

Balancing Water Use: Water Use Planning at BC Hydro

Graeme Matthews
Program Manager
BC Hydro Water Use Planning Program
Generation, BC Hydro
6911 Southpoint Drive (E16)
Burnaby, BC
V3N 4X8
graeme.matthews@bchydro.bc.ca

Edward L. Hill
Senior Environmental Coordinator
Sustainability Technical Services
Generation, BC Hydro
6911 Southpoint Drive (E16)
Burnaby, BC
V3N 4X8
ed.hill@bchydro.bc.ca

Introduction:

British Columbia, located on the West Coast of Canada, depends heavily on water for its electricity needs. As environmental and social pressures, and community power needs compete for this resource, the *allocation of water poses an ongoing sustainability challenge*. BC Hydro directly faces this challenge in its day-to-day business: *how does a hydroelectric utility serve the needs of its customers while also meeting social and environmental objectives?*

As one of the largest electric utilities in Canada, BC Hydro is a "Crown" corporation owned by the government of British Columbia. BC Hydro generates about 50,000 gigawatt-hours of electricity, 90% of which is clean, renewable, emission-free hydroelectricity produced at one of its 30 hydroelectric facilities on 27 watersheds around the province. BC Hydro serves nearly 1.6 million customers in British Columbia, while its power subsidiary, Powerex, markets energy products and services to its neighbours in western Canada and in the western United States.

Because the dams and reservoirs used to store and regulate water alter the natural cycle of annual flow patterns in order to meet the demand for electricity, BC Hydro's hydroelectric facilities can affect fish and wildlife habitat, cultural resources, industrial operations, and recreational activities. At the same time, these facilities may also create benefits by acting as a source for domestic drinking water supply, providing flood control and fueling economic development.

BC Hydro's business is to generate electricity, and in so doing must be accountable to British Columbians to take care of the environment, meet social and community needs and deliver excellent financial results. In order to ensure the sustainability of each component, BC Hydro has initiated several participatory programs that provide external input into management decisions. Four recent key programs are:

- Water Use Plans for the operation of our dams and reservoirs,
- Fish and wildlife restoration programs such as the Columbia Basin Fish and Wildlife Compensation Program as mitigation and compensation for construction impacts of our dams and reservoirs,
- Historic grievance negotiations with aboriginal communities and
- Public recreation sites and visitor centres at our facilities.

For BC Hydro, Sustainability is the responsible and integrated management of the environmental, social and economic aspects of our business over the long term for the benefit of our shareholder, customers and stakeholders.

History: Genesis of the Water Use Planning Program

BC Hydro depends on access to water to generate most of the power that it provides. Since water is a public resource, BC Hydro's success therefore depends on securing and maintaining public and government consent to the corporation's use of the water.

In British Columbia, most water licenses for power purposes, were granted before 1962 (including BC Hydro's), at a time when the public values leaned heavily towards economic development. But *public values have since shifted in favour of environmental social responsibility, as well as local involvement in resource decisions*. This shift in priorities was readily apparent by the mid-1990's when fisheries agencies and environmental interest groups were demanding that BC Hydro change water management practices for the benefit of fish habitat and other interests associated with their dams and generating facilities.

On the regulatory front, BC Hydro and the federal and provincial government fisheries agencies were embroiled in conflicts and legal challenges. Charges for regulatory violations were made and federal orders that constrained operational flexibility at hydroelectric plants were imposed.

The bottom line: BC Hydro was facing a shift in public values and regulatory control that challenged the allocation of water and the flexibility of operations. By the mid-1990's, these tensions demanded attention, and BC Hydro decided to undertake a comprehensive review of water management at two of its facilities, as an attempt to manage water allocation issues proactively and collaboratively.

By 1996, BC Hydro had conducted two of these experimental reviews, and was encouraged by its initial success in taking both a science-based and inclusive approach. BC Hydro went on to partner with government agencies and aboriginal First Nations to develop the guidelines for a structured review process to be carried out for each of its hydroelectric facilities. The Water Use Planning Program is the result of these challenges (increasing public and government concern and pressure) and opportunities (the success of the initial experimental water management reviews).

Program Aim:

In developing the Water Use Planning program, BC Hydro and its project partners set out to answer the following question:

How can a hydroelectric utility committed to sustainability effectively respond to operating conflicts driven by changing social, environmental and economic priorities?

In its search for an answer, BC Hydro designed a process, along with its partners, that is rooted in the principles of collaboration and incorporates best practices for public consultation. This ensured that a broad range of water uses such as recreational, community, industrial, flood management, and fish habitat as well as hydroelectric power production, were all considered in reviewing facility operations.

In summary, the overall goal of the Water Use Planning program is to *find a better balance between competing uses of water that are socially, environmentally and economically acceptable* to British Columbia. The intent was to create agreements (water use plans) that are sustainable both in terms of:

- o *Outcome* - each Water Use Plan balances water uses across all three bottom lines.
- o *Process* - the agreements are expected to be successfully implemented and receive continued regulatory and public support over time because they were developed using a participatory process based on solid science.

The Water Use Planning Program also aims to *increase the efficiency of regulation* for the benefit of all those involved. Regulators benefit because in knowing that BC Hydro has developed its water use plans using a collaborative and transparent public process, there is assurance that these plans do reflect the appropriate balance of social, environmental and economic uses of the water. BC Hydro benefits because the resulting water use plan documents that define the detailed operating parameters to be used by BC Hydro's facility managers in their day-to-day decisions provides the clarity they need to operate in compliance with their licence. The public wins because their values are reflected in the final Water Use Plans. All parties win because, in taking a collaborative approach, they no longer need to rely solely on *inefficient legal battles* to resolve disputes.

Description of Water Use Planning Program:

The overall goal of the program is to find a sustainable balance between competing water uses that is socially, environmentally and economically acceptable. Here are some of the key features of the program:

Inclusive Committees: The process involves an open, inclusive multi-stakeholder committee reviewing operations at a hydroelectric facility. Participants on each committee include federal, provincial and municipal government agencies, First Nations, environmental interest groups, local citizens and other public interests. Unlike most traditional consultation, this process has BC Hydro management represented at the table on an equal basis to all other participants.

Decisions Are Made Based on a Mix of Best Science & Values:

Participants follow a structured decision-making process using “value-based thinking”. They start by identifying issues, setting objectives and developing performance measures (indicators to measure progress on each objective). Any supporting scientific research that is conducted is very focused on the decisions being discussed, and is used to help participants explore and develop a wide range of alternatives for consideration. Participants then apply their values and interests to evaluate these alternatives, seek consensus on a preferred alternative, and make specific recommendations about water management at the facility.

Consensus is a Goal. Not a Requirement: The consultative process concludes with a Consultative Committee Report, signed off by participants, that outlines a set of recommendations and/or discussion of options. Consultative Committees do not have decision making authority, but they do have a lot of decision making power in that, if they reach consensus, there is a high probability that their recommendations will be implemented. Consensus among participants is desirable but not required, and all areas of agreement and disagreement are recorded. The report forms the basis of BC Hydro’s draft Water Use Plan, submitted to all relevant provincial and national regulatory authorities for review, revision (if necessary), and acceptance.

Outcome of the Process: The outcome of each planning process is a final Water Use Plan (WUP), which is a detailed set of operational instructions for a specific facility, focusing on the reservoir storage, timing and amount of water releases through various dam or power generation structures. These plans clarify how BC Hydro can use water at its hydroelectric facilities, taking into account the multiple uses of that water. Once approved, the details of this plan are then embedded in BC Hydro’s public water licences to ensure transparency and accountability.

Schedule of Implementation for Water Use Planning Program:

Between 1996 and 1998, a core group of representatives from BC Hydro and the provincial and federal governments developed the Water Use Planning framework, including a set of guidelines for the process and an interagency management structure to coordinate the various regulatory jurisdictions. During the six-year period from 1998 and 2004, BC Hydro has completed consultation on all 23 plans, and 20 of the plans have been submitted to the Water Comptroller for review and acceptance. Each consultative committee process took between one and four years to complete.

Key Results & Additional Benefits:

Aside from the practical outcome of the process (the new Water Use Plans for all BC Hydro’s facilities), here are some additional benefits.

“Win-Win” Results: Several of the water use planning processes achieved “win-win” results, meaning they generated options that would provide environmental, social and economic benefits at the same time. For example, in the Stave River Water Use Plan it was recognized that the current constraints on operations were overly conservative and changes were recommended that are expected to create net improvements for fish habitat, better water levels for the recreation season, and increased power values.

Broad Support and Stronger Relationships: Because the Water Use Planning program takes a collaborative approach instead of relying on legal dispute resolution, the process is widely supported and accepted. Inter-agency and inter-personal relationships were built through the Water Use Planning process, between government agencies, First Nations, the public and BC Hydro. This will be an ongoing legacy of the program, making collaboration a preferable alternative to legal battles as a way of resolving conflict. The consensus outcomes developed and recommended by most of the Water Use Plan committees clearly demonstrate that *structured collaboration can lead to sustainable decision-making for all players.*

Information, Tools & Process to Support Sustainable Water Management: As a result of the Water Use Planning Program, BC Hydro now has a robust management framework, including: 1) the clarity about what to manage for (a list of key objectives generated in consultation with government, aboriginal First Nations and the public) and 2) a better scientific understanding of the impacts of operations on these objectives, 3) the computer modeling tools to make use of this improved scientific knowledge and use simulation to test the impact of operating decisions, and 4) growing expertise in creating collaborative and inclusive processes using a structured decision-making model.

Innovative Aspects of the Project:

Here are some key innovative features of the program:

Adaptive Management & Continuous Improvement at Existing Facilities: Water Use Planning was initiated in response to changes in public values and regulatory pressures. Those changes will continue as technology, environmental and social conditions, water scarcity, laws and legislation, and market needs all evolve. Knowledge will also change, making water management a dynamic process. The program uses three mechanisms to help manage an uncertain future:

- o each Water Use Plan recommends studies to monitor the results of the operational changes in key areas of uncertainty (e.g., fish and wildlife responses to a changed reservoir regime),
- o each Water Use Plan is subject to review after a period of time recommended by the consultative committees (5 to 20 years depending on the issues and levels of uncertainty), and
- o the program also allows for active adaptive management, or experimentation with operational changes within the plan's life.

This framework for dealing with change and uncertainty also promotes *continuous improvement at existing hydroelectric facilities*. While standards have been set recently for sustainable development of *new* hydroelectric dams (e.g., guidelines of the World Commission on Dams), there is less guidance for hydroelectric companies pursuing continuous improvement at *existing* hydroelectric facilities. The Water Use Planning Program provides a practical example of how this can be accomplished.

Structured Decision-Making Process: The challenge was to find a way of making water management decisions that integrates scientific knowledge, conflicting jurisdictions and passionately held societal values. The Water Use Planning Program successfully uses a structured and participatory process to find solutions that connect multiple interests (e.g., fish, wildlife, hydroelectric power producers, recreation, industry, and other water users), multiple kinds of scientific information (e.g., Western science and aboriginal ecological knowledge), and multiple jurisdictions (e.g., national and provincial). What was most inspiring about this process was the unexpected creativity it unleashed in participants, and the surprisingly positive results that emerged (i.e., a higher occurrence of "win-win" outcomes than was originally expected). *Water Use Planning models an effective structured collaborative process for finding the sustainable balance of water uses.*

Interest in the program and its experimental application by others is evidence of its replication potential. The implementation of BC Hydro's Water Use Planning program has been tracked closely by other Canadian, North American and international hydroelectric companies. Specific requests for detailed information about the program and its potential for application in other regions have come from: the Tennessee Valley Authority in the United States; attendees at international conferences in Croatia, Brazil, and the United States; the International Joint Commission for the Great Lakes (in North America); the World Business Council on Sustainable Development and the World Bank (who both developed case studies of the program).

Description of Economic & Social Costs / Benefits:

Costs & Benefits of Developing Water Use Plans:

Costs of Planning Program: Over six years, BC Hydro's Water Use Planning program cost approximately 26 million \$CDN, with key provincial and federal government partners supporting the program through staffing and other resources.

Benefits of the Process: The key positive results of the program included: 1) the successful application of a collaborative approach instead of a litigative approach to dispute resolution, 2) explicit learning about the

values and interests of all participants, 3) more informed decisions and shared responsibility for outcomes, 4) stronger inter-agency and inter-personal relationships between government agencies, First Nations, the public and BC Hydro, 5) valuable scientific information about operational effects on fish, environment, recreation and aboriginal First Nations' values, 6) transferable research methodologies and knowledge, 7) regulatory clarity, 8) an adaptive framework for managing water on an ongoing basis.

Costs & Benefits of Implementing Approved Water Use Plans:

Expected Costs of Implementation: Implementation of the plan will result in BC Hydro foregoing revenue of about \$50 M per year which is approximately 1.5% of annual revenue.

Expected Benefits of Implementation: Several of the completed Water Use Plans have achieved win-win-win results across all three pillars of sustainability (social, environmental and economic). The net benefits of these plans include improvement across most or all water use values, such as: improved fish and wildlife habitat, better water levels for recreation, improved access for cultural use by aboriginal First Nations, and clearer agreement on how BC Hydro will share the water resource with other licenced industrial water users. In some cases, power generation is also expected to increase. A further expected benefit is avoided legal costs as the Water Use Planning program has created a viable collaborative alternative to litigation for resolving disputes.

Conclusion:

Water is an incredibly precious resource worldwide, and water management is a critical global sustainability challenge. Operators of hydroelectric facilities face this challenge every day as they try to manage water resources across a multitude of interests.

Water Use Planning is a *highly replicable solution* because the process is based on a *set of principles that can be used to help others meet the challenge of sustainable water management*. These principles can be adapted to suit the needs of the region, the company, the stakeholders and the legislative environment. BC Hydro successfully applied these principles to address issues across its diverse facilities, from small single-reservoir plants to large, multi-reservoir systems. In addition, the process does not require changes to existing legal and constitutional rights. Water Use Planning clarifies and articulates legal and constitutional requirements in detailed operating plans, while safeguarding the regulatory powers of provincial and federal legislation, thereby enhancing its replication potential.

The program has developed *transferable tools* to facilitate replication:

- o effective decision-making tools to help participants make difficult trade-offs between competing water uses
- o methodologies for computer modeling of instream water flow and power production to simulate operational effects on fish, wildlife, recreation and First Nations' interests (to allow the consultative committees to "test-drive" their decisions)
- o practical applications of the principles of adaptive management.