Transmission Service

# Power Flow Base Case for the Planning Time Period, Version 7

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## 1 Purpose

The purpose of this document is to describe the power flow model and base case assumptions used for calculating Available Flowgate Capability (AFC) on Transmission Services' Network Flowgates in the Planning Time Period (beyond 13 months out).

## 2 Power Flow Model

2.1 The power flow model is a mathematical representation of the actual lines, transformers, Loads, and generators that comprise the Federal Columbia River Transmission System. A key output of this model is a computation of how much power will flow over each element in the power system for the assumed Load and generation levels.

2.2 For the calculations for Planning Existing Transmission Commitments (ETC), Transmission Services models power flows representing projected System conditions in each calendar year. Transmission Services uses subsequent analysis in the base cases to reflect new or changed System conditions.

2.3 Transmission Services does not include Northwest generation levels and Load beyond Firm commitments on the Bonneville Transmission System to the extent possible. Since this creates a discrepancy between total Northwest generation and load, Transmission Services adjusts Intertie flows accordingly.

2.4 Transmission Services identifies the power flows over Network Flowgates.

2.5 The result of the power flow base case becomes the Planning ETC for the Flowgate. One Planning ETC is established per Flowgate, per season.

## 3 Power Flow Base Case Assumptions

3.1 At least once per calendar year, Transmission Services develops representative seasonal power flow cases for two years out and these representative seasons are used for the time period two to ten years out.

3.2 Normal peak (I in 2 year) Load forecasts are used for all seasons.

3.2.1 Transmission Services obtains Load forecasts for utilities that perform their own forecasts from such utilities as part of the Transmission Services' standard process for base case development.

3.2.2 Transmission Services bases Load forecasts for utilities that do not develop their own Load forecasts on forecasts developed by the Bonneville Power Administration.

3.3 Transmission Services sets initial federal generation levels using a multiple step process. The Columbia Generating Station (formerly known as WNP-2) is assumed to be on-line at full load in the power flow cases in all seasons (in the Contract Accounting Methodology, however, the plant is assumed to be off-line for maintenance during the months of April and May in the odd-numbered years). Transmission Services deems the portion of the plant's output that is not covered

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under federal Point-to-Point (PTP) contract demand to serve all contracts that call out non-specific Federal projects as Points of Receipt (PORs).

3.4 Transmission Services' sets generation levels at each of the Federal hydro projects[1] by first determining each project's 90th percentile generation value by month for the period 2006 - 2009 . The 90th percentile value means each such project is at or below these generation levels 90 percent of the time during the given month. Generation levels at the Libby, Hungry Horse, Dworshak, and Albeni Falls projects, however, are set based on the requirements set forth in the 2000 Biological Opinion. In addition, the generation levels at the Willamette Valley projects are set at the minimum levels seen by season during Calendar Year 2001 as shown below:

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**Willamette Valley Projects 2001 Generation Seasonal Averages[2]**

| | Winter | Spring | Summer | Fall |
|---|---|---|---|---|
| Big Cliff | 8 | 15 | 3 | 3 |
| Cougar | 8 | 14 | 11 | 14 |
| Detriot | 40 | 44 | 48 | 41 |
| Dexter | 4 | 10 | 0 | 0 |
| Foster | 7 | 12 | 4 | 7 |
| Green Peter | 28 | 24 | 23 | 23 |
| Hills Creek | 8 | 8 | 10 | 7 |
| Lookout Point | 35 | 45 | 38 | 23 |
| Lost Creek [3] | 15 | 24 | 21 | 10 |
| | | | | |
| **Sum** | 153 | 196 | 158 | 118 |

3.5 Transmission Services then scales the generation at the Federal hydro projects to match the sum of the demands for all contracts that call out non-specific Federal hydroelectric projects as PORs after adjusting these demands for the portion served

[1] Federal hydro projects include: Grand Coulee, Chief Joseph, Dworshak, Albeni Falls, Libby, Hungry Horse, Lower Granite, Lower Monumental, Little Goose, Ice Harbor, McNary, John Day, The Dalles, Bonneville, Willamette Valley Projects.
[2] Calendar Year 2001 was used because its averages were the lowest of the last 6 years. Winter: December – March; Spring: April – May; Summer: June – September; Fall: October – November.
[3] Most recent data for Lost Creek is 1996. Data between 1996 and 2001 for Hills Creek and Lookout Point followed a pattern that was applied to Lost Creek's 1996 data to arrive at numbers used here. Hills Creek and Lookout Point were used as models due to their regional proximity to Lost Creek.

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by Columbia Generating Station, Libby, Hungry Horse, Dworshak, Albeni Falls, and the Willamette Valley projects. The Federal PTP demands at each project are then added to this result to obtain the final assumed generation level for each Federal hydro project. This overall method for modeling the federal resources is referred to as the "Modified 90th Percentile Method" and is used in both the power flow base cases and Contract Accounting Methodology.

3.6 Generation levels at the non-Federal Mid-Columbia hydro projects are set at 90 percent of their historical output by season.

3.7 Non-federal thermal generators requiring transmission service on the Federal transmission system are set at either their contract demand or seasonal capability, whichever is lower.

3.8 Wind generators identified as PORs in PTP contracts and that require transmission service on the Federal transmission system are modeled on at 80 percent of the wind generator's contract demand.

3.9 The Flowgate impact of wind generators identified as Designated Network Resources in NT contracts or in the NT Resources [1]Memorandum of Agreement and that require Transmission Service on the Federal Transmission System are determined on a Flowgate by Flowgate basis, and set at the greater of the following:

3.9.1 Modeled on at 100 percent of the designated MW level for the wind generator or

3.9.2 Modeled off and replaced, at 100 percent of the designated MW level for the wind generator, by "Modified 90th Percentile Method" Federal generators.

3.10 Non-Federal resources that do not require Transmission Service from Transmission Services are set at levels obtained from such resource owners as part of Transmission Services' standard process for power system planning studies.

3.11 If there is more generation than Load in the power flow case after all exports and after all generation is modeled as described above, Transmission Services scales down the assumed generation levels for the Federal hydro projects and the Mid-Columbia generation, on an equal basis by the amount of excess generation to bring generation and Load into balance.

## 4 Determining Planning ETC

4.1 Transmission Services runs the power flow base cases for each season using the assumptions described in Section 2. The resulting flow across each Network Flowgate is the Planning ETC.

4.2 Transmission Services reserves the right to modify the Planning ETC at any time.

[1] Memorandum of Agreement, Management of Federal Power Sales for Network Integration Transmission Service, MOA No. 02TX-10925.

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## 5 Parallel Flows

5.1 The Network Flowgates do not necessarily represent all Transmission lines across that particular constrained portion of the power system. In the planning power flow studies for determining Planning ETC and TFC for the Network Flowgates, Transmission Services accounts for power flow across Transmission Services' Facilities only. The flows on all Facilities for several constraints follow. The information contained in the following chart is not intended to establish a formal allocation between Transmission Services and other Transmission Owners.

| Constraint | Case | | | | |
|---|---|---|---|---|---|
| **From Substation-To Substation Voltage** | **MAY04M3 (MW)** | **JUN04M3 (MW)** | **A04M3 (MW)** | **J04M3 (MW)** | **J04EHM3 (MW)** |
| **West of Mcnary** | 2598 | 2511 | 2310 | 1852 | 1788 |
| Coyote Springs-Slatt 500kV | 1801 | 1733 | 1578 | 1145 | 971 |
| McNary-Ross 345kV | 295 | 284 | 260 | 380 | 450 |
| McNary-Horse Heaven 230kV | 313 | 314 | 296 | 160 | 193 |
| McNary-Boardman Tap 230kV | 189 | 181 | 176 | 168 | 174 |
| | | | | | |
| **South of Allston** | 2479 | 2504 | 2478 | 766 | 208 |
| Allston-Keeler 500kV | 1369 | 1401 | 1420 | 122 | -239 |
| Lexington-Ross 230kV | 292 | 257 | 250 | 165 | 91 |
| Allston-St. Helens 115kV | 75 | 78 | 76 | 42 | 35 |
| Astoria-Seaside 115kV | -12 | -8 | -7 | -27 | -36 |
| Trojan-St. Mary's 230kV | 286 | 292 | 287 | 129 | 77 |
| Trojan-Rivergate 230kV | 229 | 240 | 236 | 83 | 59 |
| Merwin- St. Johns 115kV | 151 | 159 | 128 | 150 | 111 |
| Clatsop-Lewis & Clark 115kV | 89 | 85 | 88 | 102 | 110 |
| | | | | | |

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| | | | | | |
|---|---|---|---|---|---|
| **South of Napavine** | 1889 | 1908 | 1996 | 550 | 600 |
| Napavine-Allston #1 500kV | 973 | 982 | 1025 | 325 | 349 |
| Paul-Allston #2 500kV | 916 | 926 | 971 | 225 | 251 |

Notes: (a) The "from" and "to" substations are listed in the direction of positive flow; (b) the underlined substation is where the flow is metered; and (c) numbers are rounded.

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