2012 BPA Rate Case
Customer Workshop

Cost Allocation of Balancing Reserves

April 14, 2010

Agenda

- Discuss Current Embedded Cost Allocation Methodology for Regulating Reserves, Following Reserves, and Wind Balancing Service Reserves.
- Discuss Variable Cost Allocation Methodology for Regulating Reserves, Following Reserves, and Wind Balancing Service Reserves.
  - Revisions and Improvements to the Generation and Reserve Dispatch model
- Discuss Incremental Costs for Acquiring Additional Balancing Reserves.
- Next steps.

Cost Allocation for Balancing Reserves for the 2012 BPA Rate Case Initial Proposal

- Revisit methodology from the 2010 BPA rate case. What needs tweaking?
- We are sharing this material in the spirit urged by regional parties--that of sharing and discussing technical analysis before it is completed--in the interest of a better final product.
- In that spirit, the material we are sharing is very much a work in progress.

Generation Input Costs for Reserves

- Current Cost Allocation Methodology for Regulating Reserves, Following Reserves, and Wind Balancing Service Reserves
- Embedded Costs
- Variable Costs
- Total Reserve Costs
  - Embedded + Variable

Overview of Current Embedded Cost Allocation Methodology

- Method used for Balancing Reserves
  - Calculate the costs associated with selected hydro projects and divide those costs by the average annual capacity amount of those same hydro projects.

Cost Allocation for Initial Proposal Information Requirements

- Costs for hydro projects, fish and wildlife, and general and administrative from Integrated Program Review (IPR).
- Costs are set in the Integrated Program Review Process (estimated dates).
  - Kick-off meeting May 2010
  - Workshops May 2010
  - Comment Period May – July 2010
  - Decisions on FY 2012-13 Costs are Scheduled to be Announced Early October 2010
- Reserve Need Forecast is an input to the hydro regulation studies in mid-July.
- Hydro regulation study results at end of July.
- Market Price Forecast for market price adjusted for the risk analysis in August.
- Run Generation And Reserves Dispatch (GARD) model.

WP-10 Embedded Cost Allocation

- In WP-10, BPA used a cost (numerator) divided by quantity (denominator) calculation for the embedded portion of BPA's within-hour reserve obligations.
  - BPA conducted two different embedded cost calculations in WP-10. One was used for regulating and wind balancing, while the other was used for operating reserve. The difference in embedded cost allocation was due to the use of two different resource portfolios.
    - Regulating and Wind Balancing: Big 10 hydro projects
    - Operating Reserves: all regulated hydro and 11 independent hydro projects
  - The numerator of these two embedded cost calculations included the costs associated with the resources themselves, a share of the Fish & Wildlife Costs, a share of Administration & General expense, as well as three revenue credits.
  - The denominator of these two embedded cost calculations used the 120-hour measure of capacity for the portfolio of resources selected under 1958 water (average).

WP-12 Embedded Cost Allocation

- Aside from updating the numerator for updated costs and the denominator for the rate case hydro study, BPA did not envision a change from the WP-10 embedded cost allocation methodology.
- Renewable Northwest Project (RNP) has requested that BPA re-evaluate the 120-hour peaking capability used as the denominator in WP-10. BPA believes it thoroughly addressed this issue in the WP-10 ROD, issue 13.4.2, which concluded that the 120-hour peaking capability is an appropriate allocator for measuring use of system capacity to serve power loads.
- BPA also heard RNP request a study of wind's impact on the 120-hour peaking capability measurement. BPA is discussing internally if such a test would be an accurate representation given the current way the HOSS and HYDSIM account for reserve obligations when compared to the actual obligation the use of reserves cause. There is concern that the test would produce a simulation of precision which may be detached from the true impact reserves (capacity) and the use of those reserves (accumulated imbalance energy) have on the system.

Variable Cost

- Variable cost of reserves: overview
- Specific cost associated with standing ready to provide as well as providing reserves

Variable Cost of Reserves

- Goal is to cost reserves in a more robust fashion to capture the impact of carrying and deploying reserves.
- General method is to model the dispatch of controller projects over the 70-year data set for each month.

1. Start with the rate case model run for generation allocation (HYDSIM).
2. Make unit commitment and dispatch calculation to meet generation request and reserves obligation while minimizing water consumption.
3. Deploy reserves in response to an error signal.

Variable Cost of Reserves

- Costs associated with setting up the system to stand ready and respond to reserve need.
- All reserves are referred to as "inc" or "dec" obligations.
  - Inc Reserve: ability to increase generation in order to maintain load-resource balance in the Balancing Authority Area (BAA).
  - Dec Reserve: ability to decrease generation in order to maintain load-resource balance in the Balancing Authority Area (BAA).
- All costs are operations related and do not include items such as O&M.
- There are two broad categories of cost:
  1. Stand Ready
  2. Deployment

Variable Cost of Reserves

- Stand ready: Those costs associated with making the reserve available such that the system is capable of instantaneously maintaining load-resource balance 99.5% of the time. Stand ready costs consist of:

  1. Energy shift
  2. Efficiency loss
  3. Base cycling loss
  4. Spill Loss

- For each stand ready component, the impact of providing dec, non-spinning and spinning reserves by month and diurnal period is identified (note: Spill is loss only associated with non-spinning and spinning reserves).

Variable Cost of Reserves

- Deployment: Those costs associated with using the reserve in response to the system’s need to maintain load-resource balance. Deployment costs consist of the following:

    1. Response losses
    2. Incremental cycling loss
    3. Incremental spill

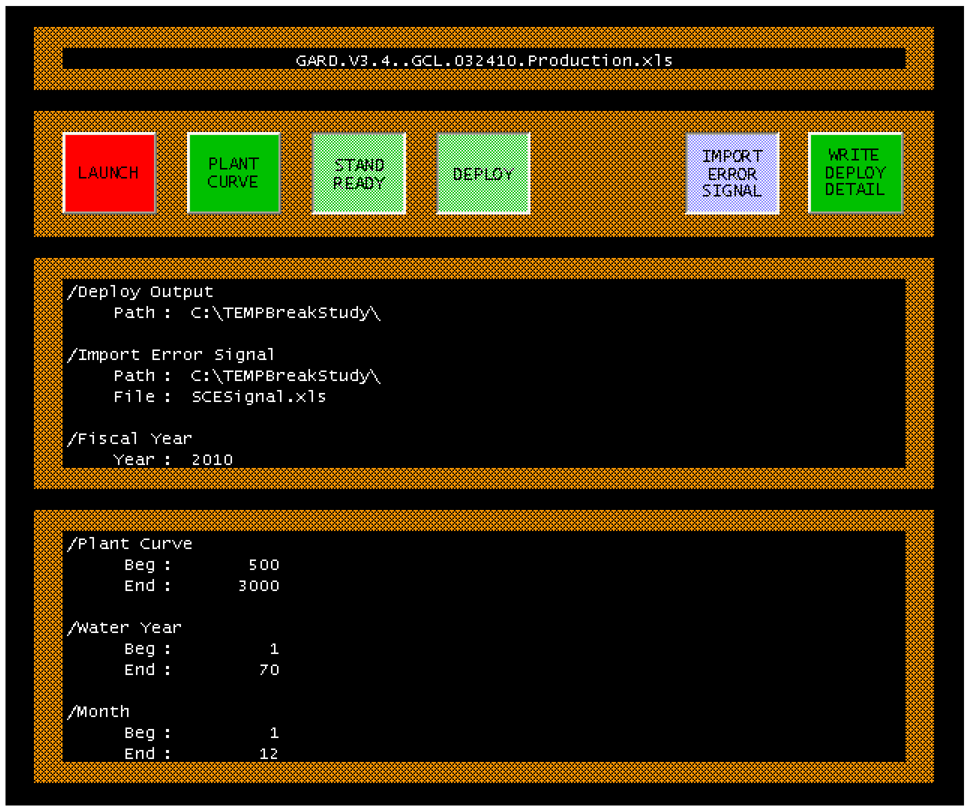
- For each deployment component, the impact of deploying dec and inc reserves by month and diurnal period is identified.

Notable Changes in Modeling

- Modeling all unit families at each controller project: this allows more flexibility by taking advantage the different operating characteristics of different unit families at a given project.
- Modeling each minute of each month during deployment: this is more precise than the simulation previously used and explicitly captures the unit cycling events.
- Explicit input of an error signal: rather than simulate an error to be balanced, actual error signals or a user generated signal is explicitly read into the model on a minute time-step for each month.
- More output data: the model will produce more and easier to read output.
- Generally more user friendly.

Notable Changes in Modeling

- Easier to use controls:



Notable Changes in Modeling

- Explicit output tables and labeling: the following sample shows the initial unit commitment and dispatch by water year and diurnal period.

/BASE	/FAM1 C	/FAM2 C	/FAM3 C	/FAM4 C	/TOTGEN	/FAM1 D	/FAM2 D	/FAM3 D	/FAM4 D	/TARGET	/KCFS	/SPIN	/NONSPIN
/OCT 1929 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1929 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1930 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1930 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1931 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1931 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1932 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1932 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1933 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1933 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1934 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1934 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1935 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1935 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1936 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1936 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1937 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1937 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1938 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1938 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1939 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1939 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1940 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1940 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1941 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1941 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1942 H	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
/OCT 1942 L	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx

Notable Changes in Modeling

- And more tables: the following shows one of the summary tables for the losses (MWh) associated with carrying and deploying. There are 16 such tables for the component costs of reserves.

	/OCT	/NOV	/DEC	/JAN	/FEB	/MAR	/APR	/MAY	/JUN	/JUL	/AUG	/SEP
/1929 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1929 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1930 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1930 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1931 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1931 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1932 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1932 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1933 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1933 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1934 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1934 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1935 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1935 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1936 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1936 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1937 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1937 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1938 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1938 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1939 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1939 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1940 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1940 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1941 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1941 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1942 H	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
/1942 L	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

Notable Changes in Modeling

- More detail: the following table show the minute-by-minute detail available for each month and water year.

/MINUTE	/FAM1 C	/FAM2 C	/FAM3 C	/FAM4 C	/TOTGEN	/FAM1 D	/FAM2 D	/FAM3 D	/FAM4 D	/TARGET	/KCFS	/SPIN	/NONSPIN
12:00:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:01:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:02:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:03:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:04:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:05:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:06:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:07:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:08:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:09:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:10:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:11:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:12:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:13:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:14:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:15:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:16:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:17:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:18:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:19:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:20:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:21:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:22:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:23:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:24:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:25:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:26:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx
12:27:00 AM	x	x	x	x	xxxx	xx	xx	xx	xx	x.xx	xx.xx	xxx	xxxx

Generation and Reserves Dispatch Model

- Next Steps
  - Update performance curves
- Assumptions and timing for Initial Proposal
  - Reserve Quantity
  - HYDSIM Run
  - Market price for risk analysis
- Availability of GARD Model
  - Release of model
    - Numbers to populate model from the Initial Proposal

Cost Allocation of Reserves

- Federal Columbia River Power System (FCRPS) Capability to Provide Reserves
  - For the 2012 rate proceeding BPA will estimate quantities of balancing reserves capacity
  - Should BPA use estimates based on
    - Average water vs. low water
  - Treatment when reserve limits are reached
    - Acquire capability to avoid limits in critical water conditions
    - Limit reserves through DSO 216

Methods of Collecting Incremental Costs

- Forecast an amount of acquisition
- Formula rate adjusted if acquisitions made

Incremental Costs for Potentially Acquiring Additional Balancing Reserves

- Alternatives for establishing incremental costs
  - Forecast cost of market purchases of dec balancing reserves
  - Forecast cost of resource that provides incs and decs
  - Any resource acquisition would need to allocate costs among balancing reserves and power uses

Other Variable Cost Issues

- Identification of Hedging costs incurred to ensure balancing reserves availability and reliable load service.
- Identification of additional Hedging costs incurred due to accumulated imbalance energy.

Parking Lot Issues

Next Steps

- Workshop scheduled for 12 May 2010
  - Imbalance
  - DSO 216
  - Persistent Deviation