NORTHWEST POWER POOL AREA
ASSESSMENT OF RELIABILITY AND ADEQUACY
2009-2010 WINTER OPERATING CONDITIONS

September 9, 2009

INTRODUCTION

The Northwest Power Pool (Power Pool) area is one of the four sub-regions of the Western Electricity Coordinating Council (WECC) and is comprised of all or major portions of the states of Washington; Oregon; Idaho; Wyoming; Montana; Nevada; and, Utah; a small portion of Northern California; and, the Canadian provinces of British Columbia and Alberta. This vast area covers 1.2 million square miles of the WECC's 1.8 million square miles. The Power Pool in collaboration with it members (18 Balancing Authorities (BA)) has conducted an assessment of reliability in response to questions raised regarding the ability of the Power Pool to meet the load requirements during the winter 2009-2010. Since the Power Pool covers a large and diverse area of the Western Interconnection, its members face unique issues in the day-to-day coordinated operations of the system. The Power Pool area in aggregate is a winter peaking sub-region with a large amount of hydro resources.

Analyses indicate the Power Pool area will have adequate generation capacity and energy, required operating reserve (regulating reserve and contingency reserve), and available transmission be able to meet the forecasted firm loads for the 2009-2010 winter operations, assuming normal ambient temperature and normal weather conditions.

This assessment is valid for the Power Pool area as a whole; however, these overall results do not necessarily apply to all sub-areas (individual members, balancing authorities, states, and or provinces) when assessed separately.

In, 2007, Sacramento Municipal Utility District (SMUD) and Turlock Irrigation District (TID) joined the Power Pool and will be fully integrated into the Northwest Power Pool Reserve Sharing Group for the 2009-2010 winter season; however, for purposes of the 2009-2010 winter assessment, SMUD and TID are included in the California sub-region and not in the Power Pool area assessment.

Report Details

- Historic Demand and Energy

  The Northwest Power Pool 2008-2009 coincidental winter peak of 63,435 MW occurred on December 15, 2008. The 2008-2009 coincidental winter peak was 104% of the forecast; however, the coincidental peak occurred during below normal temperature conditions. There is still a large component of electric space heating load within the Power Pool area. Normalizing for temperature variance (50% probability), the 2008 coincidental peak would have been 60,500 or 99.18% of the forecast.

- Forecasted Demand and Energy

  The economic recession that began in 2007 has had an impact on the Power Pool power usage and future forecasts. The 2009 summer peak forecast for the Power Pool area, as one single entity, was 54,500 MW. The actual was 50,000 MW adjusted for temperature. The recession

that has taken place has impacted the Power Pool area between 5 to 10% reduced demand. Historically, the Power Pool area lags the economic recovery by approximately one year.

The 2009-2010 winter peak forecast for the Power Pool area, as one single entity of 59,000 MW is based on normal weather, reflects the prevailing economic climate (down-turn), and has a 50% probability of not being exceeded.

The Power Pool area has approximately 575 MW of interruptible demand capability and load management. In addition, the load forecast incorporates any benefit (load reduction) associated with demand-side resources, not controlled by the individual utilities. Some of the entities within the Power Pool area have specific programs to manage peak issues during extreme conditions. Normally these programs are used to meet the entities operating reserve requirements and have no discernable impacts on the projected Power Pool area peak load.

Under normal weather conditions, the Power Pool area does not anticipate dependence on imports from external areas during winter peak demand periods. However, if much lower than normal precipitation were to occur, it may be extremely advantageous to maximize the transfer capabilities from outside the Northwest Power Pool area to reduce reservoir drafts and aid reservoir filling.

- Resource Assessment

Approximately 60% of the Power Pool resource capability is from hydro generation. The remaining generation is produced from conventional thermal plants and miscellaneous resources, such as non-utility owned gas-fired cogeneration or wind.

Hydro Capability

Power Pool power planning is done by sub-area. Idaho, Nevada, Wyoming, Utah, British Columbia and Alberta individually optimize their resources to their demand. The Coordinated System (Oregon, Washington and western Montana) coordinates the operation of its hydro resources to serve its demand. The Coordinated System hydro operation is based on critical water planning assumptions (currently the 1936-1937 water year). Critical water in the Coordinated System equates to approximately 11,000 average megawatts of firm energy load carrying capability, when reservoirs start full. Under Average water year conditions, the additional non-firm energy available is approximately 3,000 average megawatts.

The Coordinated System hydro reservoirs refilled to approximately 80% of the Energy Content Curve by July 31, 2009.

April through July

This period is the refill season when reservoirs store spring runoff. The water fueling associated with hydro powered resources can be difficult to manage because there are several competing purposes including but not limited to: current electric power generation, future (winter) electric power generation, flood control, biological opinion requirements resulting from the Endangered Species Act, as well as, special river operations for recreation, irrigation, navigation, and the refilling of the reservoirs each year. Any time precipitation levels are below normal, balancing these interests becomes even more difficult.

With the competition for the water, power operations for the 2010 may be difficult. The goal is to manage all the competing requirements while refilling the reservoirs to the highest extent possible.

Sustainable Hydro Capability

Operators of the hydro facilities maximize the hydrology throughout the year while assuring all the competing purposes are evaluated. Although available capacity margin at time of peak can be calculated to be greater than 20%, this can be misleading. Since hydro can be limited due to conditions (either lack of water or imposed restrictions), the expected sustainable capacity must be determined before establishing a representative capacity margin. In other words, the firm energy load carrying capability (FELCC) is the amount of energy that the system may be called on to produce on a firm or guaranteed basis during actual operations. The FELCC is highly dependent upon the availability of water for hydro-electric generation.

The Power Pool has developed the expected sustainable capacity based on the aggregated information and estimates that the members have made with respect to their own hydro generation. Sustainable capacity is for periods at least greater than two-hours during daily peak periods assuming various conditions. This aggregated information yields a reduction for sustained capability of approximately 7,000 MW. This reduction is more relative to the Northwest in the winter; however, under summer extreme low water conditions, it impacts summer conditions, too.

Thermal Generation

No thermal plant or fuel problems are anticipated. To the extent that existing thermal resources are not scheduled for maintenance, thermal and other resources should be available as needed during the winter peak.

Wind Generation

Several states have enacted renewable portfolio standards which will require some Power Pool members by the mid 2010 decade to satisfy at least 20% of their load with energy generated from renewable resources. This may result in a significant increase in variable generation within the Power Pool area, creating new operational challenges which will have to be addressed in the future. Some of the safety net programs such as contingency reserve, and under frequency load shedding will be re-evaluated for effectiveness.

The Power Pool area estimated installed wind generation capacity for 2009-2010 winter season is approximately 5,500 MW, contributing only 438 MW on-peak. With the increasing variable generation, conventional operation of the existing hydro and thermal resources will be impacted.

The wind generation manufactures' standard operating temperature for wind turbines range from -10° C to + 40° C (14° F to 104° F). During the winter peaking period, the temperature in the areas where the majority of the wind turbines are located can go below 14°F, leaving no capability from the wind generation during those periods.

In addition, there is a risk of over-generation in the spring and fall. When both the wind and hydro generation are both in high generation mode, and given the environmental constraints on

dissolved gases in the river, there are times when generation may exceed load plus the ability to export.

Biomass Generation

The installed capacity of biomass generation within the Power Pool area is 670 MW with expected on-peak amounts of 668 MW.

Other Generation

Within the Power Pool area there is an underground natural gas storage facility that is 100% full. This storage is located near many of the gas plants located in the Power Pool area, minimizing any effect that a regional gas problem may cause. In addition, one BA in the Power Pool area has an excess of 700 MW of generation that can be fired on diesel fuel.

External Resources

No external resources to the Power Pool area are assumed for the winter season. However, one BA located in the Power Pool area has an exchange agreement with an entity in the California region for excess energy up to 300 MW per hour delivered firm to the BA system. This exchange agreement is for the period November through February with a total potential delivery of 413,000 MWh.

- Transmission Assessment

Several BAs are constructing new transmission within the Power Pool area to address load service issues. No significant transmission lines are scheduled to be out-of-service during the winter season.

Constrained paths within the Power Pool area are known and operating studies modeling these constraints have been performed. As a result of these studies operating procedures have been developed to assure safe and reliable operations.

System Operating Limits (SOL)

The interregional transmission transfer capabilities based on System Operating limits as determined by the Northwest Operational Planning Group (NOPSG) and approved by WECC's Operating Transfer Capability Policy Committee (OTCPC) are listed below:

Path Name	Path #	Rating (MW)	2009-10 Winter SOL (OTC) (MW)
Alberta-BC (E-W)	1	1,000 (E-W)	450-1,000 (E-W)
Alberta-BC (W-E)	1	1,200 (W-E)	600-1,200 (W-E)
NW-Canada (N-S)	3	3,150 (N-S)	3,150 (N-S)
NW-Canada (S-N)	3	2,000 (S-N)	2,000 (S-N)
West of Cascades North (E-W)	4	10,200 (E-W)	10,200 (E-W)
West of Cascades North (W-E)	4	10,200 (W-E)	10,200 (W-E)
West Of Cascades South (E-W)	5	7,000 (E-W)	7,000,(E-W)
West Of Cascades South (W-E)	5	7,000 (W-E)	7,000 (W-E)
West of Hatwai (E-W)	6	4,277 (E-W)	4,250 (E-W)
Montana to Northwest (E-W)	8	2,200 (E-W)	2,200 (E-W)
Montana to Northwest (W-E)	8	1,350 (W-E)	1,321-1,350 (W-E)
Idaho-Northwest (W-E)	14	1,200 (W-E)	1,200 (W-E)
Idaho-Northwest (E-W)	14	2,400 (E-W)	2,304 (E-W)
Sierra-Idaho (N-S)	16	500 (N-S)	500 (N-S)
Sierra-Idaho (S-N)	16	360 (S-N)	262 (S-N)
Borah-West (E-W)	17	2,557 (E-W)	2,557 (E-W)
Idaho-Montana (N-S)	18	356 (N-S)	356 (N-S)
Idaho-Montana (S-N)	18	337 (S-N)	256 (S-N)
Bridger West (E-W)	19	2,200 (E-W)	2,200 (E-W)
Path C (N-S)	20	1,000 (N-S)	620-980 (N-S)
Path C (S-N)	20	1,000 (S-N)	300-800 (S-N)
Sierra-PG&E (E-W)	24	160 (E-W)	150 (E-W)
Sierra-PG&E (W-E)	24	160 (W-E)	60 (W-E)
Sierra-Utah (E-W)	32	440 (E-W)	420 (E-W)
Sierra-Utah (W-E)	32	235 (W-E)	235 (W-E)

Path Name	Path #	Rating (MW)	2009-10 Winter SOL (OTC) (MW)
TOT 2C (N-S)	35	300 (N-S)	300 (N-S)
TOT 2C (S-N)	35	300 (S-N)	300 (S-N)
Brownlee East (W-E)	55	1,915 (W-E)	1,915 (W-E)
PDCI (N-S)	65	3,100 (N-S)	3,100 (N-S)
PDCI (S-N)	65	3,100 (S-N)	2,200 (S-N)
COI + NW-Sierra (N-S)	66	4,800 (N-S)	4,800 (N-S)
COI + NW-Sierra (S-N)	66	3,675 (S-N)	3,675 (S-N)
N of John Day (N-S)	73	8,400 (N-S)	7,700 (N-S)
Midpoint-Summer Lake (E-W)	75	1,500 (E-W)	1,500 (E-W)
Midpoint-Summer Lake (W-E)	75	550 (W-E)	400 (W-E)
NW-Sierra (N-S)	76	300 (N-S)	300 (N-S)
NW-Sierra (S-N)	76	300 (S-N)	300 (S-N)
TOT 2B1 (N-S)	78	530 (N-S)	530-560 (N-S)
TOT 2B1 (S-N)	78	600 (S-N)	600 (S-N)
TOT 2B2 (N-S)	79	265 (N-S)	265 (N-S)
TOT 2B2 (S-N)	79	300 (N-S)	300 (N-S)
Montana – Southeast (N-S)	80	600 (N-S)	600 (N-S)
Montana – Southeast (S-N)	80	600 (S-N)	257-600 (S-N)

These limits recognize transmission or generation constraints in systems external to the region or sub-region.

Outage Coordination

The Power Pool coordinated outage (transmission) system (COS) was designed to assure that outages could be coordinated among all stakeholders (operators, maintenance personnel, transmission users, and operations planners) in an open process. This process had to assure that proper operating studies were accomplished and transmission impacts and limits known, to fulfill a requirement from the 1996 west coast disturbances that the system be operated only under studied conditions. The WECC Reliability Coordinator is involved in the outage coordination process and has direct access to the outage database.

Monthly Coordination

The process requires Power Pool members to designate significant facilities that, if out of service by itself or in conjunction with another outage, will impact system capabilities. The significant facilities are defined and updated annually by the Power Pool members. The scheduled outage of these critical facilities is posted on a common database. All utilities post proposed significant outages on WECC's Coordinated Outages System (COS). Outages are to be submitted to the COS at least 45 days ahead of the month they are proposed to occur so they can be viewed by interested entities. The involved entities then facilitate the Power Pool coordination of all these outages. Entities can comment on the preliminary impacts and schedules may be adjusted to maximize reliability and minimize market impacts. If coincidental outages cause too severe of an impact, the requesting utilities work together to adjust schedules accordingly. A final outage plan is posted with estimated path capabilities 30 days prior to the month in which the outages will occur. Detailed operational transfer capability studies are then performed and the limits for each affected path are posted at least 15 days prior to the outage.

Emergency outages can be requested outside these schedule guidelines. Emergency outages are coordinated among adjacent utilities to minimize system exposure. Utilities can use the COS system to assure system topology is correct for next day studies. As transmission operators increase the amount of short term outages in addition to the significant outages" the WECC RC will be able to access to the WECC COS data base and use the final outage schedule in its real-time system analysis. This coordinated outage process has been very effective. The outage information is used by Power Pool member utilities to perform system studies to maximize system reliability.

Semi-annual planning - Long-Range Significant Outage Planning (LRSOP)

The Power Pool staff facilitates outage meetings every six months with each utility's outage coordinator to discuss proposed longer term outages. Utilities discuss anticipated outages needed for time critical construction and periods where transmission capacity may need to be maximized. The outages are posted on the WECC COS and on the individual companies' OASIS sites.

Specific responsibilities of LRSOP include:

- Share outage information with all parties affected by outages of significant equipment (i.e., equipment that affects the transfer capability of rated paths). Information is shared two times each year for a minimum of a six-month period. The first meeting each year coordinates outages for July through December. The second meeting coordinates outages for January through June.
- Review the outage schedules to assure that needed outages can be reliably accomplished with minimal impact on critical transmission use.
- Outage coordinators are to post the outages on the Coordinated Outages System within the applicable timeframes.

Next Day Operating Studies

Additional path curtailments may be required depending upon current system conditions and outages. These curtailment studies are performed by the individual path operators based on the outage schedule developed through the COS process. According to the COS process, these studies are performed at least 15 days prior to the outage. Individual path operators and transmission owners may also perform updated next day studies to capture emergency outage requests and current system conditions such as generation dispatch to determine if the SOL studies and limits are still accurate. Based on these studies, additional SOL curtailments may be made by the path operators. The modified SOL's are posted on the individual transmission owners OASIS and the RC is notified.

The WECC RC also performs system studies to ensure interconnected system reliability. The WECC RC performs real-time system thermal studies to evaluate current operating conditions across the entire Interconnection. The WECC RC is in the process of incorporating real-time voltage tools to complement the thermal analysis currently being performed. Transient stability analysis capability is planned in the future. When the WECC RC observes real-time reliability problems they contact the path operator to discuss the issue and work on a solution. The WECC RC will make a directive for action if there is an imminent reliability threat and the balancing authority does not eliminate the reliability issue within an appropriate time frame.

Voltage Stability

The WECC-1-CR System Performance Criteria, requirement WRS3 is used to plan adequate voltage stability margin in the Northwest Power Pool area as appropriate. Simulations are utilized to assure system performance is adequate and meets the required criteria.

- Operating Issues

  The Power Pool area does not anticipate any operating issues for the 2009-2010 winter season.

- Reliability Assessment Analysis

  The Northwest Power Pool area does not have one explicit methodology for determining an adequacy margin. Bonneville Power Administration utilizes the Northwest Power Pool and Conservation Council's resource adequacy standard, which establishes targets for both the energy and capacity adequacy metrics derived from a loss of load probability analysis. Others will utilize NERC's reserve margin approach.

  Since no one method exists for the entire Northwest Power Pool area, we have elected to use the NERC's reserve margin analysis for the winter assessment. The 2009-2010 Power Pool area generating capability is projected to be 80,000 MW, prior to adjusting for maintenance. In determining planning margin for the current winter season one must further adjust for operating reserve requirement, which is approximately 4,200 MW. At this point based on a load of 50% probability not to exceed the planning margin is approximately 27%.

  A severe weather event for the entire Power Pool area will add approximately 6,000 MW of load while at the same time under extreme water restrictions the sustained hydro generation would reduce the capability by 7,000 MW. In addition, under the severe weather, wind generation is expected to be minimal. Accounting for the severe weather event and the operating reserve yields a planning margin of approximately 5%.

- Contingency Reserve Sharing Procedure

  As permitted by NERC and WECC criteria and standards, the Operating Committee of the Power Pool has instituted a Reserve Sharing Program for contingency reserve. Those who participate in a reserve sharing group are better positioned to meet the NERC disturbance control standard because they have access to a deeper and more diverse pool of shared reserve resources. Also, an increase in efficiency is obtained since the shared reserve obligation for the group as a whole is less than the sum of each participant's reserve obligation computed separately.

  By sharing contingency reserve, the participants are entitled to use not only their own "internal" reserve resources, but to call on other participants for assistance if internal reserve does not fully cover a contingency. The reserve sharing process for the Power Pool has been automated. A manual backup process is in place if communication links are down or the computer system for reserve sharing is not functioning correctly.

  The Power Pool is designated as a reserve sharing group (RSG) as provided under WECC Operating Reliability Criteria. Each member of the RSG submits its contingency reserve obligation (CRO) and most severe single contingency (MSSC) to a central computer. The combined member CRO must be larger than the RSG MSSC. If not, then each member's CRO is proportionally increased until this requirement is met. When any RSG member loses generation they have the right to call upon reserves from the other RSG members as long as they have first committed their own CRO. A request for contingency reserve must be sent within four minutes after the generation loss and the received contingency reserve can only be held for 60 minutes. A request is sent via the member's energy management system to the central computer. The central computer then distributes the request proportionally among members within the RSG. Each member may be called to provide reserve up to its CRO. Critical transmission paths are monitored in this process to ensure SOL limits are not exceeded. If a transmission path SOL is exceeded the automated program redistributes the request among RSG members that are delivering reserve along non-congested paths. The WECC RC continuously monitors the adequacy of the RSG reserve obligation, MSSC, and the deployment of reserve. If a reserve request fails due to various reasons, backup procedures are in place to fully address the requirements.

- Reliability Coordinator

  The Reliability Coordinator (RC) is responsible for monitoring, advising, and directing action when necessary, in order to preserve the reliability of transmission service between and within the interconnected systems of all balancing authorities within the Western Interconnection.

STRATEGIC UNDERTAKINGS

- Adequacy Response Team

  The Power Pool has developed an Adequacy Response Process whereby a team addresses the area's ability to avoid a power emergency by promoting regional coordination and communications. Essential pieces of that effort include timely analyses of the power situation and communication of that information to all parties including but not limited to utility officials, elected officials and the general public.

- Emergency Response Team (ERT)

  In the fall of 2000, the area developed an Emergency Response Process to address immediate power emergencies. The ERT remains in place and would be utilized in the event of an immediate emergency. The ERT would work with all parties in pursuing options to resolve the emergency including but not limited to load curtailment and or imports of additional power from other areas outside of the Power Pool.

CONCLUSIONS

In view of the present overall power conditions, including the forecasted water condition, the area represented by the Power Pool is estimating that it will be able to meet firm loads including the required operating reserve. Should any resources be lost to the area beyond the contingency reserve requirement and or loads are greater than expected as a result of extreme weather, the Power Pool area may have to look to alternatives which may include emergency measures to meet obligations.