Northwest Power and Conservation Council

August 2, 2006

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 forecast of the carbon dioxide (CO_2) production of the Northwest power system. A base and a comparative case were described. The base case assumed achievement of the conservation called for in the 5th Power Plan plus expected levels of generating resource development. The 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. The proposed cases and approach to this follow-on analysis are described in the attachment.

The analysis will forecast total annual, annual unit (per MWh) and cumulative 2005-24 CO_2 production for each case. The proposed Base Case remains as before, except that the generating resource mix will be updated to reflect current windpower development activity. The "Status Quo" portfolio is retained for the Low Conservation case. The Council's conservation staff believes that this case represents a plausible lower bound of possible future conservation acquisition. Moreover, the lower bound established by this case will enable estimation of the CO2 savings attributable to each increment of additional conservation. The generating resource portfolio for this case will also be adjusted to reflect current windpower development activity.

The High Renewables case will assume a doubling (energy basis) of the new renewable resources appearing in the 5th Plan portfolio. This would result in approximately a 20% penetration of new renewable resources by 2020. Finally, the No Summer Spill case will assume termination of summer spill operation at the lower Snake River dams currently required by the 2000 BiOp.

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

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

PROPOSED FORECAST OF NORTHWEST POWER SYSTEM CARBON DIOXIDE PRODUCTION

August 2, 2006

Approach:

Forecasts of the carbon dioxide (CO_2) production of the Northwest Power System will be prepared using the emission tracking capability of the AURORA^{xmp}™ Electric Market Model. Total annual, annual unit (per MWh) and cumulative 2005-24 CO_2 production will be computed for each case. Unit values will be based on generation (net demand).

For expediency, wind plants will initially be modeled using average annual output. Test runs will subsequently be performed with wind plants modeled using hourly output extrapolated from historical (2004) data. If significant differences are evident, cases will be rerun using historical hourly output for wind plants.

Cases:

Common key assumptions: 5th Plan Medium Case load growth. Near-term natural gas prices adjusted to the current Energy Information Administration (EIA) short-term forecast, transitioning to the 5th Plan Medium Case forecast.

Base case: Recommended conservation acquisition levels of the 5th Power Plan (2500 MWa by 2023). Expected development of 5th Plan recommended generating resource mix, adjusted to reflect current windpower acquisition activity and to maintain proposed capacity and energy reliability targets.

Low Conservation Case: Conservation acquisition of the "Status Quo" portfolio case (1670 MWa by 2023). Status Quo generating resource portfolio adjusted to reflect current windpower acquisition activity and to maintain proposed capacity and energy reliability targets.

High Renewable Resource Case: Recommended conservation acquisition levels of the 5th Power Plan. Renewable energy resource acquisition levels doubled from expected 5th Plan levels (~ 3000 MWa in lieu of ~1500 MWa) and scheduled to reflect current windpower acquisition activity. The additional increment of renewable resources will be modeled as a mix of geothermal, biomass and additional, higher-cost wind resources. The balance of generating resources will initially be based on an AURORA^{xmp} capacity expansion study, adjusted to maintain proposed capacity and energy reliability targets. If available, the balance of generating resources (non-renewable resources) will be based on a new portfolio risk case incorporating the added increment of renewable resources.

No Summer Spill: The hydropower values currently used in the AURORA^{xmp} price forecasting model include the effects of summer spill operation mandated by the 2000 BiOp. This case will employ hydropower energy production factors corresponding to termination of summer spill at the lower Snake River dams. Other assumptions will correspond to the Base Case described above.

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

Proposal for Continuation

Forecast of Power System CO2 Production

Jeff King

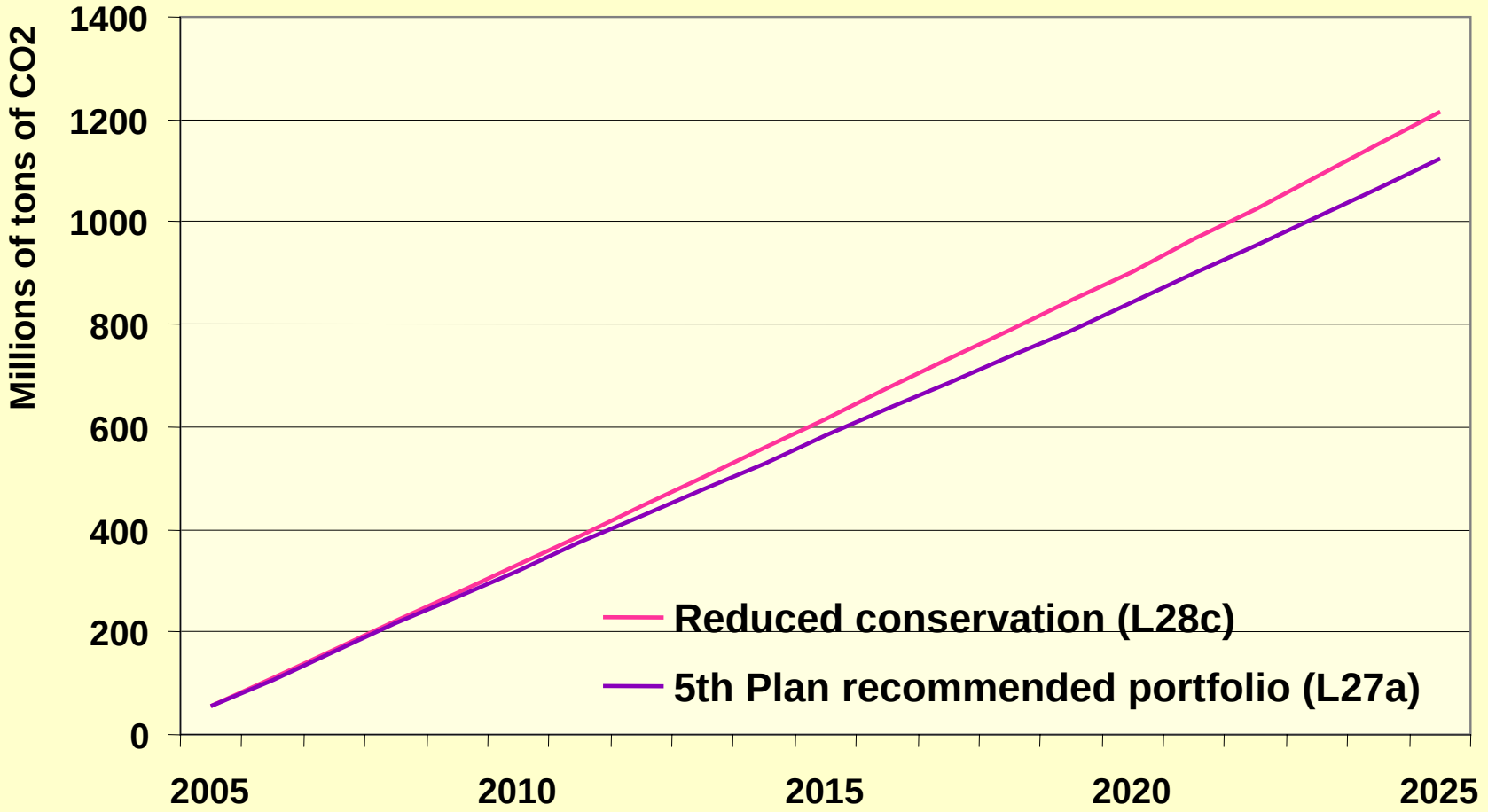
Northwest Power and Conservation Council

Power Committee

Spokane, WA

August 16, 2006

At July mtg, following request in April, staff presentated an example of a CO_2 forecast



Northwest Power and Conservation Council

Committee requested staff to develop cases for further analysis, including the following

- Base case
- Low conservation achievement
- High renewable resource acquisition
- No summer spill

Proposed Base case

- 5th Plan medium load growth
- 5th Plan recommended conservation
- EIA near-term NG price forecast transistioning to 5th Plan medium forecast
- Recommended 5th Plan generating resource portfolio, adjusted as needed for:
  - Confirmed near-term generating resource development
  - Proposed capacity & energy reliability targets

Proposed Low Conservation case

- 5th Plan medium load growth
- "Status Quo" conservation from 5th Plan Portfolio analysis
- EIA near-term NG price forecast transistioning to 5th Plan medium forecast
- Status Quo generating resource portfolio, adjusted as needed for:
  - Confirmed near-term generating resource development
  - Proposed capacity & energy reliability targets

Proposed High Renewables case

- 5th Plan medium load growth
- 5th Plan recommended conservation
- EIA near-term NG price forecast transistioning to 5th Plan medium forecast
- Renewable resource acquisition doubled from 5th Plan generating resource portfolio levels, adjusted as needed for:
  - Confirmed near-term generating resource development
  - Proposed capacity & energy reliability targets
- The added increment of renewable resources will be a mix of geothermal, biomass and additional, higher-cost wind resources

No Summer Spill case

- 5th Plan medium load growth
- 5th Plan recommended conservation
- EIA near-term NG price forecast transistioning to 5th Plan medium forecast
- Recommended 5th Plan generating resource portfolio, adjusted as needed for:
  - Confirmed near-term generating resource development
  - Proposed capacity & energy reliability targets
- Hydropower energy factors corresponding to termination of summer spill at lower Snake R. dams

Approach

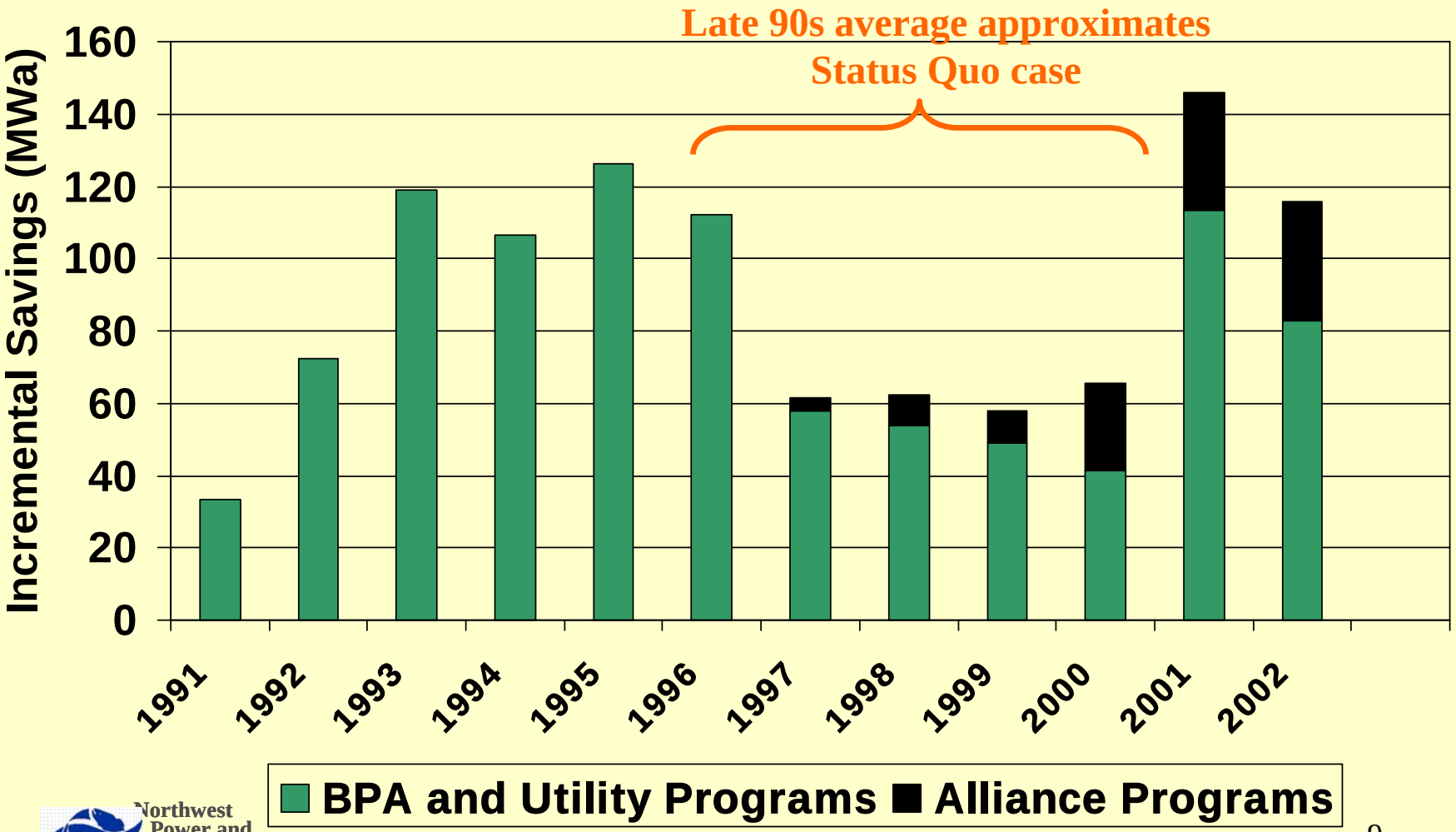
Model

- AURORA^{xmpTM} Electric Market Model using emission tracking capability

Products

- Annual CO2 production (MM tons by year)
- Cumulative CO2 production (MM tons, 2005-24)
- Unit CO2 production (tons/MWh, lb/kWh)
- Incremental CO2 production (tons/MWh, lb/kWh)
  - Base case vs. Low Conservation Case
  - Base case vs High Renewables Case

Historical precedent for Status Quo case



Northwest Power and Conservation Council