2007 Wholesale Power Rate Case Final Proposal

LOAD RESOURCE STUDY AND DOCUMENTATION

July 2006

WP-07-FS-BPA-01
WP-07-FS-BPA-01A

WP-07-FS-BPA-01A, Sections 2.4 through 2.6, Table A-2, *Federal Exports* and Table A-16, *Intra-Regional Transfers (Out)* for the rate period. These estimates are provided to the Risk Analysis Study, WP-07-FS-BPA-04.

In the 2002 Final Rate Case Proposal, Federal contract obligations included the Columbia Storage Power Exchange (CSPE) contract deliveries to CSPE members and peaking deliveries to Supplemental and Entitlement Capacity contract participants. These contracts expired March 31, 2003, and are not included in this Study.

2.3 Federal System Resource Forecast

2.3.1 Overview

Federal system resources are comprised of Federal regulated and independent hydro projects, non-Federally-owned independent hydro projects, other non-Federally owned resources (renewable, thermal, wind, and NUG projects), and other Federal contract purchases.

The Federal system regulated hydro resource estimates are derived by BPA's hydro regulation model (HYDSIM) that estimates project generation under 50 water conditions. Federal system independent hydro project generation estimates are not provided by HYDSIM, rather they are provided by the project's owners for 50 water conditions. Other Federal system resources include non-Federal projects for which BPA has acquired the output. These generation estimates are provided either by BPA or the project's owners. BPA has other contract purchases that are considered Federal system resources. They are comprised of the following: (1) contract purchases and exchanges; (2) return energy associated with BPA's capacity contracts; (3) return and exchange energy associated with BPA's capacity-for-energy exchanges; and (4) power commitments delivered to BPA under the Columbia River Treaty. Detailed Federal system generating resource and contract purchase estimates used in BPA's 2007 Wholesale Power Rate

Case Final Proposal are shown in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Sections 2.4 through 2.6. These estimates are also provided to the Risk Analysis Study, WP-07-FS-BPA-04.

2.3.2 Federal System Hydro Generation

Federal system hydro resources are comprised of the generation from regulated and independent hydro projects. The process used for estimating the generation for regulated hydro projects is detailed in Section 2.3.2.1. The methodology for forecasting independent hydro projects generation is described in Section 2.3.2.2. The Federal system also purchases the output from several small NUG hydro projects whose generation estimates are provided by the project's owners and are assumed to not vary by water conditions.

2.3.2.1 Regulated Hydro Generation Forecast

BPA markets the generation from the Federal system regulated hydro projects. The projects themselves are owned and operated by either the Bureau of Reclamation (Reclamation) or the U.S. Army Corps of Engineers (COE).

BPA uses HYDSIM to estimate the Federal system energy production that can be expected from specific hydroelectric power projects in the PNW Columbia River Basin when operating in a coordinated fashion while meeting power and non-power requirements for the 50 water years of record (August 1928 through July 1978). The hydro regulation study uses plant operating characteristics and conditions to determine energy production expected from each specific project. Physical characteristics of each project are provided by annual Pacific Northwest Coordination Agreement (PNCA) data submittals from regional utilities and government agencies involved in the coordination and operation of regional hydro projects. The HYDSIM model incorporates these operating characteristics along with power and non-power requirements

to provide project-by-project monthly energy generation estimates for the Federal system that vary by water year for operating years[3] (OY) 2007-2009. Though the HYDSIM studies are forecasted in operating years, the Federal regulated hydro resources are presented in fiscal year format for consistency within this Study.

This Study includes expected generation increases due to hydro improvements from hydro optimization, turbine runner replacement, and reliability increases through BPA's capital improvements programs at specific Federal regulated hydro projects. These improvements are included in those projects' generation estimates.

BPA's contract to purchase the Packwood Lake hydroelectric project from Energy Northwest (EN) expired on September 30, 2002, and is not included as a Federal system resource in this Study.

BPA updated the hydro regulation studies for each year of the rate period for this Study. The revised variables that characterize the hydro regulation studies include firm loads, firm resources, markets for secondary energy, and project-by-project operating requirements. These variables affect the amount and timing of energy available from the hydro system. In each year of the hydro regulation study, these variables are changed as necessary to reflect current knowledge of each operating year parameter. Sections 2.3.2.1.1 and 2.3.2.1.2 contains additional details on the process of producing the regulated hydro generation estimates for use in this Study.

The Federal system regulated hydro generation for this Study is summarized in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Section 2.3, Tables 2.3.1 through 2.3.3,

[3] Operating Year (OY) is the 12-month period August 1 through July 31. For example OY 2007 is August 1, 2006, through July 31, 2007.

Loads and Resources-Federal System, (Regulated Hydro). The monthly energy in aMW for the regulated hydro projects is detailed in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Section 2.4, Table A-3, *Federal Regulated Hydro Projects*. The combined Federal system regulated and independent hydro energy is passed to the Risk Analysis Study, WP 07-FS-BPA-04. The Federal system hydro energy estimate is apportioned to HLH and LLH in the Risk Analysis Study, WP-07-FS-BPA-04.

2.3.2.1.1 PNCA and Fish Requirements

Since the Initial Proposal, BPA has updated the HYDSIM studies to reflect current assumptions. The HYDSIM studies incorporate power and non-power operating requirements that BPA expects to be in effect during the rate period, including those described by the National Oceanographic and Atmospheric Administration Fisheries (NOAA Fisheries) in their Biological Opinion (BiOp), published November 2004, as modified by Court-Ordered Operations for 2006, the United States Fish and Wildlife Service (USFWS) BiOp, published December 2000, operations described in the Northwest Power and Conservation Council's Fish and Wildlife Program, and other fish mitigation measures. Each hydro regulation study specifies particular hydroelectric project operations for fish, such as seasonal flow augmentation, minimum flow levels for fish, spill for juvenile fish passage, reservoir drawdown limitations, and turbine operation efficiency requirements.

The following are major features of the HYDSIM non-power operating requirements that BPA expects to be in effect and has modeled for the rate period:

1) Surface Passage Improvements: Incorporated specific surface passage improvements at COE projects on the lower Columbia and lower Snake Rivers.
2) Fall Chinook Transport: Incorporated the Lower Snake Fall Chinook Transport study spill requirements at specific COE projects on the lower Columbia and lower Snake

Rivers for FY 2006-2008. For FY 2009, these spill requirements are not included since BPA expects the study to conclude after three years, in FY 2008.

3) Court-Ordered Operations: Incorporated the 2006 Court-Ordered spill in the hydro operations for FY 2007-2009.

4) Residual Hydro Load: Updated the residual hydro load for FY 2007-2009 using regional loads that conform to those published in the 2004 White Book.

Additionally, HYDSIM uses hydro plant operating characteristics in combination with the power and non-power requirements to simulate the coordinated operation of the hydro system. These operating requirements include, but are not limited to, storage content limits determined by rule curves, maximum project draft rates determined by each project, and flow and spill objectives determined by the BiOps as provided by the 2004 PNCA data submittals. Deviations from the PNCA data submittals occur when specific operating decisions have been made subsequent to the date of submission in order to implement the BiOps.

The hydro regulation studies have sets of power and non-power requirements that vary for each year of the rate period. Specific HYDSIM hydro regulation study assumptions are detailed for FY 2007-2009 in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Section 2.9, Tables 2.9.1 through 2.9.3, *HYDSIM Hydro Regulation Study Assumptions.*

2.3.2.1.2 Modified Streamflows

The HYDSIM model uses modified streamflows to estimate power generation using historical streamflow conditions. The Actual Energy Regulation (AER) and Operational Hydro regulation studies were developed using the 2000 level of modified streamflows. Modified streamflows contain adjustments to the historic streamflows to account for the effects of irrigation and consumptive diversion demand, return flow, and changes in contents of upstream reservoirs and

lakes. These modified streamflows were developed under a BPA contract funded by the PNCA parties. The modified streamflows are also adjusted to include updated estimates of Grand Coulee irrigation pumping and resulting downstream return flows using data provided by the Reclamation in their 2004 PNCA data submittal. Grand Coulee pumping provides water to the Columbia Basin Project for irrigation. In addition, the HYDSIM inputs were updated to include the 2000 level of irrigation depletion development.

There are two modes of operation for the HYDSIM hydro regulation studies: refill and continuous. Both modes estimate the energy production of the hydro system, however, each treats a project's initial reservoir conditions differently. Continuous hydro regulation studies operate from one water year to another, using the previous water year's final reservoir elevations as the initial reservoir elevations for the next water year. Refill hydro regulation studies operate each water year independent of all other water years, using the same initial reservoir elevations for each water year. Continuous studies are typically used in BPA mid- to long-range planning to provide expected generation estimates for future years. Refill studies are generally incorporated in short-term planning when information on initial reservoir elevations is known. Hydro regulation studies used in this Study were run in continuous mode.

2.3.2.2 Independent Hydro Generation Forecast

Independent hydro projects are dams that are not modeled or regulated in the HYDSIM model. BPA markets the power from independent hydro projects that are owned and operated by the Reclamation, COE, and/or other project owners. Federal system independent hydro generation estimates are provided by individual project owners for the 50 water years (August 1928 through July 1978). These include power purchased from hydro projects owned by Lewis County Public Utility District (Cowlitz Falls) and Mission Valley (Big Creek). The independent hydro

generation forecasts are typically presented in OY, however, they are presented in FY format for consistency within this Study.

For the 2007 Final Rate Case Proposal, the Federal system independent hydro projects were updated to exclude the City of Idaho Falls' Bulb turbine projects, whose contract with BPA expires September 30, 2006. This reduced Federal system independent hydro generation estimates under 1937 critical water conditions by approximately 18 aMW per year for the rate period.

The Federal system independent hydro energy generation estimates used in this Study are summarized in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Section 2.3, Tables 2.3.1 through 2.3.3, *Loads and Resources-Federal System, (Independent Hydro).* The monthly energy in aMW for the independent hydro projects, is detailed in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Section 2.4, Table A-4, *Federal Independent Hydro Projects*. The Federal system regulated and independent hydro energy is combined and passed to the Risk Analysis Study, WP-07-FS-BPA-04. The HLH/LLH splits for the Federal system regulated and independent hydro are calculated in the Risk Analysis Study.

2.3.3 Other Federal System Generation

Other Federal system generation includes the purchased output from non-Federally owned projects or project generation directly assigned to BPA. The expected generation from these non-hydro resources is summarized for monthly energy in aMW, in the Load Resource Study Documentation, WP-07-FS-BPA-01A, Tables 2.3.1 through 2.3.3, *Loads and Resources-Federal System, (Renewables), (Large Thermal),* and *(Non-Utility Generation).*