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WHITEPAPER

The Columbia River Treaty

SUBMITTED BY
Midgard Consulting Inc.

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Midgard, established in 2009, provides consulting services across the electrical power and utility sector. Midgard's principals and staff have direct experience in project development, design, contract procurement, finance, construction, and operations. This combined experience has translated into mandates in project due diligence, lender's technical advisor, loan guarantee assessments, and Independent Engineer roles in Canada, the United States, and internationally. Midgard has worked for developers, utilities, government agencies, and both project lenders and equity providers.

Midgard's team has extensive experience modelling fuel sources, creating energy yield estmates, reviewing contracts, reviewing pro-formas, and assessing project risks from a construction, operations, and financial perspective.

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1 INTRODUCTION

Canada and the United States have a long history of cooperating on water issues that impact both countries, formalized under the Boundary Water Treaty of 1909.

The Columbia River is prone to serious flooding, including 1948 floods which were responsible for the deaths of 15 people near Portland, OR. During such flooding up to 50% of the Columbia's flow can originate in Canada. The goal of the Columbia River Treaty ("CRT") was to establish an agreement by which flood control structures would be built in Canada for the mutual benefit of Canada and the U.S.

In order to understand the "CRT" in more detail, some of the quick facts regarding the Columbia River are listed below.

- The Columbia River originates in eastern British Columbia near Invermere, BC and travels 2,000 km before discharging into the Pacific Ocean on the Washington - Oregon border.
- The Columbia River is the fourth largest river in North America by water volume, behind only the Mississippi, Mackenzie, and St-Lawrence Rivers.
- Although only 15% of the Columbia River Basin's land area is located in Canada, approximately 33% of the river's water originates in Canada.
- Between the Columbia's headwaters and the Pacific Ocean there are over 24,700 MW of installed hydroelectric capacity

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2 THE COLUMBIA RIVER TREATY

The agreement that was reached called for 15.5 million acre-feet (Maf) of water storage to be constructed in Canada, along with 5.0 Maf of storage in the U.S. (on the Kootenai River). Storage is provided by specified "Treaty Structures" as discussed in this paper.

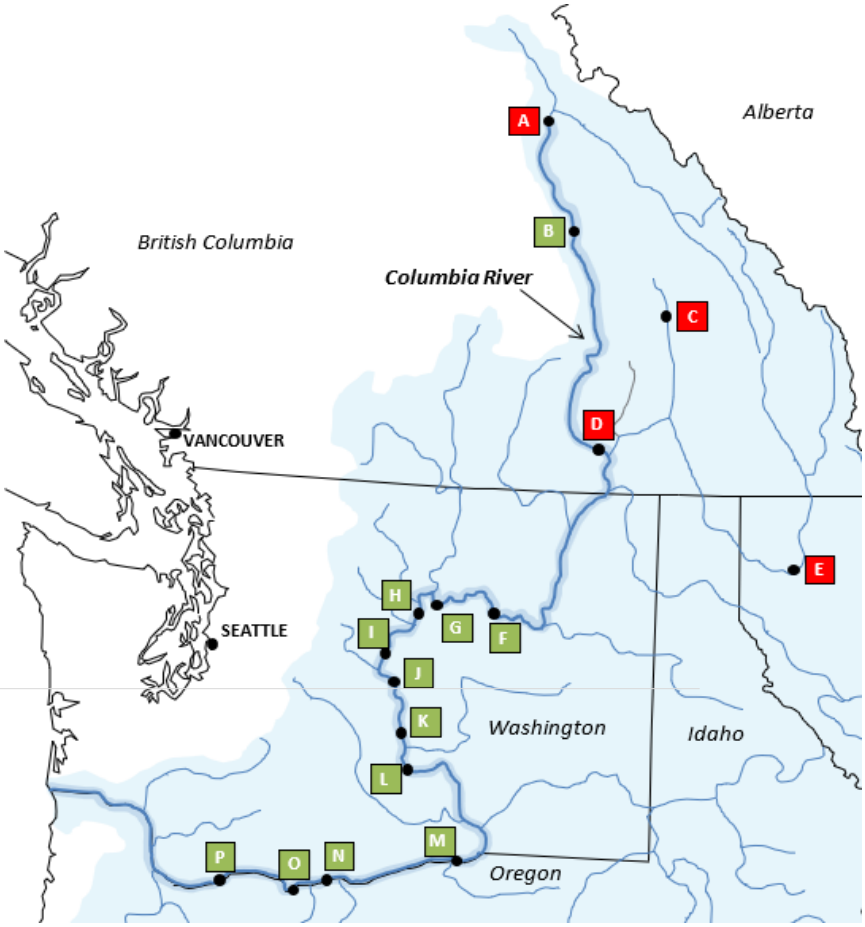
In exchange for building the Canadian structures and bearing the impacts of their presence (e.g. the flooding of the Columbia Valley), the U.S. paid Canada $64.3M for avoided flood damages and agreed to return to Canada 50% of the electrical generation benefits (known as "Canadian Entitlement") which result from the Treaty.

The Table 1 below lists the facilities located on the Columbia River in both Canada and U.S. with corresponding facility capacities and reservoir sizes. The location of the correlating facility sites are labeled in the complementary map shown in Figure 1.

Table 1: Columbia River Dams

Location	Facility	Installed Capacity	Reservoir Size
A*	Mica	1,805 MW	12.0 Maf
B	Revelstoke	2,480 MW	1.50 Maf
C*	Duncan	0 MW	1.4 Maf
D*	Keenleyside	185 MW	7.1 Maf
E*	Libby	525 MW	5.0 Maf
F	Grand Coulee	6,890 MW	5.2 Maf
G	Chief Joseph	2,614 MW	< 0.1 Maf
H	Wells	840 MW	0.1 Maf
I	Rocky Reach	1, 300 MW	< 0.1 Maf
J	Rock Island	624 MW	< 0.1 Maf
K	Wanapum	1,040 MW	< 0.2 Maf
L	Priest Rapids	956 MW	< 0.1 Maf
M	McNary	1,120 MW	< 0.2 Maf
N	John Day	2,480 MW	0.5 Maf
O	The Dalles	2,080 MW	< 0.1 Maf
P	Bonneville	1,104 MW	< 0.2 Maf

Figure 1: The Columbia River Facilities



The red boxes indicated in the map above (Figure 1) and similarly the facilities marked with asterisk in Table 1 indicates structures under the Columbia River Treaty.

2.1 Canadian Entitlement

The flood control mandated by the Treaty enables increased generation of electricity on the U.S. portion of the Columbia River; water that would otherwise have spilled over the dams can be stored in Canada and used to generate power in crucial summer and winter months.

Since this increase in energy generation comes as a result of assets located in Canada, the Treaty calls for the theoretical increase in U.S. generation to be split equally between the two countries. The 50% of these "downstream benefits" that is to be returned to Canada is known as the ***Canadian Entitlement***.

The Canadian Entitlement consists of a quantity of electricity and a quantity of electrical capacity. The amounts of each are calculated by assessing the difference between the amount of power (MW) and energy (MWh) that would be generated with and without the Canadian Treaty reservoirs. The Canadian Entitlement is equal to 50% of the difference between those amounts.

Canadian Entitlement calculations are necessarily based upon theoretical conditions - the river's flows are planned six years in advance, meaning that the "base" scenario (i.e. generation without using Canadian storage) against which actual generation is compared cannot be measured directly.

As part of the original CRT agreement, Canada and the U.S. negotiated for the U.S. to buy the Canadian Entitlement power. In 1964 the U.S. paid Canada $254.4 M for the purchase of the first 30 years of the Canadian Entitlement. Although, there is a provision in the CRT for the Canadian Entitlement power to be delivered to the Canada-U.S. border, rather than transmitting power to this point, ownership of the Canadian Entitlement power has in practice been transferred (to Powerex, as assigned by the Province of BC) at the Mid-Columbia ("Mid-C") trading point, and in turn sold (by Powerex) into the U.S. electricity markets.

The key roles of U.S. and Canadian Entities are to perform the Canadian Entitlement calculations and to plan and coordinate the River's flows.

2.2 CRT Involvement

The Treaty is negotiated between the Governments of the United States and Canada. However, the Treaty is administered by the U.S. and Canadian "Entities".

The U.S. Entity

- Bonneville Power Administration
- The U.S. Army Corps of Engineers

The Canadian Entity

- BC Hydro
- The Province of BC (recipient of the Canadian Entitlement).

Reassessment is led by the U.S. and Canadian Entities; but final decisions belong to government.

2.3 CRT Negotiations

Any and all negotiation processes encapsulate far more than a pair of chief negotiators formally sitting across the table from one another. The processes involve substantial preparations and internal discussions prior to the first public statements from either side of the table.

Formal negotiation processes can be segmented into five parts:

- Preparation stage
- Framing stage
- Persuasion stage
- Compromise stage, and
- Closing the deal

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The Canadian and U.S. Entities have been operating in the "Preparation stage" for the past few years, and have recently transited to the "Framing stage". The Framing stage is the period of the negotiation where each party lays out their negotiation objectives and the principles for the negotiation. The framing process is a communication exercise, both to the internal audience and stakeholders, and the negotiating counterparts.

2.3.1 Negotiation Tips To Remember

Janus Syndrome	Every negotiation is as much an internal negotiation as it is an external negotiation.
Follow the Money	The best way to assess a negotiation counterparties' priorities is to rank the monetary impacts of the demands.
Trust is a Must	Negotiation parties do not have to like each other, but they do have to respect that each team has a job to do; that each side has legitimate interests. Keep talking – it pays off in the end.
Think Outside the Pie	Best means of securing a deal is to seek out the win-wins. The best place to find win-wins are: • Compromise interests of the parties not at the table, and • To pay/receive benefits in future dollars. Win-wins are wonderful face savers and keystones of any deal.
Deadlines Focus the Mind	Negotiations rarely finish early. Early finishes leave the negotiating team open to internal criticism that "money was left on the table".

2.3.2 CRT Past and Future Motivations

- The Columbia River basin is big and, if left solely to Mother Nature, prone to catastrophic flooding.
- The most technically- and cost- effective manner of dealing with catastrophic flooding (mostly in the U.S.) was to build reservoirs (mostly in Canada).
- In addition to the flood control benefits, the control of the Columbia River headwaters enables greater energy and capacity characteristics for downstream generation.
- The CRT endeavors to share economic benefits between the countries. Thus, the CRT cancellation discussion is ultimately about redefining the Canadian Entitlement.

Both countries' Entities have outlined their negotiating principles for the CRT as described in Appendices.

2.4 Treaty Review and Cancellation

Over the past few years, the Canadian and U.S. entities have cooperated on a number of studies to review cancellation, etc. Below are some key points related with the Treaty Cancellation.

- The original treaty had a minimum term of 60 years.
- The treaty was ratified in 1964 and could be cancelled no earlier than 2024.
- In order to cancel the treaty, either party can issue a notice of termination 10 years in advance of the cancellation; Thus the earliest termination notice can be issued is September 2014.

- Regardless of whether or not the CRT is cancelled, the flood avoidance coordination regime that has existed for the duration of the Treaty will transition from being defined in the Treaty's articles to "On-Demand" Flood Control (see Section 2.4.1).

2.4.1 On-Demand Flood Control[1]

Regardless of whether the Columbia River Treaty continues or is terminated, Canada will continue to provide a minimum level of flood control to the U.S. – after all, the safety of those living along the Columbia River is paramount. However, the nature of the provided flood control will change in a post-CRT environment:

- Canadian-provided flood control transitions to "Called-Upon" (or "On-Demand") operations after 2024.
- The U.S. can only call upon Canadian storage for potential floods that cannot be adequately controlled by U.S. storage.
- Canada must be consulted prior to a Called-Upon action.
- Called-Upon storage will provide no greater degree of flood control after 2024 than prior to 2024.
- The U.S. must pay for costs and economic losses in Canada due to Called-Upon operations.

2.4.2 Cancellation

The reason that either the U.S. or Canadian Entity would cancel the CRT Treaty is obviously due to the fact that both Entities believes their country will be better off without the status quo of the Treaty, while preserving their interests.

U.S. Entity Top Priorities

- Avoid catastrophic flooding.
- Preserve Columbia River water use that balances the interests of the multitude of U.S. river/water users.
- Ensure that the first two priorities are achieved cost-effectively.

Canadian Entity Top Priorities

- Similar to those of the U.S. Entity, but with a Canadian focus.
- Preserve fair access to downstream benefits that continue to accrue due to the Canadian reservoir assets (and their impacts).

The countries have a long and mutually respectful history of working together, and regardless of whether or not the CRT is cancelled, Midgard fully expects that the level of mutual respect and cooperation will continue.

[1] Source: *U.S. Army Corps of Engineers and Bonneville Power Administration, 2014/2024 Review – Columbia River Treaty – Regional Briefing, Nancy Stephan and Matt Rea, February 28, 2011 - http://www.crt2014-2024review.gov/PowerPoint.aspx*

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3 MIDGARD THOUGHTS ON THE TREATY

- The U.S. will cancel the Treaty sooner rather than later in order to force the renegotiation of the terms of the Canadian Entitlement.
- Canada will "factually" state that the predictability of the Columbia River will change post-CRT.
- The U.S. will state that the predictability of the level of the Columbia River should not change post-CRT, and that besides, the On- Demand Flood Control provisions of the Treaty, which exist regardless of the status of the CRT, ensure that catastrophic floods are avoided.
- Canada will agree with the U.S. about the On-Demand Flood Control provisions in principle, but will disagree with U.S.' suggestions on the pre-requisites and costs associated with the On-Demand Flood Control provisions.
- 9 ½ years will pass.
- The U.S. and Canada will agree on a renewed CRT that enshrines a "new and improved" Canadian Entitlement, "new and improved" Columbia River coordination protocols, and "new and improved" Columbia River Rehabilitation cost sharing protocols.

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APPENDIX A: CANADIAN NEGOTIATING PRINCIPLES[2]

1. The primary objective of the Treaty should be to maximize benefits to both countries through the coordination of planning and operations.
2. The ongoing impacts to the Canadian Columbia Basin to meet Treaty requirements should be acknowledged and compensated for. The level of benefits to the Province, which is currently primarily in the form of the Canadian Entitlement, does not account for the full range of benefits in the United States (U.S.) or the impacts in British Columbia.
3. All downstream U.S. benefits, such as flood risk management, hydropower, ecosystems, water supply, recreation, navigation and any other relevant benefits, including associated risk reduction arising from coordinated operations compared to alternatives available to each country, should be accounted for and such value created should be shared equitably between the two countries.
4. Treaty provisions post-2024 should be fixed for a sufficient duration to provide planning and operational certainty while allowing for adaptive mechanisms to address significant changes to key components and interests.
5. Implementation of post-2024 flood control obligations will be consistent with the Treaty requirements that a Called Upon Flood Control request can only be made when forecasts of potential floods indicate there is a reasonable risk of exceeding 600,000 cubic feet per second at The Dalles, and the U.S. must make effective use of all related storage in the U.S. before seeking additional help from British Columbia.
6. To supplement Called Upon Flood Control, a coordinated flood risk management approach should maximize the benefits and mitigate impacts and risks to multiple U.S. interests as compared to Called Upon Flood Control regime post 2024 which includes effective use of U.S. reservoirs.
7. Ecosystem values are currently, and will continue to be, an important consideration in the planning and implementation of the Treaty.
8. The Province will explore ecosystem based improvements recognizing that there are a number of available mechanisms inside and outside the Treaty.
9. Operating conditions of Canadian Columbia basin dams and reservoirs are subject to provincial and federal licensing including water Use Plans where they exist, and consideration of aboriginal rights under the Canadian constitution.
10. The Province will seek improved coordination on Libby Dam and Koocanusa Reservoir operations.
11. Salmon migration into the Columbia River in Canada was eliminated by the Grand Coulee Dam in 1938 (26 years prior to Treaty ratification), and as such is not a Treaty issue. British Columbia's perspective is that restoration of fish passage and habitat, if feasible, should be the responsibility of each country regarding their respective Infrastructure.
12. Adaptation to climate change should be incorporated in Treaty planning and implementation.
13. The Canadian Entities (Province of British Columbia and BC Hydro) will continue to engage First Nations and communities throughout any negotiation process.
14. Canadian Columbia Basin issues not related to the Treaty will be addressed through other government programs and initiatives.

[2] Source: Columbia River Treaty Review – BC Decision, (Retrieved March 2014 from http://blog.gov.bc.ca/columbiarivertreaty/)

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APPENDIX B: U.S. NEGOTIATING PRINCIPLES[3]

1. Treaty provisions should enable the greatest possible shared benefits in the United States and Canada from the coordinated operation of Treaty reservoirs for ecosystem, hydropower, and flood risk management, as well as water supply, recreation, navigation, and other pertinent benefits and uses, as compared to no longer coordinating Treaty storage operations
2. The health of the Columbia River ecosystem should be a shared benefit and cost of the United States and Canada.
3. The minimum duration of the Treaty post-2024 should be long enough to allow each country to rely on the Treaty's planned operations and benefits for purposes of managing their long-range budgets, resource plans, and investments, but adaptable enough to allow responses to new information and changing conditions.
4. All operations of the Treaty should be based on the best available science, and, to the extent practicable. Measurable outcomes.
5. U.S. federal reservoirs/projects will continue to meet authorized uses consistent with applicable legislation, Indian treaties and tribal rights, the U.S. Government's trust responsibility to the tribes, and other U.S. laws such as the Clean Water Act and the Endangered Species Act. Non- federal U.S. projects will continue to meet their responsibilities pursuant to their Federal Energy Regulatory Commission licenses.
6. The United States and Canada should pursue a more coordinated use of Treaty and Canadian non-treaty storage under the Treaty to increase the flexibility to, and benefits of, meeting ecosystem- based function, power, flood risk management, and other authorized water management purposes in both countries.
7. The region anticipates impacts from climate change to all of the elements described in this document. The strategy for adapting the Treaty to future changes in climate should resilient, adaptable, flexible, and timely as conditions warrant.
8. It is recognized that modifications to the Treaty could result in new benefits and/ or costs to both Canada and the United States. U.S. interests should ensure that costs associated with any Treaty operation are aligned with the appropriate party.
9. Implementation of ecosystem – based functions in the Treaty should be compatible with rebalancing the entitlement and reducing U.S. power costs.

For a full list of the U.S. Entity's negotiation principles please see the source document.

[3] Source: U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2024, December 13 2013. (Retrieved March 2014 from http://www.crt2014-2024review.gov/RegionalDraft.aspx

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