



King County

Conference Notes

**“The Future Ain’t What it Used to Be:
Planning for Climate Disruption”**

Summary of Hydropower Breakout Session

October 27, 2005

Qwest Field Conference Center

Seattle, Washington

Sponsored by King County

Report prepared by Justin Minder

Information on the conference is available at:
<http://metrokc.gov/climateconference2005>

Hydropower Steering Committee

Name, Affiliation, **Co-chair**

Name, Affiliation, **Co-chair**

Name, Affiliation

Name, Affiliation

Name, Affiliation

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“The Future Ain’t What it Used to Be: Planning for Climate Disruption”
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Summary of Hydropower Breakout Session

On Thursday, October 27, 2005, King County hosted a one-day meeting to engage a broad cross-section of Washington State governments, businesses, tribes, farmers, non-profits, and the community-at-large in a dialogue about climate change impacts and potential adaptations in Washington State. The following is a summary of the hydropower breakout group presentations and discussion. More information on the meeting, including electronic copies of the breakout group presentations, is available at <http://metrokc.gov/climateconference2005>.

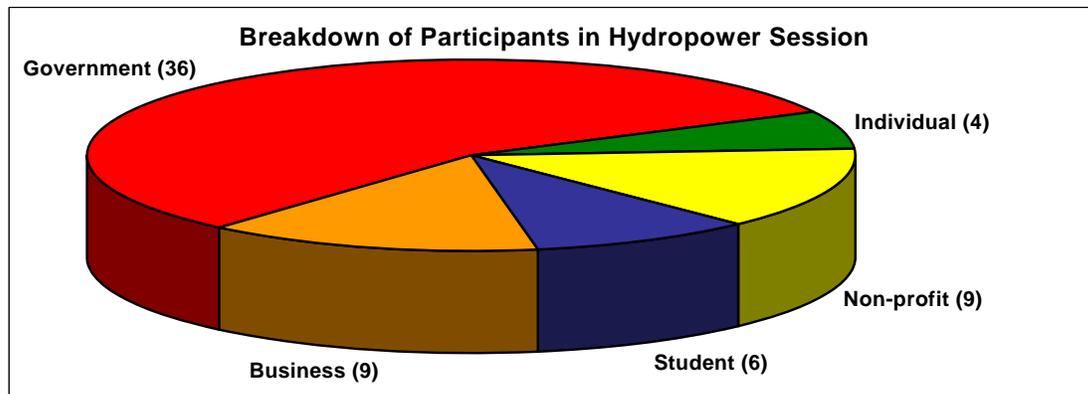
The hydropower breakout session included presentations on the science of predicting how climate change will impact hydropower, and the technological and policy options for dealing with potential impacts. Following the presentations was a question and answer period with the speakers. The session culminated with an open discussion about the future of hydropower in a changed climate.

The hydropower breakout session identified the following three items as priorities for addressing climate change in their afternoon report to the plenary:

- Expansion and/or adaptation of hard resources (i.e., storage, renewable energy)
- Expansion and/or adaptation of soft resources (i.e., conservation, management practices, “Smart Grids”)
- Expansion and/or adaptation of institutional resources (i.e., political, judicial, regulatory organization)

Participants

The hydropower breakout group attracted 64 participants representing government agencies, businesses, academic institutions and not-for-profit groups. Over 30 separate organizations were represented in the session. Illustrated below is the number of participants from each of several categories:



A full list of the session participants is available at:
<http://metrokc.gov/climateconference2005>.

Summary of Morning Session: Reviewing the Science in the Hydropower Sector

Presentations

John Willenbacher (King County), "Introduction to the Hydropower Sector"

John welcomed the breakout group and laid out the format of the session.

Alan Hamlet (Climate Impacts Group and Civil and Environmental Engineering, University of Washington), "Hydropower Systems in a Warmer Pacific Northwest"

Alan offered an overview of how the predictions of regional climate change, highlighted in the morning plenary session, are translated into effects upon stream flow and the hydropower system. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

John Fazio (NW Power and Conservation Council), "Heating up the debate on Northwest Hydropower"

John explained how projected changes in climate translate into changes in hydropower supply and demand. Additionally, he outlined management strategies for dealing with these changes. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

Matt Markoff (Ross and Associates), "Impacts of Climate Change on Pacific Northwest Hydropower"

Matt presented analysis of the range of possible climate impacts on Northwest Hydropower production using results from a wide range of global climate models and scenarios. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

Pat Serie (EnviroIssues), "Summary, Conclusions, and Questions to Think About"

Pat wrapped up the session and charged the group with considering what the hydropower sector should consider its most important priorities in dealing with climate change in preparation for the afternoon discussion.

Summary of Afternoon Session: Exploring the Options in the Hydropower Sector

Presentations

Professor Cliff Mass (University of Washington), "Downscaling Global Climate Models"

Cliff presented the technique of dynamical downscaling of global climate models, wherein high-resolution weather prediction models are used to show the regional effects of global climate change. He showed how this method can be used to highlight potential "climate surprises" that cannot be predicted using simpler downscaling methods. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

Rhys Roth (Climate Solutions), "Power Options: Conservation and Renewables"

Rhys outlined how renewable energy farms, increased efficiency and "Smart Grid" infrastructure can reduce the power system's vulnerability to climate change while providing other benefits. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

John Martin (Pacific Energy Systems), "Exploring the Options: Combined Heat and Power"

John detailed how combined heat and power generation plants offer a means to supplement power production, increase efficiency and reduce emissions. His presentation is available in PDF format at <http://metrokc.gov/climateconference2005>.

Panel Discussion: Questions and Answers

Following the presentations was a brief panel discussion during which breakout group members were given the chance to ask questions of the presenters. The questions and responses are paraphrased below.

Question (for Rhys Roth): There has been a proposed "Kids for Kyoto" program to put forth a challenge to local schools to reduce admissions. What is your take on this?

Answer: Such programs offer an opportunity for schools to save money. Some colleges have already instituted similar programs.

Question (for John Martin): Utilities are revenue driven, which can limit their capacity and/or motivation to properly address climate change. What can be done to change this?

Answer: Incentives are needed to encourage increases in efficiency and reductions in emissions. Credits for emission reductions and renewable energy use are one means for accomplishing this. Win-win actions that can reduce environmental impact and save money are the best solutions.

Question (for John Martin): You quoted a value for the amount of heat rejected by combined heat and power systems. Is the remainder of unused heat the consequence of thermodynamic requirements or a management issue?

Answer: The thermal properties of materials put a physical restraint on the amount of recoverable heat. An additional challenge is the issue of load mismatch.

General Discussion

Pat Serie moderated an open discussion among the session participants, with the purpose of tying together the important points from the day's presentation. The discussion aimed to identify the major challenges facing hydropower in a changing climate and the essential areas where action can be taken. The session's report to plenary was a product of this discussion. The major points of the discussion are summarized below:

- It is clear that regional climate changes will lead to a change in the timing of hydropower supply and demand. Some model results also show that there will be a reduction in total hydropower production potential, but not all session members were convinced of the reliability of that prediction.
- The shift in Pacific Northwest power demand, from a winter peak towards a summer peak, in a warmer climate will lead to a change in the dynamics of regional power

distribution. Most notably such a shift may place Washington utilities in direct competition with California, which already has a summer demand peak.

- Climate change is likely to acutely affect all of the many water resource users. The ability of the resource to consistently meet all user demands will diminish, likely leading to conflict.
- Wise management of the hydro resource offers one way to address the challenges of climate change. Adaptive management of reservoirs that takes into account annual climate forecasts offers one way to build flexibility into the system that will allow it to adapt to a wide range of climate conditions. “Smart Grid” systems that utilize computer systems to optimize the distribution of power from large and small suppliers offer another possible management alternative.
- A diversification of power production capabilities, including the development of renewable energy options, can reduce the vulnerability of Northwest energy to climate change and variability. Increased production capacity from other sources would provide a means for supplementing hydropower during times of decreased production or excessive demand.
- Improvements in energy conservation and efficiency throughout the region could be used to minimize future occurrences of insufficient supply.
- Increased winter reservoir storage can be used to offset summer deficits. Planning for changes in storage strategies stands to benefit from cooperation with Canadian reservoir managers.
- The range of potential climate changes needs to be incorporated into planning activities. Long term (i.e., 20 year) contracts particularly need to take into account projections of climate change since large changes are likely over these time scales. The point was made that a clear list of the climate issues that need to be taken into account in planning activities has yet to be developed.
- Sufficient, reliable, results have been presented from the scientific research community to inform the hydropower sector of the reality and potential impacts of climate change. However, more research and analysis (in both the science and policy realm) can offer further valuable guidance for use in decision-making.
- The question was raised as to who has the authority and responsibility to take the actions needed to prepare hydropower for climate change. No clear answer to this, or the relative roles of government, utilities and industry, was apparent. The fragmentation of regulatory and management organizations, and institutional barriers offer challenges for forming a coherent strategy for dealing with climate issues. The Northwest Power and Conservation Council (NWPCC) was offered as one possible organization for coordinating action.
- There is a need to integrate hydropower into a comprehensive energy plan in order to effectively mitigate and prepare for climate change.

Summary of Report to Plenary

Each breakout group was charged with identifying three top priorities for how their sector should deal with the impacts of climate change. At the end of the conference each Pat Serie presented the hydropower group's results to the plenary session. Below is a summary of the hydropower breakout group's report:

The hydropower breakout group recognized that projected changes in regional climate will lead to a change in the timing of both hydropower supply and demand, and increased conflict with other water resource demands. Additionally, some studies point to a possible reduction in total hydropower production potential. These are particularly important issues for King County since it relies heavily upon hydropower to meet its energy needs. The group identified the following three strategies for meeting the challenges posed by climate change:

- Expansion and/or adaptation of hard resources
 - Increased storage capacity could be used to address times of increased demand and/or decreased supply. This would likely be best accomplished via cooperation with resource managers in Canada and other states.
 - Increased alternative (non-hydro) energy sources may be used to pick up demand that hydropower cannot adequately meet. Renewable resources (i.e., solar, wind) are attractive, in that they do not act to force further climate change.
- Expansion and/or adaptation of soft resources
 - Conservation and increases in efficiency can be a way to limit demand increases to manageable levels.
 - Improved management infrastructure such as “Smart Grid” technology can optimize efficiency by strategically utilizing power from many sources, large and small.
 - Scientific studies have yielded solid information about the impacts of climate change, yet we still stand to benefit from further study and analysis. For example, regional climate change predictions may be improved via more sophisticated downscaling techniques to avoid climate “surprises.”
- Expansion and/or adaptation of institutional resources
 - This may include better organization of political, judicial and/or regulatory infrastructures to allow for coordinated and effective policy to address climate challenges.