

Tom Karier
Chair
Washington

Frank L. Cassidy Jr.
"Larry"
Washington

Jim Kempton
Idaho

Judi Danielson
Idaho



Joan M. Dukes
Vice-Chair
Oregon

Melinda S. Eden
Oregon

Bruce A. Measure
Montana

Rhonda Whiting
Montana

January 9, 2007

MEMORANDUM

TO: Power Committee

FROM: Jeff King

SUBJECT: Proposal for further analysis of CO₂ production

At the July meeting of the Power Committee, staff presented a preliminary forecast of the carbon dioxide (CO₂) production of the Northwest power system. The base case assumed achievement of the conservation called for in the 5th Power Plan plus expected levels of generating resource development. A comparative case was based on the "Status Quo" reduced conservation portfolio prepared during development of the 5th Plan.

Several Committee members expressed discomfort with the "Status Quo" comparative case and requested staff to propose a set of cases for further analysis, including a base case, a low conservation case, a high renewables case and a "no summer spill" case. In August, staff returned to the Committee with a proposal for completion of these forecasts. The following month, this work was tabled pending completion of the Fifth Plan Biennial Assessment and the Wind Integration Action Plan first phase report. Subsequently, in November, Save Our Wild Salmon released its report *Revenue Streams*, arguing for removal of the Lower Snake River federal hydroelectric dams. This resulted in a request for an additional Lower Snake River Dam Removal case.

With the Biennial Assessment nearing completion and the draft Wind Integration Action Plan report scheduled for release on January 22, staff is proposing that work be resumed on the CO₂ forecast. The analysis will forecast total annual, annual unit (per MWh) and cumulative CO₂ production from 2005 through 2024 for the following cases: Base, Low Conservation Achievement, High Renewable Resource Acquisition, No Summer Spill (at Lower Snake River dams) and Lower Snake River Dam Removal. The forecasts will be developed using the AURORA^{ximp}™ Electric Market Model. Assumptions will be updated for the 2007 EIA short-term fuel price forecasts, committed post-Plan resource development and possible effects of the recently adopted capacity and energy reliability standards. The effects of the recently enacted Washington renewable portfolio standards will also be considered.

The staff is seeking the concurrence of the Power Committee to proceed with this analysis. _____

q:\tm\council mtgs\jan 07\p4-4) co2 fcst.doc

Proposal for Continuation

Forecast of Power System CO₂ Production

Jeff King

Northwest Power and Conservation Council

Power Committee

Vancouver, WA

January 16, 2006

A brief History

April: Staff presented the results of a forecast of power system marginal CO₂ production prepared for the RTF.

July: The Committee requested forecasts of annual, unit and total power system CO₂ production be prepared for the following cases:

Base

Low conservation achievement

High renewable resource acquisition

No summer spill

August: Staff presented a Proposal for Continuation based on the cases requested in July.

September: Work was deferred pending completion of the Biennial Assessment and the draft Wind Integration Action Plan.

November: With release of *Revenue Stream* by Save Our Wild Salmon, Lower Snake Dam Removal has been requested as an additional case.

Base case

- 5th Plan medium load growth
- 5th Plan recommended conservation
- EIA near-term gas price forecast transitioning to 5th Plan medium forecast
- Recommended 5th Plan generating resource portfolio, adjusted for:
 - Committed post-plan generating resource development
 - Proposed capacity & energy reliability targets
 - Washington renewable portfolio standard (RPS)

Low Conservation

- Base case load growth and fuel prices
- “Status Quo” conservation from 5th Plan portfolio studies (~ average conservation 1996 – 2000)
- Status Quo generating resource portfolio, adjusted for:
 - Committed post-plan generating resource development
 - Proposed capacity & energy reliability targets
 - Washington RPS

High Renewables case

- Base case load growth, fuel prices and conservation
- Renewable resource acquisition doubled from Fifth Plan recommended levels, adjusted for:
 - Committed post-plan generating resource development
 - Proposed capacity & energy reliability targets
 - Washington RPS
- The added increment of renewable resources will be a mix of geothermal, biomass and additional, higher-cost wind resources

No summer spill case

- Base case load growth, fuel prices conservation and resource mix
- Hydropower energy factors corresponding to termination of summer spill at lower Snake R. dams

Lower Snake River dams removal case - considerations

- Replacement of Lower Snake energy and capacity
 - SOWS *Revenue Stream* assumes mix of conservation & wind
 - Nominally CO2 neutral, however, AURORA dispatches hydro differently from wind.
 - Results will not be conclusive because of limitations re: treatment of hydro and wind in AURORA
 - Best available approach may be to use fixed annual hourly wind output (2004 data, only complete year currently available).
- Available hydropower energy factors corresponding to removal of lower Snake R. dams date from ~2000

Products

- Annual CO₂ production (MM tons by year)
- Cumulative CO₂ production (MM tons, 2005-24)
- Average unit CO₂ production (tons/MWh, lb/kWh)
- Marginal unit CO₂ production (tons/MWh, lb/kWh)

Proposed schedule

- **February: Prepare AURORA**
 - EIA short-term fuel price forecast
 - Committed post-Plan resources
 - Future resource portfolios for the cases
 - Hydro factors for Lower Snake R. dams removal case
- **March:**
 - Draft results for review (ex. Lower Snake removal)
 - Hourly wind setup for Lower Snake removal case
- **April:**
 - Final results (ex. Lower Snake removal)
 - Lower Snake removal draft results for review
- **May**
 - Final Lower Snake removal results