The Energy-Water Nexus:
Meeting the Energy and Water Needs of the Snake/Columbia River Basin in the 21st Century

A Science and Technology Summit

**Purpose:** The Snake/Columbia River system is the Pacific Northwest’s primary water system, providing water for power, irrigation, transport, recreation, wildlife and many other uses. From their sources in British Columbia and Yellowstone National Park to the Pacific Ocean, this river system sustains the region’s industry, agriculture, ecosystems, and continuing population growth. Many rivers within this system are fully appropriated and many aquifers are heavily pumped, yet new demands continue to increase, threatening both present and future uses. In addition, population growth in the region continues to increase dramatically, further increasing the need for new sources of power and water.

Energy and water are inextricably linked and vital to our economic sectors and to our citizens’ health and welfare. Providing abundant and clean sources of water depends on the availability of clean, inexpensive, and sustainable energy. Likewise, providing abundant and clean sources of energy depends on the availability of clean, inexpensive, and sustainable sources of water. Our nation’s energy-security goals cannot be reached without simultaneously addressing the use of water for generating energy (e.g., emissions scrubbing, and energy-resource production) and the use of energy for supplying purifying, distributing, and treating water and wastewater.

As both these critical resources are produced, transported, used and/or consumed they impact all of our other natural resources. Considering that the projected demand for both energy and water is expected to grow substantially in the Pacific Northwest over the next 25 years, the magnitude of the challenge facing us - to manage the energy and water nexus - is enormous. The critical question is what science, technological and policy improvements/breakthroughs are necessary to meet the needs of planners, policy-makers and decision-makers to optimize our generation and use of energy and the allocation and use water in the system while minimizing their impacts on the environment?

The purpose of this Summit is to assess the state-of-the-science, technology and associated research, to meet policy and management needs, to develop cost-effective and environmentally sound methodologies and technologies that may be applied to maximize the production of energy and availability of water, and to minimize the consumption of both water and energy in the Snake/Columbia River system. Information on all phases of technology development, theoretical analysis, laboratory experiments, pilot tests, and field applications is relevant. Current policy and management needs will be presented, as will future needs.

**Output:** The results of this summit will be utilized to: 1) develop a technical strategy for developing cost-effective science and technology to predict, measure, monitor, purify, conserve, and store water, and to maximize power generation, storage and efficiency in the region; 2) evaluate methods and technologies for reducing the impacts of energy and water development and use on the environment; 3) focus science in the support of policy; and 4) improve the development and use of science-based policies. Existing and emerging/innovative science, technologies, and policy needs will be considered.
The National Academies of Science, the Office of Science and Technology Policy and numerous federal and state agencies have recently discussed the need and the role of innovative science, technology and policy in meeting the nation’s future needs for energy and water. The technical, policy, and management strategies produced through this summit will be captured and distributed to provide regional lawmakers, regional resource managers, and federal and state agencies, and the private sector concepts and ideas for developing future research development, and management programs that will benefit the Pacific Northwest.

**When:** June 25 - 27, 2007.

**Where:** The Red Lion Hotel, Boise Downtowner, Boise, ID

**Registration Fee:** $150 (includes reception, lunches and breaks – register online)

**WWW site:** [http://www.iwrri.uidaho.edu/default.aspx?pid=99479](http://www.iwrri.uidaho.edu/default.aspx?pid=99479)

**Organizers and/or Sponsors:** (CAES, INL, PNNL, IWRRI, CBT, IWW (OSU), SWRRC (WSU))

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**AGENDA**

(slight changes may be made)

**MONDAY, June 25, 2007**

4:00 PM  Registration
6:00 PM  Reception

**TUESDAY, June 26, 2007**

8:00 – 8:15 AM:  Welcome & Introductions

*Purpose and Overview of Summit* - Paul Wichlacz, Idaho National Laboratory


- **History of Energy and Water Development in the Snake/Columbia River System** – John Harrison (Northwest Power and Conservation Council)

- **Postcards from the Future: The State of the Energy and Water System in 2030** - John Keyes (BuRec retired) or Karl Dreher (IDWR retired)

Water Quality - Mary Lou Soscia (EPA Region 10)

Climate Variability and Population Growth - Mike Scott (PNNL)

Environmental Flows and Ecosystems - John Ferguson (NOAA NW Fisheries Science Center)

Major Environmental Challenges Facing the Snake/ Columbia System: A Canadian Perspective

10:40 – 10:55 AM BREAK


Integrated Planning - John Freemuth (Boise State University)


The Columbia River Treaty - Tim Newton (Columbia Basin Trust)


12:30 – 1:30 PM: Lunch - The Challenge Ahead - Mark Limbaugh, Assistant Secretary, Department of Interior *invited speaker

1:30 – 2:45 PM: Major Technical Challenges Facing the Snake/Columbia System –Moderator Michael E. Campana, Institute for Water and Watersheds - Oregon State University

Water & Energy Infrastructure: Capacity, Transmission and Storage - Andy Ford (WSU)

The National Energy Water Nexus endeavor, a national assessment and roadmap - Michael Hightower (SNL)

Major Technical Challenges Facing the Snake/Columbia System: Canadian Perspective -Kelvin Ketchum (BC Hydro)
2:45 – 3:00 PM: BREAK

3:00 – 4:30 PM: Presentations on the State-of-the-Science in Energy & Water - Moderator Gary Johnson, Idaho Water Resources Research Institute

Assessing potential impacts of climate change on water resources management - Richard Palmer (University of Washington)

Sustainable water supplies for DCMI and agriculture – Joel Hamilton

Water supply for sustainable hydropower and renewable energy in the Snake/Columbia Basin - John Fazio (NWPPC)

Water supply for sustainable thermoelectric power production in the Snake/Columbia Basin - Thomas Feeley (NETL)

4:30 – 4:45 PM: Summary of the Day

4:45 PM: Recess

WEDNESDAY, June 27, 2007

8:00 – 9:00 AM: Building a Consensus Research Agenda

8:00 – 8:15 AM: Focus Group Goals and Process - Facilitator

8:15 – 9:00 AM: - Bill McDonald *invited speaker

9:00 – 12:30 PM: Focus Groups Meet

12:30 – 2:00 PM: Lunch - Rocky Barker (The Idaho Statesman) *invited speaker

2:00 – 2:45 PM: Focus Group Chairs Report on Sessions

2:45 – 3:00 PM: Perspectives on Moving Forward (speaker)

3:00 PM: Adjourn
Focus Groups: Developing Science, Technology, and Infrastructure for Energy and Water Management in the Snake/Columbia System

The goal of the focus sessions is to determine the future challenges and research needed to:

- maximize the production of energy,
- maximize the availability of water,
- minimize the consumption of both water and energy, and to
- minimize and manage the resultant ecological impacts and pollutants in the Snake/Columbia River system.

Conference participants will divide into the following seven facilitated session to address the general issues identified below. While these questions are intended to provide some focus for each focus area, they are more so intended to provide “food for thought” and to stimulate group discussions. They are not intended to limit or stifle other potential areas of discussion within the general topical areas.

1. Energy Generation and Use
   Steering Committee Resource, Kindy Gosal
   Facilitator presents image of present power/fuel generation and use in the Columbia Basin.

   **Status and Trends**
   - What should be/will be the dominant sources of electrical energy demand and where will they be located in 2030?
   - What will be the likely electrical energy generation capacity and where will it be generated in 2030?
   - What fuels will likely be produced within the basin in 2030?

   **Emerging Challenges**
   - What will be the greatest conflicts and challenges associated with the identified trends?

   **Paths to Solutions**
   - What potential conservation measures can be implemented to reduce demand?
   - What measures can be taken (including infrastructure upgrades/changes) to increase potential supply?
   - What research efforts (including long-term monitoring), should be initiated and what technologies need to be invented or must mature to address these needs?

2. Water Allocation and Use
   Steering Committee Resource, Gary Johnson
   Facilitator presents image of present water supply and demand conditions use in the Columbia Basin.

   **Status and Trends**
   - What will be the dominant water demands in 2030?
• What will be the likely changes in water supply in 2030? Consider spatial, temporal and compartment aspects (e.g., surface water, ground water, salt water, brackish water).

**Emerging Challenges**
• What will be the dominant conflicts and how can we best overcome them?

**Paths to Solutions**
• What potential measures (e.g., conservation, conjunctive management, integrated water resources management) can be implemented to reduce demands?
• What measures can be taken (including infrastructure upgrades/changes) to increase potential supply?
• What research efforts (including long-term monitoring), should be initiated and what technologies need to be invented or must mature to address these needs?

3. **Energy/Water Storage**
Steering Committee Resource, Michael Barber
Facilitator presents image of present water and energy storage in the Columbia Basin

**Status and Trends**
• How much energy/water storage will we need in the future and how much is available using our current technologies?
• What existing anthropogenic and natural systems can be expanded and what new/innovative techniques can be developed for storing medium to large quantities of energy and water?
• How will our water and energy storage needs change and what do we believe our status will be in the Snake/Columbia River system in 2030?

**Emerging Challenges**
• What are the greatest constraints on storage and what are possible adverse impacts?

**Paths to Solutions**
• What measures can be taken so that storage needs are better met in 2030?
• What measures can be taken (including infrastructure upgrades/changes) to increase potential storage?
• What research efforts (including long-term monitoring), should be initiated and what technologies need to be invented or must mature to address these needs?
• What are the funding opportunities for developing new energy/water infrastructure?

4. **Energy and Water Infrastructure**
Steering Committee Resource, Richard Skaggs
Facilitator presents image of present water and energy infrastructure in the Columbia basin.

**Status and Trends**
• What will be the energy/water infrastructure needs of 2030?
• What will be the state of repair of present infrastructure,
• How do we prioritize funding and upgrading our energy/water infrastructure relative to other water infrastructure needs and other (non-water) social priorities?

Emerging Challenges
• To what extent will external influences such as population, climate and land use changes require us to modify our existing infrastructure and systems and what will be the critical constraints to infrastructure development?
• What adverse impacts will arise from expanded infrastructure?

Paths to Solutions
• What new technologies/methodologies can be developed and utilized to reduce the cost, speed up upgrading our energy/water infrastructure while minimizing adverse impacts?
• What are the funding opportunities and constraints for developing new energy/water infrastructure?

5. Sustaining Aquatic, Riparian, and Terrestrial Ecosystems
Steering Committee Resource, Michael E. Campana
Facilitator presents an image of the present critical ecosystem issues in the Columbia basin.

Status and Trends
• What ecosystem components are most affected by water and energy use and generation?
• What will be the status of the existing issues and what new ecosystem issues are likely to appear by 2030, assuming the status quo and assuming projected changes?

Emerging Challenges
• To what degree will these issues constrain water and power development/generation and use?
• How do we balance the energy/water needs of humans and the ecological needs of fish, wildlife and other biotic components of the basin?
• How much will it cost to fund environmental protection activities?
• What is the likelihood of successfully protecting the environment/mitigating environmental impacts

Paths to Solutions
• What measures can be taken to reduce environmental impacts from energy production and use and water allocation and use?
• What research and monitoring is needed to address the present and upcoming issues?
• How do we prioritize ecosystem protection/mitigation activities against other societal demands for the limited funding available?

6. Social, Economic, Political, and Regulatory Considerations
Steering Committee Resource, Gerald Sehlke
Facilitator presents the present social, economic, political and regulatory framework for the Columbia basin.
**Status and Trends**
- What are the crucial economic, political and regulatory issues associated with increasing water and energy demands and increasing populations in the Columbia River Basin?
- What will be the dominant policy and legal conflicts associated with fitting 1800’s policies and laws to current and future energy and water needs?

**Emerging Challenges**
- Science in the service of policy: how do we focus science and utilize the vast body of knowledge to meet the needs of policy makers, decision makers, and planners?
- The science of policy making: how do we focus academic, government and applied research to increase the effectiveness of existing water/energy policies?
- How can we best balance local, regional, national and international (e.g., transboundary social, economic, political and regulatory needs and desires?)
- How do we balance the “public good” versus individual needs, desires and rights?

**Paths to Solutions**
- Science in the service of policy: what science is needed to support policy makers, decision makers, and planners?
- The science of policy making: what policy research is necessary to modify and optimize existing water/energy policies to meet existing and future water/energy needs?