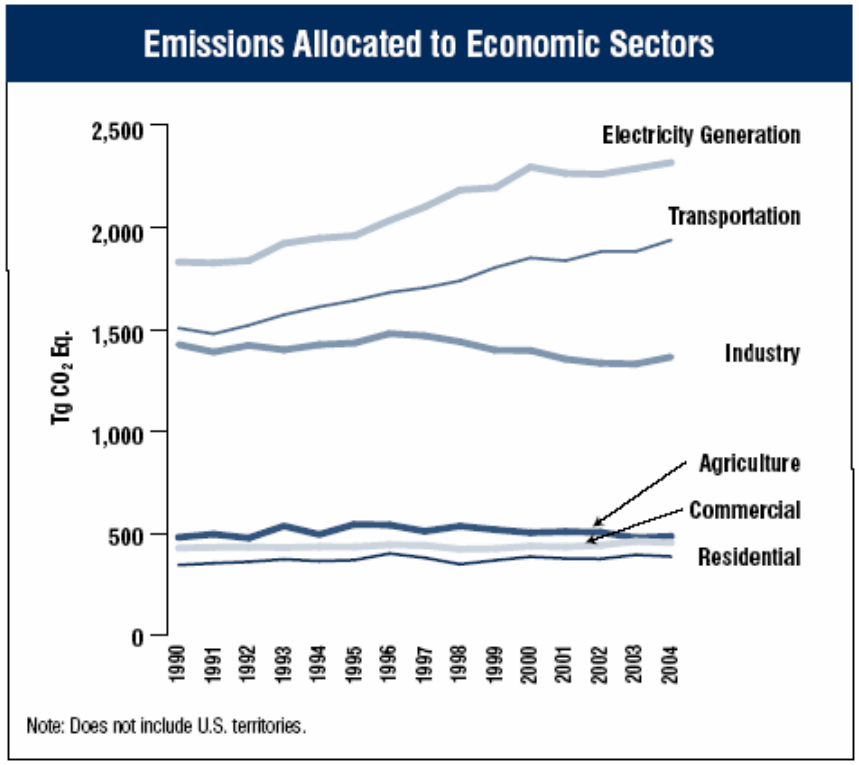
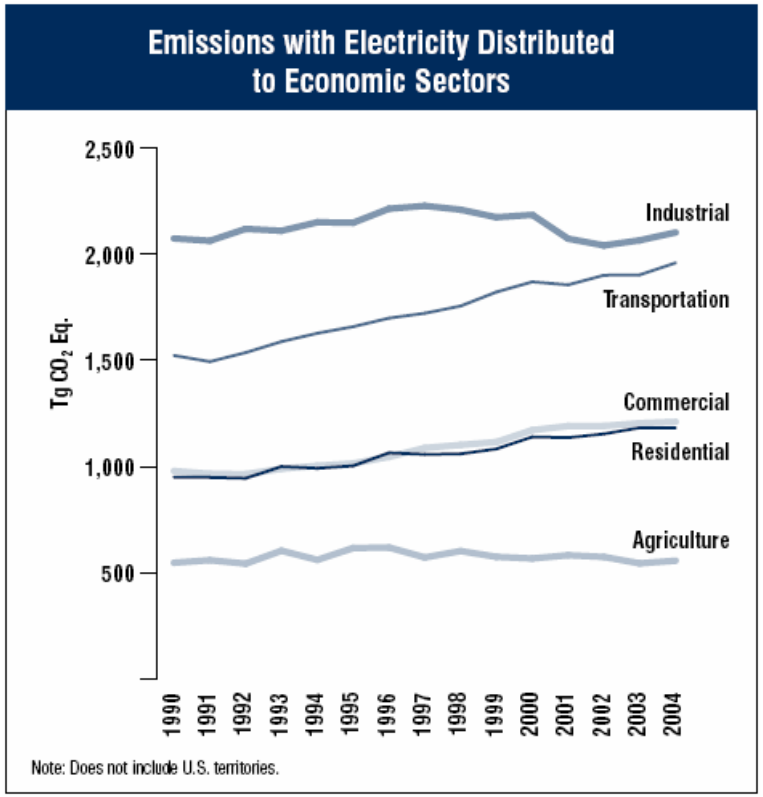
Character of Greenhouse Gas Emissions from Energy Supply and Use

Energy Supply and Use
Green Building
Subcommittee Meeting

May 3, 2007

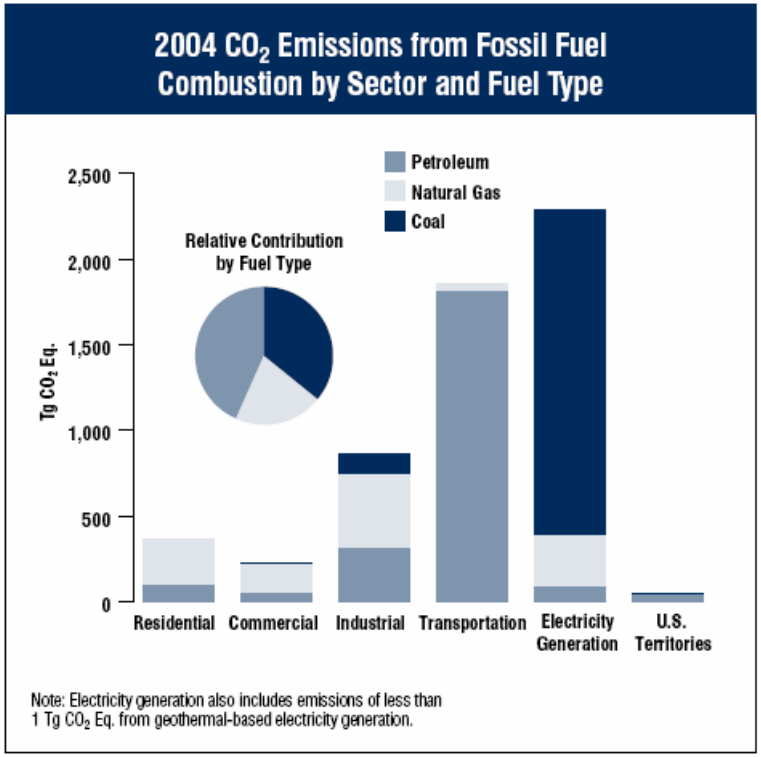
National Greenhouse Gas Emissions

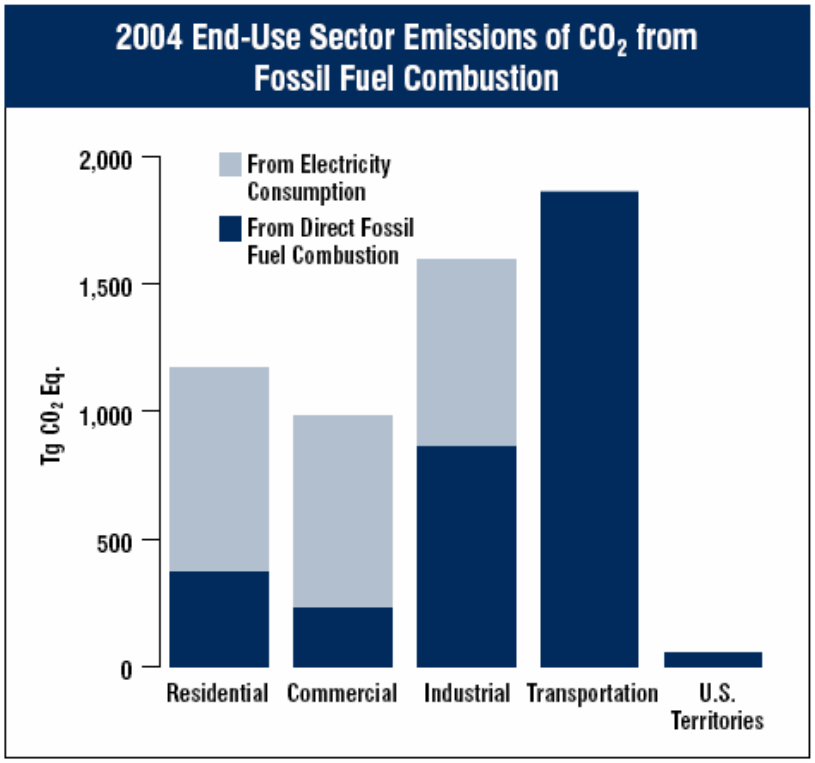




Source: U.S. EPA “Inventory of Greenhouse Gas Emissions and Sinks: 1990-2004” Published in 2006.

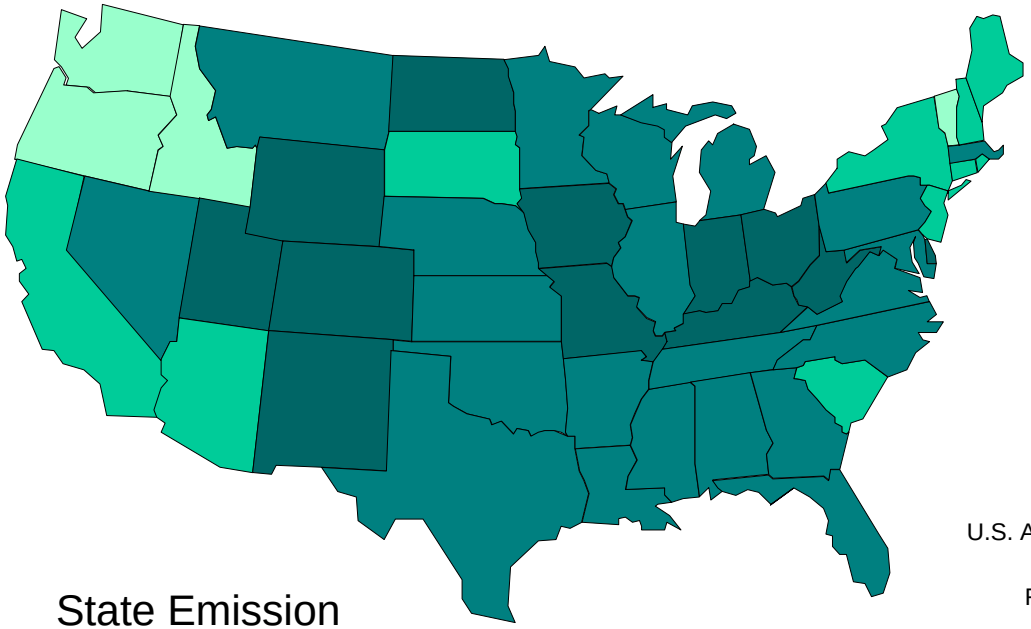
National Greenhouse Gas Emissions from Energy Use





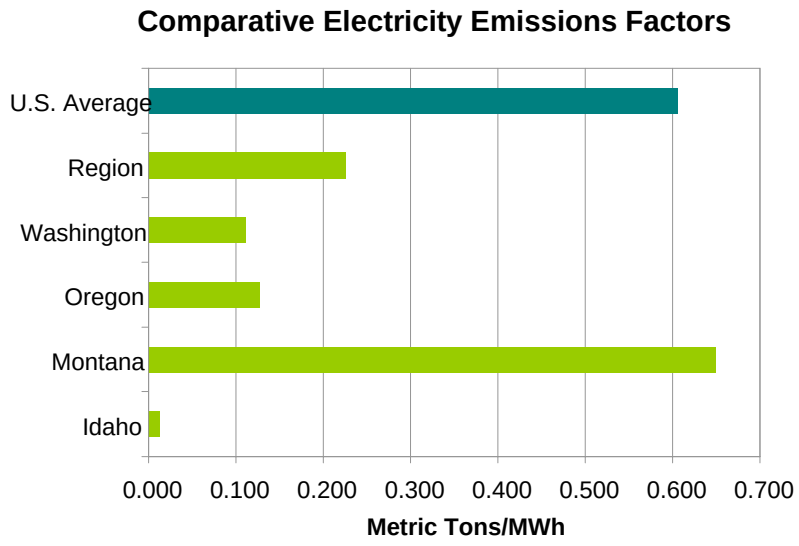
Source: U.S. EPA “Inventory of Greenhouse Gas Emissions and Sinks: 1990-2004” Published in 2006.

National and Regional Greenhouse Gas Electricity Production Emissions Factors



State Emission Factors (metric tons/MWh)

- 0.0 – 0.19
- 0.2 – 0.49
- 0.5 – 0.79
- 0.8 and up



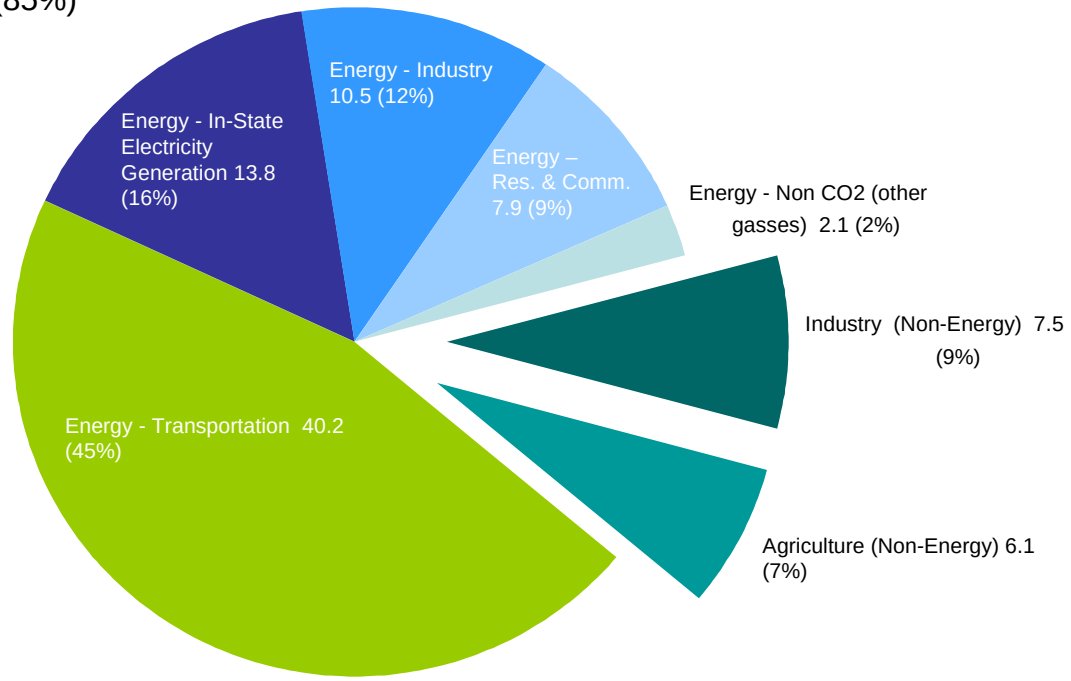
Source: U.S. Energy Information Administration "Updated State and Regional Level Greenhouse Gas Emission Factors for Electricity (March 2002).

Washington State Greenhouse Gas Emissions

Total = 88.3 million metric tons CO2-Equivalent

Based on Electricity Generation in State

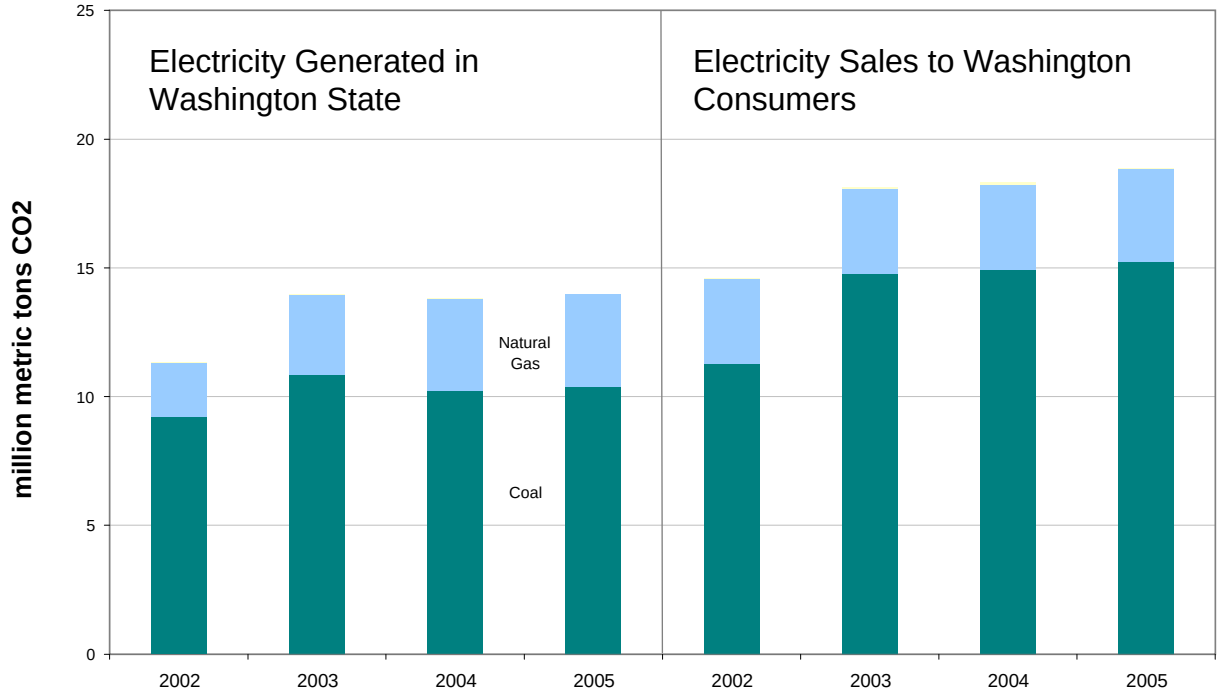
All Energy Combined = 74.6 (85%)



Note: Excludes Residual fuel used in transportation

Source: Washington State Dept. of Community, Trade & Economic Development. "Washington's Greenhouse Gas Emissions: Sources and Trends, 2006

Washington State Greenhouse Gas Emissions from Electricity Production

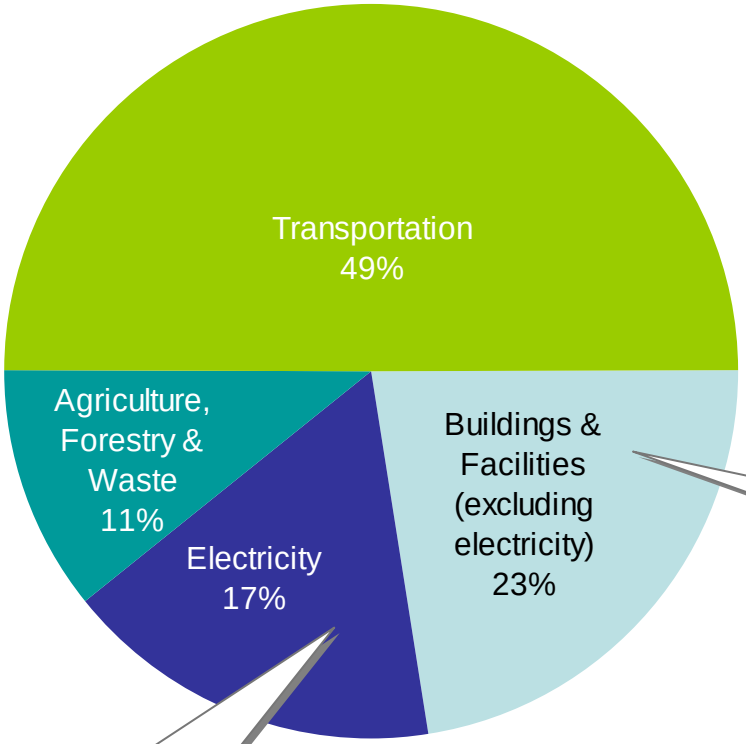


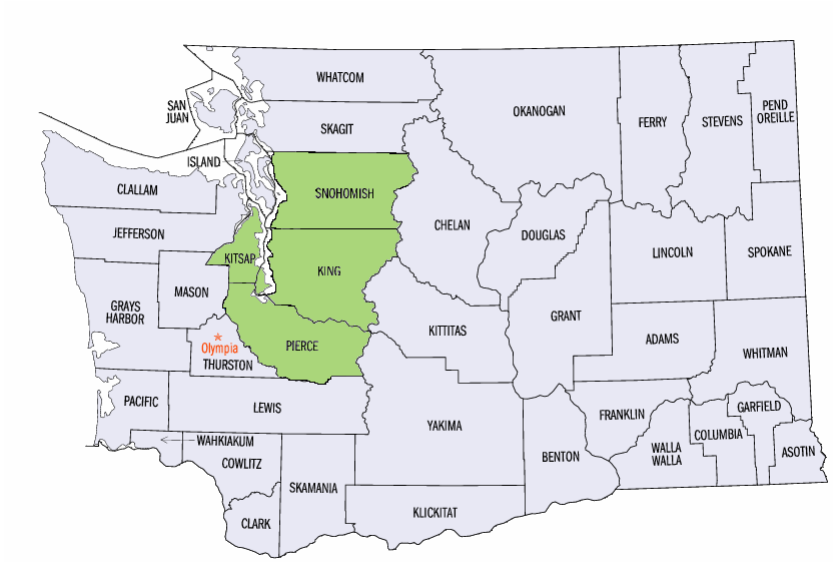
Petroleum also emits CO2 but in quantities too small to register on this chart.

Washington State utilities report their fuel mix based on all power resources used to serve their retail load. This includes electricity imported from other states. This graph shows the difference between GHG emissions from power generated inside Washington State and the emissions from power used to serve utility retail load.

Source: Washington State Dept. of Community, Trade & Economic Development. "Washington's Greenhouse Gas Emissions: Sources and Trends, 2006

Puget Sound Region Greenhouse Gas Emissions



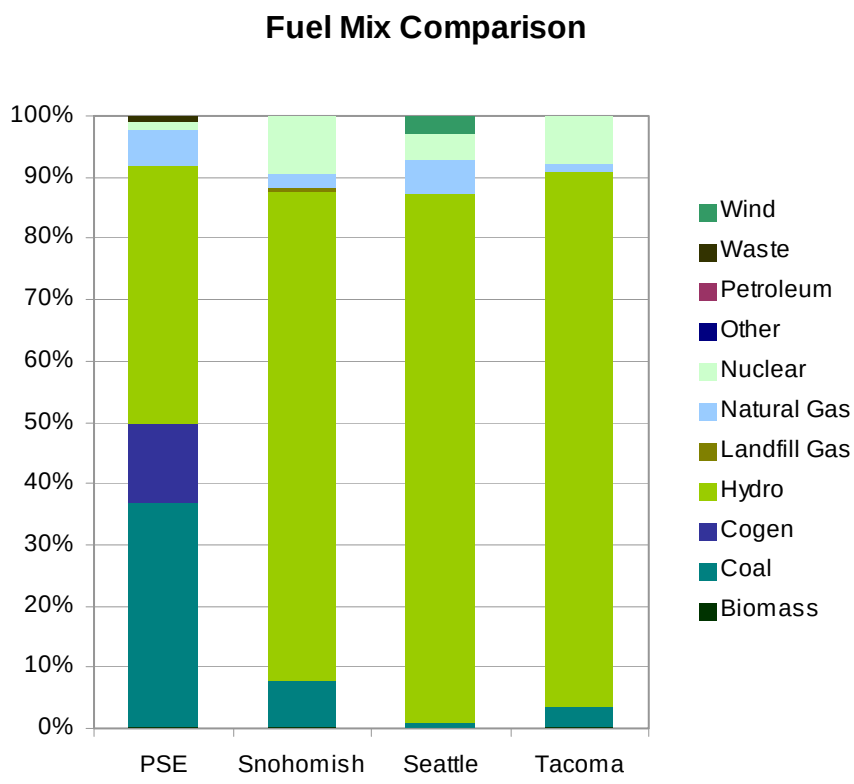


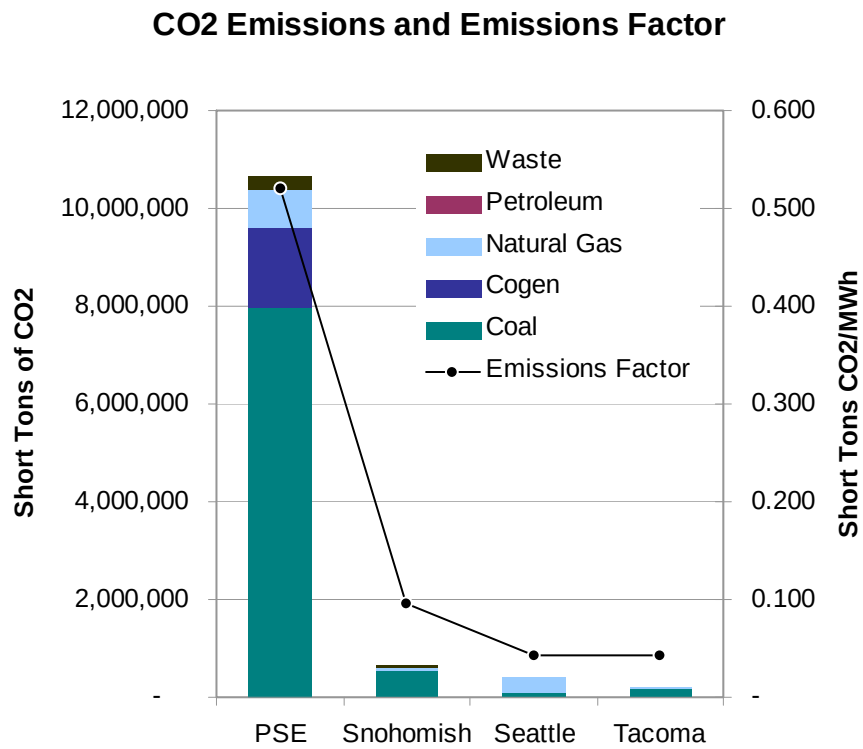
	MMTCO2e
Residential	3.1 (29%)
Commercial	2.7 (25%)
Industrial – Energy	3.5 (33%)
Industrial – Process emissions	1.5 (14%)

	MMTCO2e
Residential	3.4 (43%)
Commercial	2.9 (37%)
Industrial	1.6 (20%)

Source: Puget Sound Clean Air Agency Climate Protection Advisory Committee. "Roadmap for Climate Protection: Reducing Greenhouse Gas Emissions in Puget Sound" 2004. (p.12 of and Appendix F)

Fuel Mix and Greenhouse Gas Emissions for Puget Sound Utilities





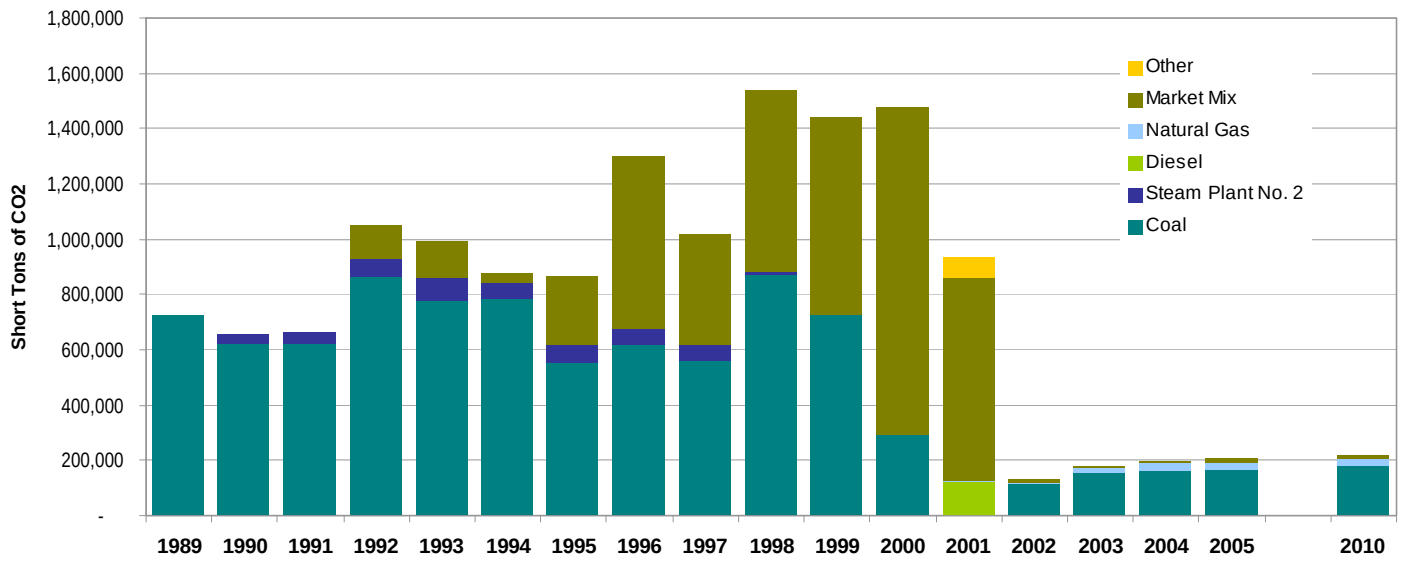
Source: Washington State Dept. of Community, Trade & Economic Development. "2006 Utility Fuel Mix Report."
Emissions factors are calculated based on best available information.

Tacoma Power Greenhouse Gas Emissions from Electricity Power Portfolio

Greenhouse Gas Emissions Estimates for Tacoma Power Resource Portfolio 1990 - 2010

	Emissions Factor (short tons CO2/MWh)	Estimate of CO2 from Tacoma Power Resource Portfolio
1990 - 1992 avg.	0.117	790,355
2000 - 2002 avg.	0.137	847,248
2005	0.034	209,463
2010	0.031	221,075

GHG Emissions from Tacoma Power's Portfolio



Tacoma Greenhouse Gas Emissions from Electricity and Natural Gas

Energy Consumption and Emissions inside Tacoma City Limits

	Residential	
	MWh	Tons CO2
Electricity Use	914,260	31,085
	Therms	Tons CO2
Natural Gas Use	21,687,230	126,220

•Residential electricity consumption for Tacoma Power customers within the City limits is from utility statistical reports and is multiplied by the emissions factor estimate used for the ICLEI modeling.

The estimates for natural gas consumption in this table are uncertain

•For Residential customers this estimate is based on U.S. Census data that identified 26,404 households within the city of Tacoma that use natural gas for home heating. This number was multiplied by the average annual residential usage for PSE customers of 821 therms per customer. An emissions factor of 11.64 lbs of CO2 per therm was used to calculate the total amount of CO2 emissions.

•No attempt has been made to estimate commercial or industrial natural gas consumption.

This highlights an area that needs significant additional investigation.

Greenhouse Gas Accounting Issues

- Personal GHG Calculators available on the Internet
  - Usually not calibrated for local energy supply
  - Emissions factors for electricity may be based on state, regional or national averages
- Greenhouse gas accounting protocols are evolving
  - ICLEI Model can be tuned with appropriate local factors or supplemented with spreadsheet models
  - California is developing a rigorous standardized GHG accounting system
  - There is a new ISO standard (ISO 14064)
- Carbon offsets and GHG trading systems are evolving