

APPENDIX F

2003 GREENHOUSE GAS EMISSIONS INVENTORY

PSE began accounting for greenhouse gas (GHG) emissions in 2003. To date, PSE has accounted for GHG's emitted during the 2002 and 2003 calendar years. These GHG inventories are based on data generated by PSE, established GHG accounting guidelines, and available Department of Energy and Environmental Protection Agency (EPA) documents. Each inventory accounts for the following:

- PSE's direct emissions from electrical generation, PSE's vehicle fleet, PSE's storage and distribution of natural gas, and PSE's use of sulfur hexafluoride as an insulating gas;
- PSE's indirect emissions associated with firm contract and non-firm (wholesale market) purchases of electricity; and
- Avoided GHG emissions due to PSE's conservation efforts and other conservation programs.

The inventories are intended to provide PSE with the information to achieve five major goals:

- Maintaining an accurate, transparent estimate of PSE's 2003 GHG emissions;
- Understanding PSE's emissions sources for relative size and importance;
- Tracking PSE's GHG emissions over time;
- Evaluating PSE's GHG emissions from electric production and purchase relative to other electric generators and electric utilities; and
- Estimating the emissions avoided through PSE's conservation programs.

A. Accounting Process and Methodology

An estimate of PSE's GHG emissions for 2003 was made based on the accounting protocols developed by the World Resource Institute (WRI) and World Business Council on Sustainable Development (WBCSD), and those used from the voluntary GHG reporting program of the Energy Information Agency (EIA) and EIA Form 1605(b). WRI/WBCSD GHG accounting protocols are explained in the *GHG Protocol* (WRI/WBCSD, 2001), an accounting and reporting standard developed by a partnership

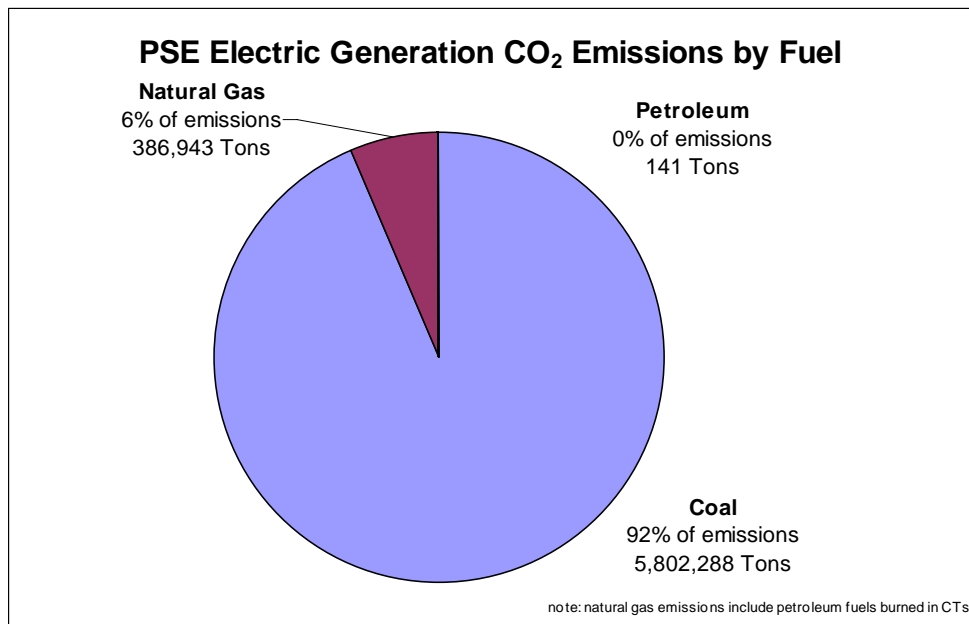
between industry, non-governmental organizations, and governments. EIA 1605(b) reporting is a voluntary reporting program for GHG emissions and reductions, developed under Section 1605(b) of the Energy Policy Act of 1992. PSE submitted reports to the EIA 1605(b) reporting program for 1994 to 1996. The accounting conducted for 2003 follows the *GHG Protocol*, and is a functional equivalent of EIA 1605(b) reporting.

Data used in the compilation of the inventories comes from a number of sources. The calculation methodology used varies depending on the data available. The greenhouse gases accounted for (in each annual GHG inventory) include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and sulfur hexafluoride (SF₆).

B. Direct Emissions – Electric

For all of PSE’s electric generation plants, fuel use data for 2003 was available for calculating emissions. In addition, direct measurements of CO₂ emissions from the Colstrip plant were available due to Colstrip’s reporting requirements under the Acid Rain Program. The actual measurements were considered the most accurate data for Colstrip. For all other electric generation plants, fuel use data and standard emission factors were used to calculate emissions associated with combustion.

**Exhibit F-1
Direct Emissions from Electric Generation Plants**



C. Direct Emissions – Natural Gas Operations and Fuel Use by Vehicles

Direct emissions from PSE’s natural gas operations include any incidental losses or leakage from the natural gas system, or venting of natural gas to depressurize lines for service, etc. PSE used USEPA/GRI emissions factors to calculate these fugitive emissions and losses from PSE’s transmission system and from PSE’s gas storage at Jackson Prairie.

Another direct source of GHG emissions included in the inventory was PSE’s emissions from fuel use in vehicles during 2003. This is calculated based on the fuel usage in PSE’s fleet and on emissions factors.

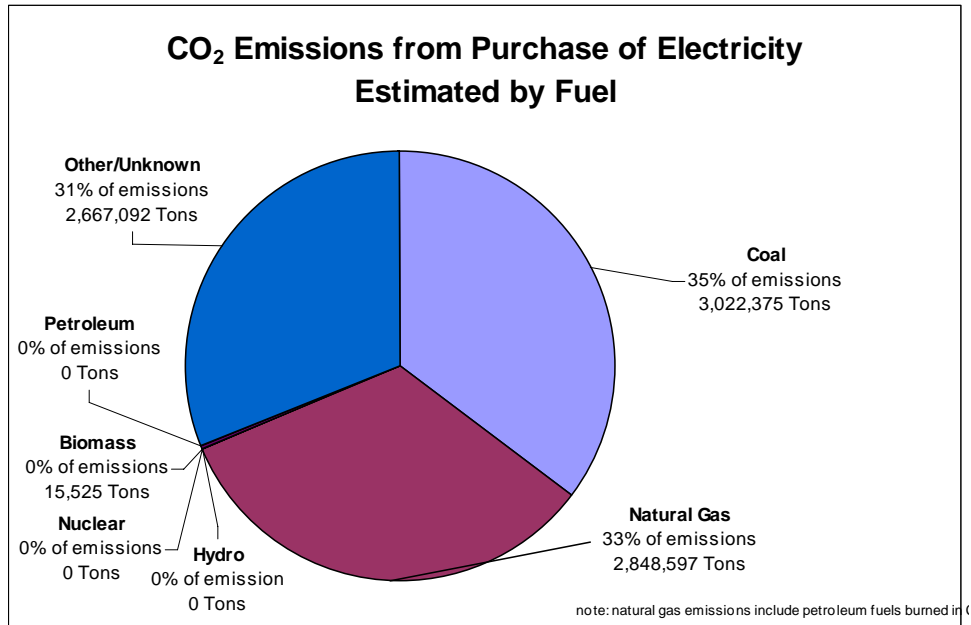
**Exhibit F-2
Direct Emissions from Natural Gas Operations and Vehicle Fuel Use**

	Emissions (Tons)			
	CO ₂	CH ₄	N ₂ O	SF ₆
Natural Gas Emissions				
Distribution - Fugitive/Vented Natural Gas Emissions		5,589		
Storage - Fugitive/Vented Natural Gas Emissions		1,066		
Fugitive/Vented SF ₆ Emissions				0.4025
Fleet Emissions				
Fleet Emissions	12,702	2.08	0.02	
TOTAL EMISSIONS	12,702	6,657	0.02	0.4025

D. Indirect Emissions – Electric

Indirect emissions associated with the generation of electricity that is sold to other intermediaries or to end consumers is also accounted for in the inventory. These emissions are based on the electricity purchased by PSE. PSE purchases electricity under firm (long-term) contracts, and under non-firm contracts (spot market purchases). Emissions were calculated based on the electricity purchased from each entity, the estimated generation sources used to produce the electricity purchased by PSE, and emissions factors for each generation source. Where generation source information was not available, a national emissions factor was used.

**Exhibit F-3
Indirect Emissions from Purchase of Electricity**



E. Indirect Emissions – Natural Gas

Indirect emissions from natural gas systems were calculated using the same methodology as direct emissions.

**Exhibit F-4
Indirect Emissions from Natural Gas Operations**

	Emissions (Tons)			
	CO ₂	CH ₄	N ₂ O	SF ₆
Natural Gas Emissions (Indirect)				
Distribution - Fugitive/Vented Natural Gas Emissions		1,435		
Storage - Fugitive/Vented Natural Gas Emissions		871		
TOTAL EMISSIONS		2,306		

F. Conservation Programs and Emissions Avoided

PSE runs a variety of electric and natural gas conservation programs, resulting in significant reductions in demand on electric and natural gas resources. These programs led to savings of 131,867,000 kWh of electricity and 2,175,375 therms of natural gas in 2003 amounting to avoided emissions of over 72,000 tons of CO₂. PSE's natural gas conservation measures amounted to an avoidance of emissions of approximately 15

tons of methane. In addition to these conservation measures, PSE owns and operates a fleet of natural gas-fueled vehicles. Assuming that these vehicles would have operated on gasoline instead of natural gas, it is estimated that approximately 500 tons of CO2 emissions were avoided by using natural gas vehicles.

**Exhibit F-5
Emissions Avoided**

<i>Summary of Emissions Reductions</i>	Emissions Reductions (Tons)			
	CO ₂	CH ₄	N ₂ O	SF ₆
Electric Conservation	72,237	6	2	
Natural Gas Vehicles	83	-1.4	0.01	
Gas Conservation		14.9		
TOTAL REDUCTIONS	72,320	19.5	2.01	

G. GHG Emissions Outlook

The Least Cost Plan has modeled a number of scenarios for PSE's future electricity demand, and how it means to meet that demand. This includes newly acquired wind power and plans to add more renewable resources to PSE's energy resource mix. As existing contracts expire, PSE is expected to meet electricity demand with CCGT, renewables, and conservation in the short term, and possibly through the addition of coal in the long term.

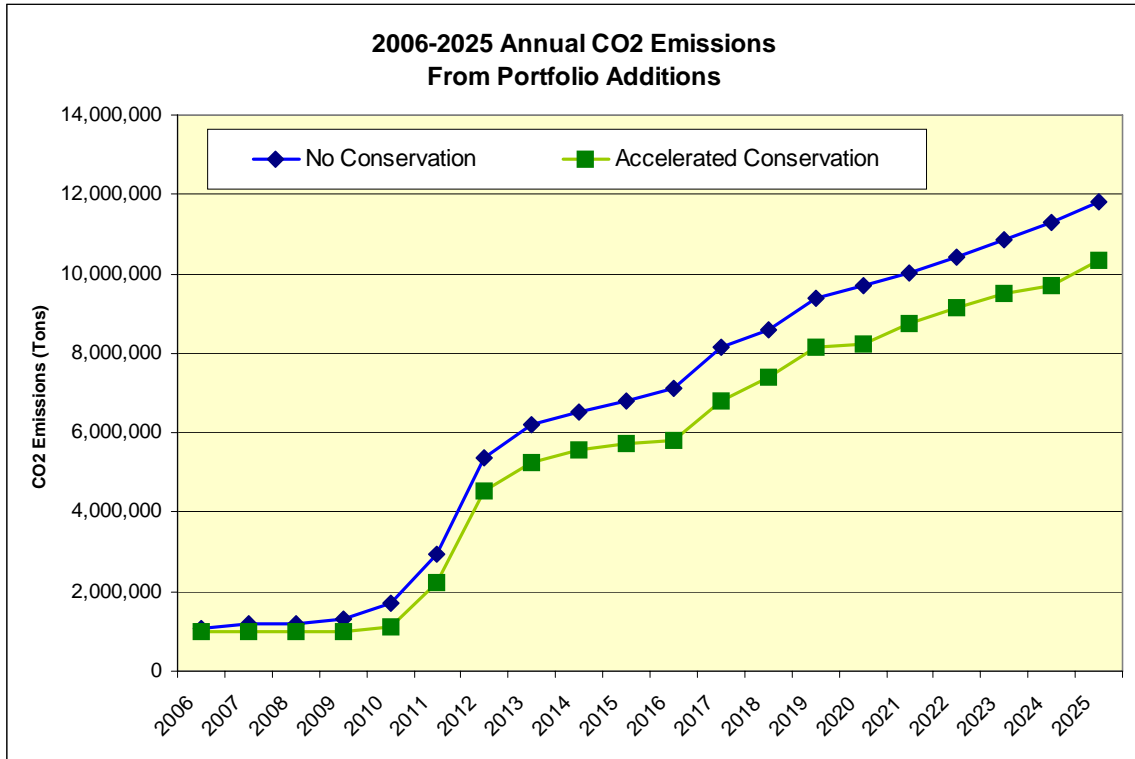
A preliminary estimate of PSE's CO2 emission rate going forward was made based on the projected preferred electric resource mix in 2015. For the market purchases of power (indirect emissions), emissions are shown as net values. The net sales approach was used to provide consistency, as it is not known what PSE's future market transactions will be. This future emissions estimate does not differentiate between future direct and indirect emissions.

Emissions from Portfolio Additions

An estimate of PSE's CO2 emissions was made based on the projected preferred electric resource mix for these resource additions and the conservation scenarios considered (see Exhibit F-6). Note that this future emissions estimate does not differentiate between future direct and indirect emissions. The market purchases of power (indirect emissions) included in this analysis are calculated as values. This is

different than the accounting protocols (GHG Inventory), which advocate reporting total indirect emissions, and separate accounting of market sales and associated indirect emissions. This approach was used to provide consistency, as it is not known what PSE's future market transactions will be.

**Exhibit F-6
Emissions from Portfolio Additions**



The estimate of emissions from portfolio additions shows that for both the No Conservation and Accelerated Conservation scenarios, CO2 emissions will increase. Under an accelerated conservation scenario, emissions increase from approximately 100,000 tons CO2 starting in 2006 to just over 10,000,000 tons CO2 by 2025. With no conservation, emissions increase from approximately 100,000 tons CO2 starting in 2006 to nearly 12,000,000 tons CO2 by 2025. Considerable CO2 emissions savings under the accelerated conservation scenario begin in 2014, just before new coal resources are brought online.

This analysis of PSE's future CO2 emissions is a very simple analysis based on fixed assumed factors. A more detailed analysis could include assumptions related to PSE's sources of energy, improvements in generation and emissions control technology (such as IGCC), and projected resource availability from the Northwest Power Planning Council and Department of Energy.