

Broos Campbell

Ghostwritten chapter from Washington: The Nature of Innovation

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(N.B.: It was house style to include mining in the energy section without a separate subhead.)

## **Light and Motion**

### **Trade, Transportation, and Energy in Washington State**

Since 1788, when Yankee trader Robert Gray plied the Pacific Northwest in search of sea otter pelts for the China trade, Washington has been the focus of a lucrative international import-export market. Its deepwater ports attract hulls laden with petroleum, seafood, and automobiles, and ideally suit it for shipbuilding and other maritime industries. Those same harbors attract further trade by air and land, and continue to foster a lucrative commerce with China and the Pacific Rim. By some estimates, nearly a third of Washington's jobs are related to trade. The state's rushing rivers, meanwhile, provide an abundance of hydroelectricity that keeps the price of power down, its utilities harvest a burgeoning crop of alternative energy from wind farms and other green methods, and its miners extract a wealth of useful minerals ranging from lead to gold.

## **Trade**

Asian markets are a day's sailing time closer to Washington than to the rest of the West Coast, and the state's 75 port districts, from Allyn to Woodland, all do their part to facilitate the flow of goods and commodities through the region. Washington's top three imports in 2006 were crude oil, motor vehicle parts and accessories, and motor vehicles. The petroleum was worth \$4.8 billion, the auto parts were worth \$3.4 billion, and the cars and trucks were worth \$3.1 billion.

The traffic flows both ways, naturally. Between 2006 and 2007 the state enjoyed an increase in export revenues of nearly 25 percent, to some \$66 billion, with aircraft, space vehicles, and related aerospace products accounting for \$41.8 billion of that. Other major exports include fruits and vegetables; industrial machinery, electronics, optics, and medical instruments; lumber, wood, and paper; and seafood.

Nearly half of Washington's exports go to Asia. Trade with China, the state's largest overseas market, brought in some \$9.6 billion in 2007, while trade with the state's second- and third-largest trading partners, Japan and Canada, brought in \$7.7 billion and \$7.6 billion respectively.

## **Transportation**

Washington is generously endowed with deepwater harbors and the interstate highways, international airports, and continental and short-line railroads to serve them. A dozen marine terminals from Puget Sound to the Columbia River keep the equivalent of more

than 100,000 people busy, with the ports of Seattle and Tacoma handling the largest portion of the maritime trade.

The Port of Seattle—the country’s 11th-largest port when ranked by the value of its overseas trade, which in 2007 added up to about \$39.5 billion—provides moorage for break-bulk carriers, roll-on/roll-off ships, large trawlers and other commercial fishing vessels, and excursion boats and passenger liners. During the 2007 season, 190 cruise-line calls embarked and disembarked 755,000 passengers at Terminal 30 and Pier 66. The port also owns and operates Seattle-Tacoma International Airport (Sea-Tac), the region’s largest commercial air facility. The airport generates about 22,000 on-site jobs and another 14,000 jobs nearby.

The Port of Tacoma, one of the largest container ports in North America, had a combined foreign and domestic trade in excess of \$36 billion in 2007, primarily from grain going out and machinery coming in. The port handles some two million 20-foot equivalent units (TEUs) and 481,000 lifts a year at its four on-dock intermodal yards. Meanwhile the Puyallup Tribal Council, stevedoring and terminal operator SSA Marine, and the port are working together to widen the Blair Waterway and build a new on-dock intermodal facility by 2012.

Washington companies that handle logistics, freight forwarding, and customs brokerage include Expeditors International of Washington, an expert in export services to the Pacific Rim; Robert E. Landweer & Co., one of the oldest full-service customs brokerage firms in the Pacific Northwest; and TransGroup Worldwide Logistics, with more than 40 locations in North America and 150-plus around the world. All three companies are headquartered in Seattle.

Puget Sound is home to numerous operations to build ships and keep them in good repair. Among them are Lake Union Dry Dock, founded in 1919, with freshwater facilities on the east side of Lake Union in Seattle; Todd Pacific Shipyards for building, maintaining, and repairing commercial and military vessels in Seattle, Bremerton, and Everett; and the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), which builds, maintains, repairs, and recycles military vessels. The PSNS & IMF's main yard is in Bremerton, with other sites in Everett and Bangor, as well as San Diego, Boston, and Japan.

To the south and east of Puget Sound, the Columbia River and its main tributary, the Snake, form an enormous highway that links the interior Pacific Northwest with the world. Ocean-going ships pass upriver to Vancouver, while giant barges reaching as far east as Idaho carry wheat and barley, lumber, fertilizer, steel, fuel, and even live salmon. The Army Corps of Engineers is dredging the lower Columbia to 43 feet, a three-foot increase in depth that will allow large container ships to reach Vancouver comfortably. The corps expects to complete the project in 2010.

The laying of the Northern Pacific Railroad's direct line across the Cascades to Tacoma in 1883 and Great Northern's arrival in Seattle 10 years later gave an incalculable boost to the state's timber, mining, and wheat industries. Today rail freight has become part of a much larger multimodal transportation system, yet it remains a powerful economic engine in its own right. Two transcontinental railroads, BNSF and the Union Pacific, connect the state with points south and east, while numerous short-line and belt-line railroads haul wheat and timber to ports on the Columbia River and the Pacific coast, and thread the industrial corridor along Puget Sound.

Helping farmers and cooperatives get their wheat and barley to deepwater ports is the Washington Grain Train, a fleet of 89 hopper cars owned by the state and the Port of Walla Walla. The Grain Train, which was seeded with federal funds and operates free of taxpayer subsidies, is managed by the Washington State Department of Transportation (WSDOT) and the ports of Walla Walla, Moses Lake, and Whitman County. WSDOT also recently bought several rail lines as a way to keep shipping costs low, preserve infrastructure, and reduce wear on highways.

Amtrak offers passenger service from Chicago to Seattle and Vancouver on its Empire Builder line, which splits into Seattle and Portland trains at Spokane, and from Los Angeles to Seattle on the Coast Starlight route. Amtrak also carries passengers between Eugene, Oregon, and Vancouver, British Columbia, on the Amtrak Cascades line. Metropolitan passenger rail lines in Washington include Tacoma Link light rail in downtown Tacoma, the SoundTransit commuter line linking Everett and Tacoma with Seattle, and the monorail and Seattle Streetcar's South Lake Union line in downtown Seattle. Seattle Streetcar, which commenced service in December 2007, carried more than 280,000 riders in its first six months of service.

Three primary interstate highways—I-5 running north and south, I-90 running east and west, and I-82 angling through central Washington—cross 15 scenic mountain passes and some of the world's longest floating bridges on their way to Washington ports and markets. A fourth interstate, I-405, loops through Kirkland, Bellevue, and other high-tech boomburbs east of Lake Washington. Among WSDOT's many highway improvement projects are the North Spokane Corridor, a limited-access route that will link I-90 with U.S. 395, and the heavy-haul industrial corridor along U.S. 97. The latter

route, which passes through the central Washington cities of Yakima and Wenatchee en route from the Canadian border down to the Sam Hill Bridge across the Columbia River, allows permitted trucks with divisible loads to significantly exceed Washington gross weight limits to reflect Canadian limits. Another WSDOT perk for truckers is a transponder that verifies weights and credentials at highway speeds, allowing trucks to bypass weigh stations.

A robust aerospace industry, along with its being the jumping-off place for Alaska and the Far East, has made Washington a crossroads of the air. Seattle-Tacoma International Airport (Sea-Tac) moved 31.3 million passengers and 319,000 metric tons of cargo in 2007; the state's other primary airports are King County International, or Boeing Field, five miles south of downtown Seattle, and Spokane International to service the eastern part of the state and the Idaho panhandle. Sea-Tac is home to Alaska Air Group, the parent company of Alaska Airlines and regional carrier Horizon Air Industries. The smiling Eskimo's late-model Boeing jets carry some 17 million travelers a year.

The layout of the cities around Puget Sound requires a large fleet of ferries. Washington State Ferries' 28 boats—the largest ferry fleet in the country—transport more than 24 million passengers annually between 20 different landings from Tacoma in the south to British Columbia in the north.

For longer seafaring adventures, passengers in Puget Sound may board ships run by the Holland America Line, Windstar Cruises, the Majestic America Line, and Cruise West. Holland America steams from its Seattle terminal to Alaska, Australia, and the Far East. Windstar, sold by Holland America to Ambassadors International in 2007, operates

sail-powered luxury liners—which is particularly interesting as fuel costs become increasingly volatile—while Seattle-based Majestic America, put up for sale by Ambassadors in 2008, plies historic waters from the Mississippi River to Alaska’s Inside Passage. Cruise West, founded by Alaska tourism pioneer Chuck West in 1946, leads informal, small-ship voyages to Alaska, East Asia, and Central America, as well as up the Columbia and Snake rivers.

## **Energy**

Washington’s large military and aerospace presence gives it a thirst for petroleum, particularly aviation fuel. However, the state is a major refiner of Alaskan and Canadian crude, which it distributes across the Pacific Northwest, and federally operated hydroelectric dams on the Columbia and Snake not only make Washington the nation’s largest producer of hydroelectric power, but allow it to be a net electricity exporter. The Columbia’s Grand Coulee Dam alone can produce 6,800 megawatts of hydroelectricity a year, giving it the fourth-largest capacity in the world, while cities such as Seattle and Tacoma supplement federal output with hydroelectric dams of their own. In 2008 the average national cost for industrial power was 9.08 cents per kilowatt hour, but in Washington the rate was 6.91 cents.

Hydroelectricity satisfies as much as three-quarters of Washington’s power needs at any given time, and although the state also produces electricity from other renewable sources such as wind and biomass, the bulk of the remainder comes from coal, natural gas, and nuclear fission. Washington’s largest and oldest power utility is Puget Sound

Energy (PSE), which supplies electricity to over a million customers and natural gas to about 750,000 customers. PSE, which is based in Bellevue and had revenue of \$3.2 billion in 2007, has declared its intention to be carbon neutral by 2050. It operates two wind farms to date, the Hopkins Ridge Wind Facility in Columbia County and the Wild Horse Wind Facility in Kittitas County. Other important suppliers are Energy Northwest, a joint operating agency that distributes electricity at cost to 22 member utilities across the state, including Seattle City Light and Tacoma Power, and is headquartered north of Richland, and Avista Corporation of Spokane, which supplies energy to some 352,000 electric and 311,000 natural gas customers in the Pacific Northwest.

The Pacific Northwest National Laboratory (PNNL) in Richland, meanwhile, is an important economic force for the Tri-Cities area. A U.S. Department of Energy national laboratory, it has a staff of nearly 4,000 and an annual business volume of \$760 million. It conducts research on energy, the environment, and security. By making technological resources available, PNNL has assisted more than 400 companies in the region.

## **Mining**

Washington's leading nonfuel mineral commodities are those used in the building trades, primarily sand and gravel, crushed stone, and portland cement. However, the state has always enjoyed a lode of precious metals such as gold and silver, as well as workaday ones such as lead and zinc. Other commercially significant minerals produced in Washington are cadmium, a byproduct of zinc production that is useful in batteries and



pigments, and diatomite, a soft, sedimentary rock that is familiar as cat litter and, when mixed with nitroglycerin, as dynamite.