestion reduction and revenue generation. Benchmarking information from this analysis may serve to inform the studies being undertaken on road usage fees in Washington.

Program/policy examples for further review:

- State of Oregon Road Usage Charge Pilot Program[115]
- London[116]
- Stockholm[117]

3.3.7 Reduce Vehicle Miles Traveled through Urban Planning

Program Summary: Urban planning can include comprehensive policy that may include initiatives to promote high-density housing and communities with mixed-use development. These policies reduce the amount of motor vehicle travel that residents need to commute to work, shops, grocery stores, entertainment and other locations by condensing these sites into communities that are walkable or accessible through public transportation. Portions of a potential comprehensive urban planning policy are included as distinct initiatives in the pedestrian/bike and transit infrastructure sections above. The State of Washington currently has a policy on local zoning that requires cities to establish urban growth boundaries under the Growth Management Act.[118]

Basis for Inclusion: This policy type will be included to benchmark the potential achievable reductions realized by other states and governments, for use as lessons learned to consider in regard to Washington's Growth Management Act as part of the analysis performed in Task 1.

Program/policy examples for further review:

- Smart Growth in Maryland[119]
- California SB 375[120]
- Oregon Urban Growth Boundary and Oregon Sustainable Transportation Initiative (OSTI), which came out of SB 1059[121]

Table 6. Transportation Policies Excluded from Further Analysis

Policy Type	Basis for Exclusion

[115] Oregon Road Usage Charge Pilot Program. Accessed July 2013 at: http://www.oregon.gov/ODOT/HWY/RUFPP/Pages/index.aspx
[116] Litman, T. Victoria Transport Policy Institute. London Congestion Pricing. (November 24, 2011). Accessed July 2013 at: http://www.vtpi.org/london.pdf
[117] Eliasson, J. Centre for Transport Studies, Royal Institute of Technology. Lessons from the stockholm congestion charging trial. Accessed July 2013 at: http://vianordica2008.vegagerdin.is/vetenskapligt_webb/Tisdag/Session3_sal3A/Eliasson2.pdf
[118] State of Washington Department of Ecology. Maps of Urban Growth Areas (UGAs). Accessed July 2013 at: http://www.ecy.wa.gov/programs/air/aginfo/ugamaps.htm
[119] Smart Growth in Maryland. Accessed July 2013 at: http://green.maryland.gov/smartgrowth.html
[120] Urban Habitat. Sustainable Planning under SB 375. Accessed July 2013 at: http://urbanhabitat.org/cj/sb375
[121] Oregon Sustainable Transportation Initiative Responding to Senate Bill 1059 Section 8. (January 27, 2011). Accessed July 2013 at: http://www.oregon.gov/LCD/docs/rulemaking/2009-11/trac/financing_report.pdf

Policy Type	Basis for Exclusion
Rideshare Program	The Washington State Department of Transportation manages a Rideshare Program, which includes HOV lanes for carpooling and a Vanpool Program.[122] While this program can likely be expanded, to include additional HOV lanes or Vanpools, this is not a priority program for investigation in this analysis.
Biofuel Mandates and Production Incentives	AFV policies for vehicle purchasing incentives and fueling infrastructure were included in this analysis to cover areas where these policies could be meaningfully expanded upon. In addition, the renewable fuels standard in the State of Washington will be analyzed further under Task 1.
Biofuels Research Funding	There are several existing loan guarantee programs available for research and development initiatives related to biofuels at the federal level (e.g., Boardman, OR funded by USDA[123]). At the state level, expansion of the renewable fuels standard could create an incentive for additional production capacity.
Renewable Fuels Standard	These GHG reduction policies already exist within the State of Washington and will be analyzed under Task 1. Any expansion or improvements to these policies will be included in that analysis.
Conversion of Public Fleet to Clean Fuels	
State Government Purchasing of Clean Cars	

3.4 Industrial Processes

Industrial process emissions contributed 4 percent to Washington's emissions, a drop from 7.2 percent in 1990. The contribution of ozone depleting substances (ODS) substitutes to Washington's emissions has increased from zero in 1990 to approximately 3 percent in 2010. As a result of the Montreal Protocol, which phased out ODS, non-ODS chemicals have filled the gap as refrigerants and other chemicals. However, many of these substitutes are extremely potent GHGs. Other high-GWP gases include PFCs and SF_6.

3.4.1 Management of High GWP Gases

Program Summary: Policies targeting high-GWP gases are specific to the industries and the applications from which the gases are emitted. SF_6 is used in the electricity transmission and distribution sector in gas insulated switchgear. One policy implemented in California requires monitoring and reductions in SF_6 leak rates from equipment. The Refrigerant Management Program dictates a leak inspection, repair, and tracking system that minimizes the loss of high-GWP refrigerants in commercial and industrial applications.

[122] Washington State Department of Transportation. Rideshare Program. Accessed July 2013 at: http://www.wsdot.wa.gov/transit/Rideshare

[123] The Oregonian. Eastern Oregon biofuel refinery wins $235 million federal loan backing to make ethanol from poplar trees. (January 26, 2012). Accessed July 2013 at: http://www.oregonlive.com/environment/index.ssf/2012/01/eastern_oregon_biofuel_refiner.html

Basis for Inclusion: High-GWP gases are often used in commercial and industrial processes subject to regular maintenance and recordkeeping. Adding requirements to specifically target these gases may provide an opportunity for GHG reductions at low cost.

Program/policy examples for further review: Through implementation of AB 32, California has developed a portfolio of policies targeting high-GWP gases, including:

- Sulfur Hexafluoride (SF_6) Emission Reductions from Gas Insulated Switchgear[124]
- Refrigerant Management Program Regulation for Non-Residential Refrigeration Systems [125]

3.5 Waste

Emissions from solid waste management in the State of Washington were 2.1 mmtCO2e, or 2 percent of total emissions in 2010.

3.5.1 Reductions to the Waste Stream

Program summary: The State of Washington's Department of Ecology runs the Waste 2 Resources program, which provides information on source reduction, recycling and waste management.[126] In addition to informational resources, some jurisdictions set quantitative targets for waste diversion, encouraging recycling and compost programs. Diverting waste from landfills reduces methane emissions.

Basis for inclusion: Although waste sector emissions are quite small, waste management is a potential source for emission reduction with the added co-benefit of reducing the need for resources to be expended for waste collection and landfill space.

Program/policy examples for further review: The states of California and Oregon are included to investigate the solid waste management practices of Washington's west coast counterparts. The cities of Seattle and San Francisco are included as the only major U.S. cities that require residential organics collection.[127] Australia is included as a country with several states having zero waste strategies in place or having adopted a zero waste goal, and New Zealand is included as a country that has adopted a nationwide zero waste goal.[128]

- Seattle, Washington Food and Yard Waste Collection[129]

[124] California Air Resources Board. Sulfur Hexafluoride (SF_6) Emission Reductions from Gas Insulated Switchgear. Accessed July 2013 at: http://www.arb.ca.gov/cc/sf6elec/sf6elec.htm
[125] California Air Resources Board. Refrigerant Management Program Regulation for Non-Residential Refrigeration Systems. Accessed July 2013 at: http://www.arb.ca.gov/cc/reftrack/reftrack.htm
[126] State of Washington Department of Ecology. Waste 2 Resources. Accessed July 2013 at: http://www.ecy.wa.gov/programs/swfa/
[127] Seattle Public Utilities. Garbage Can Rates. Accessed July 2013 at: http://www.seattle.gov/util/MyServices/Rates/GarbageRates/index.htm; and BioCycle. Residential Food Waste Collection In The U.S. January 2012, Vol. 53, No. 1, p. 23. Accessed July 2013 at: http://www.biocycle.net/2012/01/residential-food-waste-collection-in-the-u-s/
[128] Zero Waste International Alliance (ZWIA). Zero Waste Communities. Accessed July 2013 at: http://zwia.org/news/zero-waste-communities/
[129] Seattle Public Utilities. Food & Yard. Accessed July 2013 at: http://www.seattle.gov/util/MyServices/FoodYard/index.htm

- San Francisco, California Residential Recycling and Composting[130]
- Oregon Solid Waste Program[131]
- California's CalRecycle[132]
- Australia (Eurobodalla, Willoughby, South Australia State Government, Canberra, the State of Western Australia, and the State of Victoria)[133]
- ZeroWaste New Zealand[134]

3.5.2 Landfill Methane Capture

Program summary: Municipal solid waste (MSW) landfills emit methane (CH_4) emissions over time, in varying amounts depending on landfill management practices. Regulations can be implemented to require landfill owners and operators to install or optimize landfill gas (LFG) collection systems, which capture and combust CH_4 generated at landfills, preventing it from being released to the atmosphere, or capture it for energy use if it is generated in large enough amounts.

Basis for inclusion: Landfill CH_4 capture reduces GHG emissions from solid waste management, with the co-benefit of useful CH_4 recovery for energy. While there are federal New Source Performance Standards (NSPS) in place for large MSW landfills, California provides regulations beyond those standards, and can be benchmarked to show areas for additional emissions reduction.[135]

Program/policy examples for further review:

- California Air Resources Board Landfill Methane Control Measure[136]

3.6 Water Conservation

GHG emissions from water use are driven by electricity consumption in the delivery and treatment systems, however these are not separately accounted for in Washington's 2010 GHG inventory. Disaggregating energy consumption associated with Washington's water use and treatment from the State's total energy inventory will be the first step in determining the potential impact water conservation measures can have on GHG emissions, and whether these measures are worth pursuing further. It will be necessary to take this initial step and review the current data available at the state level.

Average consumption values suggest that water delivery and treatment operations can account for up to 20% of total electricity consumption. Policies that reduce the amount of water that is delivered also

[130] SF Environment. Recycling and Composting . Accessed July 2013 at: http://www.sfenvironment.org/zero-waste/recycling-and-composting
[131] Oregon Department of Environmental Quality. Solid Waste. Accessed July 2013 at: http://www.deq.state.or.us/lq/sw/index.htm
[132] CalRecycle. Accessed July 2013 at: http://www.calrecycle.ca.gov/stateagency/Assistance/4RsGuide/Intro.htm
[133] Australian Government Department of Sustainability, Environment, Water, Population and Communities. National Waste Policy. Accessed July 2013 at: http://www.environment.gov.au/wastepolicy/
[134] ZeroWaste New Zealand. Accessed July 2013 at: http://www.zerowaste.co.nz/
[135] U.S. Environmental Protection Agency. Rule and Implementation Information for Standards of Performance for Municipal Solid Waste Landfills. Accessed July 2013 at: http://www.epa.gov/ttnatw01/landfill/landflpg.html
[136] California Air Resources Board. Landfill Methane Control Measure. Accessed July 2013 at: http://www.arb.ca.gov/cc/landfills/landfills.htm

reduce electricity consumption and GHG emissions. There are significant co-benefits of water conservation, mainly protecting this resource against emerging demands, such as biofuel development, and climate change impacts (warming temperatures, changing precipitation patterns, and reduced snowpack) that heighten water scarcity concerns, particularly across the Western States.

In January of 2007, Washington State's Municipal Water Supply-Efficiency Requirements Act including the Water Use Efficiency rules became effective to help conserve water for both the environment and future generations by requiring municipal water suppliers to use water more efficiently.

3.6.1 Residential/Commercial Water Conservation Policies

Program Summary: Many water conservation policies or rules consist of a number of individual programs focusing on specific technologies or consumption behaviors. These include low-volume plumbing fixtures, landscaping restrictions, water reclamation and reuse, recirculated cooling systems, existing building retrofits, and new construction standards. Typically these programs are bundled together to achieve more significant impacts, it is expected that any recommendations or impact analysis made on water conservation programs would look at groups of the individual policies identified below.

Basis for Inclusion: The California Energy Commission, for example, estimated that approximately one fifth of the State's electricity goes into water related uses[137]. In addition to providing potential GHG benefits, water conservation measures also reduce costs, and can provide significant environmental co-benefits.

Program/policy examples for further review:

- Low flow fixtures
    - Oregon State Plumbing Board Rule[138]
    - Arizona[139]
- Restrictions on Water Use for Landscaping
    - Florida Water Management District[140]
    - Las Vegas Water Smart Landscape Rebate program[141]
    - Arizona Landscaping Rebate Program[142]
- Cooling Water Recirculation Requirements[143]

[137] California Energy Commission. November 2005. California's Water-Energy Relationship. Accessed July 2013 at: http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF
[138] Oregon State Plumbing Board. Accessed July 2013 at: http://www.cbs.state.or.us/external/bcd/boards/plumbing/plumbing.html
[139] Arizona House Bill 2276. Accessed July 2013 at: http://www.azleg.gov//FormatDocument.asp?inDoc=/legtext/46leg/2R/adopted/H.2276-SE-ENV.DOC.htm&Session_ID=79
[140] South Florida Water Management District. Accessed July 2013 at: http://www.sfwmd.gov/portal/page/portal/levelthree/Water%20Conservation
[141] Las Vegas Valley Water District. Accessed July 2013 at: https://www.lvvwd.com/conservation/ws_rebates.html
[142] Glendale Arizona Water Conservation. Accessed July 2013 at: http://www.glendaleaz.com/WaterConservation/
[143] U.S. Department of Energy, Energy Efficiency & Renewable Energy. Accessed July 2013 at: http://www1.eere.energy.gov/femp/program/waterefficiency_bmp9.html

    - Denver and Cooling Water Recirculation Requirements[144]
    - New York City Cooling Water Recirculation Requirements[144]
- Water Reclamation and Reuse (Not included - WA existing policy, chapter 90.46)[145]
- Water Efficiency Improvements
    - Metropolitan North Georgia Planning District Water Conservation Action No. 7 - Conduct Residential Water Audits (This measure requires water providers to conduct residential water audits. The largest 25 percent of water users should be targeted to evaluate water savings measures).[146]
    - California Utility Rebate Programs (California works with utilities such as Cal Water to offer rebates on qualified water-efficient appliances through the California Water Service Company Conservation Rebate Program).[147]
    - California Urban Water Reduction Goal (In 2009, California adopted a policy of further reducing urban water use by 20 percent per capita by 2020).[148]
    - Seattle Water Smart Technology Program (The program provides financial assistance for both technical studies and project installation that makes it cost-effective to realize the benefits of water-efficient technologies).[149]
    - Saving Water Partnership (Seattle sponsored partnership with 18 local water utilities to promote water conservation programs throughout the region).[150]
    - Oregon's Integrated Water Resources Strategy (provides a blueprint for understanding and meeting Oregon's water quantity, water quality, and ecosystem needs. It offers recommendations in 13 different issue areas to address the most critical challenges).[151]
    - San Diego Municipal Code (SDMC) 147.04, (requires that all buildings, prior to a change in property ownership, be certified as having water-conserving plumbing fixtures in place. All residential, commercial and industrial water customers who receive water service from the City of San Diego Public Utilities Department are affected by this Ordinance).
- Australia Water Conservation Programs (Due to severe water shortages and to manage water supplies sustainably, many governments are introducing permanent rules and restrictions to encourage sensible water use practices every day. A large number of water conservation programs are also being carried out at various levels to spread the awareness about water management and methods to conserve water in schools, homes and businesses. Examples

[144] facilitiesnet. Water Conservation: Federal, State, And Local Requirements Are Helping to Drive the Use of Water Efficient Technologies. Accessed July 2013 at: http://www.facilitiesnet.com/green/article/Water-Conservation-Rules-Spreading--2734
[145] Oregon Building Codes Division. Accessed July 2013 at: http://apps.leg.wa.gov/rcw/default.aspx?cite=90.46&full=true#90.46.005
[146] Metropolitan North Georgia Water Planning District. Accessed July 2013 at: http://www.northgeorgiawater.org/supply-conservation/residential-water-audits
[147] California Water Services Group. Water Conservation. Accessed July 2013 at: https://www.calwater.com/conservation/index.php
[148] California Water Blog. June 2011. Can California further reduce urban water use? Accessed July 2013 at: http://californiawaterblog.com/2011/06/08/can-california-further-reduce-urban-water-use/
[149] Saving Water Partnership. Conserve at Work. Accessed July 2013 at: http://www.savingwater.org/business_wstp.htm
[150] Saving Water Partnership. Accessed July 2013 at: http://www.savingwater.org/index.htm
[151] Oregon Water Resources Department. Integrated Water Resources Strategy. Accessed July 2013 at: http://www.oregon.gov/owrd/pages/law/integrated_water_supply_strategy.aspx

include; City Efficiency Programs (Melbourne, Sydney), Australian Conservation Water and Reuse Program, Australia Water Conservation and Reuse Research Program, Victoria's School water efficiency program, Queensland's watersaver education program.[152] [153] [154]

- Other Local Government Actions (such as Cary North Carolina, Ashland Oregon, Seattle Washington, Phoenix Arizona. These local programs include policies such as public education, landscape and irrigation codes, residential audits, conservation rate structures, new homes points program, landscape water budgets, and water reclamation. Newer and more unique elements of these programs include things like build your own rain barrel programs. Many of these programs have been place for multiple years and provide data and analysis on the resulting changes to consumption levels).[155]

3.6.2 Irrigation Policies[156]

Program summary: As a major source of water consumption, irrigation provides many opportunities to conserve water resources and reduce GHG emissions through reductions in the energy required for water delivery and treatment. At least half of irrigated cropland acreage across the United States is still irrigated with less efficient, traditional irrigation application systems. In addition, most irrigators do not make use of the more efficient on-farm water-management practices that conserve the most water[157]

Basis for inclusion: in 2000 Washington had 1,570 thousand acres of irrigated land, 11th highest of U.S. states, and 1,820 thousand acres in 2005 accounting for roughly 60% of freshwater withdrawals in the state.[158]

Program/policy examples for further review:

- Adoption of Certification Standards for Irrigation Professionals
- Subsidies for Efficient Irrigation Techniques and Best Practices
- Reducing or converting non-beneficial evaporation
- Subsidies for switching to lower water-consuming crops, or irrigating current crops at a deficit

3.7 Carbon Capture and Storage (CCS)

The concept of carbon capture and storage (CCS) is to use one of various technologies to capture carbon dioxide (CO_2) and store it in a location that keeps it from being released into the atmosphere (typically underground). CCS can be cost prohibitive, depending on the industrial process and type of facility to

[152] Savewater. Water conservation programs. Accessed July 2013 at: http://www.savewater.com.au/how-to-save-water/in-education/water-conservation
[153] Government of South Australia Natural Resources. Accessed July 2013 at: http://nrm.sa.gov.au/Default.aspx
[154] Benefits-of-Recycling. Australia Water Conservation Programs. Accessed July 2013 at: http://www.benefits-of-recycling.com/australiawaterconservationprograms/
[155] U.S. EPA. Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs. Accessed July 2013 at: http://www.epa.gov/WaterSense/docs/utilityconservation_508.pdf
[156] Any policy regarding irrigation needs to carefully address and define water rights water rights, water markets, water transfers, and water accounting
[157] Schaible, G. and M. Aillery. Water Conservation in Irrigated Agriculture: Trends and Challenges in the Face of Emerging Demands. United States Department of Agriculture. (September 2012). Accessed July 2013 at: http://www.ers.usda.gov/media/884158/eib99.pdf
[158] USGS State Level Water Data

which it is being applied, and incentives can assist in minimizing upfront cost and deployment risk to the project developers.

This program will be excluded unless requested by the State of Washington because there are no large-scale saline formations in Washington State, making CCS using current technologies unlikely.[159]

Program/policy examples:

- Colorado HB 06-1281 (2006)
- Florida HB 549 (2007) Ch. No. 2007-117
- Illinois P.A. 92-0012 (2002), P.A. 93-0167 (2004), P.A. 94-65 (2005), P.A. 94-1030 (2006), P.A. 95-18 (2007), SB 1592 (2007), SB 1987 (2009)
- Montana SB 498 (2009)
- Texas HB 469 (2009)

[159] U.S. DOE National Energy Technology Laboratory (NETL). Regional Carbon Sequestration Partnerships' Perspectives. Accessed July 2013 at: http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlasIV/RCSP-Perspectives-Atlas-IV-2012.pdf

Briefing for the Climate Legislative and Executive Workgroup
July 17, 2013

Summary of Science on Climate Change and Recommendations for Updating Washington Greenhouse Gas Emission Reductions

I. Background

In 2008, the Legislature enacted the Greenhouse Gas Emissions Act (Chapter 70.235 RCW) requiring the State to limit emissions of GHG to achieve the following emissions reductions:

- By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels;
- By 2035, reduce overall emissions of greenhouse gases in the state to twenty-five percent below 1990 levels; and
- By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to fifty percent below 1990 levels, or seventy percent below the State's expected emissions that year.

RCW 70.235.040 further states: "Within eighteen months of the next and each successive global or national assessment of climate change science, the department (of Ecology) shall consult with the climate impacts group at the University of Washington regarding the science on human-caused climate change and provide a report to the legislature summarizing that science and make recommendations regarding whether the greenhouse gas emissions reductions required under RCW 70.235.020 need to be updated."

The Department of Ecology is currently scoping the required report and will complete it by the end of 2013.

II. Summary of Science on Climate Change

Significant advances in understanding the impacts of greenhouse gas emissions on the atmosphere and the oceans have been made, which in turn improved our understanding of climate change impacts and ocean acidification on the state of Washington.

For example:

- In 2010, the National Academies of Sciences released a four-report series on climate change, *America's Climate Choices.*
- In 2011, the Intergovernmental Panel on Climate Change (IPCC) released a special report on *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*.
- The Third US National Climate Assessment is currently underway, with a chapter

focusing on impacts on the Northwest and a full-length report on Northwest impacts expected to be published in Fall 2013.

- And at the end of September 2013, the IPCC will release its fifth assessment report on the physical science basis of global climate change, followed by its assessment of climate change impacts in Spring 2014. The IPCC report will deliver a new set of updated global climate change scenarios.

Ecology's summary of the science on climate change will include:

- **A summary of the *current* state of science related to the implications of global climate change for Washington state**, including information about projected changes in local climate, sea level, rainstorms and other extremes, and impacts on sectors of importance to the state, noting the level of certainty associated with these projections; and
- **An evaluation of the preliminary implications of the new climate scenarios being released in September 2013**, as part of the IPCC's Fifth Assessment Report. This will include a review of future expected global, national and regional climate change assessment activities relevant to understanding and reducing climate risks to Washington State.

III. Washington's Greenhouse Gas Emissions Reductions

Decisions about reducing greenhouse gas emissions and preparing for the unavoidable impacts of a changing climate rely on climate stabilization goals and scientific information about the global and local consequences of a changing climate. Ecology's report section will include:

a. A summary of the rationale used to establish Washington's existing emissions reductions (2020, 2035, and 2050).

b. Implications of updated climate science (e.g., trends in climate stabilization targets).

c. Recommendations for any changes to Washington's emissions reductions.

IV. Timeline

August 6, 2013	Ecology executes interagency agreement with UW
End of October, 2013	Ecology draft report
Early December, 2013	Ecology final report

Biographical Information for University of Washington Climate Impacts Group (CIG) Scientists and Affiliates

May 23, 2013

Amy Snover, Ph.D., *CIG Director, Assistant Dean*

Amy Snover is Assistant Dean for Applied Research in the University of Washington's College of the Environment and CIG Director. Dr. Snover's research draws on the natural and social sciences to assess the vulnerability of natural and human systems to climate variability and change and to inform the development of climate adaptation strategies. Dr. Snover works with decision makers to develop science-based climate change planning and adaptation guidance and to assess their climate information needs in order to develop priorities for research, tool development, and outreach. She frequently advises on strategies for adapting planning and decision-making processes in light of a changing climate and collaborates with legal, economics and communications scholars to apply climate impacts science to legal analyses, economic assessments, and research on overcoming communication challenges. Dr. Snover is currently co-convening lead author on the Pacific Northwest chapter of the U.S. National Climate Assessment, Editorial Board member for the Encyclopedia of Puget Sound, member of the West Coast Governor's Association ACT climate change working group, and a member of the American Meteorological Society and the American Geophysical Union. Dr. Snover has a Ph.D. in Analytical/Environment Chemistry from the University of Washington. More information is available at: http://www.cses.washington.edu/db/pdf/snovercv.pdf.

Eric Salathé, Jr, Ph.D., *CIG Scientist, Assistant Professor*

Eric Salathé is Assistant Professor of Climate Science in the School of Science, Technology, Engineering, and Mathematics at UW Bothell, UW Director of the U.S. Department of Interior Northwest Climate Science Center, and CIG Scientist. Dr. Salathé conducts research on regional climate change and the impacts of climate change on human and natural systems. His current research focuses on how local weather and land-surface processes can affect the regional response to climate change. This research supports climate impacts applications in many fields, including air quality, hydrology, agriculture, and human health with a focus on the U.S. Pacific Northwest. Dr. Salathe's teaching interests include climate science and mathematics. Dr. Salathé earned a Ph.D. in Geology and Geophysics from Yale University. More information is available at: http://faculty.washington.edu/salathe.

Meade Krosby, Ph.D., *CIG Scientist*

Meade Krosby is a Research Scientist in the Department of Biology at the University of Washington and a CIG Scientist with expertise in conservation biology, ecology, and evolutionary biology. Dr. Krosby works closely with land and wildlife managers to

develop spatial tools for integrating climate change and habitat connectivity into large-scale conservation planning efforts. Current projects include Columbia Plateau and WA/BC transboundary climate-connectivity assessments as part of the Washington Connected Landscapes Project, and identifying riparian climate corridors as part of the Western Governors' Association's Crucial Habitat Assessment Tool. Dr. Krosby has published on connectivity conservation in a changing climate, integrating climate change into conservation planning in Washington State, and the impact of historical climate change on species ranges and hybridization. Dr. Krosby has a Ph.D. in Biology from the University of Washington. More information is available at: http://staff.washington.edu/mkrosby/Meade_Krosby/Research.html.

***Lara Whitely Binder, MPA**, CIG Outreach and Adaptation Specialist*

Lara Whitely Binder is an Outreach and Adaptation Specialist at the CIG. Lara assists the CIG with its efforts to inform decision makers about the impacts of climate variability and climate change on the Pacific Northwest and provides technical support on planning for climate variability and change to communities, organizations, and individuals across the region. Recent activities include facilitating Washington Governor Christine Gregoire's Blue Ribbon Panel on Ocean Acidification (2012), working with Sound Transit to identify climate change risks to Sound Transit's public transit modes (2012-2013), and adaptation planning support to the State of Washington (ongoing). Recent publications include "Preparing for Climate Change in Washington State (*Climatic Change*, 2010) and *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (2007). Lara has a M.P.A. from the University of Washington's Evans School of Public Affairs.

***Guillaume Mauger, Ph.D.,** CIG Postdoctoral Research Associate in Decision Sciences*

Guillaume Mauger is Postdoctoral Research Associate at CIG with expertise in climate dynamics, climate and hydrologic modeling, and science communications. Dr. Mauger's research is focused on using climate model results and observational data to assess the impacts of climate change, most often with regard to terrestrial and aquatic ecosystems. Current projects range from developing hydro-climatic change projections for the Western U.S. to analyzing approaches for maximizing the effectiveness of Pacific Northwest climate observations. Dr. Mauger's publications include doctoral work on stratocumulus clouds and climate, descriptions of recent CIG datasets, sector- or species-specific climate impacts studies, and a methods paper on the optimal placement of monitoring stations in the Pacific Northwest. Affiliations include the Washington Wildlife Habitat Conservation Group, American Geophysical Union, American Meteorological Society, and the Pacific Science Center (Science Communication Fellow). Dr. Mauger has a Ph.D. in Climate Science from Scripps Institution of Oceanography. More information is available at: http://www.mauger.org/guillaume/.

Alan Hamlet, Ph.D., *CIG Affiliate*

Alan Hamlet is an Assistant Professor in the Department of Civil and Environmental Engineering and Earth Sciences at the University of Notre Dame, Affiliate Professor in Civil and Environmental Engineering at the University of Washington, and CIG Affiliate. Dr. Hamlet's research is focused on the integrated modeling of climate variability and change, surface water hydrology, water resources systems, the built environment, and aquatic and terrestrial ecosystems. He has been actively involved in stakeholder education and outreach programs in the Pacific Northwest for many years, and is a leader in the development of decision support systems and sustainable climate change adaptation strategies in the water sector. Dr. Hamlet also has a long-term interest in the impacts of climate on renewable energy systems. Publications include numerous papers on the effects of climate variability and change on Pacific Northwest hydrologic systems and impacts to the natural and built environment. Other affiliations include the Skagit Climate Science Consortium (Co-Director) and numerous professional societies. Dr. Hamlet has a Ph.D. in Civil and Environmental Engineering from the University of Washington. More information is available at: http://engineering.nd.edu/profiles/ahamlet/.

Don McKenzie, Ph.D., *CIG Affiliate*

Don McKenzie is a research ecologist with the U.S. Forest Service, Affiliate Professor at the University of Washington, and CIG Affiliate. Dr. McKenzie is the lead CIG investigator for forest ecosystems, conducting research on climatic change and its effects on disturbance regimes, species responses, and air quality in protected areas; paleological fire studies, controls on fire regimes, and scaling relationships; forest biogeography and climatic variability; fire severity and spatial patterns of fuels. Dr. McKenzie has published scientific papers in many fields, including landscape ecology, fire science, climate change, and forest ecosystems. Dr. McKenzie has a Ph.D. from the College of Forest Resources at the University of Washington. More information is available at http://www.fs.fed.us/pnw/fera/staff/mckenzie/index.shtml.

Se-Yuen Lee, Ph.D., *CIG Affiliate*

Se-Yuen Lee is a Postdoctoral Research Associate in the Dept. of Civil and Environmental Engineering and the School of Environmental and Forest Sciences at the University of Washington and CIG Affiliate. Dr. Lee's current research is focused on accessing the impacts of climate change on wetland hydro-periods and on amphibians and other wetland-reliant montane species. This work also includes projecting water temperature on wetlands and rivers and evaluating the impacts of projected water temperature on amphibians and salmon. Recent publications have included work on optimizing flood control rule curves for climate change and climate change impacts on Pacific Northwest water supplies and hydropower production. Dr. Lee has a Ph.D. in Civil and Environmental Engineering from the University of Washington. More information is available at http://ftp.hydro.washington.edu/pub/leesy/CV_Lee_Apr012.doc

Ed Miles, Ph.D., *CIG Advisor, former CIG Director and Co-Director*

Edward Miles is Bloedel Professor Emeritus of Marine Studies and Public Affairs at the University of Washington's School of Marine and Environmental Affairs and the Evans School of Public Affairs, and technical advisor to the CIG. Dr. Miles is the creator of the CIG and served as its Director and Co-Director for sixteen years. Dr. Miles has done extensive research in the areas of international law and organization; science, technology, and international relations; marine policy and ocean management, and the impacts of climate variability and climate change. Dr. Miles has a Ph.D. in International Relations from the Korbel School of International Studies at the University of Denver. He was elected to the National Academy of Sciences in April 2003. More information is available at: http://depts.washington.edu/smea/people/faculty.

Ed Sarachik, Ph.D., *CIG Advisor, former Co-Director*

Ed Sarachik is Emeritus Professor of Atmospheric Science at the University of Washington's Dept. of Atmospheric Sciences, former Co-Director of the Center for Science in the Earth System/CIG, and technical advisor to the CIG. Dr. Sarachik has done extensive research in the areas of tropical meteorology, tropical oceanography, climate dynamics, the El Niño/Southern Oscillation, thermohaline circulation, and climate variability and change. Dr. Sarachik has a Ph.D. in Theoretical Physics from Brandeis University. More information is available at: http://www.atmos.uw.edu/people/ed_resume.html

For more about the Climate Impacts Group, go to http://cses.washington.edu/cig/.

CLIMATE LEGISLATIVE AND EXECUTIVE WORKGROUP

DRAFT SCHEDULE [1]

Workgroup Schedule	Meeting Content
July 17 (1:30 - 3:30, as needed)	Interview and select Project Manager/ Facilitator
End of August/ Early September (1/2 day)	Discuss results of **Task 1**[2] (Analyses of WA Emissions & Related Energy Consumption)
End of September (full day)	Discuss results of **Task 2** (Evaluation of Comprehensive GHG Emissions Reduction Programs Outside WA), and **Task 3** (Evaluation of Federal Policies)
Mid-October	Identify list of possible policies and actions and related additional analyses
Third week of October	Public Hearing to take public comments (Seattle?) Public Hearing to take public comments (Moses Lake?)
Early November	Review analyses of possible policies, develop a draft list of recommendations, and review outline of Workgroup report
Third week of November (during Assembly Days?)	Prioritize potential policies and actions and review draft Workgroup report
Early December	Public Hearing on draft report
Mid-December	Discuss final proposed policies and actions, and timeline and funding for actions
End-December	Issue Final Report

[1] *All dates are subject to change by the Workgroup. All meetings of the Workgroup will be in Olympia unless specified above.*

[2] *Tasks 1, 2 and 3 are further described in the contract is posted under Resources in:* http://www.governor.wa.gov/issues/economy/climateWorkgroup/default.aspx.