



*If not now, when? If not us, who?*

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**APEGBC 2004 Sustainability Award winner—BC Hydro**

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**Editorial**

The APEGBC Sustainability Award was created in 2003 to recognize the important contribution that engineering and geoscience make to the well being of human life and the ecosystems on which we all depend. Award submissions are evaluated on four basic concepts of sustainability: originality, conservation, triple bottom line and well being. The award further seeks to recognize the positive role of human qualities such as ethics, imagination, reason and common sense in achieving this end.

The 2004 competition for APEGBC’s Sustainability Award received a number of excellent submissions. Each entry was a significant step forward in raising awareness of sustainability and to planning for the future.

BC Hydro and their Water Use Planning program were this year’s winners and the award was pre-

sent to them at the APEGBC Annual General Meeting recognition luncheon back in October. BC Hydro, through this excellent initiative, has achieved their goal of long term sustainable water management through co-operative partnerships. This ongoing program is effectively translating sustainability theory into practice. The changes that have resulted at BC Hydro’s water management facilities have increased social and environmental benefits and increased regulatory certainty and public consent to operate.

This special edition of the Sustainability Now newsletter is dedicated to celebrating BC Hydro’s award winning Water Use Plan Program. More on this winning submission can be found on the Sustainability website, [www.sustainability.ca](http://www.sustainability.ca).

Lise-Anne Vershinin, Editor

**In Conversation with Graeme Matthews, P.Eng**  
 BC Hydro—Water Use Plan Program

Graeme Matthews, P.Eng, is a Program Manager with BC Hydro Water Use Planning Program, the winner of the 2004 APEGBC Sustainability Award.

When we first sat down to lunch, the waiter came over to offer us some beverages. Graeme, practicing what he preaches, ordered a glass of water, tap water, specifically requesting nothing from a bottle. What a terrific way to start an interview with someone so obviously passionate about his work.



**LV: Please tell me about your career path and your job with BC Hydro.**

GM: My career path was through estimating and scheduling for Revelstoke project, that’s when I joined Hydro,

then I moved into managing feasibility studies for future hydroelectric developments, which have never happened. Eventually I moved on to Project Management in general and managed various projects - a few of them fisheries related or environmentally related.

**LV—How long have you been at BC Hydro?**

GM: Since 1975 with a short break in the middle.

**LV: What is a WUP and why did BC Hydro decide to pursue them for all of its watersheds?**

GM: It’s a document, it’s a plan and a Hydro owned document. It’s not really a legal document - it’s our proposal. The implementation of our parameters that we put forward in the plan is done through the Water Act. That’s the key here, the formal implementation and the accountability is through the Water Act. There were some outside drivers pushing Hydro and others to review Hydro’s operations. They were using various means to push or force the government and Hydro into doing something about the environment. To give credit to those who were pushing they successfully moved Hydro into a very different way of looking at environment.

**LV: Have you had positive feedback from those who were pushing for the development of the WUP?**

GM: Yes. The feedback often is that [the program] doesn’t go far enough. That’s always a complaint of the single interest. It hasn’t gone far enough to meet their goals. In most cases we’ve got peo-

## In Conversation with Graeme Matthews, P.Eng, Cont.

ple to this day saying it's acceptable which is what it's all about, a balance between competing interests.

**LV: Can you give me an example of where a WUP resulted in environmental, social and economic gains?**

**GM:** One of the difficulties is where is your baseline for measuring? Are you going to measure against historical operations or are you going to measure against operations as they were in 1997 when we'd already made some voluntary changes?

You have to set your water licenses aside and think about how we were operating. In Stave we moved into some voluntary constraints on the Stave River particularly for Fisheries issues. When we sat down and did the WUP and actually applied the science we did a lot of scientific study and tried to actually quantify benefits for fish and fish habitat. When we did that we actually got to the point of saying this constraint we put on was actually too much. It may benefit some life stages of fish but it's hitting very hard some other life stages of fish. So a better balance from a Fisheries perspective is to reduce some of the constraints that have been put on the operation. Yes, that actually added benefit to power and added benefit to fish as well. There were several cases like that.

The real value is going through the process because one of the key outcomes is "consent to operate" or "public consent to operate".

**LV: What was the role of professional engineers and geoscientists in the Program?**

**GM:** Primarily in the power modeling, the hydro technical modeling. One of the keys was to produce information that could be used by others who were modeling environmental consequences.

For example, for recreation we want to keep the Alouette reservoir up at a certain level for 3 months in the summer, how would we then run the model? We used an **optimization** model to actually do this. The model didn't blindly put a constraint on it but used a little bit of foresight and actually did some optimization of power. So there was a lot of engineering involved from that perspective. The power modeling was the key element of engineers and the hydro technical side.

**LV: How will First Nations land claims and treaty settlements affect the WUPs?**

**GM:** They won't affect the WUPs because those are BC Hydro documents. The implementation of the proposals and the plans are under the jurisdiction of the Water Controller. If he is making a change that might infringe upon rights and/or title he has a duty to consult, that may affect the Controller's ability to implement some of the constraints.

On the other hand, most of the results were positive from an environmental perspective, which is very often one of First Nations key interests: the wildlife, the hunting, the fishing etc. It remains to be seen whether First Nations object or don't object. The response in general is that the WUP program didn't do enough to address their issues around rights and title.

**LV: Are the water use plans the type of stakeholder consultation process that can be used as a model or prototype for other processes?**

**GM:** I think many of the principles we use in the consultation process, yes, are a model but no you couldn't take it like a cookie cutter and say this could work somewhere else. Even in the WUP the process we went through in each watershed was different depending on the needs of the community that was involved.

**LV: Once all of the plans are implemented, what's the future of the program?**

**GM:** Part of the implementation requires [BC Hydro] to undertake certain monitoring studies and provide feedback. We want to do some more monitoring or some more study to [confirm] or get better information for making better decisions. There will be a review for the future and BC Hydro is committed to doing that.

**LV: Given what you've learned about Sustainability in being involved in the WUPs process, what advice would you give a new hire about**

**what they need to know about sustainability?**

**GM:** I think it involves lots of attributes that you find in leadership, in consultation. I think it's being open and honest. Sustainability is not about choosing between right and wrong but about choosing between two rights.

**LV: Knowing what you know now, what would you do differently in the WUPs process?**

**GM:** Not much. Our approach changed slightly from the beginning. We really encouraged attendance of all interested parties who had a real interest in the project and Hydro's undertaking of it.

**LV: Are there other similar programs in other provinces?**

**GM:** There weren't. BC was very leading edge. Some believe BC Hydro is way beyond where we should be and that we could potentially cost the industry a lot of money as a result of the way we're behaving. We happen to disagree, we think that public consent or consent to our operations is key to a successful business.

*Centre Photo: Recreation at Puntledge River.*



## Stave River Water Use Plan: A Case Study

Ms. Charlotte Bemister may be reached at BC Hydro, 6911 Southpoint Drive, 7th Floor, Burnaby, BC V3N 4X8

BC Hydro, the provincial hydroelectric utility in British Columbia, has developed individual water use plans (WUPs) for each of its 34 hydroelectric power plants. The plans recommend water allocation, and possibly reallocation, of their water licenses that reflect today's values of protecting fish and wildlife habitat, impacts to tourism, recreation, flood, drinking water, cultural sites, navigation and industry needs as well as evaluating the impact to lost generation and power needs. The plans took into consideration all the uses and needs of the water in each watershed as a shared provincial resource.

The Stave River Water Use Plan was one of the first WUPs to be developed and was created as part of BC Hydro's Stave Falls Power plant Replacement Project where a provision in the Energy Project Certificate issued in June 1995 required the development of a WUP.

At each facility a consultative committee was formed with representation from federal, provincial, municipal government regulatory agencies, First Nations, environmental and community interest groups, like Ducks Unlimited and the Stave Valley Salmonid Enhancement Society, private industry users like forestry companies, and local residents. Development of water use plans does not mean that conflict over various water uses is avoided or eliminated; rather the process is designed to allow heartfelt discussion of values, objectives, sets performance measures; and priorities and then evaluates each across a range of water flows and parameters that allow for a better understanding of how the power generation affects the various interests and how it may be altered to benefit these interests, and at what cost. The goal is to ensure that hydroelectric operations are aligned with public values and priorities throughout the province. Specifically the goal for the Stave River water use plan was to balance the need for hydroelectric generation with all of the other competing demands for water in the watershed. The plans were developed in a fairly short timeframe two to three years of committee meetings and studies that helped informed the discussions.

Key to the outcome is that a consensus decision is not necessary. BC Hydro maintains the responsibility to develop a water use plan from the recommendations of the consultative committee and prefers consensus be achieved; however recognize that achieving consensus is just not possible in all cases. In addition the consultative committee recommends a review period usually 10 or more years after the plan is implemented and a monitoring program that reflects key uncertainties that need to be studied so that a more informed decision can be made when the plan is reviewed.

The Stave River WUP began in 1997 with several public meetings to identify issues and concerns and then a Consultative Committee was formed and a decision analysis facilitator hired to assist with their deliberations in Spring 1998. The committee achieved consensus in June 1999 and issued a report in September 1999. The recommendations report documents in detail the consultative process, key discussions, areas of agreement and disagreement, and recommendations. BC Hydro

then developed their water use plan using the recommendations of the consultative committee. The formal water use plan provides power station managers and operations planners with the operating parameters required to manage the reservoir levels and water flows according to the consensus recommendations.

Both the recommendations report and BC Hydro's water use plan are sent to the Comptroller of Water Rights for the province of British Columbia. The comptroller, who reviews and issues all water licenses, can approve or disapprove the plan or request additional information or clarification. This was the first plan to be reviewed under the new provincial water use plan guidelines. The plan was approved and implemented in 2004. The other water use plans are expected to be reviewed and approved taking an average of about six months each to complete prior to implementation.

The Consultative Committee agreed on the following broad objectives, each with sub-objectives, for the Stave River WUP:

- Avoid disruption to industrial operations
- Support recreational opportunities
- Support Viability of wildlife populations
- Protect and preserve First Nations heritage values
  - Support viability of fish populations
  - Avoid cost increases for electricity production
  - Maximize flexibility to respond to change
  - Gain knowledge about the system and impacts



Stave River in June 1910 (BC Archives)

Twelve operating alternatives were developed designed to meet the objectives. The impacts of each alternative on each objective were estimated using the performance measures. The operating alternatives were then refined into a number of combination strategies. Eventually two very distinct strategies were evaluated in detail. A final combination strategy was developed which

best met recreation and fish objectives both downstream in the Stave River and in the Stave Reservoir while still enhancing the other watershed uses, including the cultural values of First Nations to conduct further archaeological investigations during planned deep reservoir draw-downs once every three years. The WUP has also resulted in BC Hydro's first Heritage Management Plan. This plan provides a blueprint for further First Nations archaeological investigations within the draw-down zone of the reservoir.

The WUP includes the establishment of an administrative committee to oversee the monitoring program. This committee is comprised of Fisheries and Oceans, Ministry of Water, Land and Air Protection, BC Hydro, Kwantlen First Nations and the District of Mission. The committee will prepare an annual report, and conduct an interim review after five years and a full review after ten years focussed on the knowledge gained from the studies and implementation of the new water flows. In particular, studies designed to improve understanding of reservoir productivity focusing on the effects of the introduction of partial peaking generation during the salmon spawn and monitoring of water quality at a small community water supply system to ensure there are no unexpected negative effects. The management plan also includes funding for mitigation of negative results should they occur.



## WWSS: Sustainability and BC Hydro's Water Use Planning Program

Prepared for Sustainability Now by Dr. Craig Orr, Ph.D.  
Executive Director, Watershed Watch Salmon Society

As an ecologist and salmon conservationist interested in water, the concept of sustainability is never far below the surface. Even so, my views on sustainability were profoundly altered by two recent events.

The first was my introduction to panarchy theory. Adaptive management guru Buzz Holling, in a 2002 address to a Vancouver water workshop<sup>1</sup>, dazzled us with explorations of system behavior, "management pathology," and some new notions of change based on cycles of creative destruction and renewal, which Holling and his colleagues had dubbed, panarchy theory.

The second epochal event in my sustainability education was somewhat more protracted, but no less important. That experience—the one I've been invited to share here—was the 70-some meetings I attended on behalf of Watershed Watch as part of BC Hydro's water use planning process.

The first event thus hooked me on a broadly applicable theory of change—a theory grounded in the links between human and natural systems—while the second fleshed out that theory with experience.

So what does panarchy theory all have to do with BC Hydro's water use planning process? Just about everything, I believe. Panarchy's practitioners present cogent arguments to support the contention that most management agencies (and most systems), in their drive for efficiency, and to preserve initially successful policies and accumulated resources, become progressively more myopic and rigid. In cases of extreme rigidity, so say Holling and colleagues, agencies and systems may become "accidents waiting to happen." Such systems are broadly vulnerable to a "triggering event" which may prompt crisis and transformation within the agency or system. It is at this point that systems may undergo "creative destruction" in which accumulated resources and tightly held beliefs are "released from their bound, sequestered, and controlled state, connections are broken, and feedback regulatory controls weaken," thus setting the stage for adaptive reorganization.



BC Hydro's water use planning process is a living example of how a major agency may undergo adaptive reorganization—and the positive benefits of such reorganization. Until recently, BC Hydro found itself broadly vulnerable to a rapidly changing perception that water is valuable *beyond* the generation of power. Yet overly rigid policy and the drive for efficiency made it difficult to incorporate other values, including fish production, into Hydro's operations—without the aide of external catalyts. That catalytic force was applied in the late '90s when an increasingly concerned public, aided by audits of Hydro's operating licences, a complaint to NAFTA, and an increasingly sympathetic media, persuaded the then government of the day to revamp how water is used at Hydro's facilities.

The "WUP" process arguably represents one of the most striking examples of adaptive reorganization ever undertaken by a BC crown corporation. Public values for fish were successfully incorporated into numerous new, ecosystem-connected operating plans. Resources—including people, money, expertise, and ideas—were "released" for reorganizational purposes. As a result, "transformational learning" occurred across WUPs, and solutions were found to policy challenges, often by consensus agreement.

Watershed Watch has produced a preliminary technical assessment of fish conservation gains within WUPs ([www.watershed-watch.org](http://www.watershed-watch.org)). That review outlines many positive gains, but it is not the intent here to re-iterate the report's findings, but rather, to introduce a broader story on how we assess and practise sustainable behavior.

Borrowing from the language of panarchy, then, the WUP story is about experimentation, testing of novel ideas, and paying the notion of resilience more than lip service. It is also a story of changing attitudes and perceptions, incorporating public interest into water policy, and the enhancement of overall "system potential." Most of all, however, BC Hydro's water use planning process is a made-in-BC story with global implications on how sustainable behavior is rooted both in the maintenance of adaptive capacity, and in the links between human and natural systems.

Centre Photo—Terzhagi Dam

<sup>1</sup> For information on "Water and the Future of Life on Earth Workshop" see: <http://www.sfu.ca/cstudies/science/publications.htm#freshwater>

## Sustainability in Law & Ethics Seminars

Sustainability has now been included in the APEGBC CPD Law & Ethics seminars. Tim Smith, P.Geo. Engineering Geologist for Westrek Geotechnical Services, talks to sustainability during his Professional Practice & Ethics segment.

## Score a Point for Environmental LEED-ership

*Prepared for Sustainability Now by Courtney Maier Railton, BC Hydro*

British Columbia is a centre of excellence for green building design and construction in North America and the trend toward building and certifying green buildings under the LEED rating system is growing. Consider these recent projects:

- The City of White Rock Operations Building – the first new LEED Gold building in Canada
- The City of Vancouver National Works Yard – the first LEED Gold project under LEED BC.
- Semiahmoo Library and RCMP District Office – Canada's first LEED-certified library.
- Vancouver Island Technology Park – Canada's first refurbished LEED Gold building

LEED is an international standard developed by the U.S. Green Building Council to provide a standard benchmark for the design and construction of green buildings. LEED-Canada 1.0 for new construction, to be officially launched December 1, 2004, is an adaptation of the U.S. system and is tailored specifically for Canada's climate, construction practices and regulations. The system awards points for credits achieved in six categories including energy and atmosphere, indoor environmental quality, water efficiency and oth-

ers.

Now building professionals have an assured way to meet the intent of LEED Energy Credit 6 for Green Power; to encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis; and earn credit toward certification. A purchase of BC Hydro Green Power Certificates equivalent to 50 per cent of a building's energy consumption under a two-year contract qualifies for one point under LEED.

Power Smart Green Power Certificates are a BC Hydro product that gives organizations a tangible way to ensure that their electricity use is environmentally friendly. Each certificate represents the green attributes from one megawatt of electricity generated from Eco Logo certified green energy projects in B.C.

Green Power Certificates help organizations achieve their sustainability objectives, including LEED certification.

"Design teams are faced with many challenges to accumulate enough points to meet their LEED objectives.", says Liz Johnston, BC Hydro, New Construction Program Manager. "Powering your facility with green power through the purchase of GPCs is one assured way to accumulate a point."

For more information on LEED, visit the Canada Green Building Council website at [www.cagbc.ca](http://www.cagbc.ca). To find out more about BC Hydro Green

### Upcoming Events

**POWER-GEN Renewable Energy**—March 1-3, 2005  
Las Vegas, NV (Las Vegas Hilton)  
<http://pgre05.events.pennnet.com/>

POWER-GEN Renewable Energy brings together the renewable energy (wind, solar, hydro power, geothermal energy, ocean/tidal, and biomass), renewable fuels (biofuels, ethanol, methanol, and biodiesel), and emerging energy technology (hydrogen systems, fuel cells, microturbines and energy storage) sectors of the energy industry to discuss the key technical, regulatory, structural, economic and market issues impacting their commercial future. With a conference program featuring multiple tracks of sessions covering technologies and business issues, plus an exhibit floor showcasing the latest products, systems and services, POWER-GEN Renewable Energy is the industry's premier event covering all major aspects of the renewables market.

**GeoExchange 2005 International Conference & Trade Show**  
Burnaby, BC (Metrotown Hilton)  
[www.geoexchangebc.ca](http://www.geoexchangebc.ca)

GeoExchange 2005 will be a leading event for the geoexchange industry in Canada. Featuring prominent speakers from across North America and internationally, this two-day conference will provide you with an insightful overview of present and future innovations, applications and opportunities for geoexchange systems.

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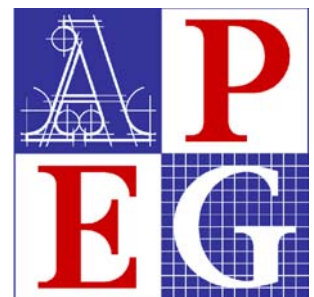
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