3.8 Energy and Natural Resources

3.8.1 Existing Conditions

Energy sources in Walla Walla County, Washington and Umatilla County, Oregon include natural gas for heating and cooking and electricity provided by local cooperatives, utility districts, and PacifiCorp delivered through their own transmission systems and through Bonneville's transmission system.

The project site is located within 5.9 miles of the PG&E Gas Transmission-Northwest (GTN) natural gas transmission line, one of the two major gas pipeline transmission systems in the Northwest. The GTN pipelines draw natural gas from Alberta in Canada's Western Canadian Sedimentary Basin, Canada's largest natural gas resource (see Figure 3.8-1). The proposed power plant would interconnect with this existing gas transmission pipeline. The other major Northwest pipeline is the property of the Williams Company (formerly Northwest Pipeline). The Williams pipeline draws gas from both the Rocky Mountains region and the gas fields of British Columbia. The Williams pipeline interconnects with the GTN pipeline at the Stanfield Exchange in northern Oregon.

The proposed interconnection with the GTN line would give the Wallula Power project access to a portion of the over 101 trillion cubic feet (Tcf) of proven Canadian natural gas reserves through the combination of GTN and Williams Company gas supplies. In addition, the proposed agreement for interruptible gas transmission with Williams Company gives the Wallula Power Project access to a portion of the reserves in the U.S. Rocky Mountain region.

The proposed project would connect to existing wells in the area carrying water to the generation plant via an underground pipeline. See Section 3.3, Water Resources, for further information on water supplies and sources.

3.8.2 Impacts of the Proposed Action

3.8.2.1 Construction

Generation Plant and Pipelines

Energy Consumption

The proposed generation plant, the supporting makeup water supply pipeline, and the natural gas supply pipeline would be constructed using materials that require energy for their production. Energy would be required to transport these materials to the project site and to operate construction equipment such as cranes, trucks, tools, and vehicles used in the construction of the power plant and pipelines. Consumables including pressurized gases and water for testing and dust suppression would be required.

Expected energy consumption during construction would be

- approximately 520,000 gallons of diesel fuel for mobile construction equipment,
- approximately 130,000 gallons of gasoline for mobile construction equipment,
- a total of 14,300 megawatt hours (MWh) of electricity with a maximum demand of 1.5 megawatt (MW) at 480 volts alternating current (VAC) during a normal scheduled 40 to 60 hours of construction per week, and
- nominal energy demand during nonworking hours, which would primarily consist of lighting for security purposes.

The level of energy consumption during construction would not significantly impact locally available energy resources.

Petroleum fuel for construction equipment and temporary electricity would be purchased from local or remotely located commodity and material suppliers. Although the suppliers of petroleum fuels are not yet selected, they would most likely be from the Tri-Cities area and would not significantly impact local supply. Electricity would come from a local utility.

Nonrenewable Resources

Natural resources used in the construction of the Wallula Power Project would include water, sand and gravel, steel (from iron ore) and concrete (from aggregate, sand, and cement quarries and pits), diesel fuel, gasoline and electricity. Approximately 5,000 gallons of water per day with a maximum demand of 45,000 gallons per day in the first several months would be consumed for dust suppression and other construction purposes. Approximately 14,000 tons of sand and gravel (aggregate) for concrete would be consumed to build the power plant and pipelines. Construction bulk materials, such as gravel and sand aggregate, would be supplied locally from existing quarries within a 25-mile radius of the project site. The nonrenewable resource requirements during construction would not significantly impact local supply.

Conservation and Renewable Resources

Before construction, a BMP manual would be developed and submitted to EFSEC for review at least 90 days prior to the start of construction. Such BMPs would include but not be limited to

- the use of on-site fueling to minimize trips off-site,
- the use of low flow water fixtures to conserve water usage, and

- the use of recycled products when applicable for the proposed project.

During operation, the Wallula Power Project would consume approximately 12,000 gallons per year of diesel fuel for vehicles, the emergency diesel generator, and the diesel fire pump. The project would also consume approximately 4,800 gallons of gasoline for vehicles annually. Fuel would be purchased in the Tri-Cities area.

Transmission Line and Associated Facilities

Aluminum, steel, wood, gravel, sand, and other nonrenewable material would be used to construct steel structures, conductors, insulators, access roads, and other facilities. Aluminum and steel would be ordered from mills and fabrication facilities. Sand, gravel, and crushed rock may come either from on-site borrow pits or from outside sources. Some petroleum-based fuels would be used for vehicles and equipment and steel for structures.

The following measures would be used to reduce impacts to supplies of energy and natural resources.

- The number of structure locations would be optimized to reduce the amount of steel required for construction.
- Construction vehicles would be regularly serviced to optimize fuel consumption.
- Crushed rock for roads would be used only where existing soil conditions require base materials and/or filter fabric for stability.

The quantities of fuel and materials required for construction of the transmission line would not be sufficient to create impacts on the availability of fuel and materials locally, regionally, or nationally.

3.8.2.2 Operation and Maintenance

Generation Plant and Pipelines

Energy Consumption

The project would generate approximately 280.1 million MWh of energy for sale over a 35-year operating life, or an annual average generation of approximately 8.0 million MWh. To achieve this generation, the project would consume approximately 2,041,200,000 MMBtu (2.017 Tcf) of natural gas (higher heating value) over its 35-year life, or an average of approximately 58,320,000 MMBtu (57.63 billion cubic feet) of natural gas (higher heating value) each year. During periods of the year when the power plant would be offline, the applicant would purchase approximately 2,000 MWh of electrical energy to operate the plant auxiliaries and for plant startup requirements.

Energy Sources

Natural Gas. The project would use natural gas as its only source of fuel for electric energy generation. The applicant has entered into long-term natural gas transportation agreements with GTN and TransCanada Pipeline for the firm delivery of up to 175,000 Dth/day of natural gas from Alberta, Canada to the project site. A second option is currently being considered in which the applicant contracts with the Northwest Pipeline for interruptible transportation services. Since the Williams Pipeline is "bi-directional" (flow in two directions), it will provide access to alternative gas sources in the Rocky Mountain region of the U.S. or the gas fields in British Columbia.

This second option could provide fuel for HRSG duct-firing or a lower cost fuel source under certain market conditions. An illustration of the pipeline connections to the gas fields and the project is provided in Figure 3.8-1, and a discussion of the size of the gas fields and the pipelines is provided in the following section entitled "Availability of Natural Gas." The applicant's strategy provides the Wallula Power Project with access to all of the major gas supply basins in the region. This approach ensures the delivery of long-term competitive natural gas fuels to the project and reduces the impact of potential natural gas shortages in any one region and the resultant impacts on natural gas fuel pricing.

The applicant proposes to enter into an interconnection agreement with GTN that would define the terms and conditions under which GTN would engineer, construct, and operate a natural gas pipeline interconnection. This natural gas pipeline interconnect would begin at the proposed gas metering building located at the southeast corner of the project site and would run approximately 5.9 miles to the existing GTN transmission system at a point southeast of the project site. The interconnect would be engineered, designed, constructed, owned, and operated by GTN under the operational and environmental conditions of their FERC permit.

Availability of Natural Gas. The applicant has contracted for new natural gas pipeline capacity. Sufficient natural gas pipeline capacity additions have been identified to supply all anticipated natural gas demands over the economic life of the project.

The long-term availability of natural gas is addressed in a report published by Energy Information Administration, U.S. Department of Energy, May 2001, entitled U.S. Natural Gas Markets: Recent Trends and Prospects for the Future. Section 3 of the report provides an outlook for the U.S. natural gas market. The key points from this report are summarized below.

- In the year 2000, U.S. natural gas consumption was more than 22 Tcf. Consumption is expected to escalate an average 2.3% annually, increasing consumption to 34.7 Tcf in the year 2020. The increased demand is expected to be accompanied by a moderate increase in natural gas wellhead price, which is projected to be less than $3.05/MMBtu in constant 1999 dollars in the year 2020 according to the Energy Information Administration's Annual Energy Outlook 2001.

- The fastest growing segment for natural gas demand is electrical generation, expanding from an estimated 3.8 Tcf in the year 2000 to 11.3 Tcf by the year 2020. Although coal is still projected to remain the predominant electrical generation fuel, natural gas will increase its share of this market from 16% to 36% by the year 2020.
- Domestic natural gas production is expected to increase more slowly than consumption from 19.3 Tcf in the year 2000 to 29.0 Tcf in the year 2020. To meet this production estimate, the number of natural gas wells drilled annually in the lower 48 U.S. states will have to increase from approximately 10,500 in the year 1999 to approximately 24,000 in the year 2020. Although the future natural gas reserves will be smaller and more difficult to develop, exploration companies have improved technology, and the real price of natural gas has increased more than threefold in 1999 dollars. This increase drives economic incentive for additional exploration.
- The current estimates of technically recoverable natural gas resources indicate that the resource base will be adequate to sustain a growing demand beyond the year 2020. The U.S. Geological Survey's assessment for future U.S. natural gas reserves is represented in Table 3.8-1.

Table 3.8-1. Forecasted Natural Gas Reserves

Type of Reserve	Capacity (Tcf)
Proven Reserves	164
Other Unproven Reserves	161
Inferred Reserves	244
Undiscovered Nonassociated Reserves	319
Unconventional Reserves	393
Total Reserves	1,281
Source: Wallula Generation (2001)	

- The cumulative natural gas production up to the year 2020 is expected to range between 480 and 512 Tcf , which is well under the forecast of available reserves.
- Natural gas imports are expected to grow in the forecast period from 16% of total consumption to 17% or 5.8 Tcf in the year 2020. The National Energy Board estimated in 1997 that future conventional proven natural gas reserves were 153 to 224 Tcf and future unconventional resources were 362 Tcf.
- The natural gas pipeline capacity in the U.S. is projected to increase 22% to a total capacity of 152 billion cubic feet per day in the year 2020. Much of the expansion is either complete, under construction, or far enough along in planning to deem it likely to occur. The ability to construct sufficient natural gas pipeline capacity to handle the 35 Tcf required in the year 2020 is not likely to be a problem.

The prospects for adding significant amounts of new natural gas supplies from the year 2002 to 2005 look promising in view of the expected level of natural gas prices. The number of exploratory and developmental natural gas rigs in operation increased by 31% and 45%, respectively, between the years 1999 and 2000. This growth means that the natural gas supply could be greatly expanded over the near term. A leading historic indicator of natural gas price declines has been the growth of supply over demand. These boom/bust cycles typically last 4 to 5 years, and so far the current price increases are following a typical cycle.

There are also a number of new pipeline expansions underway in North America. The expansions that will impact the Pacific Northwest most significantly are listed below.

PG&E Gas Transmission-Northwest Pipeline (GTN). GTN is a dual pipeline system consisting of approximately 630 miles of 36-inch-diameter gas transmission pipeline and approximately 590 miles of 42-inch-diameter transmission pipeline. The GTN natural gas transmission pipelines can transport a total of 2,700 million dectherms per day (MDth/day) to the Pacific Northwest, of which more than 1,800 MDth/day can be delivered to California and Nevada. GTN is currently in various planning stages with three proposed expansions as shown in Table 3.8-2.

Table 3.8-2 GTN Pipeline Expansion Plans

Name	Capacity, Dth/Day	In-Service Date
2002 Expansion – Kingsgate to Malin	210	June 2002
2003 Expansion – Kingsgate to Malin	500	November 2003
Vantage Pipeline - Eastern Washington to Seattle	to be determined	2004
Source: Wallula Generation (2001)		

Northwest Pipeline. The Northwest Pipeline Corporation (a subsidiary of Williams Company) owns and operates a natural gas transmission system from interconnections with El Paso Natural Gas Company and Transwestern Pipeline Company near Blanco, New Mexico. The Northwest Pipeline travels through Colorado, Utah, Wyoming, Idaho, Oregon, and Washington to the Canadian border near Sumas, Washington where it interconnects with Westcoast Energy and Sumas International Pipeline.

The Northwest Pipeline is a bidirectional pipeline that relies on a combination of physical and displacement capacity to meet firm contract commitments. Its total firm delivery capacity at the receipt point is 2,580 MDth/day. The Northwest Pipeline plans to expand this delivery capability as outlined in Table 3.8-3.

Table 3.8-3. Northwest Pipeline Expansion Plans

Name	Capacity (Dth/Day)	In-Service Date
Sumas to Chehalis Expansion	224	June 2003
Opal to Stanfield Displacement Replacement	175	November 2003
Georgia Strait Pipeline	94	November 2003
Source: Wallula Generation (2001).		

The National Energy Board estimates proven and probable gas reserves in the Western Canadian Sedimentary Basin as 57 Tcf. There is an additional 44 Tcf of unconventional resources that are known but not connected to existing natural gas pipelines infrastructure. Further, the National Petroleum Council estimates that Canada, as a whole, has an additional 603 Tcf of undiscovered natural gas potential.

Alberta natural gas production is estimated to peak at 6 billion cubic feet per year in the year 2005. Production from offshore eastern Canada, British Columbia, and the Mackenzie Delta will increase during the next 10 years to offset Alberta's projected decline. The Gas Technology Institute 2000 Baseline Projection, published in June 2000, estimates Canadian natural gas production will grow from 5 Tcf in the year 2000 to 7.7 Tcf by the year 2015. Export of Canadian natural gas to the U.S. is estimated to range from 3.7 Tcf in the year 2005 to 4.3 Tcf in the year 2015. The Wallula Power Project would consume approximately 1% of the average estimated Canadian production of 6.35 Tcf or approximately 1.5% of the estimated 4 Tcf annual average natural gas exported to the U.S. over this 15-year period.

The National Petroleum Council's late-1999 study estimates the U.S. lower 48 states' resource base to be 1,466 Tcf. The National Petroleum Council predicts U.S. production can increase from 19 Tcf in the year 1998 to 27 Tcf in the year 2015. Even the most conservative experts say North America has enough natural gas potential for the next 40 years of demand and some experts, such as ICF Kaiser, indicate 95 years.

A number of other regional natural gas pipeline expansion projects have been announced that could enhance the availability of natural gas delivery in the Pacific Northwest as follows.

- Southern Crossing –The capacity addition is 250 million cubic feet per day of new natural gas to British Columbia.
- Trailblazer Pipeline Expansion – This natural gas pipeline will have added compression to allow an extra 300 million cubic feet per day flow.

The applicant has contracted for sufficient natural gas pipeline capacity for its own use. Sufficient natural gas pipeline capacity additions have been identified to supply all anticipated natural gas demands over the economic life of the Wallula Power Project.

Cumulative impacts on natural gas resources from existing and proposed power plants are discussed in Section 3.17, Cumulative Impacts.

Electric Power. The Wallula Power Project would supply all its own electric power when operating. During periods of power plant startup or when the power plant would be completely offline, startup and backup electric power would be purchased from a local utility (to be chosen at a later date) by a backfeed through the interconnection with the Bonneville transmission system. The backfeed is estimated to range from 18.9 MW when starting up a combustion gas turbine to an average of 2 MW of standby power for times when the power plant would be out of service for maintenance or other reasons.

The total amount of electric power purchased through the backfeed is estimated at 2,000 MWh. This supply would be a very small portion of the total Bonneville capacity for sale to local utilities and others in the Northwest (10,000 MW to over 15,000 MW, depending on the annual rainfall). During periods of power plant outages, the emergency diesel generator would supply emergency electric power for plant lighting and critical controls.

Nonrenewable Resources

The Wallula Power Project would use natural gas, a nonrenewable resource, in a highly efficient manner because of the use of state-of-the-art combustion gas turbine combined-cycle generating equipment. The proposed project's primary advantage, when compared to other fossil fuel fired generating resources, would be that it generates electricity more efficiently and utilizes highly efficient state-of-art equipment. Fewer British thermal units (Btus) are required (energy) to generate a KWh of electrical energy in a combined-cycle facility, and thus fewer nonrenewable resources are consumed per KWh of electricity generation.

The project would consume aqueous ammonia to control NOx, various chemicals to control water quality, pressurized gasses for plant operation, and other consumable materials. Table 3.8-4 provides an estimate of annual average water system chemical use and Table 3.8-5 provides the quantities of other anticipated annual consumable materials for the project. All of the consumables listed below would be purchased from the Tri-Cities area.

Table 3.8-4. Average Annual Water Supply System Chemical Use

Chemical	Process/System	Amount Required (lb/yr)
Amine solution	Condensate pH adjustment	450
Anti-foam	Brine concentrator recirculation loop foam control	100
Anti-scalant	RO scale inhibitor[1]	1,000
Anti-scalant	Brine concentrator scale inhibitor	2,000
Biocides	Circulating water biocide control	1,000
Corrosion inhibitor	Circulating water scale inhibitor	20,500
Magnesium hydroxide	Sidestream softener treatment to remove silica and to soften the water	1,077,480
Oxygen scavenger solution	Boiler cycle	1,000
Phosphate solution	Boiler	5,000
Polymer	Softener sludge to aid in dewatering of sludge treatment	39,800
Soda ash	Sidestream softener treatment to remove silica and to soften the water	29,800
Sodium bisulfite	RO makeup water to remove chlorine [1]	75
Sodium hydroxide	Sidestream softener treatment to remove silica and to soften the water	631,000
Sodium hypochlorite	Raw water tank water treatment for prevention of biological growth	12,000
Sodium hypochlorite	Circulating water system treatment for prevention of biological growth	481,800
Sodium hypochlorite	Potable water system to control biological growth	350
Sulfuric acid	Reverse osmosis pretreatment to control pH and alkalinity [1]	14,500
Sulfuric acid	Circulating water to control pH and alkalinity	920,000
Sulfuric acid	Sidestream softener clearwell to control pH and alkalinity	973,000
Sulfuric acid	Brine concentrator	15,000

[1]Assumes beneficial use of cooling tower blowdown for 50% flow.
Source: Wallula Generation (2001)

Table 3.8-5. Other Anticipated Annual Fuel and Consumable Materials Usage

Chemical and Consumables	Annual Usage
Aqueous Ammonia (24.5%)	661 tons
Hydrogen	3,200 cubic feet
Battery Sulfuric Acid (station batteries)	Variable
Lube Oil	Variable
Mineral Oil	Variable
Note: All numbers are approximate. Source: Wallula Generation (2001)	

Conservation and Renewable Resources

Conservation of Energy. Power generated at the Wallula Power Project would be sold under both long-term and short-term contracts. Because the project would be easily dispatchable (i.e., could start and stop fairly rapidly), the electric power generation from the project could be sold as a backup resource for generators with renewable resources such as hydroelectric and wind-generated power that have an uncertain "fuel" supply and cannot operate all hours of the year. It is anticipated that the project may not generate electric power during periods of extremely low market prices such as during periods of high water runoff when hydroelectric-based generation is typically plentiful and inexpensive.

The Wallula Power Project would use natural gas, a nonrenewable resource, in a highly efficient manner because of its use of state-of-the-art combustion gas turbine combined-cycle generating equipment. The project's primary advantage, when compared to other fossil fuel fired generating resources, is that it generates electricity more efficiently. The project would convert thermal energy to electrical energy at an efficiency of 53.9%. This compares to 28% to 36% for coal-fired power plants, 32% for nuclear fuel power plants, and 31% for simple cycle combustion gas turbine power plants.

Water. The total amount of water that can be delivered to the Wallula Power Project under its proposed rights would be an instantaneous peak rate of 13,970 gpm, and limited to 8,249 acre-feet per year. This is considerably more than would actually be used. The estimated maximum water demand is 6,243 gpm, with an estimated peak load of 7,901 gpm. The maximum expected annual water usage is estimated to average 4,087 gpm.

The project would retire the fiber farmland purchased from Boise Cascade Corporation and purchase conservation easements from J R. Simplot Company's active farming activities. Since the full water right would not be exercised, there may be increased flow to the Columbia and Walla Walla Rivers. See Section 3.3, Water Resources, for further details.

Operations BMPs. The selected operation and maintenance contractor for power plant operations would develop BMPs that would require conservation measures for nonrenewable resources.

Transmission Line and Associated Facilities

The new 500 kV transmission line would be a permanent addition to the Bonneville transmission network. Over the life of the transmission line, relatively small quantities of fuel for maintenance vehicles and helicopters engaged in transmission line surveillance and monitoring would be consumed. Small amounts of electricity would be consumed to operate equipment at the substations and switchyard. Road maintenance activities would require the use of crushed rock, gravel, and sand over the years on an as-needed basis. Periodic replacement of conductor wires, ground wires, fiber optic cables, insulators, and structural elements may be required over time. The quantities of fuel and materials required for operation and maintenance activities would not be sufficient to create impacts on the availability of fuel and materials locally, regionally, or nationally.

3.8.3 Impacts of the Alternatives

3.8.3.1 Alternative Tower Height and Longer Span Design

This alternative would use taller towers with a longer span between towers in some areas, so it would require slightly more steel for each tower, but 17 fewer towers and slightly less fill material for tower footings. However, the effects would be basically the same as for the proposed action.

3.8.3.2 Alternative Alignment near McNary Substation

There would be very little difference between these two options in impacts to energy resources.

3.8.3.3 No Action Alternative

If the Wallula Power Project were not built, the facility would not be available to generate electricity. No energy would be consumed or generated by the project. No natural resources would be used in the construction of the project. No natural gas would be consumed to generate electricity at the project site. No net water supply benefit to the Columbia River through retired water rights would occur.

However, the need for electric generating facilities would remain unmet. New facilities would have to be built at another location to meet the demand of the region, and these facilities would create similar environmental impacts.

If the Wallula-Smiths Harbor segment, the Smiths Harbor Switchyard, and the Smiths Harbor-McNary segment were not built, there would be no fuels and materials used to fabricate, maintain, and operate the new transmission line. Without the proposed transmission line, the Wallula Power Project would have no way of delivering energy to market and therefore would not be constructed. The increasing demand for electrical energy would not be impacted. Therefore, the fuels and materials that would have been used for construction, operation, and maintenance of the project would likely be used to construct an alternate transmission system elsewhere in the Bonneville system in order to serve Pacific Northwest and other regional power users.

3.8.4 Mitigation Measures

No mitigation measures are required beyond those inherent in the project design to reduce impacts on energy and natural resources (see Appendix A).

3.8.5 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to energy or natural resources would occur from the construction or operation of this project. Water supply committed for project use is already in use for agricultural supply, and a net water gain to the Columbia and Walla Walla Rivers could result from retired water rights currently in use.