

Energy - Water Nexus

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

A Science and Technology Summit



June 25–27, 2007

*Red Lion Downtowner
Boise, Idaho*

Conference Program

Inside

Introduction	1
Conference Output	1
Agenda	3
Focus Groups	7
Conference Officials	11



Conference Organizers

- Center for Advanced Energy Studies
- Columbia Basin Trust
- Idaho National Laboratory
- Idaho Water Resources Research Institute (University of Idaho)
- Institute for Water and Watersheds (Oregon State University)
- Pacific Northwest National Laboratory
- State of Washington Water Research Center (Washington State University)

Introduction

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 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 purifying, distributing, and treating water and wastewater.

As energy and water are produced, transported, used, and/or consumed they impact all of our other natural resources. Considering that the projected demand for both these critical resources 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 and technological improvements and breakthroughs are necessary to meet the needs of planners, policy-makers, and decision-makers to optimize the 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 conference is to assess the state-of-the-science, technology, and associated research to develop cost-effective and environmentally sound methodologies and technologies 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 science and technology development, theoretical analysis, laboratory experiments, pilot tests,

and field applications is relevant. An overview of current management needs will be presented during the first day; focus groups will discuss the state-of-the-science, technology, and associated research and future needs in these realms on the second day.

Conference Output

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 results of this conference will be to help local and regional researchers: 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, and 2) evaluate methods and technologies for reducing the impacts of energy and water development and use on the environment. Existing and emerging, innovative science and technologies and the

science necessary to support policy needs will be considered.

The strategies produced through this conference will be captured and distributed to provide regional lawmakers, regional resource managers, federal and state agencies, and the private sector concepts and ideas for developing future research and technology programs that will benefit the Pacific Northwest.

Agenda

Monday, June 25

4:00 PM

Registration

6:00 PM

Reception, Characters Room

Tuesday, June 26

8:00–8:15 AM

Welcome & Introduction

Purpose and Overview of Summit

Paul Wichlacz, Idaho National Laboratory

8:15–9:15 AM

The Past, Present and Future of the Snake/Columbia River System

Moderator: Paul Wichlacz, Idaho National Laboratory

History of Energy and Water Development in the Snake/Columbia River System

John Harrison, Northwest Power and Conservation Council

9:15–10:45 AM

Major Environmental Challenges Facing the Snake/Columbia System

Moderator: John Tracy, University of Idaho

Water Quality

Mary Lou Soscia, EPA Region 10

Climate Variability and Population Growth

Mike Scott, Pacific Northwest National Laboratory

Environmental Flows and Ecosystems

John Ferguson, National Oceanic and Atmospheric Administration,
NW Fisheries Science Center

**Water Management Challenges in the Columbia System: A
Canadian Community Perspective** – Kindy Gosal, Columbia Basin
Trust

10:45–11:00 AM ***Break***

11:00–12:30 PM ***Policy and Planning Issues***

Moderator: Richard Skaggs, Pacific Northwest National Laboratory

Integrated Planning

John Freemuth, Boise State University

**Integration of Hydro Operations, Alternative Energy Sources,
Electric Transmission, and Fish and Wildlife Protection in the
Columbia River Basin**

Steve Kerns Bonneville Power Administration

The Columbia River Treaty

Tim Newton, Columbia Basin Trust

**Ecosystems, Water Supply, Climate Change, and Population
Growth: Washington’s Water Resources Strategy in the
Columbia Basin**

Gerry O’Keefe, Washington State Department of Ecology

12:30–1:30 PM ***Lunch - Snake and Columbia: A View from Upstream***

Rocky Barker, The Idaho Statesman

1:30–3:00 PM

Major Technical Challenges Facing the Snake/Columbia System

Moderator Michael Campana, Institute for Water and Watersheds, Oregon State University

Water & Energy Infrastructure: Capacity, Transmission and Storage

Andy Ford, Washington State University

The National Energy Water Nexus Endeavor, A National Assessment and Roadmap

Michael Hightower, Sandia National Laboratory

Canadian Perspectives on Major Technical Challenges Facing the Snake/Columbia

Kelvin Ketchum, BC Hydro

3:00–3:15 PM

Break

3:15–4:45 PM

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, University of Idaho, Emeritus

Water Supply for Sustainable Hydropower and Renewable Energy in the Snake/Columbia Basin

John Fazio, Northwest Power Conservation Council

Water Supply for Sustainable Thermoelectric Power Production in the Snake/Columbia Basin

Andrea McNemar, National Energy Technology Laboratory

4:45 – 5:00 PM

Summary of the Day

5:00 PM

Recess

Wednesday, June 27

8:00–8:50 AM

Building a Consensus Research Agenda

Welcome

Jerry Sehlke, Idaho National Laboratory

Department of Interior’s Climate Change Task Force and its

Implications to Science and Technology in the Columbia River Basin

Michael Bogert, Council, U.S. Department of Interior (Invited Speaker)

8:50 AM–12:30 PM ***Focus Groups Meet***

Focus Group Goals and Process

Facilitator: Wendy Green-Lowe, P2 Solutions

Focus Group Discussions (see page 7)

12:30–2:00 PM

Lunch

2:00–2:45 PM

Focus Group Chairs Report on Sessions

2:45–3:00 PM

Perspectives on Moving Forward

Harold Blackman, Center for Advanced Energy Studies

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 facilitated 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
- Minimize and manage the resultant ecological impacts and pollutants in the Snake/Columbia River system.

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

Energy Generation and Use

Steering Committee Resource: Kindy Gosal

Status and Trends

- What should be and 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?

Water Allocation and Use

Steering Committee Resource: Gary Johnson

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 and 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?

Energy/Water Storage

Steering Committee Resource: Michael Barber

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 or 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 basin 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 and changes) to increase potential storage?
- What research efforts 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?

Energy/Water Infrastructure

Steering Committee Resource: Richard Skaggs

Status and Trends

- What will be the energy/water infrastructure needs of 2030?
- What will be the state of repair of the 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 or methodologies can be developed and used to reduce the cost or speed up the upgrading of our energy/water infrastructure while minimizing adverse impacts?
- What are the funding opportunities and constraints for developing new energy/water infrastructure?

Energy Generation and Use

Steering Committee Resource: Michael Campana

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 population, infrastructure, and operational 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 and 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?

Social, Economic, Political, and Regulatory Considerations

Steering Committee Resource: Gerald Sehlke

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 are the dominant social and economic changes in the Basin that will promote or impede the development, maintenance, and operations of our energy/water infrastructure and operations?
- What will be the dominant policy and legal conflicts associated with retrofitting 1800s policies and laws to meet current and future energy and water needs?

Emerging Challenges

- What are the critical existing and developing gaps between energy/water related science and policies relative to optimizing the development and use of our energy/water resources?
- What critical social and economic factors need to be addressed and/or incorporated into our energy/water planning and management processes to optimize the development and use of our energy/water resources?
- What are the critical local, regional, national, and international (e.g., transboundary social, economic, political, and regulatory) issues that need to be addressed to reduce conflicts and optimize the development and use of our energy/water resources?
- What are the critical issues that must be addressed relative to balancing “public good” versus individual rights and the needs of present versus future generations?

Paths to Solutions

- Science in the service of policy: how do we better focus science and use the vast body of knowledge to develop more science-based energy/water policies and better inform policy makers, decision makers, and planners in their planning and decision-making processes?
- How can we better integrate social and economic information and needs into our energy/water planning and management processes?
- 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 rights and present versus future needs, desires, and rights?

Conference Officials

Presenters

- Rocky Barker, The Idaho Statesman (rbarker@idahostatesman.com)
- Michael Bogert, U.S. Department of Interior (michael_bogert@ios.doi.gov)
- John Fazio, Northwest Power Conservation Council (jfazio@nwcouncil.org)
- John Ferguson, NOAA NW Fisheries Science Center (john.w.ferguson@noaa.gov)
- Andy Ford, Washington State University (FordA@mail.wsu.edu)
- John Freemuth, Boise State University (jfreemu@boisestate.edu)
- Kindy Gosal, Columbia Basin Trust (kgosal@cbt.org)
- Joel Hamilton, University of Idaho, Emeritus (joelh@uidaho.edu)
- John Harrison, Northwest Power and Conservation Council (jharrison@nwcouncil.org)
- Michael Hightower, Sandia National Laboratory (mmhight@sandia.gov)
- Steve Kerns, Bonneville Power Administration (srkerns@bpa.gov)
- Kelvin Ketchum, BC Hydro (Kelvin.Ketchum@bchydro.com)
- Tim Newton, Columbia Basin Trust (TNewton@shaw.ca)
- Gerry O'Keefe, Washington State Department of Ecology (cwp@ecy.wa.gov)
- Richard Palmer, University of Washington (palmer@u.washington.edu)
- Andrea McNemar, National Energy Technology Laboratory (Andrea.McNemar@netl.doe.gov)
- Mike Scott, Pacific Northwest National Laboratory (michael.scott@pnl.gov)
- Mary Lou Soscia, EPA Region 10 (soscia.marylou@epa.gov)

Moderators

- Michael Barber, State of Washington Water Research Center (WSU) (meb@wsu.edu)
- Michael Campana, Institute for Water and Watersheds (OSU) (Michael.Campana@oregonstate.edu)
- Kindy Gosal, Columbia Basin Trust (kgosal@cbt.org)
- Gary Johnson, Idaho Water Resources Research Institute (UI) (johnson@if.uidaho.edu)
- Gerald Sehlke, Idaho National Laboratory (Gerald.Sehlke@inl.gov)
- Richard Skaggs, Pacific Northwest National Laboratory (Richard.Skaggs@pnl.gov)
- John Tracy, University of Idaho (tracy@uidaho.edu)
- Paul Wichlacz, Idaho National Laboratory (Paul.Wichlacz@inl.gov)
-

Facilitators

- Alison Conner, Idaho National Laboratory (Alison.Conner@inl.gov)
- Wendy Green-Lowe, P2 Solutions (wendy@p2-solution.com)
- Helen Harrington, Idaho Department of Water Resources (Helen.Harrington@idwr.idaho.gov)
- Todd Jarvis, Oregon State University (todd.jarvis@oregonstate.edu)
- Mike Louis, Boise State University (MichaelLouis@boisestate.edu)
- Carole Nemnich, Boise State University (CaroleNemich@boisestate.edu)
- Bryan Parker, Idaho National Laboratory (Bryan.Parker@inl.gov)

Many thanks to our sponsors:

- Center for Advanced Energy Studies
- Idaho National Laboratory
- Idaho Water Resources Research Institute (University of Idaho)
- Institute for Water and Watersheds (Oregon State University)
- Pacific Northwest National Laboratory
- Portage Environmental
- State of Washington Water Research Center (Washington State University)

For more information:

<http://www.iwrri.uidaho.edu/default.aspx?pid=99479>

Jerry Sehlke
Idaho National Laboratory
(208) 526-7362
gse@inel.gov

Gary Johnson
Idaho Water Resources Research Institute
(208) 282-7985
johnson@if.uidaho.edu

