

# Columbia River Treaty 2014/2024 Review

## Canadian Entitlement

### What is the Canadian Entitlement and how did it come to be?

Before the Columbia River Treaty, high springtime flows on the Columbia River frequently overwhelmed the ability of the United States' downstream infrastructure to generate power and manage flood risk. The four dams built under the terms of the 1964 Columbia River Treaty (three in Canada and a fourth in Montana) approximately doubled the water storage capacity on the Columbia River system. The Treaty and Treaty dams enhanced the cooperation between the U.S. and Canada, helping to ensure mutually advantageous operation of the dams by improving the ability to regulate the timing of streamflows by capturing high spring flows and releasing this water more gradually over the summer, fall and winter months. Overall, the coordinated storage and regulation of flows between the United States and Canada vastly improved both hydropower production and flood mitigation in the Columbia Basin.

The increased power generation in the United States resulting from the operation of additional storage capacity created by the three Treaty dams built in Canada is referred to as the downstream power benefits. The Treaty negotiators in the early 1960s agreed that the United States and Canada would equally share these benefits, which are calculated annually according to a complex method negotiated among the Treaty's authors. It is essentially a theoretical value placed on the additional generation. Canada's half of these calculated downstream power benefits is called the Canadian Entitlement.

The Canadian Entitlement is not solely a U.S. federal responsibility. Chelan County PUD, Douglas County PUD and Grant County PUD — known as the Mid-Columbia PUDs — contribute approximately 27 percent of the power delivered under the Canadian Entitlement because they own and operate five hydroelectric projects on the Columbia River that benefit from coordinated river operations under the Treaty.

The U.S. Entity believes that the Canadian Entitlement, combined with a separate flood risk management payment

to Canada, has more than repaid the cost to Canada of the three dams over the Treaty's expected minimum life of approximately 50 years (beginning after the last of these dams was completed in 1973).

In other words, the U.S. Entity's view is the Canadian Entitlement and the flood risk management payment were designed to produce a value that reflected an appropriate total payment to Canada for the cost of Treaty dams by the time the Treaty could be terminated in 2024. While the Treaty authors did their best to forecast conditions far into



Duncan Dam was the first of four new dams constructed under the Treaty.



Keenleyside Dam, also known as Arrow in the U.S., started operating in 1968.



Increased hydroelectric production under the Treaty has benefitted both Canada and the United States.

the established 450 aMW forecast for U.S. returns. The method for calculating these benefits is explicitly fixed through 2024 and cannot be significantly changed without renegotiating the Treaty's Entitlement methodology.

Through the Treaty Review process, which includes input from regional stakeholders, the U.S. Entity is evaluating what changes to propose to the Canadian Entitlement calculation. BPA also must estimate the value of power benefits associated with continuing the Treaty. Any proposed change in the calculations would have to be mutually agreeable to the United States and Canada.

### For more information

For information regarding the Columbia River Treaty 2014/2024 Review, please visit [www.crt2014-2024review.gov](http://www.crt2014-2024review.gov) or email us at [treatyreview@bpa.gov](mailto:treatyreview@bpa.gov), or call the Bonneville Power Administration at 800-622-4519 or the U.S. Army Corps of Engineers at 503-808-4510.

The delivery of all this power enables Canada to avoid building roughly 1,300 MW of new generation to meet its demand for electricity. As a comparison, Columbia Generating Station, the Northwest's only nuclear power plant, has a capacity of about 1,150 MW. When the value of the energy, capacity and flexibility are factored together, BPA currently estimates that if Canada were to replace the entire Entitlement with its own new gas generating resource, the cost would be roughly \$250 million to \$350 million each year. This range — which reflects low and high assumptions about fuel prices for a replacement power plant — serves as a good proxy of the Entitlement's value to Canada.

Certainly, the world has changed over the past 50 years. Canada's Treaty dams are in place and will be more than fully paid for by 2024. Given this reality, the U.S. Entity prefers to evaluate the Entitlement value, not in terms of whether the Treaty dams exist but on whether Canada and the United States continue to work together to coordinate hydro system operations or choose to operate independently.

The U.S. Entity is studying the difference in value between coordinated and uncoordinated cross-border hydro system operations. Initial estimates indicate that the power benefit from coordinated Treaty storage operations, compared to uncoordinated operation, is \$26 million a year, a sum much smaller than those produced using either the current Canadian Entitlement calculations or the estimated cost of a replacement resource. Analyses continue to be conducted.

## Considerations for Treaty Review

From a power perspective, the U.S. Entity believes that by 2024 the United States will have fully compensated Canada. If the formula is updated to reflect the post-2024 value of a coordinated hydro system operation, the Canadian share of downstream power benefits will be significantly lower than

This publication of the Columbia River Treaty 2014/2024 Review was developed to inform you of issues surrounding the Columbia River Treaty. It is published by the U.S. Entity, which includes the Bonneville Power Administration and the U.S. Army Corps of Engineers.







Mica Dam was the final Treaty dam built in Canada.

Also, they could not have anticipated the significant regional development of conservation and renewable energy resources and other electricity market factors, all of which influence the value of power in the region. In short, the U.S. Entity believes that over the life of the original Treaty, the U.S. will have fully compensated Canada for its investments in Treaty dams.

## The Past

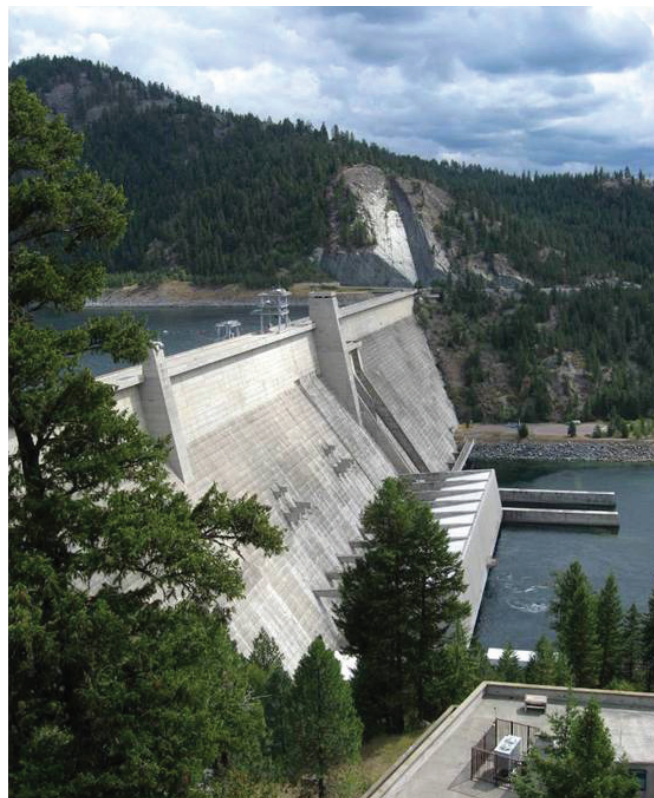
When the Treaty was enacted, Canada did not need the power provided through the Canadian Entitlement to meet its demand for electricity. Thus, it decided to sell that power to utilities in the United States for \$254 million over the first 30 years of the Treaty's term. This transaction covered almost all of the original capital cost of the Canadian Treaty dams.<sup>1</sup>

The United States made the last payment under the 30-year power sales contract in 2003. Now, the U.S. delivers Canadian Entitlement power directly to Canada over the Bonneville Power Administration's Northern Intertie at the Canada-U.S. border. This delivery ranges from 1,176 to 1,369 megawatts (MW) of capacity and 465 to 567 annual average megawatts (aMW) of energy. As a reference point, one average megawatt is enough energy to power 730 typical Northwest homes.

Capacity refers to the ability to generate or transmit electricity; this value reflects the maximum amount of power that Canada could request over a single hour. The energy Entitlement is the average amount of electricity actually delivered to Canada over a period of one year. This power delivery is a combination of federal and non-federal power, reflecting the mix of hydropower generation resources in the Columbia River Basin.

The original Treaty negotiators expected the downstream power benefits to diminish significantly over time. The final Treaty negotiations forecast the Canadian Entitlement for the 2010 to 2024 period to be about 134 aMW of energy and zero MW capacity, meaning Canada would have no flexibility regarding when the United States returned Entitlement power. Using the current calculation methodology, the 2025 forecast is 450 aMW of energy and about 1,300 MW of capacity.

<sup>1</sup> Hugh Keenleyside, 1974, "Ten Years Later, the Results of the Columbia River Treaty."



Libby Dam, the last Treaty dam to become operational is the only Treaty dam in the United States.

the future, their 1960s-era calculations overestimated regional growth in the demand for electricity and did not anticipate modern constraints on the operation of the dams to protect threatened and endangered species.

## The Future

The Canadian Entitlement currently is based on an estimation of how much hydropower could be produced with and without the additional water storage provided by the Treaty dams. There is more electricity generated when it is assumed the dams are in place (remember, this methodology uses a negotiated formula to calculate the theoretical value of the additional generation), and the Canadian Entitlement is equal to one-half of that assumed increase in generation.

The structure of the Canadian Entitlement makes it an extremely valuable commodity in the utility industry. Electricity is more valuable when it is virtually guaranteed to be available, or "reliable," and when its delivery can be shifted to times

of high demand, or "flexible." The Canadian Entitlement offers both of these attributes.

To highlight the flexibility of the Canadian Entitlement, the current agreement allows Canada to select which hours of the following day that it wants anywhere from zero to 1,321 MW of power to be delivered to the B.C. border. Similarly, to underscore the reliability of the Canadian Entitlement, these returns from the U.S. to Canada are virtually guaranteed, barring any significant transmission system problems or other unusual circumstances. During the operating year of 2012, the U.S. delivered Canadian Entitlement power 99.94 percent of the time. In the case of the few hours when deliveries were reduced, they were made up in a week or less.

## The Columbia River Treaty 2014/2024 Review

The coordinated operation of the many dams and reservoirs under the Columbia River Treaty has provided significant flood risk management and hydropower benefits for both the United States and Canada. The Treaty calls for two "entities" to implement the Treaty, one for the U.S. and one for Canada.

The U.S. Entity, appointed by the president, consists of the BPA administrator and the Northwestern Division engineer of the U.S. Army Corps of Engineers. The Canadian Entity, appointed by the Canadian cabinet, is the British Columbia Hydro and Power Authority (BC Hydro).

While the Treaty has no specified end date, it contains provisions that will change its implementation in 2024. Additionally, either Canada or the U.S. may unilaterally terminate most provisions of the Treaty in 2024, with a minimum of 10 years' advance notice, hence the focus on 2014 and 2024.

The U.S. Entity is undertaking a series of studies regarding current and potential future operations under the Treaty. The goal is a recommendation from the U.S. Entity to the U.S. Department of State by the end of 2013 on which elements the Pacific Northwest would like the Department of State to pursue in negotiations with Canada.

Collectively known as the Columbia River Treaty 2014/2024 Review, this multi-year effort will provide information critical to a U.S. Entity recommendation through evaluation of the

value of Treaty benefits to the region and consideration of contemporary concerns that reach beyond flood risk management and power generation.

Integral to the Treaty Review process is the U.S. Entity's direct consultation with the Sovereign Review Team, comprised of representatives of the four Northwest states, 15 tribal governments and 11 federal agencies. Supporting the Sovereign Review Team is the Sovereign Technical Team, responsible for completing the technical work that informs the Sovereign Review Team and the U.S. Entity.



U.S. President Dwight D. Eisenhower and Canadian Prime Minister John Diefenbaker sign the Columbia River Treaty in 1961.