



Summary

Delivery of the Canadian Entitlement

Final Environmental Impact Statement (EIS)

Purpose of and Need for Action

The Columbia River Treaty (Treaty) between Canada and the United States of America (United States), signed in 1961, required three storage dams to be constructed on the Columbia River system in Canada (Duncan, Keenleyside, and Mica Dams), and allowed for one additional dam in the United States (Libby Dam). The dams help control floods in both countries, and the regulated stream flow provided by the three Treaty reservoirs in Canada enables dams downstream in the United States to produce additional power (the "downstream power benefits"). Under the Treaty, Canada and the United States share the downstream benefits equally.

In subsequent agreements based on the Treaty, Canada sold its half of the downstream benefits of each of the Treaty dams to a consortium of U.S. utilities for 30-year periods. The 30-year sale begins to expire in 1998 and will completely expire in 2003, at which time the Canadian Entitlement (Entitlement)--Canada's share of the downstream power benefits--must be delivered to Canada. The Entitlement is currently estimated to be approximately 1,200 to 1,500 megawatts (MW) capacity and 550 to 600 average megawatts (aMW) energy (the amounts decline over time). The Treaty specifies that the Entitlement must be delivered to Canada at a point on the border near Oliver, British Columbia (BC), unless the parties agree to other arrangements. An interim agreement, signed in 1992, allows the Entitlement to be delivered over existing transmission facilities between 1998 and 2003, unless terminated by either party on 7 years' notice.

Pursuant to the Treaty, the Administrator of the Bonneville Power Administration (BPA) and the Division Engineer, North Pacific Division of the U.S. Army Corps of Engineers (Corps) are designated as the "United States Entity," which is responsible for representing U.S. interests pursuant to the Treaty. British Columbia Hydro and Power Authority (BC Hydro, a Crown corporation) is the Canadian Entity.

At the expiration of the 30-year sale, the United States Entity needs to fulfill the United States' obligation under the Treaty to deliver the Entitlement to Canada. Any plan for meeting that obligation is also expected to meet the following purposes:

- Meet the Treaty obligation cost-effectively.
- Avoid or minimize adverse environmental effects of fulfilling the Treaty obligation.
- Develop means for fulfilling the Treaty that are acceptable to the Canadian and United States Entities.
- Maintain the reliability of BPA's power system.

The Scope of This EIS

This EIS is being prepared to aid the decision the United States Entity must make on how best to meet the United States' Treaty obligations to deliver Canada's share of the downstream power benefits. While this document, and input from all interested parties, will inform the United States' decisionmakers, any decision other than delivery to a point near Oliver, BC, must be mutually acceptable to both the United States and Canadian Entities.

The BPA, which markets and transmits power from U.S. Federal hydroelectric projects, may need to implement some portions of the United States Entity's decision. The agency is providing its expertise in evaluating alternatives and has prepared this EIS. The U.S. Department of State is a cooperating agency. Depending on the alternative chosen, the Department of State would conduct negotiations to authorize the disposition of benefits within the United States, since a disposition must be evidenced by an exchange of notes between the respective governments.

Executive Order 12114 allows examination of environmental impacts outside the United States, but does not require it. The environmental analysis in this EIS examines effects in Canada, as well as in the United States. Because the Canadian Entity is a partner in the decision process, and any decision other than delivery at Oliver must be acceptable to that country as well as to the United States Entity, this analysis does not imply that the United States is trying to direct Canadian decisions. It is done in the spirit of providing full and complete information to the United States Entity on the consequences, both direct and indirect, of U.S. actions. The assessment of impacts in Canada is based on the United States Entity's perspective and interpretation of the Treaty requirements. The Canadian Entity does not necessarily agree with or endorse this analysis of the environmental effects in Canada.

Alternatives and Environmental Consequences

The United States Entity's **proposed action** is to return the Canadian Entitlement to Oliver as the Treaty requires. The United States and Canadian Entities are discussing differences regarding standby and other delivery requirements in another forum that, from the United States Entity's perspective, will not affect this environmental analysis.

Alternatives for the delivery of the Entitlement were analyzed in terms of **components** and **actions**. As shown in Figure S-1, components are the building blocks of the alternatives, and include different delivery points for the Entitlement, as well as different purchase and resource development choices. For most alternatives, a connected action in Canada would also be required. The environmental consequences of the action alternatives are compared to the Base Case in Figure S-2.

Because at the time the Draft EIS was prepared, the components of possible alternatives for delivering the Entitlement were known, but not whether or how they might be combined, the EIS focuses on the potential environmental impacts of each of the various components. The environmental consequences of each alternative (made up of one or more components) are determined by combining the impacts of the components. Alternatives other than those evaluated in this EIS can be derived by selecting components from those described in Chapter 4 and by reviewing their associated environmental impacts. In some cases, additional National Environmental Policy Act (NEPA) analyses may be prepared (tiered to this document) to address issues such as the site-specific impacts of transmission line construction and alternative transmission line alignments.

NEPA requires an agency to consider the consequences of not taking a proposed action (that is, the **No Action Alternative**). In this case, No Action would mean that the United States Entity would not deliver the Entitlement to Canada, as required by the Columbia River Treaty. Not delivering the Entitlement would violate the Treaty, and would have unacceptable social, political, and legal consequences on both sides of the border. The No Action Alternative is not acceptable to either the United States or Canadian Entity, and is dismissed from further consideration.

[Figure S-1](#)

[Figure S-2](#)

The Treaty specifies that the Entitlement is to be delivered at a point on the United States-Canada border near Oliver, BC, "or at such other place the entities may agree upon." The **Base Case** for this EIS is the delivery of the Entitlement in its entirety at Oliver. The Base Case is also the Proposed Action. Delivering the full Entitlement at Oliver would require:

Base Case (Proposed Action) Components

UNITED STATES

Transmission Construction. One new single-circuit 500 -kilovolt (kV) line from Grand Coulee Substation to the United States/Canada border near Oliver by 2003:

- 135 to 155 kilometers (km)--85 to 95 miles (mi) long.
- Right-of-way (new or expansion of existing): 38 meters (m)--125 feet (ft) wide for standard lattice steel structures.
- New or upgraded access roads: 2 km/km of line--(2 mi/mi of line).
- Potential improvements at or expansions of existing substations.

East-West Standby Transmission. The United States would provide East-West Standby transmission service in accordance with Article X of the Columbia River Treaty. It appears that no new transmission facilities would be required to provide this service.

Base Case Construction Date Assumptions for Cross-Cascades Transmission Lines. Two 200- to 240-km (125- to 150-mi) cross-Cascades lines are needed by the end of the second and third decades of the 21st century.

Resource Development and Operation. The PNW would develop 550 aMW of energy and 1,400 MW of capacity by 2003 and would operate the system to serve Entitlement load.

CANADA

Transmission Construction. Border-to-Oliver: One new single-circuit 500-kV line and substation by 2003:

- 13 to 46 km (8 to 29 mi) long.
- Right-of-way (new or expansion of existing): 49 to 64 m (161 - 210 ft) wide.
- New or upgraded access roads: Likely.
- New 500 -kV switching station or substation (approx. 9 hectares (ha) (22 acres)).

Base Case Construction of Interior-to-Lower-Mainland Transmission Lines. The following transmission lines may be needed to transmit the Entitlement to Canadian load centers in the Lower Mainland. These lines are not anticipated before 2008, but they may be required before the end of the study period (2024). The need is related to the location of future generation in BC.

- Oliver-to-Nicola: 138-km (86-mi) 500-kV line.
- Nicola-to-Lower-Mainland: 248-km (154-mi) 500-kV line.

The principal environmental impacts of the Base Case would result from transmission line construction and the operation of new generating resources. The transmission line construction could preclude or change some uses of the land, and could cause impacts to vegetation and wildlife, water and fish, wetlands, and cultural and aesthetic resources because of clearing, erosion, and the physical presence of the line. While some impacts could be largely mitigated by location and design choices, others could be significant.

In the Base Case, in order to deliver the Entitlement to Canada, the United States would have to develop and operate up to 1,400 MW of new conservation and/or generation resources. While the Entitlement delivery would be a system transaction, supported by the entire generation system, it is likely that the capacity and energy resources added in the Pacific Northwest (PNW) to deliver Entitlement power would be combustion turbines (CTs). Gas-fired CT emissions include nitrogen oxides, carbon monoxide, and carbon dioxide. The amounts and environmental impacts of such emissions can vary considerably according to a CT's design, air pollution controls, and location. Once the Entitlement energy is delivered to Oliver, the United States would fulfill its Treaty obligations. How Canada would use the Entitlement power is difficult to predict. Canada could use the power to meet its own loads, or it could re-market it south to purchasers in the PNW or California. Any such marketing transactions to the south would be subject to the same regulatory or policy restrictions that apply to other transactions using the PNW transmission network; however, with the current trend toward the deregulation of transmission and open transmission access, it is likely that Canada would not be restricted from marketing the Entitlement power south if it found a purchaser. In that case, the

Entitlement power would displace existing or proposed generation in the PNW or California, reducing the air and other impacts of generation in the purchasing region.

Alternative A (Partial Purchase and Partial Delivery at Blaine) combines several delivery and purchase components. Specifically:

- The United States would deliver to Canada the energy component of the Entitlement (approximately 550 aMW) and 650 MW of its capacity component.
- The United States would purchase, with a single payment, the balance of Canada's entitlement to capacity (approximately 750 MW).
- Deliveries would be to Blaine or other points on BPA's existing transmission system as specified by Canada. For purposes of analysis, it is assumed that deliveries would be at Blaine.

The following actions would be required:

Alternative A Components

UNITED STATES

Transmission Construction. One cross-Cascades 500-kV transmission line would be accelerated by 3 to 4 years compared to the Base Case if the majority of future generation occurs east of the Cascades. A second cross-Cascades line may also be accelerated.

Transmission Use. BPA would deliver power over the Northern Intertie at Blaine and BPA could purchase the right to store energy on the BC Hydro system for return at a later date.

Resource Development and Operation. The PNW would develop up to 550 aMW of energy and 650 MW of capacity, probably combustion turbines (CTs), and operate the system to serve Entitlement load.

Purchases. The PNW would purchase approximately 750 MW of capacity.

CANADA

Resource Development and Operation. In the long term, Canada would develop and operate 750 MW of capacity resources, probably new generators at existing hydroelectric facilities.

Transmission Construction. Compared to the Base Case, the need for the Nicola-to-Lower-Mainland (Meridian) and Oliver-to-Nicola 500-kV lines would most likely be delayed by several years.

In Alternative A, the direct land use, biological, cultural resources, and visual impacts associated with transmission line construction from Grand Coulee Substation to Oliver in the Base Case would not occur. However, in Alternative A, the partial delivery at Blaine would accelerate the impacts associated with the construction of one or two cross-Cascades lines in Washington State 3 to 4 years, or maybe more. (Due to uncertain load growth and generation development scenarios, a cross-Cascades line without the Entitlement delivery may not be needed until after 2024.) The line would cross areas with many sensitive biological, land use, and aesthetic values. In Canada, the land use, biological, and cultural resources impacts associated with the construction of new transmission lines from Oliver to the border would not occur; impacts for lines from the interior to load centers on the Lower Mainland would be deferred by several years.

In Canada, the additional capacity resources needed in the long term would require minimal changes in land use; however, new generators could affect dissolved gas concentrations and water temperature at existing hydroelectric facilities. Depending on the design and operation of the existing and new facilities, dissolved gas concentrations and water temperatures could increase or decrease, with the potential to affect resident fish. These impacts would not occur in the Base Case.

In **Alternative B (PNW Purchase)**, PNW utilities would purchase the entire Entitlement. The following actions would be required:

Alternative B Components

UNITED STATES

Purchases. The PNW would purchase up to 1,400 of capacity and 550 aMW of energy.

Transmission. Requirements for cross-Cascades transmission are the same as the Base Case.

CANADA

Resource Development and Operation. In the long term, Canada would develop and operate up to 550 aMW of energy and 1,400 MW of capacity resources (probably CTs and new generators at existing hydroelectric facilities) to replace the Entitlement energy and capacity sold to the PNW.

Transmission Construction. Compared to the Base Case, the need for the Nicola-to-Lower Mainland (Meridian) and Oliver-to-Nicola 500-kV lines most likely would be delayed by several years. The need for a third 500-kV line segment, Selkirk-to-Oliver (164 km, 102 mi) may be slightly accelerated from when it might otherwise be needed.

In Alternative B, the air quality impacts of new generating resources, which in the Base Case would occur in the PNW, would occur instead in Canada, where new generation to support the sale of the Entitlement to the PNW is assumed to be located. Because this alternative does not directly require the construction of new transmission lines in the United States, the land use, biological, cultural, and visual impacts of new transmission line construction in the Base Case would not occur. In Canada, similar impacts of transmission line construction either would not occur (Oliver-border) or, for the most part, would be delayed (Oliver-Nicola-Meridian segment).

In **Alternative C (Pacific Southwest [PSW] Purchase)**, the PSW would purchase the entire Entitlement, which would be delivered to the PSW over the PNW-PSW Intertie. The following actions would be required:

Alternative C Components

UNITED STATES

Transmission Use. BPA would deliver power over the PNW-PSW Intertie to the PSW. In addition, BPA could purchase the right to store energy on the BC Hydro system, or could sell surplus energy to BC when transmission was constrained. Requirements for cross-Cascades transmission are the same as the Base Case.

Resource Development and Operation. The PNW would develop up to 550 aMW of energy and 1,400 MW of capacity resources (probably CTs) and operate the system to serve the Entitlement obligation.

Purchase. The PSW would purchase up to 1,400 MW of capacity and 550 aMW of energy.

CANADA

Resource Development and Operation. Canada would develop and operate up to 550 aMW of energy and 1,400 MW of capacity resources (probably CTs and new generators at existing hydroelectric facilities) to replace the Entitlement energy and capacity sold to the PSW.

Transmission Construction. Requirements are the same as for Alternative B. Specifically, compared to the Base Case, the need for the Nicola-to-Lower Mainland (Meridian) and Oliver-to-Nicola 500-kV lines most likely would be delayed by several years. The need for a third 500-kV line segment, Selkirk-to-Oliver (164 km, 102 mi) may be slightly accelerated from when it might otherwise be needed.

The principal environmental impacts of Alternative C would stem from the development of new generating resources in the PNW and Canada, and the displacement or deferral of thermal resource generation in the PSW. Air pollution emissions would increase somewhat in the PNW and Canada, but would be reduced in the PSW, in areas where poor air quality and dense population make air quality particularly serious. Because this alternative does not directly require the construction of new transmission lines in the United States, their land use, biological, cultural, and visual impacts as described in the Base Case would not occur. In Canada, similar impacts of transmission line construction would not occur or would be delayed as in Alternative B.

Alternative D (Partial Purchase and Partial Delivery at Blaine and Selkirk) would combine purchase and sale components.

- The PNW would deliver 650 MW of capacity and a portion of the 550 aMW of energy over existing facilities at Blaine.
- The PNW would deliver 300 MW of capacity and the remaining portion of the 550 aMW of energy over existing facilities at Selkirk.
- The PNW would purchase 450 MW of capacity.

Alternative D Components

UNITED STATES

Transmission Construction. One cross-Cascades 500-kV transmission line would be accelerated 3 or 4 years compared to the Base Case if the majority of future generation occurs east of the Cascades. A second cross-Cascades line might also be accelerated.

Transmission Use. BPA would deliver power over the Northern Intertie at Blaine and Selkirk.

Resource Development and Operation. The PNW would develop up to 550 aMW of energy and 950 MW of capacity resources (probably CTs) and operate the system to serve 550 aMW/950 MW of Entitlement load.

Purchase. The PNW would purchase 450 MW of capacity.

CANADA

Resource Development and Operation. In the long term, Canada would develop and operate 450 MW of capacity resources, probably new generators at existing hydroelectric facilities.

Transmission Construction. Requirements are nearly the same as for Alternatives B and C.

In Alternative D, the direct land use, biological, cultural resources, and visual impacts of transmission line construction from Grand Coulee Substation to Oliver in the Base Case would not occur. However, the partial delivery at Blaine would accelerate the impacts associated with the construction of one or two cross-Cascades lines in Washington State 3 to 4 years, or maybe more. (Due to uncertain load growth and generation development scenarios, without the Entitlement delivery a cross-Cascades line may not be needed until after 2024.) The line would cross areas with many sensitive biological, land use, and aesthetic values. In Canada, the land use, biological, and cultural resources impacts of the construction of new transmission lines from the interior to load centers on the Lower Mainland would be deferred by several years.

In Canada, in the long term, additional capacity resources (probably new generators at existing hydroelectric facilities) would need to be developed to support the capacity sale to the PNW (although less than in Alternatives A, B, and C). While land use requirements should be minimal, new generators could affect dissolved gas concentrations and water temperature at existing hydroelectric facilities. Depending on the design and operation of the existing and new facilities, dissolved gas concentrations and water temperatures could increase or decrease, with the potential to affect

resident fish. These impacts would not occur in the Base Case.

Cumulative Impacts

Each component of the alternatives for the delivery of the Entitlement could contribute to cumulative impacts to the environment. Transmission construction could in some cases create impacts to land use, soils, water bodies, and fish that in and of themselves are not major, but which may become major when added to the impacts of other construction activities. This would be particularly true for construction that would take place in areas where transmission lines or other construction has already occurred (such as the cross-Cascades transmission line). The cumulative impacts of transmission construction would be addressed more specifically in the NEPA review that would be conducted before any such alternative would be implemented.

Alternatives that would make use of the BPA transmission system and/or Northern or PNW/PSW Interties could add to or displace other uses of the transmission line, as discussed in this EIS (Section 4.1.2). The cumulative impacts of resource development and operation are discussed in the *Resource Programs Final EIS* (DOE, February, 1993).

Relationship Between Short-Term Uses of the Environment and the Maintenance of Long-Term Productivity

All alternatives that involve new transmission facility or generation construction would cause short-term impacts, including noise, soil compaction and erosion, and water and air quality degradation. In the long term there could be loss of wildlife habitat, altered land uses, degradation of air quality, and contributions to global warming. Many of these impacts would be site-specific and mitigable, and would be addressed in subsequent site-specific environmental documentation. However, both the long-term and short-term uses of the environment would have a beneficial effect on long-term productivity. By fulfilling United States' Treaty obligations with Canada, the Columbia River can continue to be operated more efficiently and effectively, reducing substantially the amount of generation or conservation resources that would otherwise be required.

Irreversible or Irrecoverable Commitments of Resources

Alternatives that involve the construction of new transmission or the construction or operation of generation facilities would involve the irreversible or irretrievable commitment of resources (i.e., the metals, concrete, and other materials used to construct these facilities).

Environmentally Preferred Alternative and the Preferred Alternative

The environmentally preferred alternative is Alternative B--PNW Purchase, which would not require new transmission line construction in either the United States or Canada. The Proposed Action (the Preferred Alternative) is the Base Case--Full Delivery at Oliver.

