

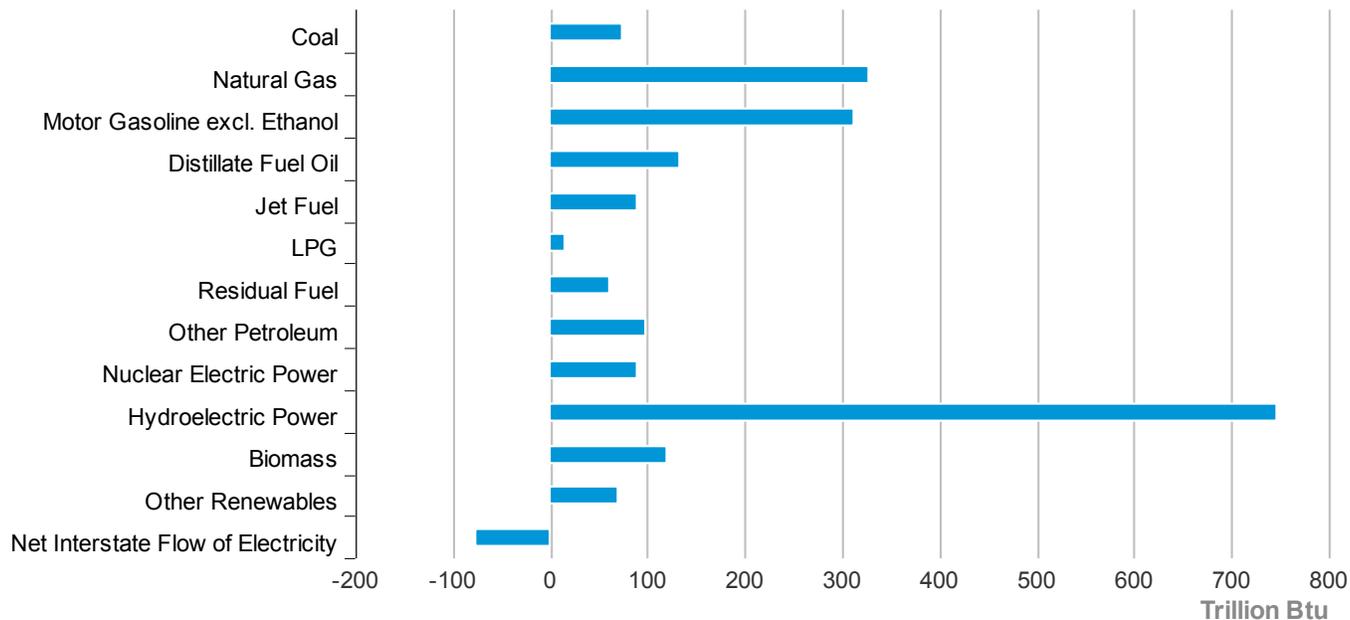
Washington State Energy Profile

Washington Quick Facts

- The Grand Coulee Dam on Washington's Columbia River is the largest hydroelectric power producer in the United States, with a net summer generating capacity of 7,079 megawatts.
- In 2014, Washington was the leading producer of electricity from hydroelectric sources and produced 30% of the nation's net hydroelectricity generation.
- Although not a crude oil-producing state, Washington ranked fifth in the nation in crude oil-refining capacity as of January 2015.
- Washington ranked 10th in the nation in net generation of electricity from wind energy in 2014.
- In 2014, Washington had the lowest average residential retail electricity prices in the nation and the lowest average combined retail electricity price across all sectors.

Last Updated: October 15, 2015

Washington Energy Consumption Estimates, 2013



Source: Energy Information Administration, State Energy Data System

Ex5583-000016-CRK

Data

Last Update: April 21, 2016 | **Next Update:** May 19, 2016

Energy Indicators

Demography	Washington	Share of U.S.	Period
Population	7.1 million	2.2%	2014
Civilian Labor Force	3.6 million	2.3%	Feb-16
Economy	Washington	U.S. Rank	Period
Gross Domestic Product	\$ 427.1 billion	14	2014
Gross Domestic Product for the Manufacturing Sector	\$ 57,772 million	10	2014
Per Capita Personal Income	\$ 49,610	13	2014
Vehicle Miles Traveled	57,211 million miles	19	2013
Land in Farms	14.7 million acres	18	2012
Climate	Washington	U.S. Rank	Period
Average Temperature	50.0 degrees Fahrenheit	31	2015
Precipitation	43.2 inches	22	2015

Prices

Petroleum	Washington	U.S. Average	Period	find more
Domestic Crude Oil First Purchase	--	\$ 27.11 /barrel	Jan-16	
Natural Gas	Washington	U.S. Average	Period	find more
City Gate	\$ 3.21 /thousand cu ft	\$ 3.44 /thousand cu ft	Jan-16	find more
Residential	\$ 9.23 /thousand cu ft	\$ 8.31 /thousand cu ft	Jan-16	find more
Coal	Washington	U.S. Average	Period	find more
Average Sales Price	--	\$ 37.24 /short ton	2013	
Delivered to Electric Power Sector	W	\$ 2.11 /million Btu	Jan-16	
Electricity	Washington	U.S. Average	Period	find more
Residential	9.07 cents/kWh	12.01 cents/kWh	Jan-16	find more
Commercial	8.29 cents/kWh	9.98 cents/kWh	Jan-16	find more

Industrial

4.40 cents/kWh

6.42 cents/kWh

Jan-16

[find more](#)**Reserves & Supply**

Reserves	Washington	Share of U.S.	Period	find more
Crude Oil	--	--	2014	find more
Dry Natural Gas	--	--	2014	find more
Expected Future Production of Natural Gas Plant Liquids	--	--	2014	find more
Recoverable Coal at Producing Mines	--	--	2013	find more
Rotary Rigs & Wells	Washington	Share of U.S.	Period	find more
Rotary Rigs in Operation	0 rigs	0.0%	2013	
Natural Gas Producing Wells	--	--	2014	find more
Production	Washington	Share of U.S.	Period	find more
Total Energy	1,003 trillion Btu	1.2%	2013	find more
Crude Oil	--	--	Jan-16	find more
Natural Gas - Marketed	--	--	2014	find more
Coal	--	--	2013	find more
Capacity	Washington	Share of U.S.	Period	
Crude Oil Refinery Capacity (as of Jan. 1)	631,700 barrels/calendar day	3.5%	2015	
Electric Power Industry Net Summer Capacity	30,993 MW	2.9%	Jan-16	
Net Electricity Generation	Washington	Share of U.S.	Period	find more
Total Net Electricity Generation	9,502 thousand MWh	2.7%	Jan-16	
Net Electricity Generation (share of total)	Washington	U.S. Average	Period	
Petroleum-Fired	NM	0.4 %	Jan-16	find more
Natural Gas-Fired	13.8 %	31.1 %	Jan-16	find more
Coal-Fired	3.9 %	32.2 %	Jan-16	find more
Nuclear	9.1 %	20.5 %	Jan-16	find more

Hydroelectric	66.4 %	7.2 %	Jan-16	find more
Other Renewables	6.3 %	7.6 %	Jan-16	
Stocks	Washington	Share of U.S.	Period	find more
Motor Gasoline (Excludes Pipelines)	544 thousand barrels	2.9%	Jan-16	
Distillate Fuel Oil (Excludes Pipelines)	2,287 thousand barrels	1.8%	Jan-16	find more
Natural Gas in Underground Storage	37,900 million cu ft	0.5%	Jan-16	find more
Petroleum Stocks at Electric Power Producers	W	W	Jan-16	find more
Coal Stocks at Electric Power Producers	W	W	Jan-16	find more
Production Facilities	Washington			
Major Coal Mines	None			find more
Petroleum Refineries	BP West Coast Products (Ferndale), Phillips 66 Company (Ferndale), Shell Oil Products (Anacortes), Tesoro West Coast (Anacortes), U.S. Oil & Refining (Tacoma)			find more
Major Non-Nuclear Electricity Generating Plants	Grand Coulee (U S Bureau of Reclamation) ; Chief Joseph (USCE-North Pacific Division) ; Transalta Centralia Generation (TransAlta Centralia Gen LLC) ; Rocky Reach (PUD No 1 of Chelan County) ; Boundary (Seattle City of)			
Nuclear Power Plants	Columbia Generating Station (Energy Northwest)			find more

Distribution & Marketing

Distribution Centers	Washington			
Petroleum Ports	Anacortes, Seattle, Longview, Port Angeles, Tacoma.			find more
Natural Gas Market Hubs	None			
Major Pipelines	Washington			find more
Crude Oil	Kinder Morgan			
Petroleum Product	Chevron Pipeline, Phillips 66 Pipeline, Enbridge			
Natural Gas Liquids	None			
Interstate Natural Gas Pipelines	Northwest Pipeline Group, Transcanada - Gas Transmission NW			
Fueling Stations	Washington	Share of U.S.	Period	
Motor Gasoline	1,901 stations	1.7%	2014	

Liquefied Petroleum Gases	94 stations	2.5%	2016
Electricity	667 stations	4.3%	2016
Ethanol	21 stations	0.7%	2016
Compressed Natural Gas and Other Alternative Fuels	55 stations	2.2%	2016

Consumption & Expenditures

Summary	Washington	U.S. Rank	Period	
Total Consumption	2,039 trillion Btu	16	2013	find more
Total Consumption per Capita	292 million Btu	30	2013	find more
Total Expenditures	\$ 26,509 million	18	2013	find more
Total Expenditures per Capita	\$ 3,801	40	2013	find more
by End-Use Sector	Washington	Share of U.S.	Period	
Consumption				
» Residential	495 trillion Btu	2.3%	2013	find more
» Commercial	383 trillion Btu	2.1%	2013	find more
» Industrial	569 trillion Btu	1.8%	2013	find more
» Transportation	593 trillion Btu	2.2%	2013	find more
Expenditures				
» Residential	\$ 4,530 million	1.8%	2013	find more
» Commercial	\$ 3,110 million	1.7%	2013	find more
» Industrial	\$ 2,602 million	1.1%	2013	find more
» Transportation	\$ 16,267 million	2.3%	2013	find more
by Source	Washington	Share of U.S.	Period	
Consumption				
» Petroleum	132.4 million barrels	1.9%	2014	find more
» Natural Gas	306.6 billion cu ft	1.1%	2014	find more
» Coal	4.6 million short tons	0.5%	2014	find more
Expenditures				
» Petroleum	\$ 17,219 million	2.0%	2014	find more
» Natural Gas	\$ 2,158 million	1.2%	2014	find more

» Coal	\$ 200 million	0.4%	2014	find more
Consumption for Electricity Generation	Washington	Share of U.S.	Period	find more
Petroleum	2 thousand barrels	0.1%	Jan-16	find more
Natural Gas	9,247 million cu ft	1.1%	Jan-16	find more
Coal	255 thousand short tons	0.4%	Jan-16	find more
Energy Source Used for Home Heating (share of households)	Washington	U.S. Average	Period	
Natural Gas	34.9 %	48.3 %	2013	
Fuel Oil	2.3 %	5.5 %	2013	
Electricity	54.3 %	37.4 %	2013	
Liquefied Petroleum Gases	3.0 %	4.8 %	2013	
Other/None	5.5 %	3.9 %	2013	

Environment

Special Programs	Washington			find more
Clean Cities Coalitions	Western Washington (Seattle)			
Alternative Fuels	Washington	Share of U.S.	Period	find more
Alternative Fueled Vehicles in Use	23,563 vehicles	2.0%	2011	find more
Ethanol Plant Operating Capacity	0 million gal/year	0.0%	2016	find more
Ethanol Consumption	5,723 thousand barrels	1.8%	2014	find more
Total Emissions	Washington	Share of U.S.	Period	find more
Carbon Dioxide	73.0 million metric tons	1.4%	2013	
Electric Power Industry Emissions	Washington	Share of U.S.	Period	find more
Carbon Dioxide	12,427 thousand metric tons	0.6%	2014	
Sulfur Dioxide	12 thousand metric tons	0.4%	2014	
Nitrogen Oxide	17 thousand metric tons	0.8%	2014	

Analysis

Last Updated: October 15, 2015

Overview

Washington's economy developed around the fishing and logging industries during the 19th century.¹ The state's industrial base has expanded with increased access to abundant and affordable energy.^{2,3} Energy resources in Washington include little in the way of fossil fuels,^{4,5} however, the state is the crude oil refining center for the Pacific Northwest.⁶ Washington's greatest energy supply comes from its significant renewable energy resources, especially hydroelectric power.^{7,8} The state's climate ranges from the rainforest in the extreme western part of Washington, where the heaviest precipitation in the continental United States occurs, to near desert conditions in areas east of the Cascade Range.⁹ Washington's western forests provide ample biomass, and many areas of the state are conducive to wind and geothermal power development.^{10,11,12}

Washington is a leader in the energy-intensive forest products industry and the transportation equipment manufacturing industry.¹³ The industrial sector and the transportation sector each consume almost three-tenths of the total energy used in the state.¹⁴ The residential sector accounts for only about one-fourth of the state's total energy consumption, in part because Washington's more densely populated areas are west of the Cascade Range where the summers are cool and comparatively dry, and the winters are mild.^{15,16,17} Overall energy consumption in Washington is well below the national median on a per capita basis, and electric power generation in Washington exceeds the state's needs.^{18,19}

Washington is the crude oil refining center for the Pacific Northwest.

Petroleum

Early oil exploration activity in Washington was largely unsuccessful. Only small amounts of oil were found, and no oil production has been reported since the early 1960s.²⁰ Nonetheless, Washington is a principal refining center serving Pacific Northwest markets.²¹ The five refineries in Washington receive crude oil supplies primarily from Alaska by tanker.^{22,23} However, Alaskan production is declining, and Washington's refineries have become increasingly dependent on crude oil from other sources. In addition to imports from Canada and other countries, all five refineries are now receiving or plan to receive crude oil by railcar from the Bakken shale formation in North Dakota.^{24,25,26}

Motor gasoline accounts for nearly half of Washington's consumption of petroleum products.²⁷ The use of oxygenated motor gasoline is required throughout the state.²⁸ Motor gasoline is produced at Washington's five oil refineries. The largest oil refinery in the state can process about 225,000 barrels of crude oil per calendar day. The other four refineries each process between about 40,000 and 145,000 barrels of crude oil per day.^{29,30,31,32,33} Some refineries produce CARB (California Air Resources Board) motor gasoline, as well as conventional motor gasoline.³⁴ Most of these refineries also produce jet fuel. Washington is among the top 10 states in the nation in jet fuel consumption.^{35,36} Several large U.S. Air Force bases and U.S. Navy installations located in the state contribute to the considerable amount of jet fuel consumed.³⁷

Washington's jet fuel consumption is among the highest in the nation.

Natural gas

A small amount of natural gas was produced in south-central Washington in the mid-20th century, but there has not been any production in the state since then. Exploration wells drilled in the state have resulted in the development of Washington's only natural gas storage field.³⁸ Because Washington has no natural gas production, the state relies heavily on natural gas produced in Canada that is transported by pipeline to U.S. markets.³⁹ The Sumas Center, in

Canada, near the border between Washington and British Columbia, is the principal natural gas trading and transportation hub for the U.S. Northwest.⁴⁰ The Northwest Pipeline system supplies natural gas to markets in western Washington,⁴¹ and the Gas Transmission Northwest Pipeline enters the state from Idaho, bringing Canadian natural gas to the eastern part of Washington.^{42,43} More than three-fifths of the natural gas entering Washington flows south to Oregon and beyond.⁴⁴

The residential sector is typically the leading natural gas-consuming sector in Washington, followed closely by the industrial sector. Occasionally the electric power sector consumes the largest share.⁴⁵ More than one-third of Washington households use natural gas as their primary energy source for home heating.⁴⁶

Coal

Washington's last remaining coal mine was closed in 2006.⁴⁷ The mine had provided most of the coal used at the large coal-fired power plant in Centralia, Washington.⁴⁸ Fuel for the Centralia power plant is now delivered by train from the Powder River Basin of Wyoming and Montana.⁴⁹ Small amounts of coal are delivered to industrial facilities in the state.⁵⁰ Large amounts of western coal are shipped by rail through Washington's Seattle Customs District, the fifth-largest coal export center in the nation and the largest on the West Coast, on the way to Canada for export to Asia.⁵¹ Several proposals for the construction of coal export terminals in Washington have been made, but only two are still under consideration—one in Bellingham, Washington and one in Longview, Washington.⁵²

Electricity

Washington is the leading U.S. producer of hydroelectric power, routinely contributing more than one-fourth of the nation's total net hydroelectric generation.⁵³ Eight of the state's 10 largest power plants are hydroelectric facilities,⁵⁴ and most of them are located on the Columbia River.⁵⁵ The largest hydroelectric facilities in Washington are, at more than 60 years of age, among the oldest generating facilities in the nation.^{56,57} Federal entities built and continue to own or operate the largest hydroelectric facilities in Washington.⁵⁸ The Bonneville Power Administration, one of four federal power marketing administrations,⁵⁹ is the marketer of electricity produced at the federal dams in the state.⁶⁰ Hydroelectric power accounts for about seven-tenths of Washington's electricity generation and dominates the state's electricity market, providing abundant and relatively inexpensive electricity.^{61,62}

Natural gas-fired power plants, the state's one nuclear power plant, wind turbines, a single coal-fired power plant, and, to a lesser extent, biomass, account for almost all of Washington's remaining net electricity generation.⁶³ The state's two largest nonhydroelectric power plants by capacity are the coal-fired power plant and the nuclear generating station.⁶⁴ Washington's one large coal-fired power plant generates enough electricity each year to supply a city about the size of Seattle. The site's two coal-fired units are scheduled to be decommissioned, one in 2020 and the other in 2025, as part of a plan to reduce emissions.^{65,66} Conversion of the units to natural gas or construction of a new natural gas-fired power plant at the site is being considered.⁶⁷ Nuclear power provides less than one-tenth of Washington's net electricity generation.⁶⁸ The state's only nuclear power plant, the Columbia Generating Station, is located near the Columbia River in the south-central part of the state on the U. S. Department of Energy's Hanford site.⁶⁹

Net electricity generation exceeds retail electricity sales in Washington. The state is an exporter of electricity to the Canadian power grid and supplies U.S. markets as far away as California and the Southwest.^{70,71} Large amounts of cheaply produced hydroelectric power leave Washington via the Western Interconnection, which runs from British Columbia and Alberta, Canada through Washington and Oregon to southern California and the northern part of Baja California, Mexico. The entire system covers all or parts of 14 states.⁷² Because of the relatively low operating costs of hydroelectric power generation, Washington's average retail electricity prices are the lowest in the nation.⁷³ More than

half of all Washington households are heated with electricity.⁷⁴

Renewable energy

Washington leads the nation in electricity generation from renewable resources.⁷⁵ The state generates more than three-fourths of its electricity from renewable resources, predominantly hydroelectric power, and it produces about one-sixth of the electricity generated nationwide from these resources.⁷⁶ Some renewable resources provide energy in forms other than electricity, such as the wood used in wood stoves.⁷⁷ When these other types of energy are included, renewable resources account for more than nine-tenths of Washington's total overall energy production.⁷⁸

The Columbia River, second only to the Mississippi River in the volume of its flow, enters Washington near the state's northeastern corner and flows in an arc through the eastern half of the state, before forming much of the boundary between Washington and Oregon. Draining all of eastern Washington and the western slopes of the Cascade Range south of Mt. Rainier, the river provides water for vast hydroelectric projects.⁷⁹ The Grand Coulee Dam on Washington's Columbia River is the largest hydropower producer in the United States. The dam's power plant is the nation's largest electricity generating facility of any kind when measured by capacity.⁸⁰

Although nonhydroelectric renewable energy sources provide less than one-tenth of Washington's net electricity generation,⁸¹ the state is among the top 10 in electricity generation from these resources.⁸² Washington's more than 3,000 megawatts of installed capacity make wind energy the second-largest contributor to the state's renewable generation after hydropower.^{83,84} Washington's first utility-scale wind project came online in 2001, and development of resources along the Columbia Gorge, a high wind resource area, has continued in recent years.⁸⁵ Washington is also a substantial producer of energy from wood and wood waste,⁸⁶ and the state accounts for almost 3% of the nation's net electricity generation from biomass.⁸⁷ Mountainous areas throughout the state and a major portion of the lowlands west of the Cascades are covered by timber.⁸⁸ Despite the large biomass resource, Washington generates more than four times as much electricity from wind as from biomass.^{89,90}

Washington has both low- and high-temperature geothermal resources, primarily in the Columbia Basin and in the southern Cascade Range.^{91,92} Although low-temperature geothermal resources do not have a large impact on the energy economy as a whole, they have direct-use applications, such as heating buildings, greenhouses, and water, and for use in geothermal heat pumps. More than 900 low-temperature geothermal wells have been drilled in the Columbia Basin. Undeveloped high-temperature geothermal areas in Washington's volcanic Cascade Range have an estimated electric potential of up to 300 megawatts. If fully developed, it is estimated that this 300-megawatt potential could produce about 2.5 billion kilowatt-hours of electricity per year, enough to provide electricity to more than 265,000 average U.S. homes.⁹³

Washington has several programs focused on energy independence, energy conservation, and energy efficiency. The state provides incentives for investment in production and distribution facilities for biofuels created from agricultural product wastes from Washington's almost 15 million acres of farmland and for electricity generation from anaerobic digestion.^{94,95} Facilities in Washington have the capacity to produce more than 100 million gallons of biodiesel per year.⁹⁶ The state's Energy Independence Act, enacted in 2006, seeks energy independence for Washington, and the Pacific Northwest region as a whole, through increased energy conservation and through the use of appropriately sited renewable energy projects.⁹⁷ The act requires utilities with at least 25,000 retail customers to obtain 15% of their electricity from qualified new renewable resources by 2020 and to undertake cost-effective energy conservation.^{98,99} In 2005, Washington became the first state in the country to adopt high-performance green buildings standards for new

*Washington
leads the nation
in electricity
generation from
renewable
resources.*

state-funded buildings.¹⁰⁰

Energy on Tribal Lands

Washington is 1 of 14 states with more than 100,000 Native American residents.¹⁰¹ The 29 federally recognized tribes in the state have more than 2.5 million acres of tribal land.^{102,103,104} Like much of Washington, tribal lands in the state have substantial renewable resource potential. Hydropower, biomass, and geothermal energy are abundant. The largest reservation in the state, the Colville Reservation, is working on creating a reservation-wide tribal utility that will use distributed generation and renewable energy projects to support the tribal goals of self-reliance and environmental sustainability.¹⁰⁵ Land that was once part of two Washington reservations, the Confederated Tribes of the Colville Reservation and the Spokane Tribe Indian Reservation along the Columbia River, is now the site of Grand Coulee Dam.¹⁰⁶ Smaller hydroelectric projects on tribal lands in Washington include power generated from water flowing in the Wapato Irrigation Project canals on the Yakama reservation.¹⁰⁷ Hydropower generation potential on the Yakama reservation, the second-largest reservation in the state, is among the highest of any reservation in the nation.¹⁰⁸ The Yakama tribe is also investigating opportunities to use its solar and woody biomass resources.^{109,110}

Washington tribal lands also have substantial biomass and geothermal resources. The Yakama and Coeur d'Alene tribal lands of Washington are among the top five reservations in the nation in their potential for electricity generation from solid biomass.¹¹¹ The Quinault Indian Nation on Washington's Pacific Coast has abundant woody biomass and is working toward using it for heat and energy through the development of wood pellet manufacturing on the reservation.^{112,113} The greatest potential for significant geothermal generation on Washington's tribal lands is in the south-central part of the state, but tribal lands in the northeastern and the northwestern parts of the state also have geothermal electricity generation potential.¹¹⁴

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Other Resources

Energy-Related Regions and Organizations

- [Coal Region: Western](#)
- [Petroleum Administration for Defense District \(PADD\): 5](#)
- [North American Electric Reliability Corporation \(NERC\) Region: Western Electricity Coordinating Council \(WECC\)](#)

Other Websites

- [Washington State Energy Office](#)
- [Washington Utilities and Transportation Commission](#)
- [Department of Commerce - Weatherization](#)
- [Washington State LIHEAP](#)
- [Washington State Department of Enterprise Services - Construction and Public Works - Conserve Energy](#)

- [Alternative Fuels and Advanced Vehicle Data Center - Federal and State Incentives and Laws](#)
- [Benefits.Gov Energy Assistance \(105\)](#)
- [DSIRE - Database of State Incentives for Renewables and Efficiency](#)
- [National Association of Regulatory Utility Commissioners \(NARUC\)](#)
- [National Association of State Energy Officials \(NASEO\)](#)
- [National Conference of State Legislatures \(NCSL\)-Issues and Research - News Highlights: Issues and Research - Energy](#)
- [National Renewable Energy Laboratory \(NREL\)-Dynamic Maps, Geographic Information System \(GIS\) Data and Analysis Tools - Maps](#)
- [U.S. Geological Survey \(USGS\) Maps, Imagery, and Publications - Maps](#)
- [Interstate Oil and Gas Compact Commission](#)
- [Bureau of Ocean Energy Management](#)
- [Western Interstate Energy Board, Western Governors Association](#)
- [Bonneville Power Administration](#)
- [West Coast Green Highway](#)
- [Northwest Power and Conservation Council](#)
- [Electric Drive WA](#)
- [Washington State Department of Agriculture - Bioenergy at WSDA](#)
- [United States Department of Health and Human Services - Administration for Children and Families - Low Income Home Energy Assistance Program](#)

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States:Electricity Transmission Lines - Ventyx, Velocity Suite;Grey Base:National

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| ▲ Underground Coal Mine | ⊕ Nuclear Power Plant | ⊕ Wind Power Plant |
| ⊕ Biomass Power Plant | ● Other Power Plant | ⊕ Wood Power Plant |
| ⊕ Coal Power Plant | ⊕ Other Fossil Gases Power Plant | ⊕ Petroleum Refinery |
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