Attachment 2

2011 Power Supply Assessment

Western Electricity Coordinating Council

November 17, 2011

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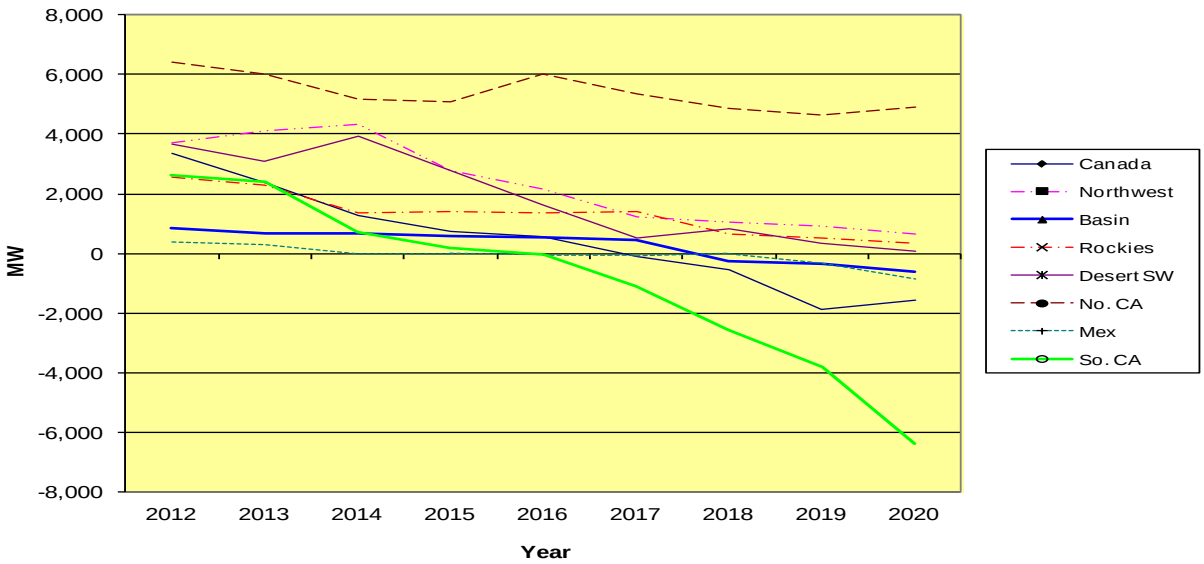
2011 Power Supply Assessment

Executive Summary

The 2011 Western Electricity Coordinating Council (WECC) Power Supply Assessment (PSA) is an evaluation of generation resource reserve margins (in MW) for the WECC summer and winter peak hours for the forecast period 2012 through 2020. The PSA presents the results of the assessment that was conducted by the WECC staff during the second quarter of 2011. This assessment is based on data requested in the fall of 2010 and submitted by WECC member utilities in the spring of 2011.

The capacity assessment identifies subregions within WECC that have the potential for electricity supply shortages based on reported demand, resource, and transmission data. The PROMOD Model (PROMOD)[1] used to conduct the assessment includes 20 zones that are aggregated to make the eight subregions shown in the graphs. The aggregation of zones into subregions is shown in Table 3 on page 7. The Power Supply Margin (PSM) by subregion (shown in the graphs) is a measure of a subregion's ability to meet its total load requirements — i.e., demand plus a target reserve margin — with resources in the subregion and imports from other subregions, as calculated by PROMOD. A PSM equal to or greater than zero denotes that the target, including the reserve margin, was met. A PSM less than zero indicates that the subregion's native generation and calculated imports were less than the target amount.

Graph 1 – Subregional Power Supply Margin Results – Summer (Case 1)



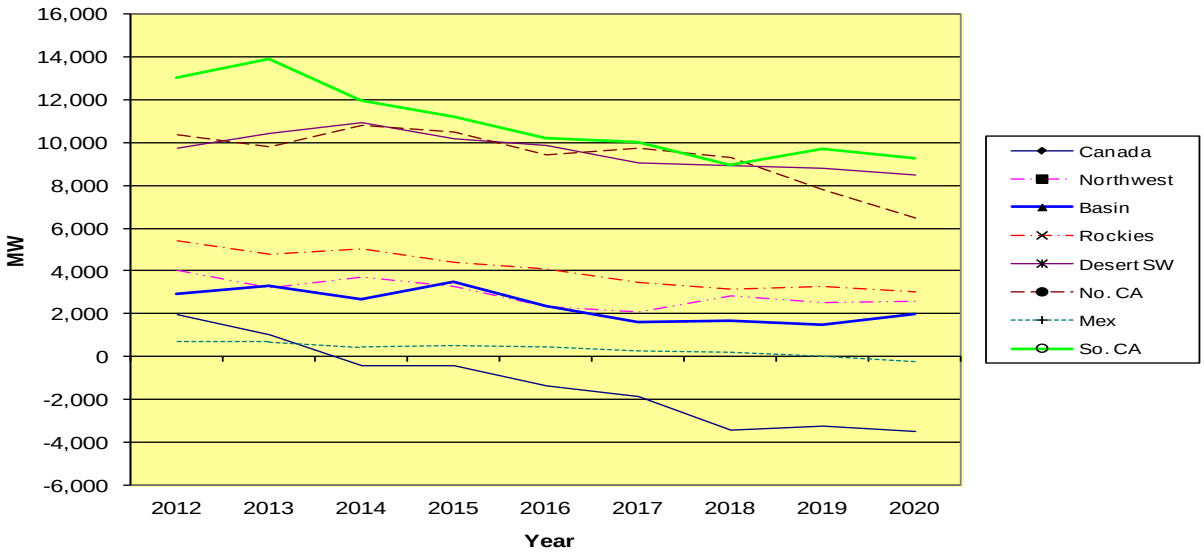
[1] Additional information regarding the PROMOD Model can be found on page 5.

The graphs for both summer and winter PSMs, Cases 1 and 2 respectively, portray a need for future resources in some subregions in the out years beyond those already under active construction and after accounting for the potential imports from the subregions with capacity surpluses. Resources have been proposed to meet a portion of these needs. A significant number of these resources are not under active construction although they are undergoing regulatory review; others, as noted later in this Executive Summary and listed in Attachment 7, have not yet been proposed for regulatory review. The subregion PSM also varies significantly throughout the WECC region.

It is important to note that, although the PROMOD model considers energy limitations while performing economic dispatch runs, the summer and winter analyses for the Northwest subregion still may not adequately capture the limitations on the ability of the Northwest hydro system to sustain capacity output levels beyond a single hour. More details on these limitations are described on page 5.

Results that indicate amounts below target reserve levels in later years of the assessment period are not forecasts of shortages. Rather, they are an indication that proposed resources need to be brought along through regulatory approval to construction at appropriate speed. The study results shift from an evaluation of PSM to a determination of future needs and investment opportunities. The point when this shift occurs varies by region and can vary by case study.

Graph 2 – Subregional Power Supply Margin Results - Winter (Case 2)



As summarized in Tables 1 and 2, a total of nine cases are included in the 2011 PSA. Each case evaluates whether there are sufficient resources (e.g., local generation including near-term additions and transmission import capacity) in each of the 20 defined zones to meet the peak load forecast requirements plus a reserve margin. The cases are distinguished by season, by the amount of new generation that is included in

addition to existing resources, by the location and intensity of the extreme weather impact, and by the reserve requirement.

Table 1 – Case Description

Case	Season	New Resources	Margin
1	Summer	Class 1	Building Blocks
2	Winter	Class 1	Building Blocks
3	Summer	Class 1 through 2	Building Blocks
4	Winter	Class 1 through 2	Building Blocks
5	Summer	Class 1 through 3	Building Blocks
6	Winter	Class 1 through 3	Building Blocks
7	Summer	Class 1	15%

Table 1 provides a description of the cases that were developed using the different seasons, amounts of new resources, and margin definitions. The definitions of the resource classes are found under "New Generation," on page 4.

Table 2– Temperature Sensitivity Cases

Temperature Sensitivities: Modified Building Blocks			
Case	**Season**	**New Resources**	**Temperature Definition**
8	Summer	Class 1	1-in-20 temperature adjustment
9	Winter	Class 1	1-in-20 temperature adjustment

Table 2 provides a description of the temperature sensitivities that were studied. These sensitivities were created to examine a WECC-wide 1-in-20-year extreme temperature increase. Although this Interconnection-wide extreme temperature is not an anticipated event, it does represent a scenario that would stress generation and transmission. The temperature addition element of the Building Block margin was modified from the 1-in-10 base scenario to a 1-in-20 extreme case. All other elements of the Building Block are unchanged.

The variables used in the PSA cases are described below.

- **Reserve Margin:** The 2011 PSA uses a Building Block approach that was developed from an evaluation of a number of uncertainties faced by Load-Serving Entities to calculate the reserve margins. The Building Block approach has four elements: Contingency Reserves, Regulating Reserves, reserves for

Additional Forced Outages, and reserves for 1-in-10 Weather Events.[2] Separate Building Block values were developed for each BA and then aggregated by subregions, using a MW based weighted average, for the analysis. The subregions and the Reserve Margin used for each subregion are shown in Table 3 on page 7.

- **Temperature Sensitivity:** The temperature sensitivity cases looked at the impact on available capacity for the entire Western Interconnection when 1-in-20 year temperature demand occurred across the Interconnection.
- **New Generation:** The following categories were defined for new resource additions (reported as of December 2010). Class 1 additions were used in all of the cases. Eight of the cases included Class 2 additions, and four of the cases included all resource additions through Class 3. Class 4 additions were listed for the purpose of categorizing all reported projects in a manner consistent with NERC categories, but they were not included in any of the analyses (see Attachment 1 for details on NERC and WECC categories). All new generation resources reported, including those in Class 4, are listed in Attachment 7.
    - *Class 1:* Generation additions/retirements that were reported to be under active construction as of the reporting date of December 2010 and are projected to be in-service/retired prior to January 2016.
    - *Class 2:* Generation additions/retirements that were reported to 1) have received regulatory approval or are to undergo regulatory review, 2) have a signed interconnection agreement, and 3) have an expected on-line/retirement date prior to January 2018. This class includes resources that were expected to be in-service as early as Class 1 resources, but did not meet the test of being under construction or resources that may not be completed/retired before the January 2016 date.
    - *Class 3:* Generation additions/retirements that were reported and have met the NERC criteria for Future Planned Resources but do not qualify as Class 1 or 2 resources.
    - *Class 4:* Generation additions/retirements that were reported and have met the NERC criteria for Future Other or Conceptual Resources. This class also includes projects that are indefinitely postponed. The LRS included this class to allow consistent reporting of resources between the NERC LTRA and the WECC PSA; however, these resources are not included in any of the PSA cases.

The following list describes elements of the PSA case studies. These elements are highlighted below and described in more detail throughout the body of the report.

[2] See "Building Block Guideline for Reserve Margin" on page 12 for definitions and details.

- PROMOD IV is an energy planning and analysis software system that has production cost dispatch model capability. There are two specific advantages associated with the PROMOD model.
    1. PROMOD uses the WECC coincidental peak demand (as opposed to the non-coincidental peak demand) to calculate margins.
    2. PROMOD has a robust subregional transfer process.
- In an effort to better align the PSA and the North American Electric Reliability Corporation's (NERC) Long-Term Reliability Assessment (LTRA), Mexico is considered separate from Southern California and is reported as a subregion. Additionally, the Imperial Irrigation District (IID) has been moved from the Desert Southwest Subregion into the Southern California Subregion. These changes create consistent geographical boundaries between the PSA and LTRA. However, there are additional differences between the two reports that make a one-to-one comparison difficult.
- WECC staff created wind and solar hourly production curves using the National Renewable Energy Laboratory (NREL) synthetic data set for the years 2004-2006 for wind and 2004-2005 for solar. The wind and solar curves used in the analysis were created using one-hour interval data for 2006. These curves were generated based on detailed weather modeling, initialized from historical conditions. The NREL data was aggregated to create a limited number of wind and solar profiles for each subregion.
- For wind and solar resources, NREL Variable Resource curves are used to represent an expected hourly dispatch. Actual hourly wind generation was collected from the BAs in the annual data collection process. This data is being process and will be input into PROMOD to be used in future reliability assessments. Actual solar data will be collected and processed for use in PROMOD in future years.
- PROMOD, in its evaluation of all hours of the year, uses both a peak capacity value from its data base, supplied by the BAs, and an annual hourly energy curve, chosen to represent adverse hydro conditions.

  These hourly curves vary by hydro system. For the major plants in the Northwest and California, PROMOD employs an algorithm that shapes the available hydro energy — subject to the available hydro capacity — to meet the target loads. What this means is that there can be hydro capacity that is essentially unusable to meet actual loads because it is constrained by the available energy in the hydro system. It should also be noted that the Northwest hydro system is more constrained in August than in July, although July is used for the summer peak analysis in the PSA.

- The reserve margin calculation, while using the same Building Block concepts as last year, used slightly different calculations and/or data, resulting in a slightly higher reserve requirement than in 2010.
- The determination of which planned resources to include in each classification was modified to better align with the NERC definitions for existing and new resources. NERC now calls the new resources "Future Planned," "Future Other," and "Conceptual" resources. These categories are described below and in Attachment 1, which includes a cross reference between NERC and WECC new resource categories.
- The PROMOD model allows WECC staff to capture the West-wide coincidental peak demand. PROMOD starts with static hourly demand curves for each BA within WECC. These curves were created using the actual hourly demand for 2002. PROMOD uses an algorithm and the annual peak and annual energy supplied by each BA to modify these curves for each year of the study period. PROMOD "fixes" the annual peak at the amount supplied by the BA, and adjusts the annual curves up or down to match the demand under the curve to the annual energy reported. This process "flattens" the annual demand curve if more annual energy is reported or "peaks" the annual curve for less annual energy. BAs have reported annual peak and annual energy that grows at different rates and has caused the year-to-year coincident peak demand to grow at a non-constant rate. The year-to-year coincident peak difference is consistent with actual annual peak demand growth.

It should be noted that the decision of which resources to include in the various case studies can affect the timing of when deficits occur in the subregions. The case studies in the 2011 PSA only use resources that will be in-service prior to January 2016 for resources that are currently under construction, or January 2018 for resources that are going through a regulatory review process. The LRS elected to limit the planned additions to this subset of resources due to a higher confidence that projects in Class 1 and 2 will be built. The LRS also realizes that limiting the resources included to this subset can, and does, exclude many short lead-time approval and construction projects, such as wind, small scale solar, or natural gas peaking units. As utilities adjust their procurement processes to rely on renewable resources to a greater extent — in compliance with various state Renewable Portfolio Standards (RPS) — and to rely less on highly visible, central station projects, the shortcomings of the current data collection process become more visible. The current process does not capture short lead-time projects that are being developed. Methods that link renewable generation development to transmission commitments may be one promising approach. It is the intent of the LRS to address this classification limitation in future PSAs.

The zonal results are aggregated to eight subregions to mitigate modeling limitations and to maintain load forecast confidentiality in years two and three of the forecast period as required by Exhibit B of the WECC Reliability Information Sharing Policy. The surplus

or deficit amount is the sum of the surpluses and deficits across all of the zones in the subregion. A deficit does not necessarily indicate that all of the zones in the subregion are deficit; a surplus does not mean that all zones are surplus, as a surplus zone may mask a deficit in an adjacent zone, such as occurs within the Canada subregion. Table 3 below shows the zones for each subregion[3] and also shows the Building Block Reserve Margin values that were used for the subregions in the analysis. The margin calculation for the 2011 PSA used the same four elements as last year's margin.

Table 3 – Zones and Building Block Margins

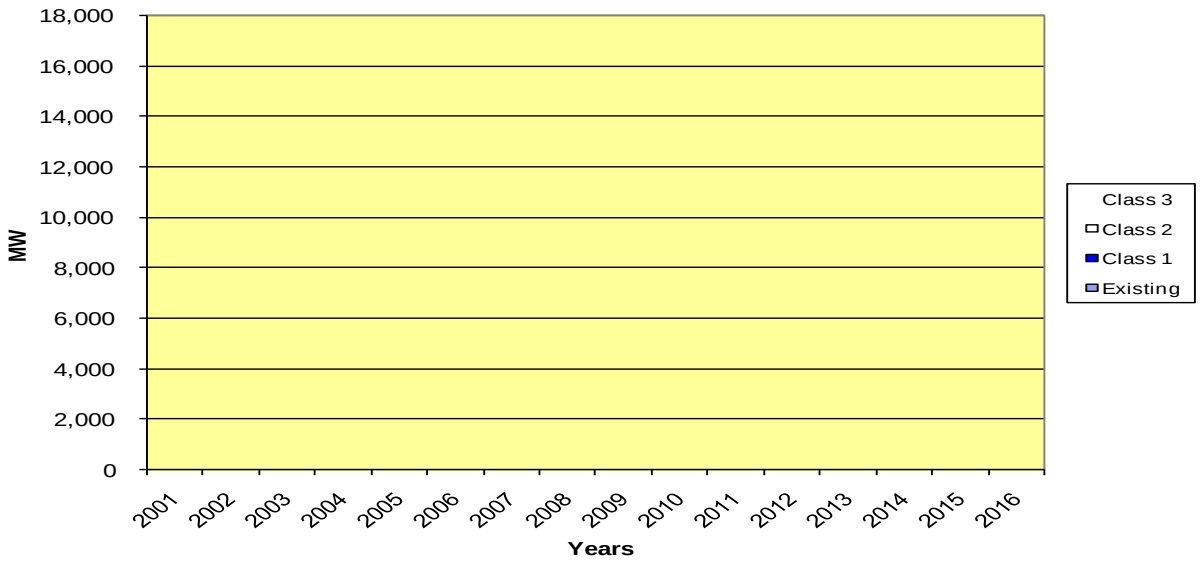
Sub-Region	Zones Included in Sub-Region	Summer Margin	Winter Margin
Canada	British Columbia, Alberta	12.4%	14.0%
Northwest	Pacific Northwest, Montana	17.9%	19.9%
Basin	Idaho, Northern Nevada, Utah	12.6%	13.5%
Rockies	Colorado, Wyoming	14.7%	15.7%
Desert Southwest	Arizona, New Mexico, Southern Nevada	13.5%	14.0%
Northern California	Northern California, San Francisco, SMUD	14.7%	11.9%
Southern California	Southern California Edison, San Diego Gas & Electric, LADWP, Imperial Irrigation District	15.1%	11.0%
Mexico	Comision Federal de Electricidad (CFE)	11.9%	10.7%
WECC Total		14.6%	14.6%

It is important to note that the values for reserve margins used in the PSA are not the values used by individual Load-Serving Entities (LSE) or their regulators, or local governing boards to evaluate individual resource adequacy. Moreover, they are not intended to supplant any of those values. There is at least one subregion that is a competitive wholesale market for which there is no mandated reserve margin. Attachment 6 presents more detail on this issue.

The 2011 PSA cases include load forecasts for the full term of the PSA studies (2012-2020). Forecasts for continued increases in new generation resources and/or transmission capacity, based on late 2010 data and reported in the spring of 2011, include future new generation projects. These projects range from projects that are being contemplated to new projects that are nearing completion. Graph 3 uses the resource definitions described earlier to show projected resource summer additions from 2011 through 2016. (Note: in prior years the resources additions were reported net of expected variable generation derates.)

[3] More detail on the PROMOD zones or "bubbles" is provided in Attachment 2.

Graph 3 – Existing and Reported Resource Additions by Class



Wind and solar de-rates are reflected in Graph 3 and Attachment 7. The analysis of the appropriate capacity value for wind and solar projects, particularly in geographically diverse developments, is still ongoing in a number of forums in the West, including the WECC Variable Generation Subcommittee. The results will be used to inform future adequacy evaluations.

Study Caveats

Among the important caveats that should be considered on reviewing these results are the following:

1. The analysis is based on loads and resources (L&R) data submitted in March 2011. The demand forecasts and reported resources for each BA were “locked” as of May 2011.
2. The assessment is based on the physical ability of the Interconnection to supply all loads regardless of contractual obligations during winter and summer peak hours.
3. The Loads and Resources Subcommittee recognizes that the results of this assessment may differ from the results of similar assessments by other parties.
4. Case results are specific to the assumptions used for these studies. The use of different assumptions will produce different results.
5. The L&R reporting instructions are written to collect uniform data from submitting BAs. However, responders have deviated from these instructions to better align with regional standards.

6. Transmission constraints apply only between bubbles. All generation within a bubble is deemed deliverable within the bubble (see Result Aggregation on page 17 for additional information).
7. Studies use the WECC summer (July) and winter (December) coincidental peak. The subregional reserve margins may be higher or lower depending on the monthly peak load and resource limitations of the individual subregions.

2011 Power Supply Assessment

Purpose and Background

The 2011 WECC PSA evaluates the Power Supply Margins (PSM) of subregions of the Western Interconnection. It identifies subregions within WECC that have the potential for electricity supply shortages based on reported demand and resource data, assumed non-contracted economic transfers, and transmission constraints among the subregions.

The members of the WECC Loads and Resources Subcommittee (LRS) have the responsibility to establish the tools, methodology, and data requirements for conducting the PSA annually. The responsibility is described in the attached document entitled "WECC Power Supply Assessment Policy" (Attachment 4).

The purpose of this report is to present the results of the PSA that was conducted during the second quarter of 2011. The studies cover the summer period from 2012 through 2020, and the winter period from 2012/13 through 2020/21. The input data represent the BA Loads and Resources (L&R) data submitted in March 2011. The PROMOD Model (PROMOD) was used to produce the results for the assessment.

Key Definitions

Class 1 Generation Additions – planned generation additions (projects) that are currently under active construction and projected to be in-service prior to January 2016.

Class 1 Generation Retirements – planned generation retirements or planned long-term shutdowns that will take place prior to January 2016. This also includes facilities or units that have a firm retirement date of within 10 years, as a result of regulatory requirements or corporate decisions.

Class 2 Generation Additions – planned generation additions (projects) that 1) have received regulatory approval or will undergo regulatory review, 2) have a signed interconnection agreement, and 3) have an expected on-line date prior to January 2018. This class includes resources that were expected to be in-service as early as Class 1 resources but did not meet the test of being under construction, or for resources that may not be completed before the January 2016 date.

Class 2 Generation Retirements – planned generation retirements or planned long-term shutdowns that will take place prior to January 2018. This also includes facilities or units that have an estimated retirement date of within 10 years.

Class 3 Generation Additions – planned resource additions (projects) that meet the NERC criteria for Future Planned Resources but do not qualify as Class 1or 2 Resources.

Class 3 Generation Retirements – planned generation retirements or planned long-term shutdowns that meet the NERC criteria for Future Planned Resources but do not qualify as Class 1or 2 Resources.

Class 4 Generation Additions/Retirements – planned generation additions, retirements, or planned long-term shutdowns that do not meet the criteria for Class 1, Class 2, or Class 3 but have met the NERC criteria for Future Other or Conceptual Resources. Class 4 changes were not included in any of the cases of this assessment.

Existing Generation – generation that was available (in-service) as of December 31, 2010.

Load-Requirement – demand or load that is expected to be served during the peak hour of the month being studied plus a target reserve margin.

Peak Demand – demand or load that is expected to be served during the peak hour of the month being studied. The peak demand in this assessment is the total simultaneous demand (firm demand plus non-firm demand as reported by all BAs). Note that in this assessment, demand is synonymous with load.

Power Supply Margin – PSA result identifying the amount of available resource capacity (including net imports) in excess of the demand requirements, after applying the specified adjustments to both demand and resources and accounting for the non-contracted zonal transfers calculated by the model (see discussion below).

Power Supply Margin (PSM) versus Reserve Margin

It is important to understand the relationship between the output of PROMOD and a reserve margin calculation. In equation form the PROMOD output (referred to as Power Supply Margin) is:

Power Supply Margin = Resource capacity + Imports – Exports – Load Requirement

(where both Resource capacity and Load Requirement include case adjustments)

While this equation is very similar to the equation for calculating a reserve margin, the key difference is that PROMOD also calculates the Imports and Exports simultaneously for all zones during its solution. When the internal resource capacity for a zone is less than the load requirement PROMOD will import additional capacity, if available, to meet the load requirement. For example, if the resource capacity for a zone is 1,000 MW and the load requirement is 2,000 MW, PROMOD will attempt to import 1,000 MW to make up the difference. Assuming that there are no exports, the PSM is then (1,000 + 1,000 – 0 – 2,000) = 0 MW and the load requirement is met.

Restricted Transfer Capabilities – These are the transfer capabilities that may reasonably be expected to apply under simultaneous high-seasonal adverse transmission loading conditions.

Synopsis of Input Data

The input data consists of the following data collected from the WECC BA areas:

a) Generation capacities including planned additions and retirements
b) Monthly peak demand forecasts
c) Generation outage forecasts
d) Zone-to-zone transfer capabilities
e) Load temperature sensitivity data in megawatts per degree Fahrenheit

The generation capabilities represent the expected seasonal available capacities. The peak demands represent the 1-in-2 probability load forecasts for the peak hour of the study month.

Building Block Guideline for Reserve Margin

The reserve margins for all of the cases except Case #7 were based on the Building Block Guideline developed by the LRS, and approved by the Planning Coordination Committee (PCC) and the Board of Directors. The Building Block Guidelines/targets are comprised of four elements:

1. Contingency Reserves – An additional amount of operating reserve sufficient to reduce area control error to zero in 10 minutes following loss of generating capacity, which would result from the most severe single contingency. The Contingency Reserve element for the 2011 PSA was calculated using the proposed Contingency Reserve Standard. This proposed standard requires that BAs carry reserves equal to three percent of their load plus three percent of their generation. Because WECC does not track contracted purchases or sales, which will increase or decrease the individual BA's reserve requirement, WECC used a reserve requirement of six percent of load for all BAs for the 2011 PSA. Contingency Reserves are required to be carried by BAs (individually or through reserve sharing pools) by NERC and WECC Standards.
2. Regulating Reserves – The amount of spinning reserves responsive to automatic generation control that is sufficient to provide normal regulating margin. The regulating component of the guideline was calculated using responses received in the 2011 data request. The BAs were asked how much Regulating Reserve they would expect to carry during 2011, as either a MW value or as a percentage of load. MW responses were converted to a percentage of load by dividing the MW provided by the forecasted 2011 peak demand. A "sanity" check was done for all responses and those that seemed unreasonably low or high were replaced

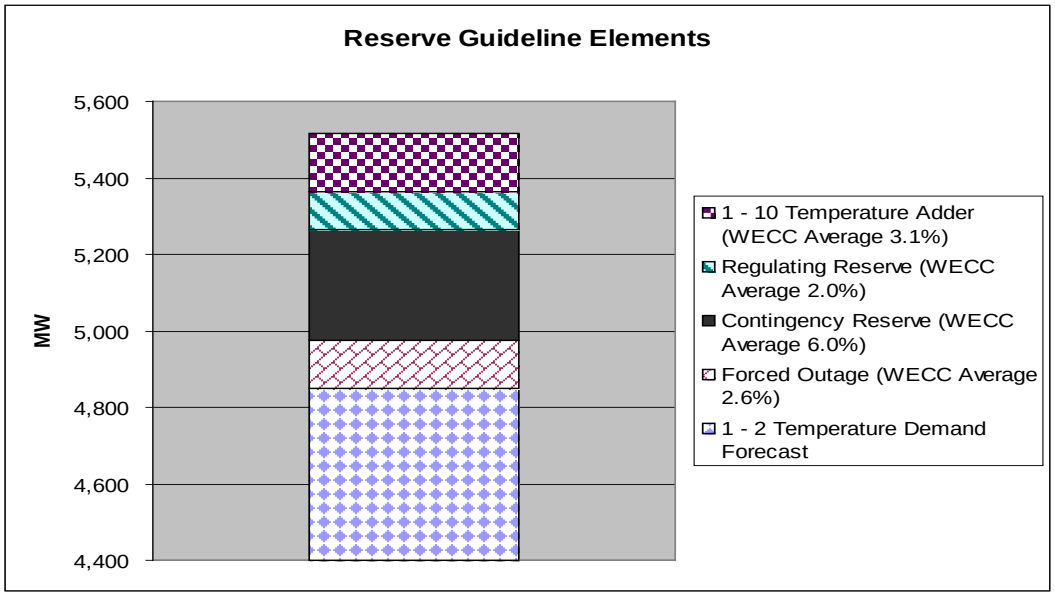
by the subregional weighted average of reported regulating reserves. This component also includes reserves to balance variations in output from variable resources (such as wind) and may be significant for some BAs. The BAs are required to carry Regulating Reserves by NERC and WECC Standards.

3. Additional Forced Outages – Reserves for additional forced outages, beyond what might be covered by operating reserves in order to cover second contingencies, were calculated using the forced outage data supplied to WECC through the L&R data request. Ten years of data (2001-2010) were averaged to calculate both a summer (July) and winter (December) forced outage rate. (The actual calculation is total forced outages divided by total resources reported in the L&R request.) The same forced outage rate was used for all BAs in WECC when calculating the Building Block Guideline. Neither NERC nor WECC standards require the BAs to carry these reserves.

4. Temperature Adders – Using historic temperature data for up to 20 years, the annual maximum and minimum temperature for each BA's[4] area was identified. That data was used to calculate the average maximum (summer) and minimum (winter) temperature and the associated standard deviation. The standard deviation was multiplied by a 90 percent probability factor, and added to the average historic temperature to convert from a 1-in-2 temperature (50 percent exceedence) condition to a 1-in-10 (10 percent exceedence) condition. The 1-in-2 temperature was subtracted from the 1-in-10 temperature to calculate the temperature change associated with the 1-in-10 outlook. The temperature change was then multiplied by the MW per degree change supplied by the individual BAs to arrive at a MW increase associated with converting from a 1-in-2 temperature related forecast to a 1-in-10 forecast. This MW change was divided by the forecast peak demand from 2011 to create a percentage change to be applied to future demand forecasts to convert from a 1-in-2 forecast to a 1-in-10 forecast. An example calculation is given in Attachment 5. BAs are not required to carry these reserves by NERC or WECC Standards.

[4] For the CAISO, which covers four PROMOD zones with significantly varying weather and load responses, the analysis was done by zone, rather than for the CAISO as a whole.

Graph 4 – Elements of the Building Block Planning Reserve Guideline



Graph 4 illustrates the WECC-wide average for the summer Building Block elements on top of a hypothetical BA's basic demand forecast (1-in-2 temperature demand). Note that the vertical scale is truncated to more readily show the size of each Building Block.

Table 4 – Summer Building Block Reserves by Subregion in MW and Seasonal Percent of Load

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Canada	2,124	2,188	2,347	2,514	2,442	2,502	2,548	2,669	2,789	12.4%
Northwest	4,396	4,436	4,488	4,544	4,566	4,609	4,646	4,707	4,767	17.9%
Basin	1,762	1,762	1,799	1,769	1,890	1,918	1,944	1,923	1,902	12.6%
Rockies	1,445	1,471	1,584	1,330	1,577	1,609	1,641	1,551	1,461	14.7%
Desert SW	3,753	3,804	4,006	4,048	4,058	4,153	4,246	4,333	4,524	13.5%
No. CA	3,706	3,562	3,558	3,738	3,936	3,997	4,055	4,038	4,021	14.7%
So. CA	4,708	4,773	4,874	5,160	5,036	5,104	5,171	5,369	5,568	15.1%
MX	251	263	293	304	304	318	332	356	379	11.9%
Total WECC	22,145	22,258	22,949	23,408	23,809	24,209	24,584	24,946	25,413	14.6%

Table 5– Winter Building Block Reserves by Subregion in MW and Seasonal Percent of Load

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Canada	3,073	3,156	3,277	3,384	3,482	3,558	3,617	3,669	3,716	14.0%
Northwest	5,918	5,973	6,023	6,073	6,127	6,183	6,235	6,293	6,355	19.9%
Basin	1,586	1,586	1,658	1,689	1,716	1,744	1,770	1,799	1,823	13.5%
Rockies	1,527	1,560	1,586	1,624	1,671	1,711	1,748	1,783	1,807	15.7%
Desert SW	2,321	2,351	2,398	2,440	2,519	2,572	2,626	2,674	2,719	14.0%
No. CA	2,071	2,157	2,207	2,243	2,191	2,227	2,262	2,372	2,435	11.9%
So. CA	2,509	2,555	2,612	2,657	2,688	2,735	2,784	2,831	2,902	11.0%
MX	157	165	173	181	189	198	207	217	226	10.7%
Total WECC	19,163	19,503	19,934	20,292	20,583	20,929	21,249	21,638	21,982	14.6%

Tables 4 and 5 show the reserves, in MW, and percent of load by subregion that were calculated using the Building Blocks. Note that this calculation produces a constant percentage margin above load over time that, due to the annual energy issue described on page 6, may not product linear Reserve Targets as in prior years.

It is important to note that the values for reserve margins used in the PSA are not the values used by individual LSEs or their regulators or local governing boards to evaluate their individual resource adequacy. Moreover, they are not intended to supplant any of those values. There is at least one subregion that is a competitive wholesale market for which there is no mandated reserve margin. A more complete description of this issue is given in Attachment 6.

WECC Resource Additions

The L&R data submittals included a list of planned generation additions, changes, and retirements. Table 6 is a summary of the WECC reported resource additions by class. The resource additions in Table 6, and all tables and graphs throughout this report, are net of additions and retirements.

Table 6 – Net Annual Planned Resource Additions by Class (Summer Capacity)

Class	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
1	5,158	3,870	1,840	(670)	0	0	0	0	0	10,198
2	6,424	6,952	3,221	2,522	555	246	0	0	0	19,920
1-2	11,582	10,822	5,061	1,852	555	246	0	0	0	30,118
3	2,275	3,103	4,424	6,981	560	289	165	530	(603)	17,724
1-3	13,857	13,925	9,485	8,833	1,115	535	165	530	(603)	47,842
4	1,775	4,968	3,067	4,054	2,418	2,113	4,371	1,188	2,030	25,984
Total	15,632	18,893	12,552	12,887	3,533	2,648	4,536	1,718	1,427	73,826

The majority of the projects reported in the 2011 L&R data request are Class 3 and Class 4 additions. The LRS believes these resources are less certain and therefore has reported Class 1, Class 2, and Class 3 resources separately. A detailed list of the identified generation projects is provided in Attachment 7.

One of the purposes of this PSA is to apply reasonably uniform criteria in making resource assessments across WECC and its various subregions, so that the industry can understand the need for additional resources. Nevertheless, caution needs to be exercised about the resources reported in Classes 3 and 4. For example, the new generation additions reported by the AESO and the California Independent System Operator (CAISO) were based on projects in their respective generator interconnection queues, which included all projects requesting interconnection to their grids. As is shown by the subregional resources additions tables in the “Summary of Assessment Results by Subregion”, a significant percentage of the projects in the CAISO are Class 3 resources, which by nature makes these projects more uncertain. The AESO reported the majority of these resources in the interconnection queue as Class 4. Consequently,

the treatment of Class 3 and exclusion of Class 4 category generation have a significant impact on the PSMs in the Canada and California subregions.

Finally, the existing L&R data request process systematically excludes resources that have very short lead-times for development, or that are not dependent on associated transmission development. Wind resources can be permitted and built within a year if they can be interconnected without requiring expanded transmission capacity. Such resources will not show up in the data obtained from BAs even though they might be very likely additions or be mandated by state RPS laws.

Summary of Assessment Results by Case

The results that are included in this report are a measure of the ability of the defined subregions to meet their load requirements with internal generation and imports from other subregions or zones under the specified conditions. The LRS approved a set of study cases to model the criteria, but recognized that the interpretation and methodology are limited by the modeling tool.

Case Descriptions

The common criteria used in all of the cases included: Existing Generation as of December 31, 2010, Class 1 Generation Additions, Scheduled Maintenance/Inoperable, Adverse Hydro, and Total Demand. The criteria that varied in the study cases are summarized in Table 7. Note that “additions” refers to both generation additions and retirements. The Class 4 resource additions, which are projects with relatively high timing and construction uncertainty, were excluded from all of the cases for this year’s assessment.

Table 7– Case Criteria Matrix

Criteria	#1	#2	#3	#4	#5	#6	#7
Generation							
Class 2 Additions (under active regulatory review, or have received regulatory approval and with a completion date prior to January 2018)	No	No	Yes	Yes	Yes	Yes	No
Class 3 Additions (Meet NERC criteria for Future, Planned Resources)	No	No	No	No	Yes	Yes	No
Peak Demands							
Peak Month	Jul	Dec	Jul	Dec	Jul	Dec	Jul
Reserve Requirement	Building Block	Building Block	Building Block	Building Block	Building Block	Building Block	15%
Temperature Event	No	No	No	No	No	No	No

Result Aggregation

The assessment results are aggregated into eight defined subregions (see Table 8) due to limitations of the modeling and to maintain the confidentiality of years 2 and 3 of load forecast data. The actual zonal topology is presented in the Bubble Diagrams on pages 59 (summer) and 60 (winter). The colors of the zones (described as "bubbles") in the diagrams also identify the grouping of the zones into the aggregate subregions.

Table 8 – Subregional Zones and Balancing Authorities

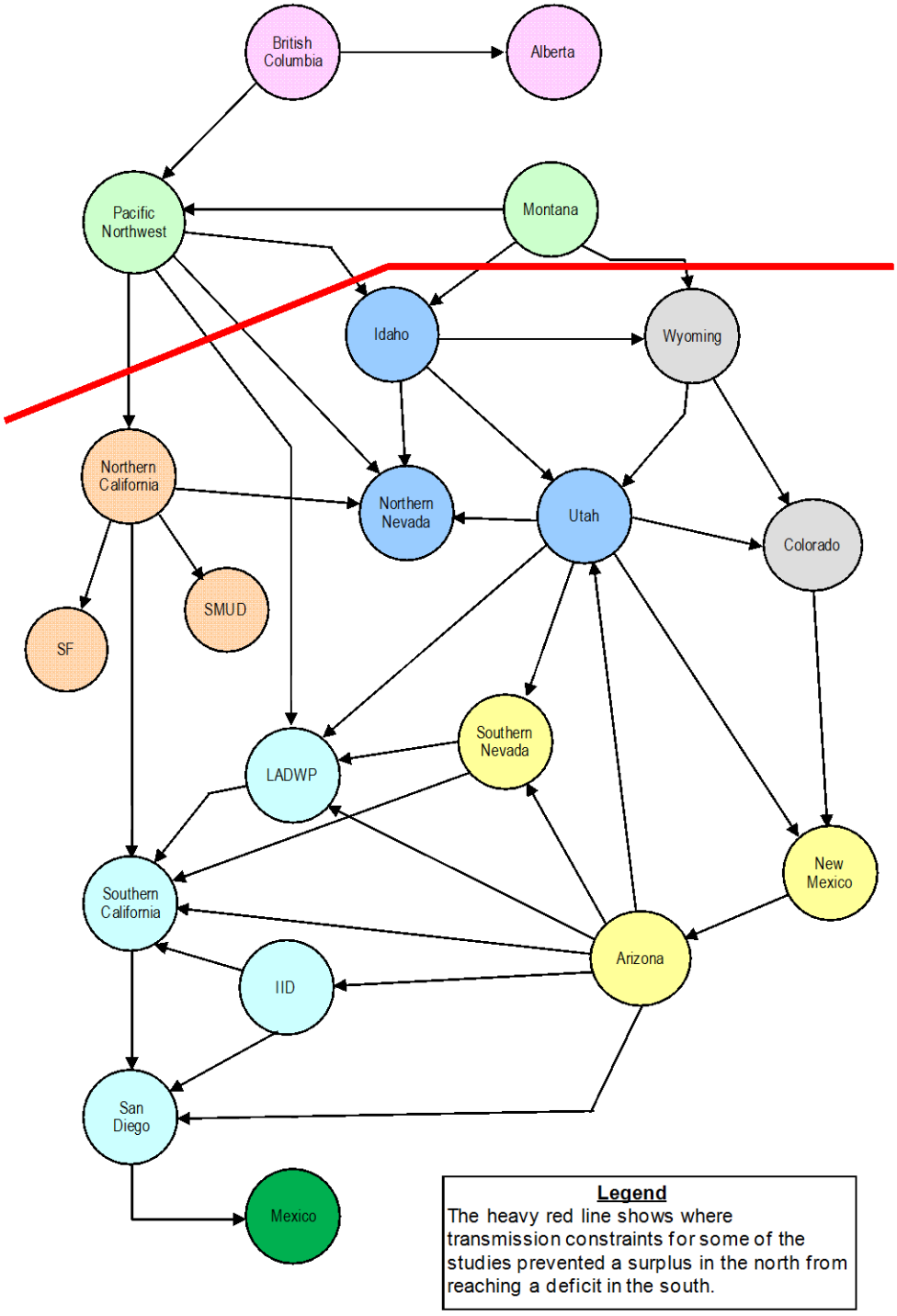
Sub-Region	Zones in Sub-Region	Balancing Authorities in Sub-Region
Canada	Alberta, British Columbia	Alberta Electric System Operator, British Columbia Transmission Corporation
Northwest	Montana, Pacific Northwest	Avista Corporation, Bonneville Power Administration - Transmission, Tacoma Power , NaturEner Glacier Wind Energy, Northwestern Energy, Pacificorp - West, Portland General Electric Company, PUD No. 1 of Chelan County, PUD No. 2 of Grant County, PUD No. 1 of Douglas County, Puget Sound Energy, Seattle Department of Lighting, Western Area Power Administration - Upper Great Plains West
Basin	Idaho, No. Nevada, Utah	Idaho Power Company, Pacificorp - East, Sierra Pacific Power Company
Rockies	Colorado, Wyoming	Public Service Company of Colorado, Western Area Power Administration - Colorado-Missouri Region
Desert Southwest	Arizona, New Mexico, So. Nevada	Arizona Public Service Company, Arlington Valley, El Paso Electric Company, Gila River Maricopa Arizona, Griffith Energy, Harquahala Generating Maricopa Arizona, Nevada Power Company, Public Service Company of New Mexico, Salt River Project, Tucson Electric Power Company, Western Area Power Administration - Lower Colorado Region
Northern California	Northern CA, Sacramento Municipal Utility District, San Francisco	California Independent System Operator, Balancing Authority of Northern California, Turlock Irrigation District
Southern California	Los Angeles Department of Water and Power, San Diego, Southern CA, Imperial Irrigation District	California Independent System Operator, Imperial Irrigation District, Los Angeles Department of Water and Power
Mexico	Comision Federal de Electricidad	Comision Federal de Electricidad

Result Summaries

Summaries of the results for each case are presented in this section of the report. Additional details are presented in Attachment 3.

A condition called the "North-South split" shows up in this year's and previous PSA analyses. This occurs when the transmission system between the Northwest/British Columbia/Montana (the North)[5] and the areas to the south (the South) is insufficient to allow all reported surpluses north of the constraint to meet loads south of the constraint in the economic dispatch performed in PROMOD. However, in many cases the split is more prominent between Northern and Southern California. The diagram below shows the location of the split in this year's analysis.

[5] Alberta does not contribute to the surplus.



Note: transmission may be constraining on exports from the North to the South in the summer cases following because the reported surplus in the Northwest is so large. In any case, it is unlikely that additional summer capacity transfers out of the Northwest, other than what is already calculated in the PROMOD, would be available under poor water conditions. This caveat needs to be taken into account in all the following summer cases.

Interpretation of Power Supply Margin (PSM) Tabulations

The PSM Tables display the excess capacity in each subregion for each year of the study. The subregion values are the sum of the PSM for the zones in each subregion. **If the PSM is zero or positive, then the combination of subregion resources and subregion imports is sufficient to meet or exceed the load requirements, including any reserves defined for the given case.**

A positive PSM implies that a subregion has excess generation capacity that is either not needed by other subregions, or that there are transmission constraints that prevent the excess capacity from being delivered to other subregions that are deficit.

A zero margin is an indication that a subregion is in load-resource balance or that there are transfers involved.

A negative PSM indicates that the combination of subregion resources and subregion imports were not sufficient to meet the load requirements. If the overall WECC margin is not deficit, one or more transmission constraints between the surplus subregion(s) and the deficit subregion(s) must exist. When the total WECC margin becomes negative, additional transmission capacity would not be able to resolve all subregional deficits.

A non-negative PSM for a subregion does not necessarily mean that the load requirements in all of the subregion's zones were satisfied. The subregion PSM is the sum of the zonal PSM, some of which could be negative.

In each of the following cases, two tables are presented that summarize the capacity situation of each subregion. The first matrix displays the PSM, in megawatts (MW). Again, it should be noted that results indicating deficits below target reserve levels are not forecasts of shortages. They indicate that the subregion's native generation and calculated imports were less than the PSM. The yellow highlighting shows the capacity needed to meet the PSM. The second matrix displays the margin status of the individual zones within the subregion and highlights that individual zones within a subregion may be below the PSM before the entire subregion. The first number in the 'year' columns shows the number of surplus zones and the second number shows the amount of zones within each subregion that are below the PSM.

Case #1 – Summer Modeling Building Block Reserve Guideline

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Excluded
Class 3 Additions	Excluded
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	July
Temperature Event	No
Transfer Capability	Restricted

This case models the Building Block Reserve Margin guideline formulated by the LRS, as outlined in the Building Block Reserve Margin section of this report. With the appropriate Building Block Guideline applied as a reserve margin requirement to each zone, the PSM (see table below) is greater than or equal to zero for all zones through 2013. Beginning in 2014, insufficient resource capacity and the effect of a transmission constraint on exports cause the Mexico subregion to become deficit by a very small margin.

Power Supply Margin (MW) by Subregion for Case #1

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	3,342	2,389	1,259	734	579	-100	-537	-1,871	-1,576
Northwest	3,719	4,115	4,319	2,784	2,168	1,224	1,043	909	627
Basin	834	688	664	574	533	443	-280	-330	-628
Rockies	2,554	2,289	1,374	1,398	1,351	1,417	648	504	350
Desert SW	3,670	3,090	3,918	2,764	1,638	498	841	326	73
No. CA	6,408	6,008	5,166	5,068	5,997	5,369	4,858	4,643	4,906
So. CA	2,620	2,397	709	165	-48	-1,087	-2,573	-3,833	-6,395
Mex	384	272	-25	-4	-44	-75	-10	-339	-861
Surplus	23,530	21,247	17,409	13,488	12,266	8,953	7,390	6,382	5,956
Deficit	0	0	-25	-4	-92	-1,263	-3,400	-6,372	-9,459

Count of Surplus and Deficit Zones in Case #1

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	2 : 0	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	0 : 2
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	2 : 1	2 : 1	2 : 1	2 : 1	1 : 2	2 : 1	1 : 2	2 : 1	1 : 2
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1	1 : 1	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	2 : 1	2 : 1	2 : 1	2 : 1
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	3 : 1	3 : 1	1 : 3	2 : 2	2 : 2	2 : 2
Mex	1 : 0	1 : 0	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

The Count table indicates that as early as 2012, one zone in the Northern California subregion and one zone in the Basin subregion are deficit. The Count table also

indicates that the Canadian subregion has a deficient zone even when the entire subregion is not deficit due to a west-to-east transmission constraint between British Columbia and Alberta.

The data and the model's solution method generally do not allow a precise determination of which particular zone or zones would actually be deficit. The issue of which zones are deficit, or even which subregions, is compounded by the absence of surplus capacity in the south and by unused transfer capability between the southern subregions.

Case #2 – Winter Modeling Building Block Reserve Guideline

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Excluded
Class 3 Additions	Excluded
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	December
Temperature Event	No
Transfer Capability	Restricted

Case #2 models the Building Block Reserve Margin guideline, but under winter conditions. With the applicable Building Block Guideline applied as a reserve margin requirement to each zone, the PSM is greater than or equal to zero for all zones, with the exception of Canada and Mexico. In 2014, a transmission constraint between British Columbia and Alberta trigger a deficit condition in Canada. The Mexico subregion indicates a deficit in 2020.

Power Supply Margin (MW) by Subregion for Case #2

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	1,932	1,029	-417	-439	-1,339	-1,880	-3,413	-3,259	-3,470
Northwest	4,001	3,225	3,710	3,304	2,349	2,072	2,850	2,539	2,600
Basin	2,945	3,326	2,653	3,468	2,357	1,605	1,696	1,475	2,002
Rockies	5,397	4,797	5,013	4,383	4,078	3,436	3,124	3,281	3,046
Desert SW	9,741	10,438	10,923	10,144	9,825	9,017	8,902	8,781	8,453
No. CA	10,327	9,811	10,824	10,470	9,443	9,705	9,263	7,800	6,465
So. CA	13,001	13,895	11,972	11,187	10,219	10,012	8,951	9,700	9,252
Mex	695	708	447	544	437	287	238	50	-238
Surplus	48,038	47,229	45,541	43,499	38,709	36,134	35,025	33,626	31,819
Deficit	0	0	-417	-439	-1,339	-1,880	-3,413	-3,259	-3,708

Count of Surplus and Deficit Zones in Case #2

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	0 : 2
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	3 : 0	3 : 0	3 : 0	3 : 0	2 : 1	2 : 1	2 : 1	1 : 2	3 : 0
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0
Mex	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	0 : 1

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

The Count table indicates that, until 2020, only one of the two zones in the Canada subregion became deficit. This is due to a transmission constraint that limits imports from the Northwest into British Columbia as well as a constraint between British Columbia and Alberta. Both Canadian zones have load requirements that exceed their generation capability and the PROMOD method allows British Columbia to have first rights to the imports to serve their increasing load. In addition, Alberta has a market-driven generation development process that relies on market and investor decisions to provide intermediate-to-long-term power supply plans. The Northern California subregion also indicated a deficit zone as early as 2012.

Case #3 – Summer Modeling Building Block with Class 2 Changes

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Included
Class 3 Additions	Excluded
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	July
Temperature Event	No
Transfer Capability	Restricted

Case #3 is the same as Case #1 but includes the Class 2 resource additions. The addition of the Class 2 resources eliminated the deficit in the Canada subregion and substantially improves the PSM for all subregions.

Power Supply Margin (MW) by Subregion for Case #3

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	4,636	4,104	2,402	1,715	3,776	3,093	2,623	1,233	470
Northwest	4,025	4,432	6,759	5,421	3,047	2,934	2,965	3,053	1,783
Basin	392	1,012	853	923	831	737	136	-371	-865
Rockies	2,667	2,427	2,271	2,582	2,549	2,514	1,818	1,404	897
Desert SW	5,907	6,233	6,402	5,572	3,946	3,097	3,102	2,254	1,197
No. CA	7,549	9,241	7,577	7,338	8,950	8,422	8,320	8,045	7,666
So. CA	3,505	4,071	3,753	2,473	2,674	1,716	-245	-693	-722
Mex	505	496	457	359	353	220	337	155	-4
Surplus	29,184	32,017	30,474	26,383	26,126	22,732	19,301	16,143	12,014
Deficit	0	0	0	0	0	0	-245	-1,064	-1,591

Count of Surplus and Deficit Zones in Case #3

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	2 : 1	3 : 0	3 : 0	2 : 1	2 : 1	3 : 0	1 : 2	1 : 2	1 : 2
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	2 : 1	3 : 0
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	4 : 0	3 : 1	3 : 1	3 : 1	3 : 1	2 : 2
Mex	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	0 : 1

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

The Basin, Northern California, Southern California, and Mexico subregions indicate deficit zones during the study period. In most cases these deficits appear to be due to transmission constraints as adjacent subregions indicate surplus capacity.

Case #4 – Winter Modeling Building Block with Class 2 Changes

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Included
Class 3 Additions	Excluded
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	December
Temperature Event	No
Transfer Capability	Restricted

Case #4 is the same as Case #2 but includes the Class 2 resource additions. The addition of Class 2 eliminates the deficit conditions in the Canada and Mexico subregions.

Power Supply Margin (MW) by Subregion for Case #4

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	3,521	3,032	2,856	2,685	2,552	2,658	1,743	1,462	764
Northwest	4,423	3,818	4,025	3,118	2,911	2,723	3,050	2,973	2,751
Basin	3,042	3,206	3,363	3,484	3,154	2,458	2,108	1,560	2,292
Rockies	4,786	4,711	5,540	4,758	3,902	3,859	3,907	3,844	3,529
Desert SW	10,907	12,481	13,094	12,285	11,323	9,917	9,300	9,822	9,677
No. CA	10,368	10,039	10,109	11,244	10,634	10,095	9,511	8,587	8,518
So. CA	13,805	15,164	13,226	14,104	12,648	12,732	11,983	12,272	11,814
Mex	1,232	1,496	1,098	1,195	676	523	496	317	29
Surplus	52,084	53,947	53,312	52,872	47,800	44,966	42,098	40,838	39,373
Deficit	0	0	0	0	0	0	0	0	0

Count of Surplus and Deficit zones in Case #4

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1	1 : 1
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0
Mex	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

Although the Power Supply Margin table does not indicate a deficit in the Canada or Northern California subregions the Count table shows that a zone within those subregions is deficit as early as 2012. This deficit appears to be caused by transmission constraints within the subregion that are preventing transfers from a zone with surplus capacity to a zone that is deficit. The addition of Class 2 resources affects the magnitude of the deficits or surpluses within the zones.

Case #5 – Summer Modeling Building Block with Class 2 and 3 Changes

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Included
Class 3 Additions	Included
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	July
Temperature Event	No
Transfer Capability	Restricted

Case #5 is the same as Case #1 but includes the Class 2-3 resource additions. The addition of the Class 3 resources has a substantial effect on all subregions as all subregions, with the exception of the Basin, have positive PSMs.

Power Supply Margin (MW) by Subregion for Case #5

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	4,666	4,164	2,912	3,069	3,736	4,053	3,583	2,693	961
Northwest	4,526	3,468	6,148	6,672	3,783	3,125	3,444	3,801	3,478
Basin	774	1,765	1,879	1,994	1,809	1,287	777	504	-163
Rockies	2,419	3,161	3,030	3,613	3,663	3,113	2,749	2,681	1,955
Desert SW	6,604	6,168	6,067	6,444	5,679	4,735	4,841	3,883	3,319
No. CA	7,902	9,999	9,180	9,441	10,621	10,400	9,661	9,605	8,853
So. CA	5,365	8,098	7,460	6,855	5,742	4,356	2,636	2,085	1,392
Mex	505	496	535	845	723	763	621	348	199
Surplus	32,760	37,320	37,211	38,933	35,756	31,831	28,311	25,600	20,156
Deficit	0	0	0	0	0	0	0	0	-163

Count of Surplus and Deficit Zones in Case #5

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	3 : 0	3 : 0	3 : 0	2 : 1	2 : 1	3 : 0	2 : 1	2 : 1	1 : 2
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	3 : 1
Mex	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

Although the Power Supply Margin table does not indicate a deficit in the Basin subregion until 2020, the Count table shows that a zone within that subregion is deficit as early as 2015. This deficit is caused by transmission constraints within the subregion that are preventing transfers from a zone with surplus capacity to a zone that is deficit. The same is true for the Canada, Northern California, and Southern California subregion. Although the Power Supply Margin table does not show either of these subregions as being deficit, the Count Table shows that at least one zone is deficit within each of those subregions.

Case #6 – Winter Modeling Building Block with Class 2 and 3 Changes

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Included
Class 3 Additions	Included
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	Building Block
Study Month	December
Temperature Event	No
Transfer Capability	Restricted

Case #6 is the same as Case #2 but includes the Class 2-3 resource additions. As would be expected, the addition of the Class 2-3 resources increases the PSM for all subregions.

Power Supply Margin (MW) by Subregion for Case #6

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	3,355	3,459	3,805	3,818	3,808	3,580	3,156	2,891	2,323
Northwest	4,486	3,641	4,321	3,722	3,333	3,046	3,010	2,988	2,765
Basin	2,936	3,333	3,346	3,440	3,251	2,699	2,966	2,150	2,998
Rockies	4,669	4,998	5,540	4,322	4,130	4,151	3,971	3,844	3,476
Desert SW	13,032	14,167	14,813	15,224	12,449	11,109	10,649	11,473	11,274
No. CA	10,732	10,640	10,521	11,965	11,418	11,210	10,456	9,887	9,891
So. CA	15,001	16,368	14,698	15,163	14,425	15,073	13,628	14,146	13,660
Mex	1,232	1,496	1,211	1,195	952	147	496	352	32
Surplus	55,444	58,101	58,254	58,847	53,765	51,016	48,332	47,731	46,420
Deficit	0	0	0	0	0	0	0	0	0

Count of Surplus and Deficit Zones in Case #6

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1	1 : 1
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0	4 : 0
Mex	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0	1 : 0

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

The Count table shows a zone within Canada remains deficit even after the Class 3 resources are added. Additionally, the Class 3 resource additions do not eliminate the resource deficit in the Northern California zone.

Case #7 – Summer Modeling with 15% Demand Escalation

Resource Parameters	
Existing Generation	Included
Class 1 Additions	Included
Class 2 Additions	Excluded
Class 3 Additions	Excluded
Outages and De-rates	
Adverse Hydro	Yes
Scheduled Maintenance	Yes

Demand/Load Parameters	
Firm Demand	Included
Non-firm Demand	Included
Reserve Margin	15%
Study Month	July
Temperature Event	No
Transfer Capability	Restricted

Case #7 models an assumed 15 percent planning reserve margin for each zone. It has no relationship to the Building Block calculation but was included to provide a partial

benchmark comparison to previous PSA results for this case. Some BAs in WECC use 15 percent as a planning margin and it is the default margin in the complex Resource Adequacy requirements for most of California. With the demand forecasts for each zone escalated by 15 percent, the Power Supply Margin is deficit for the Mexico subregion beginning in 2014. The Southern California is deficit beginning in 2016 and the Canada, Basin, and Desert Southwest subregions are deficit beginning in 2017, 2018, and 2019 respectively.

Power Supply Margin (MW) by Subregion for Case #7

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2,889	1,921	622	143	35	-658	-1,127	-1,486	-1,986
Northwest	4,407	4,835	3,966	2,942	2,933	1,996	1,844	1,051	1,506
Basin	716	396	317	237	193	78	-650	-1,197	-1,890
Rockies	2,538	2,297	1,398	1,462	1,407	1,397	609	467	315
Desert SW	3,285	2,749	3,516	2,304	1,217	29	380	-603	-418
No. CA	6,335	5,938	6,314	5,584	5,898	5,291	4,778	4,427	5,437
So. CA	2,422	2,275	662	189	-101	-1,040	-2,525	-3,483	-6,343
Mex	324	203	-103	-90	-138	-160	-98	-283	-961
Surplus	22,917	20,613	16,796	12,860	11,684	8,790	7,610	5,944	7,258
Deficit	0	0	-103	-90	-240	-1,857	-4,400	-7,052	-11,598

Count of Surplus and Deficit zones in Case #7

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2 : 0	2 : 0	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	1 : 1	0 : 2
Northwest	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0
Basin	2 : 1	1 : 2	1 : 2	1 : 2	1 : 2	1 : 2	1 : 2	2 : 1	0 : 3
Rockies	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	2 : 0	1 : 1	1 : 1	2 : 0
Desert SW	3 : 0	3 : 0	3 : 0	3 : 0	3 : 0	2 : 1	2 : 1	2 : 1	2 : 1
No. CA	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1	2 : 1
So. CA	4 : 0	4 : 0	4 : 0	3 : 1	2 : 2	1 : 3	2 : 2	2 : 2	2 : 2
Mex	1 : 0	1 : 0	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1	0 : 1

Note: Surplus is capacity greater than the PSM, deficit is a reduction of the PSM.

The Count table indicates that all subregions, with the exception of the Northwest, have deficient zones even when the entire subregion is not deficit.

Comparison of Summer 15% Margin Case to 2010 PSA Results

The following section compares the results of the 15 percent margin case study from the 2010 PSA with the equivalent case study from the 2011 PSA. The 15 percent case study allows for a year-on-year comparison because the classes of resources and the flat 15 percent margin adder are the same in both studies (except that Class 1 includes one additional year of resources in the 2011 study compared to the 2010 study).

2010 PSA 15 percent Reserve Results

Sub-region	2011	2012	2013	2014	2015	2016	2017	2018	2019
Canada	4,487	4,104	4,040	1,444	834	1,018	492	30	0
Northwest	3,725	2,421	3,606	3,013	2,512	3,030	2,251	1,916	925
Basin	739	523	689	854	805	293	9	-1,096	-1,503
Rockies	2,375	2,769	2,220	1,472	1,084	1,233	955	839	912
Desert SW	2,645	2,401	2,200	1,646	1,230	348	353	351	248
No. CA	5,142	3,881	4,718	4,060	3,334	1,335	640	305	0
So. CA	4,142	2,754	2,433	1,549	693	324	-80	-514	-2,539
Mex	288	239	105	69	30	-7	-552	-686	-779
Surplus	23,542	19,092	20,011	14,107	10,521	7,579	4,700	3,441	2,084
Deficit	0	0	0	0	0	-7	-632	-2,296	-4,821

2011 PSA 15 percent Reserve Results

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	2,889	1,921	622	143	35	-658	-1,127	-1,486	-1,986
Northwest	4,407	4,835	3,966	2,942	2,933	1,996	1,844	1,051	1,506
Basin	716	396	317	237	193	78	-650	-1,197	-1,890
Rockies	2,538	2,297	1,398	1,462	1,407	1,397	609	467	315
Desert SW	3,285	2,749	3,516	2,304	1,217	29	380	-603	-418
No. CA	6,335	5,938	6,314	5,584	5,898	5,291	4,778	4,427	5,437
So. CA	2,422	2,275	662	189	-101	-1,040	-2,525	-3,483	-6,343
Mex	324	203	-103	-90	-138	-160	-98	-283	-961
Surplus	22,917	20,613	16,796	12,860	11,684	8,790	7,610	5,944	7,258
Deficit	0	0	-103	-90	-240	-1,857	-4,400	-7,052	-11,598

As the above charts indicate, the magnitude and the timing of the surpluses and deficits changed from the 2010 study to the 2011 study. This change appears to be related to transmission constraints between Northern and Southern California, and between British Columbia and Alberta. Resources are transferred from the Northwest to Northern California; however, transmission constraints between Northern and Southern California prevent the flow to the south. The same condition exists between British Columbia and Alberta where the Northwest can send resources to British Columbia but a transmission constraint prevents the flow to Alberta.

Temperature Events – Cases #8 and #9

The impacts of severe summer and winter temperature events were examined in Cases 8-9. In prior years, the temperature events examined the impact of unexpectedly high or low temperatures in a single future year against the reserve margin that would minimally be maintained in actual operating circumstances for contingency and regulating reserves. This year's PSA examined temperature events for the impacts on available capacity if the Western Interconnection experienced a 1-in-20 year temperature demand that occurred across the entire Interconnection, and examined each year in the study period. The following process was used to create the extreme temperature case.

The WECC BAs were asked to report their load sensitivity to temperature (MW per degree Fahrenheit) for both summer and winter, the temperatures upon which their

reported 1-in-2 demand forecasts were based and their temperature extremes. Historical temperature data for Western load centers was developed for the period 1990 to 2004 by a consultant at Lawrence Berkeley National Laboratory. Historic temperature data for the period of 2005-2010 was requested in the WECC data request. A statistical process was used to convert the 1-in-2 year weather demand supplied in the 2010 LRS Data Request to a 1-in-20 year weather demand condition. This process is described in detail in the Building Block Guideline for Reserve Margin section beginning on page 12.

Table 9 – Temperature Sensitivity Description

Temperature Sensitivities: Modified Building Blocks			
Case	**Season**	**New Resources**	**Temperature Definition**
8	Summer	Class 1	1-in-20 temperature adjustment
9	Winter	Class 1	1-in-20 temperature adjustment

Power Supply Margin (MW) by Subregion for Case #8

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	3,246	2,290	1,153	620	469	286	-653	-1,988	-1,902
Northwest	3,510	3,904	4,106	2,568	1,952	506	823	686	601
Basin	736	588	565	476	428	337	-388	-440	-733
Rockies	2,479	2,212	1,292	1,329	1,269	1,334	563	418	274
Desert SW	3,370	2,787	3,598	2,441	1,314	167	502	-20	-288
No. CA	5,806	5,429	4,588	4,461	5,357	4,720	4,199	4,015	4,253
So. CA	1,684	1,448	-260	-861	-1,049	-2,102	-3,601	-4,573	-7,502
MX	312	190	-117	-105	-153	-175	-114	-300	-980
Surplus	21,142	18,847	15,301	11,895	10,788	7,349	6,087	5,119	5,128
Deficit	0	0	-378	-966	-1,202	-2,277	-4,755	-7,321	-11,405

Power Supply Margin (MW) by Subregion for Case #9

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	1,705	795	-660	-690	-1,597	-2,144	-3,681	-3,531	-3,745
Northwest	3,476	2,695	3,176	2,765	1,805	1,524	2,297	1,981	2,037
Basin	2,848	3,228	2,552	3,365	2,253	1,499	1,589	1,366	1,891
Rockies	5,326	4,725	4,940	4,308	4,001	3,357	3,044	3,199	2,963
Desert SW	9,562	10,257	10,737	9,955	9,630	8,818	8,698	8,573	8,242
No. CA	10,233	9,712	10,723	10,368	9,344	9,604	9,160	7,692	6,354
So. CA	12,925	13,818	11,894	11,107	10,138	9,930	8,868	9,615	9,166
MX	695	708	447	544	437	287	238	50	-238
Surplus	46,770	45,939	44,470	42,412	37,609	35,018	33,894	32,476	30,652
Deficit	0	0	-660	-690	-1,597	-2,144	-3,681	-3,531	-3,983

The above charts show that a wide spread increase in demand does not vary the PSM among subregions. Subregions that are deficit in Case #1 increase the deficit under the extreme weather case. The reasons behind this are simple. Increase in demand limits the amount of capacity available for export as local demand is served, and areas that do

have surplus are already exporting as much capacity as transmission will allow. Therefore, if all subregions are experiencing similar increases in demand, resources are not available for export.

This appears to be the case for the 1-in-20 case studies. The subregions that are deficit are importing where possible. However, the combination of increased demand from other subregions and constraints on the transmission system limit the imports that deficit subregions can use.

Phase-Out of Once-Through Cooling in California

California's State Water Resources Control Board (SWRCB) adopted a Once-Through Cooling (OTC) policy on May 4, 2010, implementing Section 316(b) of the federal Clean Water Act that would substantially limit the impacts of power plant cooling water intakes on marine and estuarine environments. The policy completed all procedural reviews and became effective October 1, 2010. Since then, two efforts to modify the policy by the Los Angeles Department of Water & Power (LADWP) have resulted in a substantial change in the compliance dates for that utility's OTC capacity. Some units were accelerated by a few years and some were delayed for a decade or more.

The adopted OTC mitigation policy establishes closed cycle wet cooling towers as the benchmark for compliance in most instances. Generator owners have three basic options: 1) retire the unit, 2) replace the OTC intake structure with dry or evaporative cooling towers, or 3) refit the plant's OTC intake structure to reduce environmental impacts by roughly 90 percent. Nuclear power plants are potentially able to satisfy a lesser requirement if a new study provides cost estimates that are higher than anticipated by SWRCB staff in developing the draft policy. At the time that the SWRCB proposed the OTC policy, 19 plants with approximately 19,000 MW of capacity were subject to the policy,[6] which is roughly one-third of the installed capacity in California.[7]

The fossil capacity subject to this policy is mostly owned by merchant generating companies, although the LADWP has roughly 2,000 MW also affected. All affected power plant owners were required by the policy to submit implementation plans by April 1, 2011. These plans were submitted and are in review. They show about two-thirds of units to be retired and most of this capacity repowered on site, and about one-third trying to refit existing OTC intake structures to sufficiently reduce environmental impacts to satisfy the requirements. One plant proposed to retire an existing steam boiler with evaporative cooling towers and shift these towers to two other steam boilers thus eliminating their use of OTC. While all generators submitted the required implementation plans, virtually all of the merchant generators indicated that they would

[6] SWRCB, Final Substitute Environmental Document, http://www.waterboards.ca.gov/water_issues/programs/npdes/docs/cwa316may2010/sed_final.pdf, p. 15.

[7] Since then three facilities have been closed – Humboldt and Portreo in Northern California, and South Bay in San Diego.

only make the capital investment required if they obtained a long-term power purchase agreement from a utility or other Load-Serving Entity. No generating company seemed willing to risk recovery of the needed investment simply as a merchant generator.

As a result of extensive consultation between the principal energy agencies in California (the California Energy Commission (CEC), California Public Utilities Commission (CPUC), and CAISO) and the SWRCB the dates chosen by SWRCB for compliance are considered to be aggressive, but realistic. The core of the joint proposal of the energy agencies, now embodied in the adopted OTC policy, is built around the concept of allowing OTC facilities to continue in operation until replacement capacity is operational.[8] A paper prepared by staff representatives of the three sponsoring agencies provides the proposal along with background discussion to understand the reasoning behind the proposal.[9] The SWRCB's adopted policy calls for this schedule to be annually updated as a result of further study and analysis by the energy agencies. The update is underway, with a target of March 31, 2012 to provide updated information to SWRCB.

In Northern California and San Diego, the replacement infrastructure needed to retire existing OTC capacity is relatively clear as the result of previous studies and announced power plant proposals. Some retirements have already taken place as was already expected at the time the policy was adopted. Humboldt was retired and replaced. Portrero was retired without replacement. South Bay units were retired without replacement. In the Los Angeles basin, the opposite is true. Not only is there less announced capacity from new projects compared to that of existing OTC facilities, the ability to actually construct announced facilities is highly clouded by scarcity of criteria pollutant offsets — especially PM10.[10] Further, the South Coast Air Quality Management District adopted a new PM2.5 rule in June 2011 that may make repowering the largest facilities with numerous units in a single site (Haynes and Alamitos) even more complex. A few new power plants long under development have broken ground once air quality permitting issues were resolved. The El Segundo repower of Units 1-2 was licensed only by also retiring Unit 3. Walnut Creek was licensed because Edison Mission Energy bought and will retire Huntington Beach 3-4 before Walnut Creek starts the testing process, expected in 2013. The path for others is much more uncertain.

An additional element is the interaction of this replacement of a major portion of California's power plants with renewable generation, which is desired by California's

[8] The SWRCB's proposed policy, supporting documents, background materials, and comments on previous proposals are available at http://www.waterboards.ca.gov/water_issues/programs/npdes/cwa316.shtml#otc

[9] http://www.energy.ca.gov/2009publications/CEC-200-2009-013/CEC-200-2009-013-SD.PDF

[10] PM10 addresses particulate matter (particles) of 10 micrometers or less and PM2.5 addresses particles less than 2.5 micrometers in aerodynamic diameter.

policy makers to achieve green house gas emission reductions to conform with state law. By eliminating the OTC units a significant portion of the ancillary service capable units (especially regulation and ramping) in the CAISO will be eliminated as well. Whatever the mixture of new generation and transmission replacing the OTC units looks like, it must be able to provide the increasing need for ancillary services that the integration of large amounts of renewable resources will require. This is an issue that will need to be followed more closely in future PSAs, when the outcomes of the various decisions are clearer.

Because California is a net importer of power during the summer load peaks, the bulk of the impact will be felt in California, largely in the CAISO and LADWP BA areas. Depending on the outcomes, including replacement generation and transmission development, there may be some operating issues raised for transmission operators outside of California that will need to be addressed.

The Northwest, which can under some circumstances rely on imports from California and the Southwest in the winter, may be impacted as well. A large amount of capacity capable of generating energy surplus to California's winter energy needs will not be replaced in a way that allows for contingent energy generation.

A special analysis of the OTC issue was conducted for this PSA. CEC staff provided a retirement schedule based on the SWRCB OTC policy compliance dates, but modified to reflect additional information where available. Some units were retired on dates associated with replacement projects already in the approval pipeline, although no additional replacement generation or transmission upgrades were assumed to occur other than those normally provided as part of Class 1-4 resource additions. For example, Huntington Beach units 3-4 are retired in 2013 even though they are not required to comply until 2020. The retirement schedule developed through this process is reported on an annual basis for Northern California and Southern California in Table 10.

Table 10 – Retirement Schedule Based Once-Through Cooling Compliance

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
No CA	0	674	0	650	0	3,159	0	0	0	4,483
So CA	0	1,322	0	785	0	946	0	0	5,751	8,804

The results of the analysis are shown in Tables 11-13 below. Table 11 reports results for summer peak conditions when only Class 1 resource additions are included, which is comparable to Case #1. When comparing the results of this analysis to Case #1, about 13,300 MW of capacity are retired by 2020 and the Northern California region shows a small surplus rather than easily satisfying reserve requirements as shown in Case #1. Southern California's deficit increases in 2020 from 1,700 MW in Case #1 to 15,199 MW.

The pattern of deficits in Southern California reflects the previous discussion. Various power plants are assumed to retire and, absent a firm replacement, the capacity margin shifts from positive to negative and grows progressively more negative. A large amount of retirements take place in 2020 without replacement. The deficit more than doubles from 2019 to 2020.

Table 11 – Summer – Building Block Reserves with Once Through Cooling Units Removed Class 1

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	3,342	2,389	1,259	734	579	-100	-537	-1,871	-1,576
Northwest	3,719	4,115	4,319	2,784	2,168	1,224	1,043	909	627
Basin	834	688	664	574	533	443	-280	-330	-628
Rockies	2,554	2,289	1,374	1,398	1,351	1,417	648	504	350
Desert SW	3,670	3,090	2,918	1,964	1,638	498	841	326	73
No. CA	6,408	5,334	4,492	3,744	4,673	886	375	160	423
So. CA	2,620	1,075	387	-1,142	-2,155	-4,140	-5,626	-6,586	-15,199
MX	384	272	-25	-4	-44	-75	-10	-639	-861
Surplus	23,530	19,251	15,413	11,199	10,942	4,470	2,907	1,899	1,473
Deficit	0	0	-25	-1,146	-2,199	-4,316	-6,453	-9,425	-18,263

Table 12 reports results for summer peak using both Class 1-2 additions making it comparable to Case #3. In this OTC sensitivity assessment, Basin has a modest deficit beginning in 2019 and a Southern California deficit rapidly increases as large amounts of retirement occur. Northern California maintains a surplus throughout as it has substantial resource additions in the pipeline that exceed its more limited retirements. By including the additional resources of class 2, the results shown in Table 12 are not as extreme as those shown in Table 11. In addition, there are numerous years when aggregate WECC surpluses exceed the deficits, indicating that transmission limitations are preventing available generating resources from satisfying load.

Table 12 – Summer – Building Block Reserves with Once Through Cooling Units Removed Class 1–2

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	4,636	4,104	2,402	1,715	3,776	3,093	2,623	1,233	470
Northwest	4,025	4,432	6,759	5,421	3,047	2,934	2,965	3,053	1,783
Basin	392	1,012	853	923	831	737	136	-371	-865
Rockies	2,667	2,427	2,271	2,582	2,549	2,514	1,818	1,404	897
Desert SW	5,907	6,233	6,402	5,572	3,946	2,097	2,102	2,254	197
No. CA	7,549	8,567	6,903	6,014	7,626	3,939	3,837	3,562	3,183
So. CA	3,505	2,749	2,431	366	567	-337	-2,298	-3,746	-8,526
MX	505	496	457	359	353	220	337	155	-4
Surplus	29,184	30,021	28,478	22,952	22,695	15,533	13,818	11,660	6,531
Deficit	0	0	0	0	0	-337	-2,298	-4,117	-9,395

Table 13 reports results for summer peak that are comparable to Case #5 by including additions from classes 1-3. The same three regions affected by OTC retirements looking at just Class 1 or Classes 1 and 2 resource additions are affected here.

However, at the end of the assessment time horizon, the very large surpluses in each of the three regions in Case #5 are switched to large deficits for Southern California and a very small deficit for Basin. No changes occur for the other regions.

Table 13 – Summer – Building Block Reserves with Once Through Cooling Units Removed Class 1–3

Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Canada	4,666	4,164	2,912	3,069	3,736	4,053	3,583	2,693	961
Northwest	4,526	3,468	6,148	6,672	3,783	3,125	3,444	3,801	3,478
Basin	774	1,765	1,879	1,994	1,809	1,287	777	504	-163
Rockies	2,419	3,161	3,030	3,613	3,663	3,113	2,749	2,681	1,955
Desert SW	6,604	6,168	6,067	6,444	5,679	4,735	3,941	3,883	2,419
No. CA	7,902	9,325	8,506	8,117	9,297	5,917	5,178	5,122	4,370
So. CA	5,365	6,776	6,138	4,748	3,635	1,303	483	-968	-6,512
MX	505	496	535	845	723	763	621	348	199
Surplus	32,760	35,324	35,215	35,502	32,325	24,295	20,775	19,032	13,381
Deficit	0	0	0	0	0	0	0	-968	-6,675

Clearly none of these three results is the intended outcome that California's energy agencies actually expect to occur. The analysis with just Class 1 resource additions omits needed resources; therefore, supply/demand balances worsen in a pattern that might suggest immediate action is required. While the analysis with both Class 1 and 2 resource additions is a considerable improvement, it too shows a worsening of supply/demand balances through time and deficits at the end of the analysis period. The analysis that includes all Class 1-3 resource additions creates a permanent surplus in most regions that policy makers could not sustain due to the excessive cost of resources identified, and a large deficit in Southern California. Finally, the impacts that uncompensated retirements have on the surpluses or deficits of the other regions illustrates once again that the system is interconnected.

The final policy adopted by the SWRCB posits a highly planned set of resource additions (either generation or transmission) that are closely timed with the retirement of OTC facilities precisely to avoid local and system reliability problems. However, only a few of the matched resource additions that allow existing OTC plants to retire can be identified precisely today. As noted earlier, those replacements that can be specifically identified and that are already moving through the development and approval process are already included in Class 1 resource additions. Other replacement infrastructure, mostly generation but in a few instances transmission, will be identified through further iterations of California's electricity planning/procurement processes.

The nature of the analysis undertaken using PROMOD does not fully address the potential reliability concerns of large amounts of OTC capacity retirement. PROMOD is not configured to assess local capacity areas; this must be done through other analyses. Even at the level of the specific zones for which PROMOD is configured to, for this PSA assessment there are smaller local capacity areas that could have deficits

even if the overall zone were to show a surplus. Similarly, the system stability issues that the Southern California Import Transmission operating procedure attempts to avoid need to be examined in this long-term planning horizon. Sufficient Southern California capacity must be on-line to avoid reliability problems and to ensure that the appropriate type of capacity is built so that it can operate like the OTC units do once the operating time horizon is reached.

Finally, the adverse supply/demand balances reported here do not incorporate the impacts of additional development of demand-side policies that California policy makers are counting upon. These include:

- energy efficiency savings from expanded programs through time, increased demand-response capability;
- distributed generation located mostly on the distribution system; and
- combined heat and power projects that both reduce load and export surpluses to the grid.

None of these have been modeled in this assessment for the PSA. If they could be assessed using the techniques that WECC staff has available, then the deficits shown in Tables 11-13 would not be as extreme.

Summary of Assessment Results by Subregion

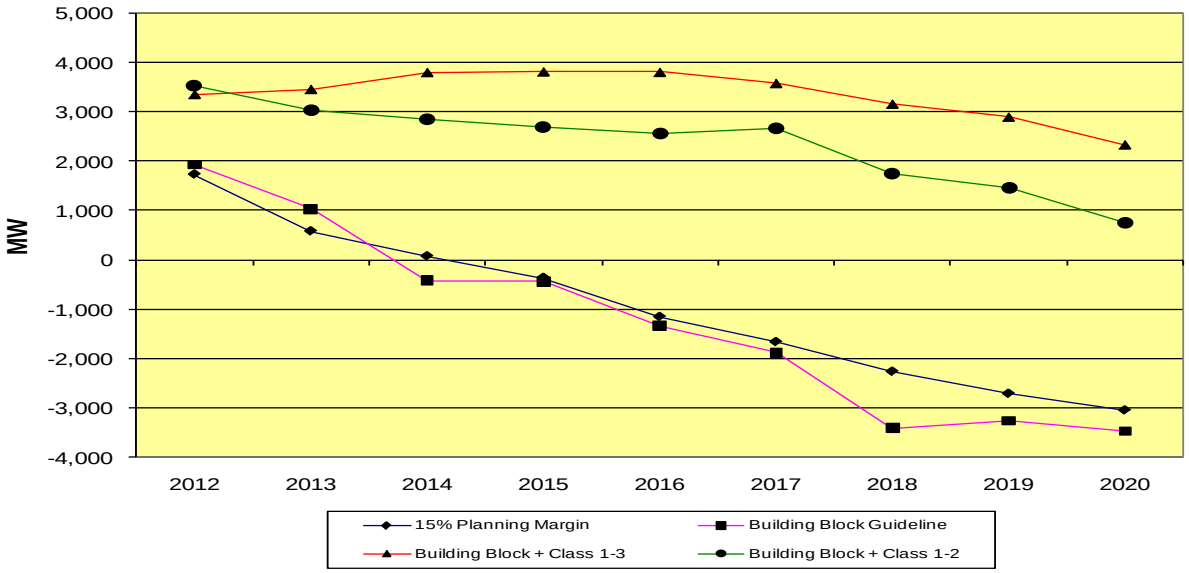
The following section of the PSA presents subregional specific graphs and charts. Each graph presents the subregion's PSM through 2020 using four different sets of assumptions. A description of each case is summarized below. Following each graph are four charts. The first lists the Planned Resources identified by Class. The next three charts list the Planned Resources identified by Type, and broken into Class 1-2, Class 1-3, and All Classes. The information represents the winter rating for the Canada and the Northwest subregions, and the summer rating for the Basin, the Rockies, the Desert Southwest, Northern California, Southern California, and Mexico subregions. The winter (Canada and Northwest) and summer (Basin, Rockies, Desert Southwest, Northern California, Southern California, and Mexico) charts show the reported capacities that are planned to be added during the calendar years for each subregion. This information is presented to highlight the importance of adding additional resources above and beyond those resources reported in Class 1-2.

To the extent that the subregions are successful in adding Class 3 and 4 resources and/or transmission, the PSM pictures improve as described in the narrative for each subregion.

Canada

Subregion	Zones in Subregion
Canada	Alberta, British Columbia

Graph 5 – Comparison of Canada Subregion Power Supply Margin – Winter



The results for the winter case show that the Canada subregion has sufficient resources to cover the PSM through 2014. By 2015, the Building Block Guideline case and the 15 percent Planning Margin are both deficit.

As depicted in the table, the addition of the Class 2 resources will greatly benefit the Canada subregion. This highlights the need for some of the generation projects to move through the development phases to construction and operation.

Canada Planned Resources (Winter Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Canada	1	61	(23)	0	4	0	0	0	0	0	42
	2	2,305	1,007	425	2,750	0	0	0	0	0	6,487
Total	1-2	2,366	984	425	2,754	0	0	0	0	0	6,529
	3	17	0	0	0	0	0	0	0	0	17
Total	1-3	2,383	984	425	2,754	0	0	0	0	0	6,546
	4	154	2,999	1,559	544	55	75	1,268	9	903	7,566
Total	1-4	2,537	3,983	1,984	3,298	55	75	1,268	9	903	14,112

Canada Planned Resources (Winter Rating) Identified by Type (Class 1 - 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Canada	Wind	1,410	568	425	750	0	0	0	0	0	3,153
Canada	Hydro	45	51	0	4	0	0	0	0	0	100
Canada	Thermal	853	365	0	2,000	0	0	0	0	0	3,218
Canada	Solar	0	0	0	0	0	0	0	0	0	0
Canada	Other	58	0	0	0	0	0	0	0	0	58
	Total	2,366	984	425	2,754	0	0	0	0	0	6,529

Canada Planned Resources (Winter Rating) Identified by Type (Class 1 - 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Canada	Wind	1,410	568	425	750	0	0	0	0	0	3,153
Canada	Hydro	62	51	0	4	0	0	0	0	0	117
Canada	Thermal	853	365	0	2,000	0	0	0	0	0	3,218
Canada	Solar	0	0	0	0	0	0	0	0	0	0
Canada	Other	58	0	0	0	0	0	0	0	0	58
	Total	2,383	984	425	2,754	0	0	0	0	0	6,546

Canada Planned Resources (Winter Rating) Identified by Type (All Classes) (as of Dec. 31)

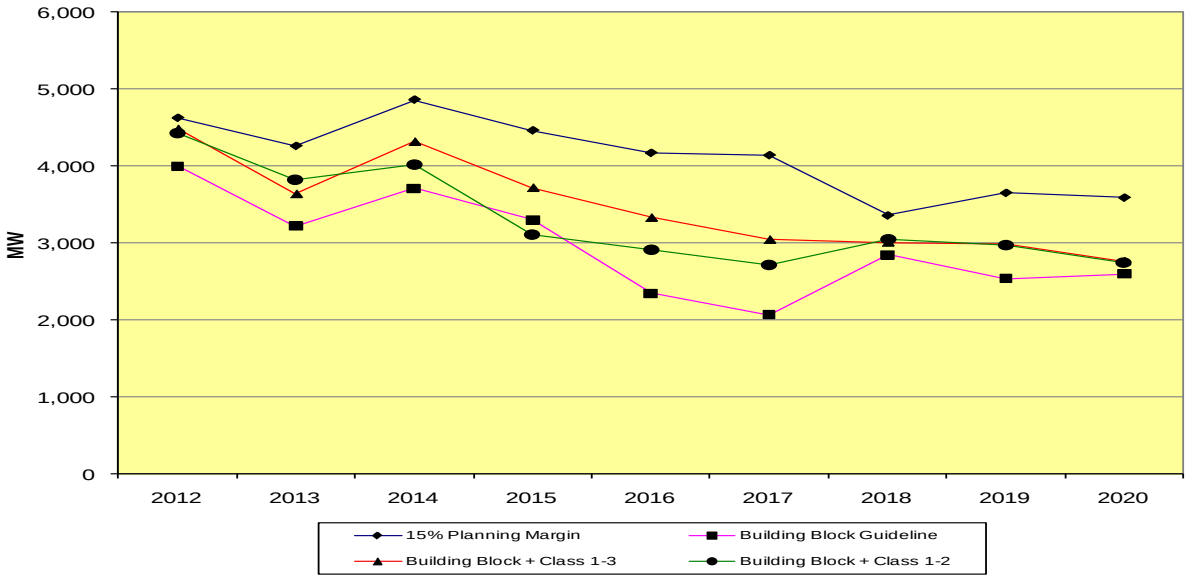
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Canada	Wind	1,510	3,281	1,205	775	0	22	18	9	3	6,822
Canada	Hydro	62	151	592	472	17	53	1,250	0	900	3,497
Canada	Thermal	892	529	85	2,000	0	0	0	0	0	3,506
Canada	Solar	0	0	0	0	0	0	0	0	0	0
Canada	Other	73	21	103	51	38	0	0	0	0	286
	Total	2,537	3,983	1,984	3,298	55	75	1,268	9	903	14,112

The data presented in the above charts are the reported winter ratings for projects planned to be added during the calendar years.

Northwest

Subregion	Zones in Subregion
Northwest	Montana, Pacific Northwest

Graph 6 – Comparison of Northwest Subregion Power Supply Margin – Winter



The consistent capacity surplus may not be sustainable over prolonged cold spell or heat wave events. Even with the analytical improvements provided by PROMOD (described on page 5), this peak hour capacity assessment may not fully address the complicated energy limitations that apply to the Northwest hydro system. In addition, while the PSA uses December for the peak period, January is more likely to be the peak in the Northwest.

The capacity surpluses shown in the above graph are for the Northwest power system, which includes all of the existing hydro generation capacity. Similar to the potential loss of existing resource in California, as described under the above section on Phase-out of Once-Through Cooling in California, fishery issues in the Northwest may result in the removal of existing hydroelectric plants.

The Federal Columbia River Power System could possibly be reduced by over 3,000 MW if the Lower Snake River dams (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite) were removed. The biological opinion (BiOp) Adaptive Management Implementation plan requires dam breaching studies as a contingency of last resort to address the possibility of a significant decline in the abundance of listed fish and biological triggers that result in contingency actions, despite the benefits these dams provide in terms of greenhouse gases, wind integration, and power system reliability.

However, any action that would change the federally-approved purposes of these resources would require Congressional approval.

Fishery issues may also result in the removal of PacifiCorp's Klamath River Project hydroelectric facilities, which contribute almost 170 MW of hydro capacity to the Western Interconnection. PacifiCorp has signed an agreement in principle that could result in the removal of the Klamath mainstream dams as early as 2020. However, final settlement is not yet complete.

Northwest Planned Resources (Winter Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
Northwest	1	897	14	0	0	0	0	0	0	0	911
	2	1,071	1,173	600	0	0	0	0	0	0	2,844
Total	1-2	1,968	1,187	600	0	0	0	0	0	0	3,755
	3	36	152	694	2	0	300	208	400	(179)	1,613
Total	1-3	2,004	1,339	1,294	2	0	300	208	400	(179)	5,368
	4	0	0	0	350	650	550	1,100	200	0	2,850
Total	1-4	2,004	1,339	1,294	352	650	850	1,308	600	(179)	8,218

Northwest Planned Resources (Winter Rating) Identified by Type (Class 1 - 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Northwest	Wind	1,806	1,019	600	0	0	0	0	0	0	3,425
Northwest	Hydro	77	100	0	0	0	0	0	0	0	176
Northwest	Thermal	0	4	0	0	0	0	0	0	0	4
Northwest	Solar	65	0	0	0	0	0	0	0	0	65
Northwest	Other	20	65	0	0	0	0	0	0	0	85
	Total	1,968	1,187	600	0	0	0	0	0	0	3,755

Northwest Planned Resources (Winter Rating) Identified by Type (Class 1 - 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Northwest	Wind	1,806	1,169	1,292	0	0	300	200	400	0	5,167
Northwest	Hydro	76	100	0	0	0	0	0	0	(179)	(3)
Northwest	Thermal	0	4	0	0	0	0	8	0	0	12
Northwest	Solar	67	2	2	2	0	0	0	0	0	72
Northwest	Other	55	65	0	0	0	0	0	0	0	120
	Total	2,004	1,339	1,294	2	0	300	208	400	(179)	5,368

Northwest Planned Resources (Winter Rating) Identified by Type (All Classes) (as of Dec. 31)

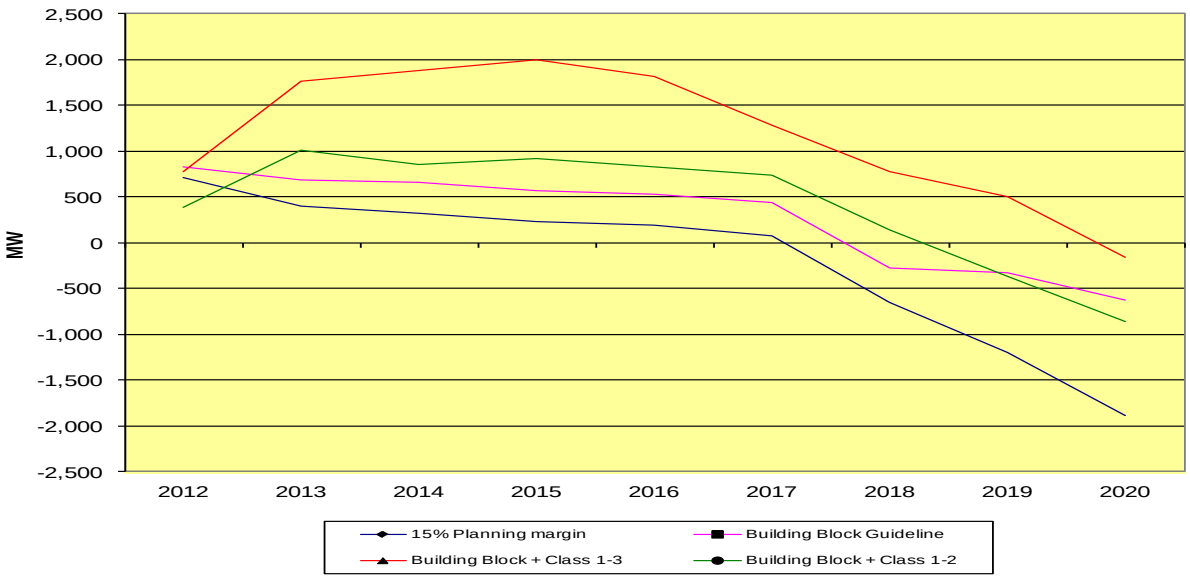
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Northwest	Wind	1,806	1,169	1,292	350	650	850	1,300	600	0	8,017
Northwest	Hydro	76	100	0	0	0	0	0	0	(179)	(3)
Northwest	Thermal	0	4	0	0	0	0	8	0	0	12
Northwest	Solar	67	2	2	2	0	0	0	0	0	72
Northwest	Other	55	65	0	0	0	0	0	0	0	120
	Total	2,004	1,339	1,294	352	650	850	1,308	600	(179)	8,218

The data presented in the above charts are the reported winter ratings for projects planned to be added during the calendar years.

Basin

Subregion	Zones in Subregion
Basin	Idaho, No. Nevada, Utah

Graph 7 – Comparison of Basin Subregion Power Supply Margin – Summer



The load requirements for the Basin subregion are met through 2017 for all cases studied. However, to avoid potential shortages beyond 2018 the additions of Class 2 and Class 3 resources are needed.

Basin Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
Basin	1	(28)	(32)	0	(83)	0	0	0	0	0	(143)
	2	310	0	0	(1)	0	0	0	0	0	309
Total	1-2	282	(32)	0	(84)	0	0	0	0	0	166
	3	882	32	190	18	0	(11)	(123)	0	0	988
Total	1-3	1,164	0	190	(66)	0	(11)	(123)	0	0	1,154
	4	0	0	637	50	597	0	0	0	0	1,284
Total	1-4	1,164	0	827	(16)	597	(11)	(123)	0	0	2,438

Basin Planned Resources (Summer Rating) Identified by Type (Class 1 - 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Basin	Wind	0	21	0	0	0	0	0	0	0	21
Basin	Hydro	0	0	0	(1)	0	0	0	0	0	(1)
Basin	Thermal	282	(53)	0	(83)	0	0	0	0	0	146
Basin	Solar	0	0	0	0	0	0	0	0	0	0
Basin	Other	0	0	0	0	0	0	0	0	0	0
	Total	282	(32)	0	(84)	0	0	0	0	0	166

Basin Planned Resources (Summer Rating) Identified by Type (Class 1 - 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Basin	Wind	689	21	0	0	0	0	0	0	0	710
Basin	Hydro	0	0	0	(1)	0	0	0	0	0	(1)
Basin	Thermal	320	(53)	0	(65)	0	0	(113)	0	0	89
Basin	Solar	0	0	190	0	0	0	0	0	0	190
Basin	Other	155	32	0	0	0	(11)	(10)	0	0	166
	Total	1,164	0	190	(66)	0	(11)	(123)	0	0	1,154

Basin Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

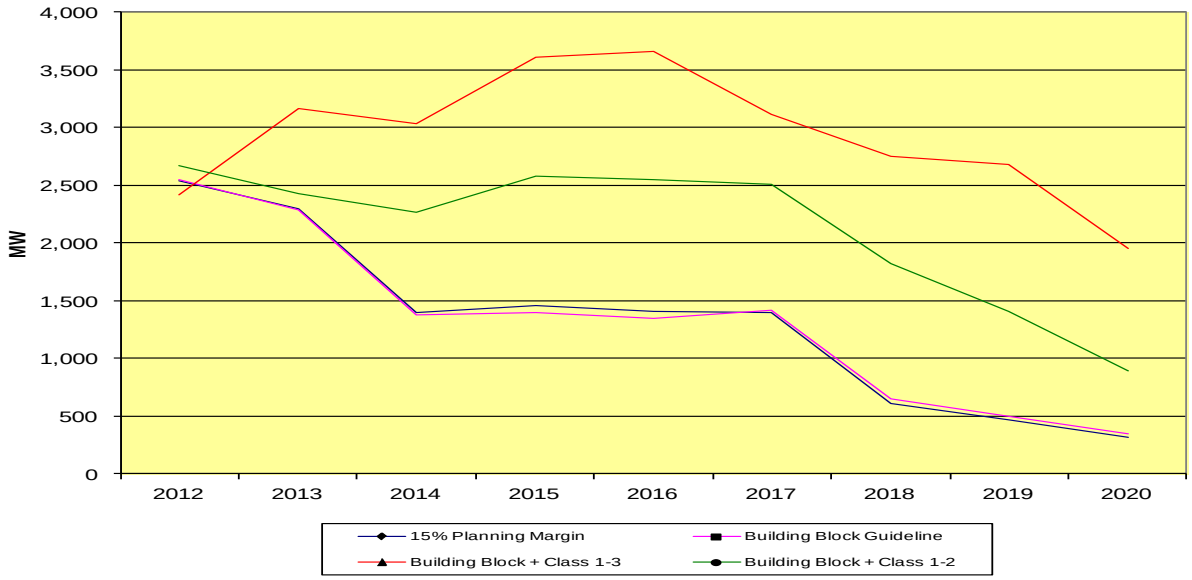
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Basin	Wind	689	21	0	0	0	0	0	0	0	710
Basin	Hydro	0	0	0	49	0	0	0	0	0	49
Basin	Thermal	320	(53)	637	(65)	597	0	(113)	0	0	1,323
Basin	Solar	0	0	190	0	0	0	0	0	0	190
Basin	Other	155	32	0	0	0	(11)	(10)	0	0	166
	Total	1,164	0	827	(16)	597	(11)	(123)	0	0	2,438

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Rockies

Subregion	Zones in Subregion
Rockies	Colorado, Wyoming

Graph 8 – Comparison of Rockies Subregion Power Supply Margin – Summer



Under all cases studied the load requirements for the Rockies subregion are met throughout the study period.

Rockies Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
Rockies	1	662	0	(42)	(152)	0	0	0	0	0	468
	2	0	(65)	155	0	0	166	0	0	0	256
Total	1-2	662	(65)	113	(152)	0	166	0	0	0	724
	3	0	0	0	0	0	0	0	0	0	0
Total	1-3	662	(65)	113	(152)	0	166	0	0	0	724
	4	682	350	300	0	81	50	410	350	732	2,955
Total	1-4	1,344	285	413	(152)	81	216	410	350	732	3,679

Rockies Planned Resources (Summer Rating) Identified by Type (Class 1 – 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Rockies	Wind	252	0	0	0	0	0	0	0	0	252
Rockies	Hydro	0	0	0	0	0	0	0	0	0	0
Rockies	Thermal	380	(65)	113	(152)	0	166	0	0	0	442
Rockies	Solar	30	0	0	0	0	0	0	0	0	30
Rockies	Other	0	0	0	0	0	0	0	0	0	0
	Total	662	(65)	113	(152)	0	166	0	0	0	724

Rockies Planned Resources (Summer Rating) Identified by Type (Class 1 – 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Rockies	Wind	252	0	0	0	0	0	0	0	0	252
Rockies	Hydro	0	0	0	0	0	0	0	0	0	0
Rockies	Thermal	380	(65)	113	(152)	0	166	0	0	0	442
Rockies	Solar	30	0	0	0	0	0	0	0	0	30
Rockies	Other	0	0	0	0	0	0	0	0	0	0
	Total	662	(65)	113	(152)	0	166	0	0	0	724

Rockies Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

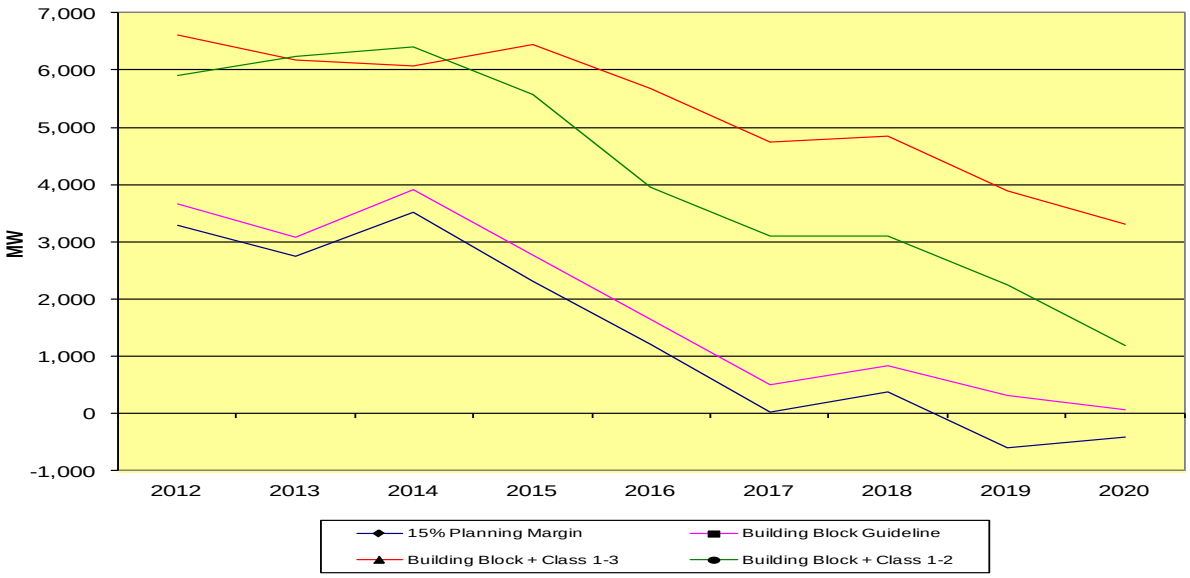
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Rockies	Wind	822	300	300	0	0	0	360	300	200	2,282
Rockies	Hydro	0	0	0	0	0	0	0	0	0	0
Rockies	Thermal	442	(65)	113	(152)	29	166	0	0	480	1,013
Rockies	Solar	32	0	0	0	2	0	0	0	2	36
Rockies	Other	48	0	0	0	0	0	0	0	0	48
	Total	1,344	235	413	(152)	31	166	360	300	682	3,379

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Desert Southwest

Subregion	Zones in Subregion
Desert SW	Arizona, New Mexico, So. Nevada

Graph 9 – Comparison of Desert Southwest Subregion Power Supply Margin – Summer



The results show that, under all cases studied — except the 15 percent Planning margin beginning in 2019 — the Desert Southwest subregion has a positive PSM throughout the study period.

Desert Southwest Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
Desert SW	1	214	(92)	9	(74)	0	0	0	0	0	57
	2	12	0	0	(227)	(97)	0	0	0	0	(312)
Total	1-2	226	(92)	9	(301)	(97)	0	0	0	0	(255)
	3	359	500	0	0	0	0	0	0	(504)	355
Total	1-3	585	408	9	(301)	(97)	0	0	0	(504)	100
	4	701	1,618	566	3,070	273	451	1,023	87	288	8,077
Total	1-4	1,286	2,026	575	2,769	176	451	1,023	87	(216)	8,177

Desert Southwest Planned Resources (Summer Rating) Identified by Type (Class 1 – 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Desert SW	Wind	0	0	0	0	0	0	0	0	0	0
Desert SW	Hydro	0	0	2	0	0	0	0	0	0	2
Desert SW	Thermal	(51)	(92)	7	(301)	(97)	0	0	0	0	(534)
Desert SW	Solar	262	0	0	0	0	0	0	0	0	262
Desert SW	Other	15	0	0	0	0	0	0	0	0	15
	Total	226	(92)	9	(301)	(97)	0	0	0	0	(255)

Desert Southwest Planned Resources (Summer Rating) Identified by Type (Class 1 – 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Desert SW	Wind	0	0	0	0	0	0	0	0	0	0
Desert SW	Hydro	0	0	2	0	0	0	0	0	0	2
Desert SW	Thermal	99	(92)	7	(301)	(97)	0	0	0	(504)	(888)
Desert SW	Solar	471	500	0	0	0	0	0	0	0	971
Desert SW	Other	15	0	0	0	0	0	0	0	0	15
	Total	585	408	9	(301)	(97)	0	0	0	(504)	100

Desert Southwest Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

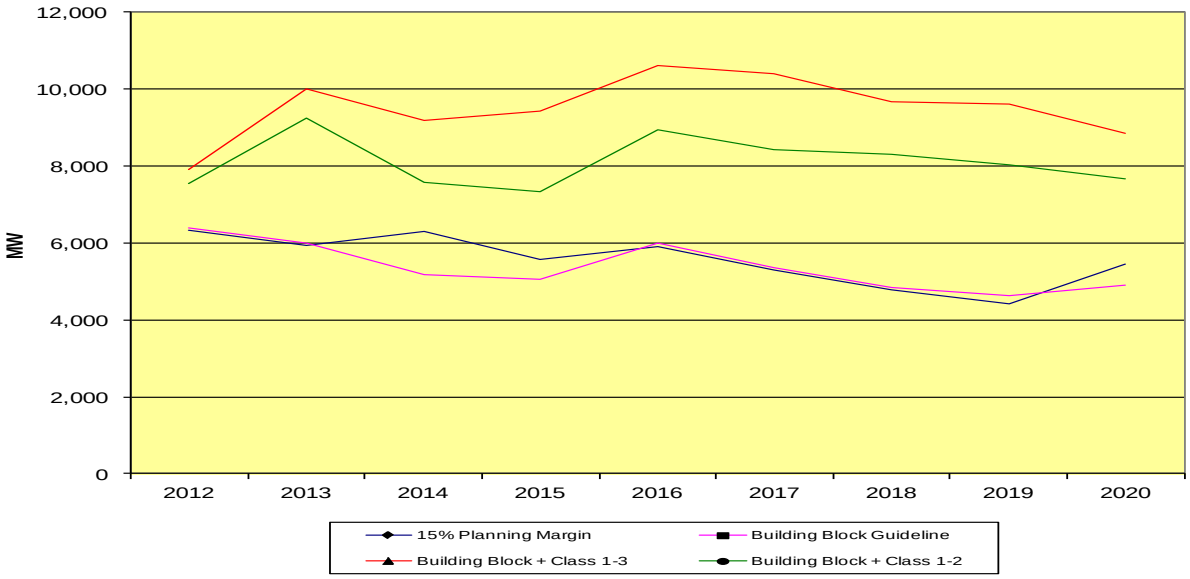
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Desert SW	Wind	500	65	0	940	0	0	0	0	0	1,505
Desert SW	Hydro	0	0	2	0	0	0	0	0	0	2
Desert SW	Thermal	99	495	7	349	176	451	1,008	87	(216)	2,456
Desert SW	Solar	672	1,466	551	1,480	0	0	15	0	0	4,184
Desert SW	Other	15	0	15	0	0	0	0	0	0	30
	Total	1,286	2,026	575	2,769	176	451	1,023	87	(216)	8,177

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Northern California

Subregion	Zones in Subregion
No. CA	Northern CA, San Francisco, SMUD

Graph 10 – Comparison of Northern California Subregion Power Supply Margin – Summer



Under all scenarios studied the load requirements for the Northern California subregion are met throughout the study period. The PSM is a reflection of the transfers modeled by PROMOD into and out of the Northern California subregion. As is explained earlier in this report, resources will be imported as long as the PSM is less than zero or exported as long as the margin is positive for a bubble within a subregion. The North-South split doesn't affect the Northern California subregion as early as it does Southern California and the Desert Southwest due to its proximity to the Northwest, the limited transfer capacity to Southern California zones, and the dispatch method used by PROMOD. Northern California, in essence, is given the first opportunity to use the imports from the Northwest.

No. California Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
No. CA	1	1,128	853	1,514	0	0	0	0	0	0	3,495
	2	1,262	2,384	225	0	0	0	0	0	0	3,871
Total	1-2	2,390	3,237	1,739	0	0	0	0	0	0	7,366
	3	132	191	1,513	820	0	0	0	0	0	2,656
Total	1-3	2,522	3,428	3,252	820	0	0	0	0	0	10,022
	4	66	0	0	0	0	972	390	0	0	1,428
Total	1-4	2,588	3,428	3,252	820	0	972	390	0	0	11,450

No. California Planned Resources (Summer Rating) Identified by Type (Class 1 – 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
No. CA	Wind	168	24	0	0	0	0	0	0	0	192
No. CA	Hydro	0	0	0	0	0	0	0	0	0	0
No. CA	Thermal	1,673	1,809	1,514	0	0	0	0	0	0	4,996
No. CA	Solar	549	1,354	225	0	0	0	0	0	0	2,128
No. CA	Other	0	50	0	0	0	0	0	0	0	50
	Total	2,390	3,237	1,739	0	0	0	0	0	0	7,366

No. California Planned Resources (Summer Rating) Identified by Type (Class 1 – 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
No. CA	Wind	168	24	27	0	0	0	0	0	0	219
No. CA	Hydro	0	0	0	0	0	0	0	0	0	0
No. CA	Thermal	1,716	1,809	1,514	350	0	0	0	0	0	5,389
No. CA	Solar	638	1,545	1,711	470	0	0	0	0	0	4,364
No. CA	Other	0	50	0	0	0	0	0	0	0	50
	Total	2,522	3,428	3,252	820	0	0	0	0	0	10,022

No. California Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

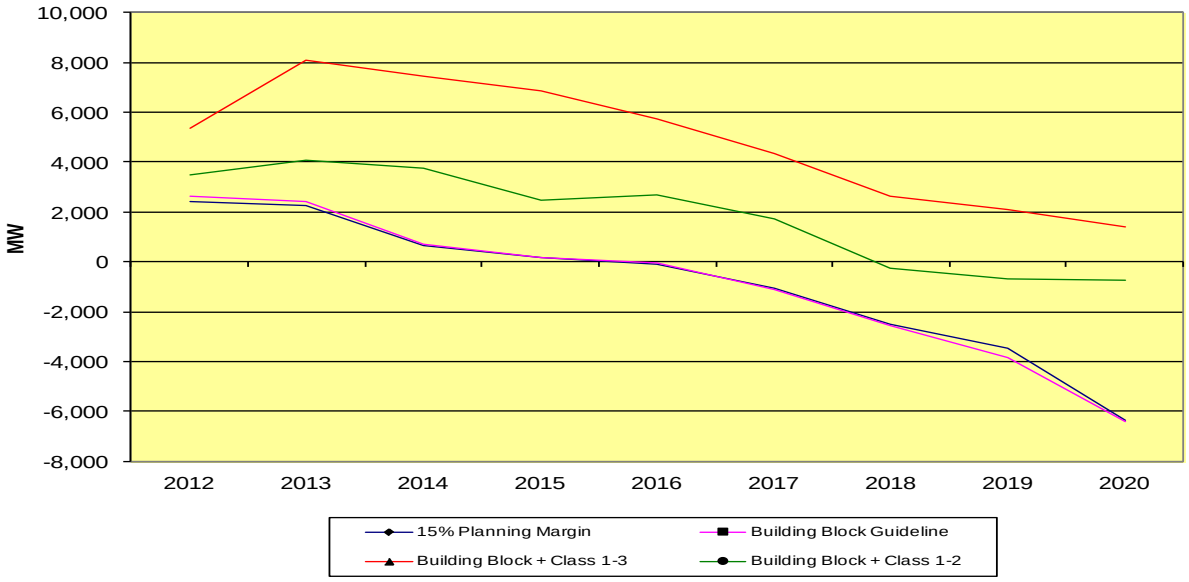
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
No. CA	Wind	168	24	27	0	0	0	0	0	0	219
No. CA	Hydro	0	0	0	0	0	0	390	0	0	390
No. CA	Thermal	1,716	1,809	1,514	350	0	220	0	0	0	5,609
No. CA	Solar	704	1,545	1,711	470	0	752	0	0	0	5,182
No. CA	Other	0	50	0	0	0	0	0	0	0	50
	Total	2,588	3,428	3,252	820	0	972	390	0	0	11,450

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Southern California

Subregion	Zones in Subregion
So. CA	Southern CA, San Diego, LADWP, IID

Graph 11 – Comparison of Southern California Subregion Power Supply Margin - Summer



The results of this assessment predict that the load requirements for all cases in Southern California can be met through 2016. In each of the summer cases Southern California is reliant on imports from other subregions to meet its load requirements (see Tables in Attachment 3).

So. California Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
So. CA	1	2,224	3,150	359	(365)	0	0	0	0	0	5,368
	2	1,345	2,171	1,815	0	652	80	0	0	0	6,063
Total	1-2	3,569	5,321	2,174	(365)	652	80	0	0	0	11,431
	3	849	2,228	2,026	6,141	560	0	80	130	80	12,094
Total	1-3	4,418	7,549	4,200	5,776	1,212	80	80	130	80	23,525
	4	172	0	5	40	195	15	180	0	107	714
Total	1-4	4,590	7,549	4,205	5,816	1,407	95	260	130	187	24,239

So. California Planned Resources (Summer Rating) Identified by Type (Class 1 – 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
So.CA	Wind	441	268	371	0	140	0	0	0	0	1,220
So.CA	Hydro	16	0	4	0	0	0	0	0	0	20
So.CA	Thermal	948	1,750	0	(445)	512	0	0	0	0	2,765
So.CA	Solar	2,131	3,303	1,799	0	0	0	0	0	0	7,233
So.CA	Other	33	0	0	80	0	80	0	0	0	193
	Total	3,569	5,321	2,174	(365)	652	80	0	0	0	11,431

So. California Planned Resources (Summer Rating) Identified by Type (Class 1 – 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
So.CA	Wind	476	466	560	0	140	0	0	130	0	1,772
So.CA	Hydro	443	0	4	0	0	0	0	0	0	447
So.CA	Thermal	948	2,026	180	648	512	0	0	0	0	4,314
So.CA	Solar	2,361	5,013	3,456	5,048	196	0	0	0	0	16,074
So.CA	Other	190	0	0	80	364	80	80	0	80	874
	Total	4,418	7,505	4,200	5,776	1,212	80	80	130	80	23,481

So. California Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

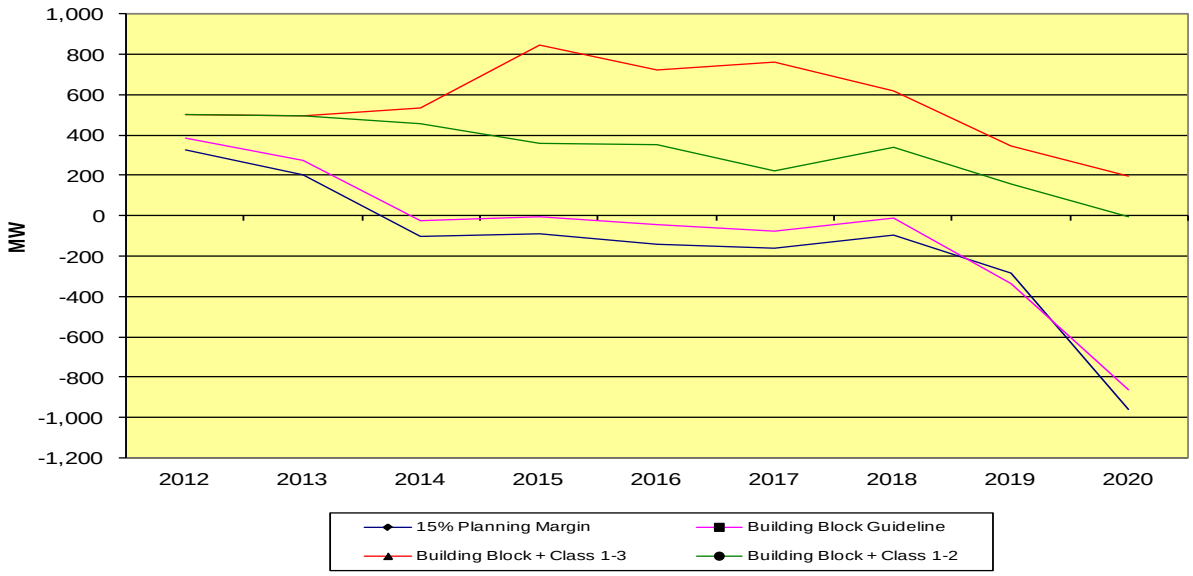
Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
So.CA	Wind	476	466	560	0	140	0	0	130	0	1,772
So.CA	Hydro	443	0	4	0	0	0	0	0	0	447
So.CA	Thermal	1,090	2,026	180	648	692	0	180	0	107	4,923
So.CA	Solar	2,361	5,013	3,456	5,048	196	0	0	0	0	16,074
So.CA	Other	220	0	5	120	379	95	80	0	80	979
	Total	4,590	7,505	4,205	5,816	1,407	95	260	130	187	24,195

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Mexico

Subregion	Zones in Subregion
Mex	CFE

Graph 12 – Comparison of Mexico Subregion Power Supply Margin – Summer



The results of the assessments indicate that the Mexico subregion has a positive PSM through 2014, with a very small Building Block Guideline deficit through 2018. When class 2 resources are included the subregion is adequate through the study period. This indicates that Mexico has planned additions sufficient to cover the forecasted increase in demand.

Mexico Planned Resources (Summer Rating) Identified by Class (as of Dec. 31)

Sub-region	Class	2012	2013	2014	2015	2016	2017	2018	2019	2019	Total
MX	1	0	0	0	0	0	0	0	0	0	0
	2	119	282	0	0	0	0	0	0	0	401
Total	1-2	119	282	0	0	0	0	0	0	0	401
	3	0	0	0	0	0	0	0	0	0	0
Total	1-3	119	282	0	0	0	0	0	0	0	401
	4	0	0	0	0	567	0	0	542	0	1,109
Total	1-4	119	282	0	0	567	0	0	542	0	1,510

Mexico Planned Resources (Summer Rating) Identified by Type (Class 1 – 2 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
MX	Wind	0	0	0	0	0	0	0	0	0	0
MX	Hydro	0	0	0	0	0	0	0	0	0	0
MX	Thermal	119	282	0	0	0	0	0	0	0	401
MX	Solar	0	0	0	0	0	0	0	0	0	0
MX	Other	0	0	0	0	0	0	0	0	0	0
	Total	119	282	0	0	0	0	0	0	0	401

Mexico Planned Resources (Summer Rating) Identified by Type (Class 1 – 3 Only) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
MX	Wind	0	0	0	0	0	0	0	0	0	0
MX	Hydro	0	0	0	0	0	0	0	0	0	0
MX	Thermal	119	282	0	0	0	0	0	0	0	401
MX	Solar	0	0	0	0	0	0	0	0	0	0
MX	Other	0	0	0	0	0	0	0	0	0	0
	Total	119	282	0	0	0	0	0	0	0	401

Mexico Planned Resources (Summer Rating) Identified by Type (All Classes) (as of Dec. 31)

Sub-Region	Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
MX	Wind	0	0	0	0	0	0	0	0	0	0
MX	Hydro	0	0	0	0	0	0	0	0	0	0
MX	Thermal	119	282	0	0	567	0	0	542	0	1,511
MX	Solar	0	0	0	0	0	0	0	0	0	0
MX	Other	0	0	0	0	0	0	0	0	0	0
	Total	119	282	0	0	567	0	0	542	0	1,511

The data presented in the above charts are the reported summer ratings for projects planned to be added during the calendar years.

Additional Assumptions

The following assumptions were made for this assessment:

- The input data represents demand forecasts and resource plans submitted in March 2011. New generation projects announced after these submittals are not included in the resource totals.
- July data was used for the summer peak period for each year. December data was used for the winter peak period.
- This assessment assumes that the demand for a given zone is the sum of the BA customer demands within that zone. This differs from the “load requirement” concept where the load that must be served is the customer demand plus the

firm exports. Under most circumstances, the application of “forced transfers” to accommodate firm exports would tend to undermine the model solution.

- The adjustments (forced transfers) for external generation (generation in one zone owned by an LSE in another zone) that were used in the studies were for Bridger, Colstrip, Craig, Four Corners, Hayden, Hoover, Intermountain, Navajo, Palo Verde, San Juan, and San Onofre. No other adjustments were made for other joint plants or firm purchases.
- The model freely transfers resources from areas with surplus generation to deficit areas, considering transfer path constraints and transmission losses. Simultaneous flows, loop flows, and other transfer restrictions are approximated by the restricted transfer limits that were used in the studies, but the model is a transport model, not a power flow model.
- The model is not intended to measure the PSMs in the individual BAs (unless the zone definition and transfer capabilities exactly match the BA area). The model assumes that there are no constraints internal to a zone and all resources are assumed to be deliverable.

Recommendations for Future Assessments

1. The hydro generation capability in the Northwest subregion has limitations beyond those assumed for this assessment. The seasonal operation of the coordinated hydro system is subject to dozens of parameters to accommodate the various interests in the river systems. Northwest entities are continuing to work on a more realistic characterization of the ability of the hydro system to meet loads and export markets.
2. Future plans for the PROMOD model beyond the 2011 PSA may include conducting probabilistic or stochastic studies to study the effects of random uncertainties. This would require that the members provide additional information such as resource forced outage rates, resource operating costs, demand variations, transmission loss data, and transmission wheeling costs.
3. Planned changes to the transfer path capabilities must be reflected in the model to accurately measure their effect on the results. Since they would usually directly affect the results, only changes that are highly probable should be taken into consideration.
4. The effects of fuel diversity and availability should be modeled in future assessments. The prevalence of natural gas and coal fired generation in WECC has raised concerns about the interdependencies of electricity and fuel supply. Improved analyses should evaluate the impact of fuel shortages due to fuel supply interruptions or demand spikes.

5. The growth of short lead time resources requires a review of the resource classification and modeling approaches.
6. The PROMOD model has an artificial transmission constraint in Northern California that prevents resources from reaching demand. WECC staff will work with the reporting entities to eliminate this problem in future studies.

Attachment 1: Comparison of LTRA and PSA Results

The NERC required LTRA and the WECC PSA analyze the potential for electricity supply shortages, over a 10-year period, based on BA reported demand, resources, and transmission data. Although efforts have been made in recent years to better align the results reported in the LTRA and the PSA there are still differences in the reporting requirements that make a comparison between the two reports difficult.

The method used to calculate the peak demand of the individual subregions contributes to the difficulty of performing a one-to-one comparison of the LTRA and the PSA. NERC requires that the peak demand used in the LTRA, for both summer and winter seasons, be the reported seasonal peak demands of the subregion. This is in contrast to the PSA which reports the seasonal peak demand, July for summer and December for winter, peak demand of the entire Western Interconnection. Therefore, when calculating the LTRA subregional peak demand, unless each BA within the subregion peaks in July, the subregional peak demand reported in the LTRA will differ from the subregional peak demand reported in the PSA and a one-to-one comparison cannot be made.

In addition, NERC reporting guidelines for categorizing new resources differ from those used in the PSA.

The NERC categories for future resources are:

FUTURE RESOURCES

This category includes generation resources the reporting entity has a reasonable expectation of coming on-line during the period of the assessment. As such, to qualify in either of the Future categories, the resource must have achieved one or more of these milestones:

- Construction has started
- Regulatory permits being approved, any one of the following:
    - Site permit
    - Construction permit
    - Environmental permit
- Regulatory approval has been received to be in the rate base
- Approved power purchase agreement

- Approved and/or designated as a resource by a market operator

FP – Future, Planned – Generation resources anticipated to be available to operate and deliver power within or into the region during the period of analysis in the assessment. This category includes, but is not limited to, the following:

- Contracted (or firm) or other similar resource
- Where organized markets exist, designated market resource that is eligible to bid into a market or has been designated as a firm network resource
- Network Resource, as that term is used for FERC pro forma or other regulatory approved tariffs.
- Energy-only resources confirmed able to serve load during the period of analysis in the assessment and will not be curtailed
- Where applicable, included in an integrated resource plan under a regulatory environment that mandates resource adequacy requirements and the obligation to serve

FO – Future, Other – This category includes future generating resources that do not qualify in FP and are not included in the Conceptual category. This category includes, but is not limited to, generation resources during the period of analysis in the assessment that may:

Be curtailed or interrupted at any time for any reason

- Energy-only resources that may not be able to serve load during the period of analysis in the assessment
- Variable generation not counted in the FP category or may not be available or is de-rated during the assessment period
- Hydro generation not counted in category FP or de-rated

C – Conceptual – This category includes generation resources that are not in a prior listed category, but have been identified and/or announced on a resource planning basis through one or more of the following sources:

- Corporate announcement
- Entered into or is in the early stages of an approval process
- Is in a generator interconnection (or other) queue for study
- Place-holder generation for use in modeling.

Resources included in this category may be adjusted using a confidence factor to reflect uncertainties associated with siting, project development, or queue position. This will be applied from the NERC Conceptual Confidence Factor that is to be reported on the peak data tab.

The WECC categories for new resources are:

Class 1 – Generation additions/retirements that were reported to be under active construction as of the reporting date of December 2010 and are projected to be in-service prior to January 2016.

Class 2 – Generation additions/retirements that were reported to 1) have received regulatory approval or will undergo regulatory review, 2) have a signed interconnection agreement, and 3) have an expected on-line date prior to January 2018. This class includes resources that were expected to be in service as early as Class 1 resources but did not meet the test of being under construction or for resources that may not be completed/retired before the January 2016 date.

Class 3 – Generation additions/retirements that were reported and have met the NERC criteria for Future Planned Resources, but do not qualify as Class 1 or 2 Resources.

Class 4 – Generation additions/retirements that were reported which have met the NERC criteria for Future Other or Conceptual resources. This class also includes projects that are indefinitely postponed.

The cross reference between the two sets of categories is shown in the following table (NERC's Existing Certain (EC), Existing Other (EO), Future Other (FO), and Conceptual (C) resources correspond to the WECC Existing category):

NERC Class Codes	WECC Class Codes
EC	0
EO	
FP	1
	2
	3
FO	2 3 4
C	4

Attachment 2: Model Outline

A. Description of Model

For the purposes of this assessment, the WECC region is divided into the following zones or “bubbles.” The zones are configured around demand centers and transmission hubs. Refer to the topology bubble diagrams on pages 59 and 60 for connections between zones.

Alberta	Calif., San Francisco	Nevada, Northern
Arizona	California, SMUD	Nevada, Southern
British Columbia	California, Southern	New Mexico
California, IID	CFE-Mexico	Northwest
California, LDWP	Colorado	Utah
California, Northern	Idaho	Wyoming
California, San Diego	Montana	

Model Topology

The topology of the model is shown in the bubble diagrams on pages 59 and 60. The lines between zones are intended to represent transmission connections between the zones and the listed numbers are the transfer path capabilities as reported by the BA representatives. The model observes these maximum capabilities as it calculates the solutions for each case. These maximum capabilities represent the Restricted Transfer Capabilities (the limits that may reasonably be expected to apply under simultaneous high seasonal transmission loading conditions).

If the bubble diagrams have any capabilities shown with blue highlighting, the highlighted areas indicate that there were changes in transfer capability during the study period. Transfers with other regional councils such as Midwest Reliability Organization and Southwest Power Pool are ignored in this assessment as this would require an assumption regarding the amount of surplus or deficit generation in those councils.

Model Solution & Constraints

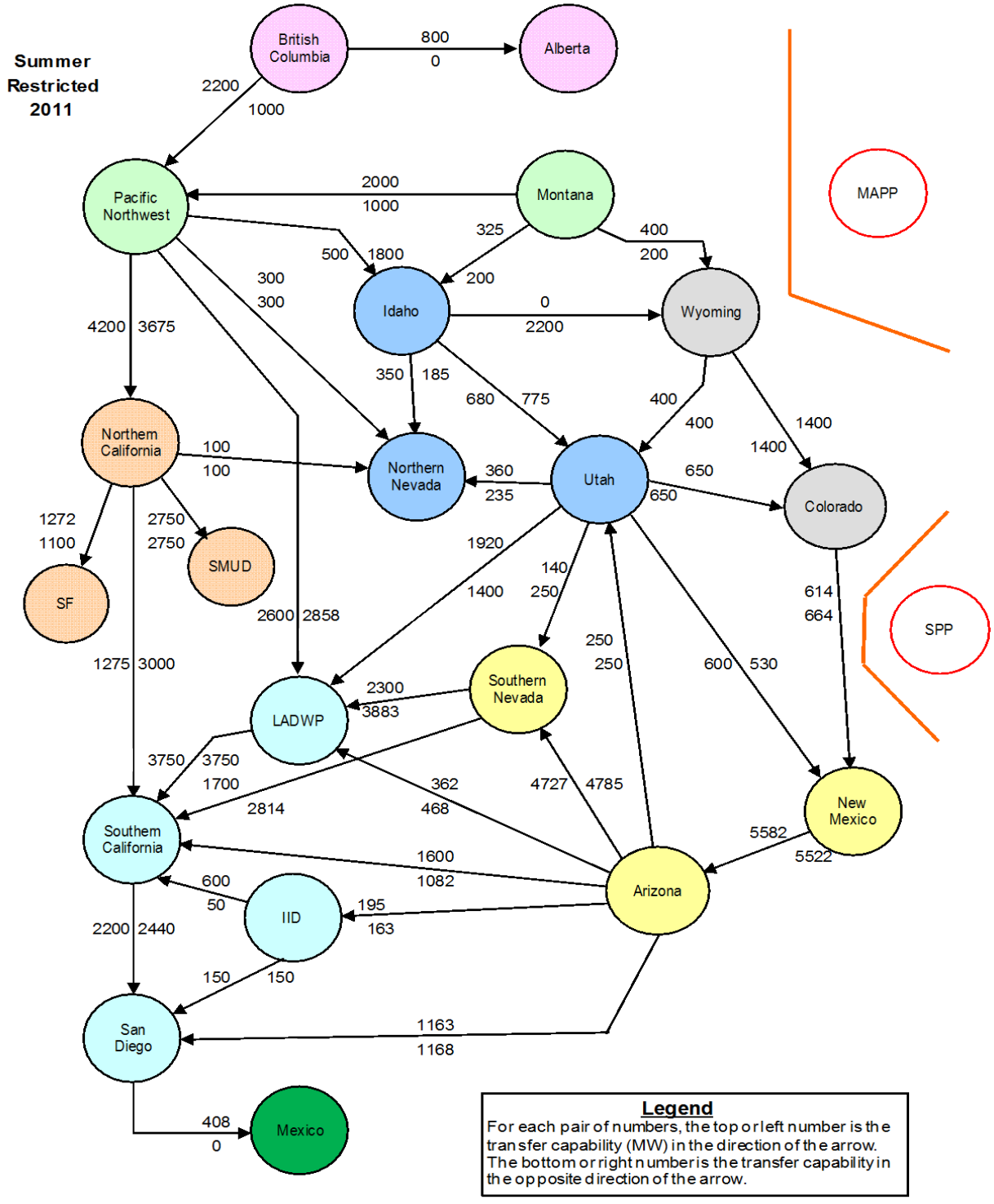
PROMOD is used to solve the demand/resource balance and calculate the surplus generation and transfers for each zone. The resource solution seeks the lowest overall resource cost subject to the following constraints:

- The resource solution for each zone must be equal to or greater than zero.
- The resource solution for each zone must not be greater than the available resources.
- The resource solution for each zone must not be less than the minimum resource allocation.

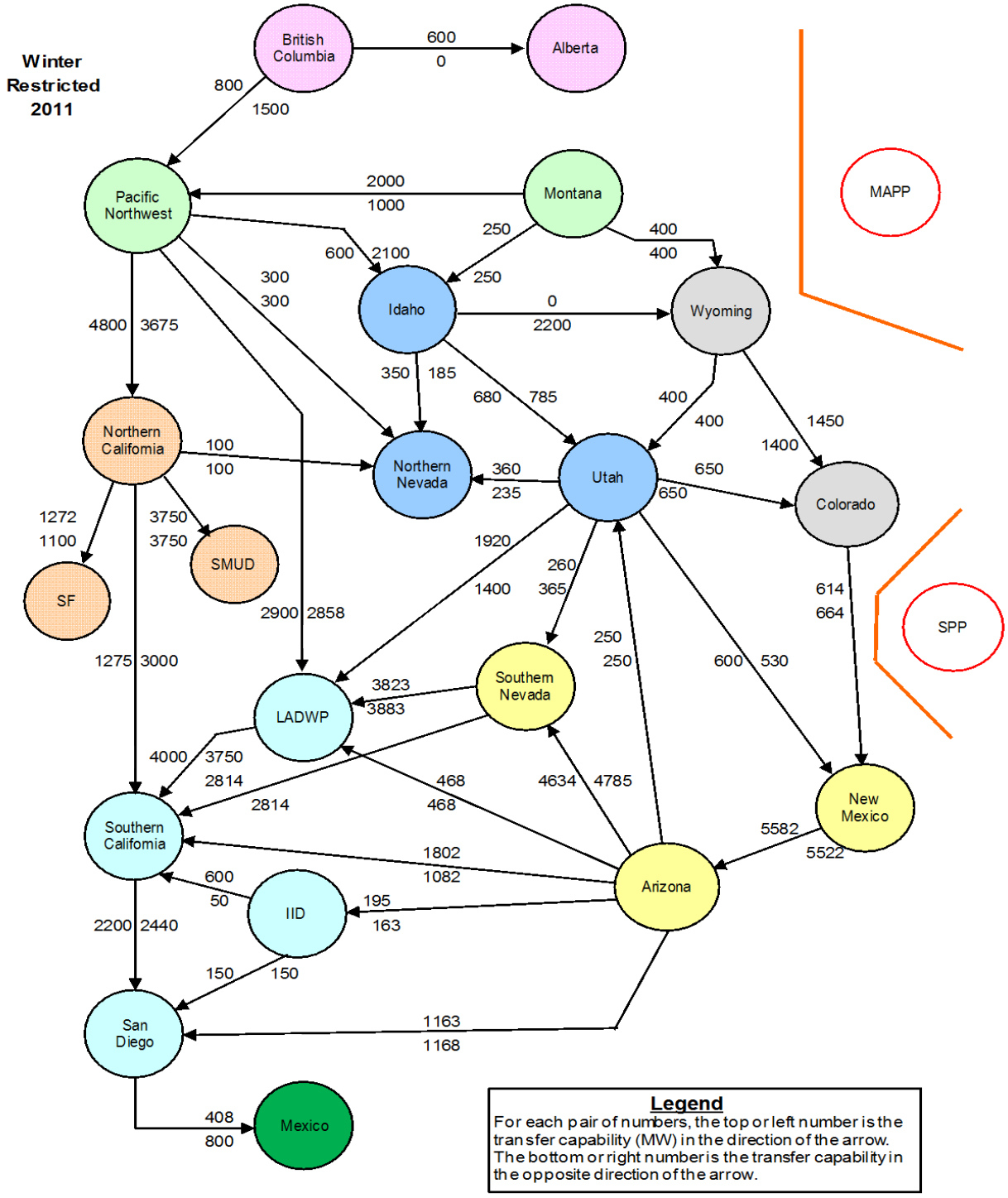
The solution uses transfers between zones to export resources from surplus zones to deficit zones. If a deficit is greater than the available transfer capability from the connected zones, then the zone will have a net deficit. Lower cost resources such as hydro resources are given priority within a zone and as imports, to serve local load and to displace more expensive generation.

The assessment model is designed to measure the supply/demand margins based on forecasts of peak demands and resources. While peak demand forecasts for several years into the future are readily available from the WECC BAs, the forecasts of resource additions only exist for a few years into the future. Therefore, the validity of the results decreases as one looks further into the future. The assessment results for the period beyond 2016, or the timeframe where Class 2 resource additions are incorporated, are not a realistic picture of future PSMs. The addition of generation plants that are not accounted for in the current data should be expected. The study results shift from an evaluation of PSM to a determination of future needs and investment opportunities. The point when this shift occurs varies by region and can vary by case study.

Bubble Diagram #1 – Zone Topology (Summer – Restricted)



Bubble Diagram #2 – Zone Topology (Winter – Restricted)



Attachment 3: Study Outline

A. Study Details

The descriptions of the studies and a summary of the results were provided earlier in the Overview section.

Methodology

The assessment utilized a deterministic approach in evaluating the PSM[11] in meeting the total peak demand requirements for the peak hour of the study month. Uncertainties associated with such factors as resource availability and seasonal demand variations were considered explicitly by running additional cases. The primary input variations were:

- The adjustment to the load requirement to model the Building Block reserve margins and the severe temperature conditions, by escalating the peak demand forecast.
- The inclusion or exclusion of Class 2 and 3 resource additions and retirements.
- The treatment of resource outages such as scheduled maintenance, generation de-ratings, contingency outages, and forced outages.

The peak demands represent the BAs expected peak demand forecasts (1-in-2 probability, defined as 50 percent probability of not being exceeded) for the study months. In Case #7, the peak demand escalation was applied directly to the peak demand forecasts. For example, if the peak demand escalation for a summer case was 15 percent, the July peak demand forecast for each year was multiplied by a factor of 1.15. Peak demand escalation should not be confused with the load growth escalation that is already represented in the peak demand forecasts.

An equation for the PSM calculation is represented below. The internal resources are adjusted to account for scheduled maintenance, inoperable units, forced outages, and hydro de-ratings. The demand is adjusted as previously described.

Power Supply Margin = Zone Resources (adjusted) + Imports – Demand (adjusted) - Exports

Qualifications

The assessment model is designed to measure the PSM based on forecasts of peak demands and seasonal resource capacity. While peak demand forecasts for several years into the future are readily available from the WECC BAs, the forecasts of resource additions are only accurate for a few years into the future. The study results shift from

[11] Power Supply margin is the amount of resource capability (including imports) in excess of the demand requirements, after the specified adjustments to both demand and resources are applied.

an evaluation of PSM to a determination of future needs and investment opportunities. The point when this shift occurs varies by region and can vary by case study.

There is an ongoing concern regarding the potential retirement of several older generation plants, largely in California. Based on a traditional service life, numerous plants will be retiring over the time frame of this study; however, only the portion of these potential retirements that have been officially scheduled and reported to WECC are retired in the data used for this assessment. As more retirements are announced and reported, they will be represented in future assessments.

There is an important distinction between capacity and energy that must be considered, particularly for the Northwest subregion. While a peak capacity study such as is reported here may show surplus capacity in the Northwest subregion, the capacity may not be available for a multi-hour period due to the limited availability of water under most water conditions. Eventually WECC hopes to develop a methodology for preparing an energy assessment that would help to evaluate the impact of adverse water conditions on available capacity.

A determination that a zone has sufficient resources and imports to meet its load requirement does not necessarily mean that all of the demand centers within that zone can meet their load requirements. Transmission constraints internal to a zone may limit capacity transfers to local demand areas, leaving them without a positive margin. These transmission-constrained local demand areas may include one or more major metropolitan areas within a zone and may include most of the total population within a zone.

B. Input Data and Parameters

The specific input data used in the assessment are presented in Tables 14-26, beginning on page 69. The tables list the base generation resources and show the derivation of the PSM for each case.

The transition to PROMOD makes a comparison to prior years PSAs quite difficult. Demand is reported on a coincidental basis which reduces the peak demand and delays the onset of potential deficit conditions several years. Resources are reported as maximum capacity and not with seasonal adjustments, as in prior years (the seasonal adjustments show as a separate item this year).Transfers are calculated to produce the lease cost, not just to meet reliability needs. These differences will be highlighted in the following sections.

Demands

Estimated monthly peak demands for each of the PROMOD zones are included in the input data. These peak demands are derived from the annual peak demand and energy forecasts that were submitted with the L&R data, and represent a 1-in-2 year probability

forecast (50 percent probability of not being exceeded). The non-firm demands include interruptible and load management demands as reported with the L&R data, and were included in all cases.

The transition to PROMOD allows the use of a coincidental WECC-wide peak demand when performing case studies. PROMOD creates an annual demand for each year of the study period using an algorithm of the annual peak, the annual energy, and a BA specific hourly demand curve, based on historic data. The result of the change to coincidental peak demand is a lowering of the monthly WECC-wide peak.

Temperature Sensitivity

There is an expectation that the peak demand is directly correlated with the temperature(s) at the load centers. The applicable WECC members were requested to provide an indication of the approximate sensitivity (megawatts per degree Fahrenheit) of their peak demand to temperature variations. This data was used in this assessment to conduct a severe temperature case for both summer and winter.

Resources

The resource data include the Existing Generation units, the Generation Additions, the Generation Retirements, the Scheduled Maintenance, the Inoperable Generation, the Forced Outages, and Miscellaneous De-ratings. As the diversity of generating technologies has increased, WECC has not developed completely standardized methods for determining resource capacity values for BAs to use when submitting the L&R data. The net resource capacities submitted through the L&R process were summarized by zone and type (hydro or non-hydro) before being copied into the model.

The summary tables in the results section provide details by subregion for the generation capacities. Although the plans could change, Generation Retirements were considered by retirement date.

Scheduled Maintenance and Inoperable Generation as reported in the L&R data were included as indicated in the studies. The majority of the July outages are scheduled for generation in the Canada subregion. Other areas try to have all their units available for the summer peak. The generation owners in the summer peaking zones usually schedule their maintenance in the fall or spring.

All resources are entered into PROMOD at the maximum expected capacity for the year. This treatment has a direct impact on four parameters of the following sub-regional tables; 1) Existing Generation, 2) Existing Hydro Generation, 3) Existing Non-Hydro Generation, and 4) Generation Adjustments (comprised of hydro de-rates, planned outages, seasonal adjustments, and unused variable generation).

Existing Generation, Existing Hydro Generation and Existing Non-Hydro Generation are greater than in prior years because maximum capacity is reported, not the seasonally adjusted capacity that has been included in prior years.

Several factors contribute to larger Generation Adjustments than were reported in prior years. Variable Generation resources, such as wind and solar, are included in Existing Generation at maximum capacity, and the reduction to expected capacity is included in the De-rate section. Hydro resources are reported in the same faction. Also, the seasonal capacity reductions in thermal resources are reported as de-rates, as are all planned outages.

How “forced transfers” are treated in PROMOD also effects where resources are located. PROMOD does not allow for “forced transfers” so remotely owned resources are “moved” into the owners BA with a corresponding reduction in transfer capacity between the locations. The net effect of this treatment is an increase in generation in the receiving BA and reduction in generation in the sending BA.

Resource Adjustments - Hydro

Hydro generation in PROMOD is constrained by annual energy limits. Actual energy production from 2003 is the limit for Northwest Hydro generation and the annual energy production for 2002 is the California Hydro generation limit. These two years were selected by the TEPPC Data Work Group as low water years and would best reflect adverse hydro conditions.

As stated above, the Existing Hydro Generation capacity included in the sub-regional tables is greater than in prior years because maximum capacity is reported, not the seasonally adjusted capacity. However, the reported de-rates are larger because the seasonal adjustments are reported as de-rates.

Resource Adjustments – Non-Hydro

The non-hydro generation includes thermal steam generation, carbon fuel combustion generation, geothermal generation, solar generation, wind generation, and others. The non-hydro generation capacities were de-rated as specified for selected cases.

As stated above, the Existing Non-Hydro Generation capacity included in the sub-regional tables is greater than in prior years because maximum capacity is reported, not the seasonally adjusted capacity. However, the reported de-rates are larger because the seasonal adjustments are reported as de-rates.

Wind and Solar Capacity De-rates

WECC staff created wind and solar hourly production curves using the National Renewable Energy Laboratory (NREL) synthetic data set for the years 2004-2006 for wind and 2004-2005 for solar. The wind and solar curves used in the analysis were created using one-hour interval data for 2006. These curves were generated based on detailed weather modeling, initialized from historical conditions. The NREL data was aggregated to create a limited number of wind and solar profiles for each subregion.

Transfer Paths

The transfer paths used by the program are based on the zones, with paths connecting one of the zones to another of the zones where applicable. The model has data fields for the path, transfer capability, wheeling cost, and loss factor. The wheeling costs for each path are used to calculate the transfer costs for any imports into a zone. The wheeling costs that were used were between $0.00 and $6.48. The loss factors are used to calculate the net transfer after losses for any imports into a zone. The Loads and Resources data request asks that line losses are included in all demand forecasts, therefore a loss factor of zero (0) percent was used for all PROMOD runs. Note that neither the wheeling cost nor the loss factors impeded the ability to import surplus resources to meet load.

The WECC BAs were requested to provide the appropriate values to use for the restricted transfer capabilities between zones.

C. Results

The following tables present additional results for the various cases, including tabular listings of the derivation of the annual PSMs by WECC subregion. Note that the extent of the supply surplus or deficiency for a given subregion is subject to the inherent problems associated with the simplistic methodology. If multiple zones are in need of additional capacity, several factors may determine which zone(s) get access to any surplus capacity. Additionally, the model solves to the least cost solution for the entire Western Interconnect, and not for the individual subregions. Therefore, if a bubble has excess capacity after balancing its supply and demand, the model will send that excess capacity to the bubble that produces the lowest cost for the entire interconnect, and not reserve that capacity for bubbles within the same subregion. However, this effect is limited by the very small variation in resource prices that are used in the model. Generally, the model will make excess capacity available first to the deficit zone that is closest to the surplus zone because wheeling charges would typically be lower.

The results that are reported in this assessment are a measure of the amount of unused generation capacity (PSM) in each of the defined subregions under the specified conditions. The input data for the individual zones included reported generation and demand values, but excluded the reported firm contracts with entities in other zones. The model calculates the transfers between the zones based on the solution criteria and the provided transfer capabilities. A negative Power Supply Margin for a zone or subregion is indicative of resource shortages and/or transmission constraints. It is important to note that when the PSM for a subregion is zero, the subregion is in resource/demand balance, and it may be importing to meet its demand. At the point where the PSM becomes negative, transmission constraints are preventing the subregion from importing additional capacity.

D. Reserve Margin

Reserve Margin is a measure of the resource capability in excess of demand requirement. The industry commonly refers to two kinds of reserve margin, namely, operating reserve margin for day to day operations, and planning reserve margin for short or long-term planning purposes. A planning reserve margin is generally higher than an operating reserve margin since it must account for all of the uncertainties. A planning reserve margin includes the margin for an operating reserve margin plus an additional margin for planning purposes.

The Minimum Operating Reliability Criteria Work Group (MORCWG) of WECC has defined an operating reserve requirement (operating reserve margin or contingency reserve) that requires a control area to maintain sufficient operating reserve as quoted below from the WECC Standard BAL-STD-002-WECC-1 – Contingency Reserves. It should be noted that, while this Standard has been approved by the WECC Board and submitted for final approval by both NERC and FERC, it is not effective at this time. The LRS has elected to use the six percent operating reserve as proposed in the new Standard when constructing the Building Block Guideline for the 2011 PSA.

R1. Each Reserve Sharing Group or Balancing Authority that is not a member of a Reserve Sharing Group shall maintain as a minimum Contingency Reserve that is the sum of the following:

R1.1. The greater of the following:

R1.1.1. An amount of reserve equal to the loss of the most severe single contingency; or

R1.1.2. An amount of reserve equal to the sum of three percent of the load (generation minus station service minus Net Actual Interchange) and three percent of net generation (generation minus station service).

R1.2. If the Source Balancing Authority designates an Interchange Transaction(s) as part of its Non-Spinning Contingency Reserve, the Sink Balancing Authority shall carry an amount of additional Non-Spinning Contingency Reserve equal to the Interchange Transaction(s). This type of transaction cannot be designated as Spinning Reserves by the source BA. If the Source Balancing Authority does not designate the Interchange Transaction as part of its Contingency Reserve, the Sink Balancing Authority is not required to carry any additional Contingency Reserves under this Requirement.

R1.3. If the Sink Balancing Authority is designating an Interchange Transaction(s) as part of its Contingency Reserve either Spinning or Non-Spinning, the Source Balancing Authority shall increase its Contingency Reserves equal in amount and type, to the capacity transaction(s) where the Sink Balancing Authority is designating the transaction(s) as a resource to meet its Contingency Reserve requirements. These types of transactions could be designated as either spinning or non-spinning reserves. If designated as Spinning Reserves, all of the requirements of section R2.1 & R2.2 must be met.

R2. Each Reserve Sharing Group or Balancing Authority that is not a member of a Reserve Sharing Group shall maintain at least half of the Contingency Reserve in R1.1 as Spinning Reserve. Any Spinning Reserve specified in R1 shall meet the following requirements.

R2.1. Immediately and automatically responds proportionally to frequency deviations, e.g., through the action of a governor or other control systems.

R2.2. Capable of fully responding within ten minutes.

R3. Each Reserve Sharing Group or Balancing Authority shall use the following acceptable types of reserve which must be fully deployable within 10 minutes of notification to meet R1:

R3.1. Spinning Reserve;

R3.2. Interruptible Load;

R3.3. Interchange Transactions designated by the source Balancing Authority as non-spinning contingency reserve;

R3.4. Reserve held by other entities by agreement that is deliverable on Firm Transmission Service;

R3.5. An amount of off-line generation which can be synchronized and generating; or

R3.6. Load, other than Interruptible Load, once the Reliability Coordinator has declared a capacity or energy emergency.

WECC does not currently have a planning reserve margin requirement. However, the "Power Supply Assessment Policy" (see Attachment 4) defines a requirement to "project whether enough physical resources exist, at any price, to meet load and possible reserves while considering the transmission transfer capabilities of major paths." The Building Blocks reserve margin developed by LRS and approved by PCC is a means to meet that requirement.

Table 14 – Sub-region Resources - Class 1 Parameters (Summer Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1 Additions/Retirements	Canada	797	264	36	30	0	0	0	0	0
	Northwest	934	222	0	0	0	0	0	0	0
	Basin	215	21	0	0	0	0	0	0	0
	Rockies	1,387	0	0	0	0	0	0	0	0
	Desert SW	1,529	99	11	0	0	0	0	0	0
	No. CA	2,064	450	685	1,156	0	0	0	0	0
	So. CA	2,994	3,244	250	209	0	0	0	0	0
	Mex	0	0	0	0	0	0	0	0	0
	Total	9,919	4,300	982	1,395	0	0	0	0	0
Cumulative Additions/Retirements	Canada	797	1,061	1,097	1,127	1,127	1,127	1,127	1,127	1,127
	Northwest	934	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156
	Basin	215	236	236	236	236	236	236	236	236
	Rockies	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387
	Desert SW	1,529	1,628	1,639	1,639	1,639	1,639	1,639	1,639	1,639
	No. CA	2,064	2,514	3,199	4,355	4,355	4,355	4,355	4,355	4,355
	So. CA	2,994	6,238	6,488	6,697	6,697	6,697	6,697	6,697	6,697
	Mex	0	0	0	0	0	0	0	0	0
	Total	9,919	14,219	15,201	16,597	16,597	16,597	16,597	16,597	16,597
Generation Adjustments	Canada	-3,729	-4,364	-4,307	-4,443	-3,959	-4,128	-4,178	-4,364	-4,443
	Northwest	-16,619	-17,655	-17,211	-16,932	-16,320	-16,944	-16,845	-16,973	-16,421
	Basin	-2,499	-2,405	-2,584	-2,534	-2,154	-2,396	-2,896	-2,863	-2,958
	Rockies	-2,726	-2,848	-2,836	-2,997	-3,114	-3,156	-3,268	-3,320	-3,319
	Desert SW	-2,852	-2,883	-3,095	-3,141	-3,329	-3,431	-3,422	-3,404	-3,529
	No. CA	-3,943	-4,919	-4,752	-5,254	-4,875	-5,009	-5,066	-5,327	-5,405
	So. CA	-6,763	-9,303	-9,059	-10,165	-9,840	-9,770	-9,824	-10,165	-10,172
	Mex	-94	-93	-128	-131	-132	-130	-132	-131	-131
	Total	-39,226	-44,470	-43,973	-45,595	-43,723	-44,964	-45,633	-46,547	-46,377
Net Base Resource Capacity	Canada	24,848	24,478	24,570	24,464	24,948	24,779	24,729	24,544	24,464
	Northwest	38,759	37,945	38,388	38,668	39,279	38,656	38,755	38,627	39,179
	Basin	13,039	13,154	12,974	13,025	13,405	13,163	12,663	12,695	12,601
	Rockies	14,614	14,492	14,504	14,343	14,227	14,184	14,072	14,020	14,021
	Desert SW	37,772	37,841	37,640	37,594	37,406	37,304	37,313	37,331	37,206
	No. CA	32,485	31,959	32,811	33,465	33,844	33,711	33,653	33,392	33,315
	So. CA	33,126	33,830	34,324	33,427	33,752	33,822	33,768	33,427	33,420
	Mex	2,753	2,755	2,720	2,717	2,716	2,718	2,716	2,717	2,717
	Total	197,397	196,452	197,931	197,704	199,577	198,336	197,667	196,753	196,922

Table 15 – Sub-region Resources - Class 1 & 2 Parameters (Summer Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1 & 2 Additions/Retirements	Canada	2,331	1,243	802	710	545	0	0	0	0
	Northwest	1,925	1,743	370	570	20	0	0	0	0
	Basin	720	21	0	0	0	0	0	0	0
	Rockies	1,387	0	380	0	0	0	0	0	0
	Desert SW	1,782	99	11	0	0	0	0	0	0
	No. CA	3,542	2,057	1,388	1,176	0	0	0	0	0
	So. CA	9,730	8,378	3,781	2,179	0	662	0	0	0
	Mex	124	107	288	0	0	0	0	0	0
	Total	21,541	13,648	7,020	4,635	565	662	0	0	0
Cumulative Additions/Retirements	Canada	2,331	3,574	4,377	5,086	5,631	5,631	5,631	5,631	5,631
	Northwest	1,925	3,668	4,038	4,608	4,628	4,628	4,628	4,628	4,628
	Basin	720	741	741	741	741	741	741	741	741
	Rockies	1,387	1,387	1,767	1,767	1,767	1,767	1,767	1,767	1,767
	Desert SW	1,782	1,881	1,892	1,892	1,892	1,892	1,892	1,892	1,892
	No. CA	3,542	5,599	6,987	8,163	8,163	8,163	8,163	8,163	8,163
	So. CA	9,730	18,108	21,889	24,068	24,068	24,730	24,730	24,730	24,730
	Mex	124	231	519	519	519	519	519	519	519
	Total	21,541	35,188	42,209	46,843	47,408	48,070	48,070	48,070	48,070
Generation Adjustments	Canada	-3,970	-5,162	-6,220	-6,632	-5,237	-5,371	-5,423	-5,718	-6,739
	Northwest	-17,278	-19,349	-19,188	-19,984	-19,094	-19,673	-19,410	-19,482	-19,493
	Basin	-2,494	-2,460	-2,700	-2,634	-2,217	-2,512	-2,890	-2,919	-3,058
	Rockies	-2,632	-2,774	-2,793	-2,830	-3,082	-3,082	-3,162	-3,257	-3,152
	Desert SW	-2,770	-2,870	-2,979	-3,036	-3,214	-3,319	-3,338	-3,391	-3,424
	No. CA	-4,280	-5,770	-5,718	-6,107	-5,709	-5,764	-5,796	-5,998	-6,257
	So. CA	-11,671	-16,184	-18,147	-21,576	-21,884	-21,530	-21,873	-22,040	-21,656
	Mex	-98	-100	-144	-147	-148	-146	-148	-147	-147
	Total	-45,193	-54,669	-57,889	-62,944	-60,583	-61,396	-62,040	-62,951	-63,926
Net Base Resource Capacity	Canada	26,141	26,193	25,937	26,234	28,175	28,041	27,989	27,693	26,672
	Northwest	39,091	38,762	39,293	39,067	39,977	39,398	39,661	39,589	39,578
	Basin	13,549	13,604	13,363	13,430	13,847	13,552	13,173	13,145	13,005
	Rockies	14,709	14,566	14,927	14,890	14,639	14,639	14,558	14,463	14,568
	Desert SW	38,109	38,107	38,010	37,953	37,775	37,670	37,651	37,598	37,565
	No. CA	33,626	34,193	35,633	36,420	36,818	36,763	36,731	36,529	36,270
	So. CA	34,953	38,819	40,637	39,387	39,078	40,095	39,751	39,584	39,969
	Mex	2,874	2,979	3,223	3,220	3,219	3,221	3,219	3,220	3,220
	Total	203,051	207,222	211,023	210,603	213,528	213,378	212,733	211,823	210,847

Table 16 – Sub-region Resources - Class 1 - 3 Parameters (Summer Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1, 2, & 3 Additions/Retirements	Canada	2,361	1,273	1,252	1,159	545	0	0	500	0
	Northwest	1,962	1,743	1,249	570	20	254	200	208	0
	Basin	1,923	199	0	149	18	0	0	0	0
	Rockies	1,387	0	380	0	0	0	0	0	0
	Desert SW	3,206	839	11	0	0	0	0	0	0
	No. CA	4,024	2,549	1,504	1,376	400	0	0	0	0
	So. CA	11,891	11,798	9,332	3,179	1,177	662	0	0	0
	Mex	124	107	288	0	156	0	0	0	0
	Total	26,877	18,507	14,016	6,434	2,316	916	200	708	0
Cumulative Additions/Retirements	Canada	2,361	3,634	4,887	6,046	6,591	6,591	6,591	7,091	7,091
	Northwest	1,962	3,705	4,954	5,524	5,544	5,798	5,998	6,206	6,206
	Basin	1,923	2,122	2,122	2,270	2,288	2,288	2,288	2,288	2,288
	Rockies	1,387	1,387	1,767	1,767	1,767	1,767	1,767	1,767	1,767
	Desert SW	3,206	4,044	4,055	4,055	4,055	4,055	4,055	4,055	4,055
	No. CA	4,024	6,573	8,077	9,453	9,853	9,853	9,853	9,853	9,853
	So. CA	11,891	23,689	33,021	36,200	37,377	38,039	38,039	38,039	38,039
	Mex	124	231	519	519	675	675	675	675	675
	Total	26,877	45,384	59,400	65,834	68,150	69,066	69,266	69,974	69,974
Generation Adjustments	Canada	-3,970	-5,162	-6,220	-6,228	-5,237	-5,371	-5,423	-5,718	-6,739
	Northwest	-17,315	-19,350	-20,011	-20,079	-19,600	-20,754	-20,633	-20,322	-20,600
	Basin	-2,598	-2,613	-2,864	-2,708	-2,587	-2,910	-3,214	-3,150	-3,506
	Rockies	-2,632	-2,774	-2,793	-2,418	-3,082	-3,082	-3,162	-3,257	-3,152
	Desert SW	-2,863	-3,118	-3,251	-2,605	-3,443	-3,576	-3,594	-3,640	-4,097
	No. CA	-4,408	-5,986	-5,609	-4,954	-5,227	-5,375	-5,414	-5,617	-5,948
	So. CA	-13,069	-20,459	-27,452	-30,344	-32,372	-32,074	-32,390	-32,478	-32,066
	Mex	-98	-100	-144	-47	-148	-150	-153	-151	-151
	Total	-46,953	-59,562	-68,344	-69,383	-71,694	-73,292	-73,981	-74,333	-76,259
Net Base Resource Capacity	Canada	26,171	26,253	26,447	27,598	29,135	29,001	28,949	29,153	28,132
	Northwest	39,091	38,798	39,386	39,888	40,387	39,487	39,808	40,327	40,049
	Basin	14,648	14,832	14,580	14,885	15,024	14,701	14,397	14,462	14,105
	Rockies	14,709	14,566	14,927	15,302	14,639	14,639	14,558	14,463	14,568
	Desert SW	39,439	40,023	39,901	40,547	39,709	39,575	39,558	39,511	39,055
	No. CA	33,979	34,951	36,832	38,863	38,990	38,842	38,803	38,600	38,269
	So. CA	35,716	40,124	42,463	42,751	41,900	42,860	42,544	42,456	42,868
	Mex	2,874	2,979	3,223	3,320	3,375	3,372	3,370	3,371	3,371
	Total	206,627	212,525	217,759	223,153	223,159	222,477	221,987	222,343	220,418

Table 17 – Sub-region Resources - Class 1 Parameters (Winter Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1 Additions/Retirements	Canada	835	262	0	30	0	0	0	0	0
	Northwest	1,147	9	0	0	0	0	0	0	0
	Basin	215	21	0	0	0	0	0	0	0
	Rockies	1,387	0	0	0	0	0	0	0	0
	Desert SW	1,544	84	11	0	0	0	0	0	0
	No. CA	2,114	510	1,731	0	0	0	0	0	0
	So. CA	4,330	2,158	209	0	0	0	0	0	0
	Mex	0	0	0	0	0	0	0	0	0
	Total	11,571	3,044	1,951	30	0	0	0	0	0
Cumulative Additions/Retirements	Canada	835	1,097	1,097	1,127	1,127	1,127	1,127	1,127	1,127
	Northwest	1,147	1,156	1,156	1,156	1,156	1,156	1,156	1,156	1,156
	Basin	215	236	236	236	236	236	236	236	236
	Rockies	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387	1,387
	Desert SW	1,544	1,628	1,639	1,639	1,639	1,639	1,639	1,639	1,639
	No. CA	2,114	2,624	4,355	4,355	4,355	4,355	4,355	4,355	4,355
	So. CA	4,330	6,488	6,697	6,697	6,697	6,697	6,697	6,697	6,697
	Mex	0	0	0	0	0	0	0	0	0
	Total	11,571	14,615	16,567	16,597	16,597	16,597	16,597	16,597	16,597
Generation Adjustments	Canada	-2,385	-2,743	-2,789	-2,685	-2,793	-2,698	-2,812	-2,743	-2,729
	Northwest	-13,861	-12,614	-12,111	-11,307	-13,138	-12,929	-12,672	-11,776	-11,109
	Basin	-2,040	-1,514	-1,736	-910	-2,256	-2,290	-2,557	-1,955	-1,265
	Rockies	-2,024	-2,259	-2,423	-2,628	-2,134	-2,788	-2,610	-2,746	-2,807
	Desert SW	-3,634	-3,302	-3,732	-3,900	-3,583	-3,420	-3,944	-3,525	-3,878
	No. CA	-5,720	-6,238	-6,630	-6,653	-6,971	-6,829	-6,692	-6,591	-6,784
	So. CA	-9,679	-11,430	-11,280	-11,872	-12,385	-12,176	-12,001	-12,071	-11,882
	Mex	-216	-176	-326	-227	-373	-790	-640	-479	-787
	Total	-39,560	-40,275	-41,027	-40,183	-43,632	-43,921	-43,927	-41,886	-41,241
Net Base Resource Capacity	Canada	26,230	26,135	26,088	26,222	26,114	26,209	26,096	26,165	26,178
	Northwest	41,729	42,986	43,488	44,292	42,462	42,670	42,927	43,824	44,490
	Basin	13,498	14,044	13,823	14,648	13,302	13,269	13,002	13,603	14,293
	Rockies	15,316	15,081	14,917	14,712	15,206	14,553	14,730	14,594	14,534
	Desert SW	37,006	37,422	37,003	36,835	37,152	37,315	36,791	37,210	36,857
	No. CA	30,758	30,751	32,090	32,067	31,748	31,890	32,027	32,128	31,935
	So. CA	31,546	31,953	32,312	31,720	31,207	31,416	31,591	31,521	31,710
	Mex	2,632	2,672	2,522	2,621	2,475	2,058	2,208	2,369	2,061
	Total	198,715	201,043	202,242	203,117	199,667	199,379	199,372	201,414	202,058

Table 18 – Sub-region Resources - Class 1 & 2 Parameters (Winter Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1 & 2 Additions/Retirements	Canada	3,051	1,226	590	765	0	0	0	0	0
	Northwest	2,822	1,215	570	20	0	0	0	0	0
	Basin	720	21	0	0	0	0	0	0	0
	Rockies	1,387	0	380	0	0	0	0	0	0
	Desert SW	1,797	84	11	0	0	0	0	0	0
	No. CA	4,314	2,078	1,771	0	0	0	0	0	0
	So. CA	13,859	6,970	3,239	0	662	0	0	0	0
	Mex	231	288	0	0	0	0	0	0	0
	Total	28,181	11,882	6,561	785	662	0	0	0	0
Cumulative Additions/Retirements	Canada	3,051	4,277	4,866	5,631	5,631	5,631	5,631	5,631	5,631
	Northwest	2,822	4,038	4,608	4,628	4,628	4,628	4,628	4,628	4,628
	Basin	720	741	741	741	741	741	741	741	741
	Rockies	1,387	1,387	1,767	1,767	1,767	1,767	1,767	1,767	1,767
	Desert SW	1,797	1,881	1,892	1,892	1,892	1,892	1,892	1,892	1,892
	No. CA	4,314	6,392	8,163	8,163	8,163	8,163	8,163	8,163	8,163
	So. CA	13,859	20,829	24,068	24,068	24,730	24,730	24,730	24,730	24,730
	Mex	231	519	519	519	519	519	519	519	519
	Total	28,181	40,063	46,623	47,408	48,070	48,070	48,070	48,070	48,070
Generation Adjustments	Canada	-2,756	-3,478	-3,387	-3,876	-3,013	-2,680	-2,950	-2,822	-3,068
	Northwest	-15,211	-15,257	-15,179	-13,984	-15,607	-15,527	-15,147	-14,596	-13,786
	Basin	-2,150	-1,619	-1,840	-1,020	-2,353	-2,401	-2,667	-2,060	-1,375
	Rockies	-1,674	-2,076	-2,308	-2,349	-2,072	-2,522	-2,187	-2,563	-2,527
	Desert SW	-3,843	-3,555	-3,985	-4,154	-3,837	-3,673	-4,197	-3,778	-4,132
	No. CA	-7,438	-9,001	-9,053	-8,966	-9,418	-9,241	-9,124	-9,042	-9,097
	So. CA	-18,832	-23,842	-26,818	-26,606	-28,003	-27,847	-28,003	-27,549	-26,681
	Mex	-216	-176	-326	-227	-373	-790	-640	-479	-787
	Total	-52,122	-59,004	-62,896	-61,182	-64,676	-64,682	-64,914	-62,889	-61,452
Net Base Resource Capacity	Canada	28,075	28,579	29,259	29,535	30,398	30,731	30,461	30,590	30,343
	Northwest	42,055	43,224	43,872	45,088	43,464	43,544	43,925	44,475	45,286
	Basin	13,892	14,445	14,223	15,044	13,711	13,663	13,397	14,004	14,689
	Rockies	15,666	15,264	15,412	15,371	15,648	15,198	15,533	15,158	15,193
	Desert SW	37,050	37,422	37,003	36,835	37,152	37,315	36,791	37,210	36,857
	No. CA	31,239	31,755	33,474	33,561	33,109	33,286	33,403	33,485	33,430
	So. CA	31,921	33,881	34,145	34,357	33,622	33,777	33,621	34,075	34,944
	Mex	2,863	3,191	3,041	3,140	2,994	2,577	2,727	2,888	2,580
	Total	202,761	207,761	210,430	212,930	210,098	210,091	209,859	211,884	213,321

Table 19 – Sub-region Resources - Class 1 - 3 Parameters (Winter Rating)

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Existing Generation (in-service on 12/31/10)	Canada	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780	27,780
	Northwest	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443	54,443
	Basin	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323	15,323
	Rockies	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953	15,953
	Desert SW	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096	39,096
	No. CA	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364	34,364
	So. CA	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895	36,895
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703	226,703
Existing Hydro Generation	Canada	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397	14,397
	Northwest	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868	33,868
	Basin	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322	2,322
	Rockies	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
	Desert SW	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062	3,062
	No. CA	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131	10,131
	So. CA	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
	Mex	0	0	0	0	0	0	0	0	0
	Total	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452	69,452
Existing NonHydro Generation	Canada	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384	13,384
	Northwest	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576	20,576
	Basin	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000
	Rockies	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218	14,218
	Desert SW	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034	36,034
	No. CA	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233	24,233
	So. CA	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959	32,959
	Mex	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848	2,848
	Total	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251	157,251
Net Class 1, 2, & 3 Additions/Retirements	Canada	3,111	1,676	1,039	765	0	0	500	0	0
	Northwest	2,859	1,374	1,290	20	0	254	200	208	0
	Basin	2,069	53	149	18	0	0	0	0	0
	Rockies	1,387	0	380	0	0	0	0	0	0
	Desert SW	3,460	584	11	0	0	0	0	0	0
	No. CA	5,116	2,266	2,051	420	0	0	0	0	0
	So. CA	17,920	11,551	6,359	947	1,262	0	0	0	0
	Mex	231	288	0	0	156	0	0	0	0
	Total	36,153	17,791	11,280	2,170	1,418	254	700	208	0
Cumulative Additions/Retirements	Canada	3,111	4,787	5,826	6,591	6,591	6,591	7,091	7,091	7,091
	Northwest	2,859	4,234	5,524	5,544	5,544	5,798	5,998	6,206	6,206
	Basin	2,069	2,122	2,270	2,288	2,288	2,288	2,288	2,288	2,288
	Rockies	1,387	1,387	1,767	1,767	1,767	1,767	1,767	1,767	1,767
	Desert SW	3,460	4,044	4,055	4,055	4,055	4,055	4,055	4,055	4,055
	No. CA	5,116	7,382	9,433	9,853	9,853	9,853	9,853	9,853	9,853
	So. CA	17,920	29,471	35,830	36,777	38,039	38,039	38,039	38,039	38,039
	Mex	231	519	519	519	675	675	675	675	675
	Total	36,153	53,944	65,224	67,394	68,812	69,066	69,766	69,974	69,974
Generation Adjustments	Canada	-2,756	-3,478	-3,387	-3,876	-3,013	-2,680	-2,950	-2,822	-3,068
	Northwest	-15,211	-15,410	-16,025	-14,405	-16,475	-16,564	-16,429	-15,504	-14,753
	Basin	-2,469	-1,934	-2,219	-1,368	-2,773	-2,839	-3,145	-2,524	-1,723
	Rockies	-1,674	-2,076	-2,308	-2,349	-2,072	-2,522	-2,187	-2,563	-2,527
	Desert SW	-4,572	-4,784	-5,214	-5,383	-5,066	-4,902	-5,426	-5,007	-5,361
	No. CA	-7,940	-9,391	-9,691	-9,654	-10,074	-9,930	-9,808	-9,690	-9,785
	So. CA	-21,896	-31,482	-37,384	-37,930	-39,607	-39,399	-39,792	-39,309	-38,304
	Mex	-216	-176	-326	-227	-373	-790	-640	-479	-787
	Total	-56,734	-68,732	-76,554	-75,192	-79,452	-79,627	-80,376	-77,899	-76,309
Net Base Resource Capacity	Canada	28,135	29,089	30,219	30,495	31,358	31,691	31,921	32,050	31,803
	Northwest	42,092	43,267	43,942	45,582	43,512	43,677	44,012	45,145	45,896
	Basin	14,923	15,510	15,374	16,243	14,838	14,772	14,466	15,087	15,888
	Rockies	15,666	15,264	15,412	15,371	15,648	15,198	15,533	15,158	15,193
	Desert SW	37,984	38,356	37,937	37,769	38,086	38,249	37,725	38,144	37,791
	No. CA	31,540	32,355	34,106	34,563	34,143	34,287	34,409	34,527	34,432
	So. CA	32,919	34,883	35,340	35,742	35,327	35,535	35,142	35,624	36,629
	Mex	2,863	3,191	3,041	3,140	3,150	2,733	2,883	3,044	2,736
	Total	206,122	211,915	215,373	218,905	216,062	216,142	216,092	218,778	220,367

Table 20 – Sub-region Summary - Case #1

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	17,182	17,701	18,988	20,336	19,757	20,245	20,617	21,592	22,567
	Northwest	24,547	24,771	25,056	25,371	25,492	25,732	25,943	26,281	26,619
	Basin	13,983	14,323	14,277	14,043	14,999	15,220	15,432	15,265	15,099
	Rockies	9,861	10,040	10,811	9,078	10,767	10,981	11,200	10,587	9,974
	Desert SW	27,742	28,112	29,611	29,922	29,994	30,694	31,383	32,411	33,439
	No. CA	25,196	24,215	24,190	25,412	26,758	27,170	27,565	27,452	27,338
	So. CA	31,094	31,523	32,192	34,085	33,266	33,712	34,153	35,465	36,777
	Mex	2,118	2,219	2,473	2,565	2,562	2,683	2,801	3,000	3,198
	Total	151,722	152,904	157,599	160,812	163,594	166,437	169,093	172,052	175,011
Building Block Reserve Requirement	Canada	2,124	2,188	2,347	2,514	2,442	2,502	2,548	2,584	2,789
	Northwest	4,396	4,436	4,488	4,544	4,566	4,609	4,646	4,688	4,767
	Basin	1,762	1,805	1,799	1,769	1,890	1,918	1,944	1,978	1,902
	Rockies	1,445	1,471	1,584	1,330	1,577	1,609	1,641	1,664	1,461
	Desert SW	3,753	3,804	4,006	4,048	4,058	4,153	4,246	4,333	4,524
	No. CA	3,706	3,562	3,558	3,738	3,936	3,997	4,055	3,865	4,021
	So. CA	4,708	4,773	4,874	5,160	5,036	5,104	5,171	5,233	5,568
	Mex	251	263	293	304	304	318	332	347	379
	Total	22,145	22,301	22,949	23,408	23,809	24,209	24,584	24,692	25,413
Load Requirement	Canada	19,306	19,889	21,335	22,850	22,199	22,747	23,165	24,176	25,356
	Northwest	28,943	29,207	29,544	29,915	30,057	30,341	30,589	30,969	31,386
	Basin	15,744	16,127	16,076	15,812	16,888	17,138	17,376	17,243	17,001
	Rockies	11,306	11,511	12,395	10,408	12,344	12,590	12,841	12,251	11,435
	Desert SW	31,495	31,916	33,617	33,970	34,052	34,847	35,629	36,744	37,964
	No. CA	28,902	27,776	27,749	29,150	30,694	31,166	31,620	31,317	31,360
	So. CA	35,802	36,296	37,066	39,245	38,302	38,816	39,324	40,698	42,345
	Mex	2,369	2,482	2,766	2,869	2,866	3,001	3,133	3,346	3,577
	Total	173,867	175,205	180,548	184,220	187,403	190,646	193,677	196,744	200,425
Net Base Resource Capacity	Canada	24,848	24,478	24,570	24,464	24,948	24,779	24,729	24,544	24,464
	Northwest	38,759	37,945	38,388	38,668	39,279	38,656	38,755	38,627	39,179
	Basin	13,039	13,154	12,974	13,025	13,405	13,163	12,663	12,695	12,601
	Rockies	14,614	14,492	14,504	14,343	14,227	14,184	14,072	14,020	14,021
	Desert SW	37,772	37,841	37,640	37,594	37,406	37,304	37,313	37,331	37,206
	No. CA	32,485	31,959	32,811	33,465	33,844	33,711	33,653	33,392	33,315
	So. CA	33,126	33,830	34,324	33,427	33,752	33,822	33,768	33,427	33,420
	Mex	2,753	2,755	2,720	2,717	2,716	2,718	2,716	2,717	2,717
	Total	197,397	196,452	197,931	197,704	199,577	198,336	197,667	196,753	196,922
Net Imports (+) (negative if exporting)	Canada	-2,200	-2,200	-1,976	-881	-2,170	-2,132	-2,101	-2,239	-684
	Northwest	-6,097	-4,623	-4,525	-5,969	-7,053	-7,091	-7,122	-6,749	-7,165
	Basin	3,539	3,662	3,766	3,361	4,016	4,418	4,433	4,218	3,773
	Rockies	-755	-692	-736	-2,537	-531	-177	-583	-1,265	-2,236
	Desert SW	-2,608	-2,834	-105	-859	-1,716	-1,959	-843	-262	831
	No. CA	2,825	1,825	103	753	2,846	2,825	2,825	2,568	2,952
	So. CA	5,296	4,863	3,451	5,983	4,503	3,907	2,983	3,438	2,530
	Mex	0	0	21	149	106	208	408	291	0
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	22,648	22,278	22,594	23,584	22,778	22,647	22,628	22,305	23,780
	Northwest	32,662	33,322	33,863	32,699	32,226	31,565	31,632	31,877	32,013
	Basin	16,578	16,815	16,741	16,386	17,421	17,581	17,096	16,913	16,374
	Rockies	13,859	13,800	13,768	11,806	13,695	14,007	13,489	12,755	11,785
	Desert SW	35,165	35,006	37,535	36,735	35,690	35,345	36,470	37,069	38,037
	No. CA	35,310	33,784	32,915	34,218	36,690	36,536	36,478	35,960	36,266
	So. CA	38,421	38,693	37,775	39,411	38,255	37,729	36,751	36,865	35,950
	Mex	2,753	2,755	2,741	2,865	2,821	2,926	3,124	3,008	2,717
	Total	197,397	196,452	197,931	197,704	199,577	198,336	197,667	196,753	196,922
Power Supply Margin	Canada	3,342	2,389	1,259	734	579	-100	-537	-1,871	-1,576
	Northwest	3,719	4,115	4,319	2,784	2,168	1,224	1,043	908	627
	Basin	834	688	664	574	533	443	-280	-330	-628
	Rockies	2,554	2,289	1,374	1,398	1,351	1,417	648	504	350
	Desert SW	3,670	3,090	3,918	2,764	1,638	498	841	326	73
	No. CA	6,408	6,008	5,166	5,068	5,997	5,369	4,858	4,644	4,906
	So. CA	2,620	2,397	709	165	-48	-1,087	-2,573	-3,833	-6,395
	Mex	384	272	-25	-4	-44	-75	-10	-338	-861
	Total	23,530	21,247	17,383	13,484	12,174	7,690	3,990	9	-3,503

Table 21 – Sub-region Summary - Case #2

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	21,891	22,478	23,338	24,102	24,801	25,340	25,764	26,130	26,464
	Northwest	29,816	30,091	30,344	30,597	30,868	31,151	31,412	31,704	32,015
	Basin	11,756	12,022	12,292	12,522	12,720	12,925	13,119	13,334	13,515
	Rockies	9,630	9,839	10,000	10,241	10,534	10,789	11,021	11,244	11,394
	Desert SW	16,743	16,963	17,305	17,608	18,180	18,566	18,956	19,303	19,626
	No. CA	17,461	18,184	18,607	18,913	18,473	18,779	19,068	20,003	20,535
	So. CA	22,751	23,160	23,683	24,092	24,374	24,795	25,236	25,667	26,307
	Mex	1,466	1,539	1,615	1,692	1,765	1,852	1,936	2,024	2,110
	Total	131,514	134,276	137,184	139,765	141,714	144,197	146,512	149,409	151,965
Building Block Reserve Requirement	Canada	3,073	3,156	3,277	3,384	3,482	3,558	3,617	3,669	3,716
	Northwest	5,918	5,973	6,023	6,073	6,127	6,183	6,235	6,293	6,355
	Basin	1,586	1,622	1,658	1,689	1,716	1,744	1,770	1,799	1,823
	Rockies	1,527	1,560	1,586	1,624	1,671	1,711	1,748	1,783	1,807
	Desert SW	2,321	2,351	2,398	2,440	2,519	2,572	2,626	2,674	2,719
	No. CA	2,071	2,157	2,207	2,243	2,191	2,227	2,262	2,372	2,435
	So. CA	2,509	2,555	2,612	2,657	2,688	2,735	2,784	2,831	2,902
	Mex	157	165	173	181	189	198	207	217	226
	Total	19,163	19,538	19,934	20,292	20,583	20,929	21,249	21,638	21,982
Load Requirement	Canada	24,964	25,634	26,615	27,486	28,283	28,898	29,381	29,799	30,180
	Northwest	35,734	36,065	36,368	36,670	36,995	37,334	37,647	37,997	38,370
	Basin	13,342	13,644	13,950	14,211	14,435	14,669	14,889	15,133	15,338
	Rockies	11,157	11,399	11,586	11,865	12,205	12,500	12,769	13,027	13,201
	Desert SW	19,064	19,314	19,703	20,048	20,699	21,139	21,582	21,977	22,345
	No. CA	19,532	20,340	20,814	21,156	20,664	21,006	21,330	22,375	22,970
	So. CA	25,260	25,715	26,296	26,749	27,063	27,530	28,019	28,498	29,208
	Mex	1,623	1,704	1,788	1,873	1,954	2,050	2,143	2,241	2,336
	Total	150,677	153,814	157,118	160,058	162,297	165,126	167,760	171,047	173,947
Net Base Resource Capacity	Canada	26,230	26,135	26,088	26,222	26,114	26,209	26,096	26,165	26,178
	Northwest	41,729	42,986	43,488	44,292	42,462	42,670	42,927	43,824	44,490
	Basin	13,498	14,044	13,823	14,648	13,302	13,269	13,002	13,603	14,293
	Rockies	15,316	15,081	14,917	14,712	15,206	14,553	14,730	14,594	14,534
	Desert SW	37,006	37,422	37,003	36,835	37,152	37,315	36,791	37,210	36,857
	No. CA	30,758	30,751	32,090	32,067	31,748	31,890	32,027	32,128	31,935
	So. CA	31,546	31,953	32,312	31,720	31,207	31,416	31,591	31,521	31,710
	Mex	2,632	2,672	2,522	2,621	2,475	2,058	2,208	2,369	2,061
	Total	198,715	201,043	202,242	203,117	199,667	199,379	199,372	201,414	202,058
Net Imports (+) (negative if exporting)	Canada	667	528	110	824	830	808	-128	375	532
	Northwest	-1,994	-3,696	-3,410	-4,319	-3,118	-3,263	-2,430	-3,288	-3,521
	Basin	2,789	2,926	2,780	3,030	3,490	3,006	3,583	3,005	3,046
	Rockies	1,238	1,115	1,682	1,536	1,077	1,383	1,163	1,714	1,714
	Desert SW	-8,201	-7,670	-6,378	-6,643	-6,628	-7,159	-6,308	-6,453	-6,059
	No. CA	-899	-600	-452	-440	-1,641	-1,179	-1,434	-1,953	-2,500
	So. CA	6,715	7,657	5,955	6,216	6,074	6,125	5,380	6,677	6,751
	Mex	-314	-259	-287	-204	-84	279	174	-77	37
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	26,897	26,662	26,197	27,046	26,944	27,017	25,968	26,540	26,710
	Northwest	39,735	39,290	40,078	39,974	39,344	39,406	40,497	40,536	40,970
	Basin	16,287	16,970	16,602	17,678	16,792	16,274	16,585	16,608	17,340
	Rockies	16,554	16,196	16,599	16,248	16,283	15,936	15,893	16,308	16,248
	Desert SW	28,805	29,752	30,626	30,191	30,524	30,156	30,484	30,757	30,798
	No. CA	29,859	30,151	31,637	31,626	30,107	30,711	30,593	30,175	29,435
	So. CA	38,261	39,609	38,267	37,936	37,281	37,541	36,970	38,198	38,461
	Mex	2,318	2,412	2,235	2,417	2,391	2,337	2,382	2,291	2,098
	Total	198,715	201,043	202,242	203,117	199,667	199,379	199,372	201,414	202,058
Power Supply Margin	Canada	1,932	1,029	-417	-439	-1,339	-1,880	-3,413	-3,259	-3,470
	Northwest	4,001	3,225	3,710	3,304	2,349	2,072	2,850	2,539	2,600
	Basin	2,945	3,326	2,653	3,468	2,357	1,605	1,696	1,475	2,002
	Rockies	5,397	4,797	5,013	4,383	4,078	3,436	3,124	3,281	3,046
	Desert SW	9,741	10,438	10,923	10,144	9,825	9,017	8,902	8,781	8,453
	No. CA	10,327	9,811	10,824	10,470	9,443	9,705	9,263	7,800	6,465
	So. CA	13,001	13,895	11,972	11,187	10,219	10,012	8,951	9,700	9,252
	Mex	695	708	447	544	437	287	238	50	-238
	Total	48,038	47,229	45,124	43,059	37,370	34,253	31,612	30,367	28,111

Table 22 – Sub-region Summary - Case #3

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	17,182	17,701	18,988	20,336	19,757	20,245	20,617	21,592	22,567
	Northwest	24,547	24,771	25,056	25,371	25,492	25,732	25,943	26,281	26,619
	Basin	13,983	14,323	14,277	14,043	14,999	15,220	15,432	15,265	15,099
	Rockies	9,861	10,040	10,811	9,078	10,767	10,981	11,200	10,587	9,974
	Desert SW	27,742	28,112	29,611	29,922	29,994	30,694	31,383	32,411	33,439
	No. CA	25,196	24,215	24,190	25,412	26,758	27,170	27,565	27,452	27,338
	So. CA	31,094	31,523	32,192	34,085	33,266	33,712	34,153	35,465	36,777
	Mex	2,118	2,219	2,473	2,565	2,562	2,683	2,801	3,000	3,198
	Total	151,722	152,904	157,599	160,812	163,594	166,437	169,093	172,052	175,011
Building Block Reserve Requirement	Canada	2,124	2,188	2,347	2,514	2,442	2,502	2,548	2,584	2,789
	Northwest	4,396	4,436	4,488	4,544	4,566	4,609	4,646	4,688	4,767
	Basin	1,762	1,805	1,799	1,769	1,890	1,918	1,944	1,978	1,902
	Rockies	1,445	1,471	1,584	1,330	1,577	1,609	1,641	1,664	1,461
	Desert SW	3,753	3,804	4,006	4,048	4,058	4,153	4,246	4,333	4,524
	No. CA	3,706	3,562	3,558	3,738	3,936	3,997	4,055	3,865	4,021
	So. CA	4,708	4,773	4,874	5,160	5,036	5,104	5,171	5,233	5,568
	Mex	251	263	293	304	304	318	332	347	379
	Total	22,145	22,301	22,949	23,408	23,809	24,209	24,584	24,692	25,413
Load Requirement	Canada	19,306	19,889	21,335	22,850	22,199	22,747	23,165	24,176	25,356
	Northwest	28,943	29,207	29,544	29,915	30,057	30,341	30,589	30,969	31,386
	Basin	15,744	16,127	16,076	15,812	16,888	17,138	17,376	17,243	17,001
	Rockies	11,306	11,511	12,395	10,408	12,344	12,590	12,841	12,251	11,435
	Desert SW	31,495	31,916	33,617	33,970	34,052	34,847	35,629	36,744	37,964
	No. CA	28,902	27,776	27,749	29,150	30,694	31,166	31,620	31,317	31,360
	So. CA	35,802	36,296	37,066	39,245	38,302	38,816	39,324	40,698	42,345
	Mex	2,369	2,482	2,766	2,869	2,866	3,001	3,133	3,346	3,577
	Total	173,867	175,205	180,548	184,220	187,403	190,646	193,677	196,744	200,425
Net Base Resource Capacity	Canada	26,141	26,193	25,937	26,234	28,175	28,041	27,989	27,693	26,672
	Northwest	39,091	38,762	39,293	39,067	39,977	39,398	39,661	39,589	39,578
	Basin	13,549	13,604	13,363	13,430	13,847	13,552	13,173	13,145	13,005
	Rockies	14,709	14,566	14,927	14,890	14,639	14,639	14,558	14,463	14,568
	Desert SW	38,109	38,107	38,010	37,953	37,775	37,670	37,651	37,598	37,565
	No. CA	33,626	34,193	35,633	36,420	36,818	36,763	36,731	36,529	36,270
	So. CA	34,953	38,819	40,637	39,387	39,078	40,095	39,751	39,584	39,969
	Mex	2,874	2,979	3,223	3,220	3,219	3,221	3,219	3,220	3,220
	Total	203,051	207,222	211,023	210,603	213,528	213,378	212,733	211,823	210,847
Net Imports (+) (negative if exporting)	Canada	-2,200	-2,200	-2,200	-1,670	-2,200	-2,200	-2,200	-2,285	-846
	Northwest	-6,123	-5,123	-2,991	-3,731	-6,873	-6,123	-6,108	-5,568	-6,408
	Basin	2,587	3,536	3,566	3,305	3,872	4,322	4,339	3,728	3,131
	Rockies	-736	-628	-261	-1,900	255	465	100	-808	-2,236
	Desert SW	-707	42	2,010	1,589	222	274	1,080	1,399	1,596
	No. CA	2,825	2,825	-307	68	2,825	2,825	3,210	2,833	2,756
	So. CA	4,353	1,549	182	2,331	1,898	437	-672	420	1,654
	Mex	0	0	0	8	0	0	251	281	353
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	23,941	23,993	23,737	24,564	25,975	25,841	25,789	25,408	25,826
	Northwest	32,968	33,640	36,303	35,336	33,105	33,275	33,554	34,022	33,170
	Basin	16,136	17,139	16,929	16,736	17,719	17,874	17,512	16,873	16,136
	Rockies	13,973	13,938	14,666	12,990	14,894	15,103	14,659	13,655	12,332
	Desert SW	37,402	38,149	40,020	39,542	37,997	37,944	38,731	38,998	39,161
	No. CA	36,451	37,018	35,326	36,488	39,643	39,588	39,940	39,362	39,026
	So. CA	39,307	40,367	40,819	41,718	40,977	40,532	39,079	40,004	41,623
	Mex	2,874	2,979	3,223	3,228	3,219	3,221	3,470	3,501	3,573
	Total	203,051	207,222	211,023	210,603	213,528	213,378	212,733	211,823	210,847
Power Supply Margin	Canada	4,636	4,104	2,402	1,715	3,776	3,093	2,623	1,232	470
	Northwest	4,025	4,432	6,759	5,421	3,047	2,934	2,965	3,053	1,783
	Basin	392	1,012	853	923	831	737	136	-370	-865
	Rockies	2,667	2,427	2,271	2,582	2,549	2,514	1,818	1,404	897
	Desert SW	5,907	6,233	6,402	5,572	3,946	3,097	3,102	2,254	1,197
	No. CA	7,549	9,241	7,577	7,338	8,950	8,422	8,320	8,045	7,666
	So. CA	3,505	4,071	3,753	2,473	2,674	1,716	-245	-694	-722
	Mex	505	496	457	359	353	220	337	155	-4
	Total	29,184	32,017	30,474	26,383	26,126	22,732	19,056	15,079	10,423

Table 23 – Sub-region Summary - Case # 4

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	21,891	22,478	23,338	24,102	24,801	25,340	25,764	26,130	26,464
	Northwest	29,816	30,091	30,344	30,597	30,868	31,151	31,412	31,704	32,015
	Basin	11,756	12,022	12,292	12,522	12,720	12,925	13,119	13,334	13,515
	Rockies	9,630	9,839	10,000	10,241	10,534	10,789	11,021	11,244	11,394
	Desert SW	16,743	16,963	17,305	17,608	18,180	18,566	18,956	19,303	19,626
	No. CA	17,461	18,184	18,607	18,913	18,473	18,779	19,068	20,003	20,535
	So. CA	22,751	23,160	23,683	24,092	24,374	24,795	25,236	25,667	26,307
	Mex	1,466	1,539	1,615	1,692	1,765	1,852	1,936	2,024	2,110
	Total	131,514	134,276	137,184	139,765	141,714	144,197	146,512	149,409	151,965
Building Block Reserve Requirement	Canada	3,073	3,156	3,277	3,384	3,482	3,558	3,617	3,669	3,716
	Northwest	5,918	5,973	6,023	6,073	6,127	6,183	6,235	6,293	6,355
	Basin	1,586	1,622	1,658	1,689	1,716	1,744	1,770	1,799	1,823
	Rockies	1,527	1,560	1,586	1,624	1,671	1,711	1,748	1,783	1,807
	Desert SW	2,321	2,351	2,398	2,440	2,519	2,572	2,626	2,674	2,719
	No. CA	2,071	2,157	2,207	2,243	2,191	2,227	2,262	2,372	2,435
	So. CA	2,509	2,555	2,612	2,657	2,688	2,735	2,784	2,831	2,902
	Mex	157	165	173	181	189	198	207	217	226
	Total	19,163	19,538	19,934	20,292	20,583	20,929	21,249	21,638	21,982
Load Requirement	Canada	24,964	25,634	26,615	27,486	28,283	28,898	29,381	29,799	30,180
	Northwest	35,734	36,065	36,368	36,670	36,995	37,334	37,647	37,997	38,370
	Basin	13,342	13,644	13,950	14,211	14,435	14,669	14,889	15,133	15,338
	Rockies	11,157	11,399	11,586	11,865	12,205	12,500	12,769	13,027	13,201
	Desert SW	19,064	19,314	19,703	20,048	20,699	21,139	21,582	21,977	22,345
	No. CA	19,532	20,340	20,814	21,156	20,664	21,006	21,330	22,375	22,970
	So. CA	25,260	25,715	26,296	26,749	27,063	27,530	28,019	28,498	29,208
	Mex	1,623	1,704	1,788	1,873	1,954	2,050	2,143	2,241	2,336
	Total	150,677	153,814	157,118	160,058	162,297	165,126	167,760	171,047	173,947
Net Base Resource Capacity	Canada	28,075	28,579	29,259	29,535	30,398	30,731	30,461	30,590	30,343
	Northwest	42,055	43,224	43,872	45,088	43,464	43,544	43,925	44,475	45,286
	Basin	13,892	14,445	14,223	15,044	13,711	13,663	13,397	14,004	14,689
	Rockies	15,666	15,264	15,412	15,371	15,648	15,198	15,533	15,158	15,193
	Desert SW	37,050	37,422	37,003	36,835	37,152	37,315	36,791	37,210	36,857
	No. CA	31,239	31,755	33,474	33,561	33,109	33,286	33,403	33,485	33,430
	So. CA	31,921	33,881	34,145	34,357	33,622	33,777	33,621	34,075	34,944
	Mex	2,863	3,191	3,041	3,140	2,994	2,577	2,727	2,888	2,580
	Total	202,761	207,761	210,430	212,930	210,098	210,091	209,859	211,884	213,321
Net Imports (+) (negative if exporting)	Canada	411	87	211	636	437	825	663	672	600
	Northwest	-1,898	-3,341	-3,479	-5,300	-3,558	-3,487	-3,227	-3,505	-4,165
	Basin	2,492	2,404	3,089	2,650	3,878	3,465	3,600	2,688	2,941
	Rockies	277	847	1,714	1,252	459	1,161	1,142	1,714	1,537
	Desert SW	-7,079	-5,627	-4,206	-4,502	-5,130	-6,260	-5,909	-5,412	-4,835
	No. CA	-1,339	-1,375	-2,551	-1,161	-1,811	-2,184	-2,562	-2,523	-1,942
	So. CA	7,144	6,997	5,377	6,497	6,089	6,484	6,381	6,695	6,079
	Mex	-8	9	-155	-72	-364	-4	-88	-330	-215
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	28,485	28,666	29,470	30,171	30,835	31,556	31,124	31,261	30,943
	Northwest	40,157	39,882	40,393	39,788	39,906	40,057	40,698	40,970	41,121
	Basin	16,384	16,849	17,312	17,694	17,589	17,127	16,997	16,693	17,630
	Rockies	15,943	16,111	17,126	16,623	16,107	16,359	16,675	16,872	16,730
	Desert SW	29,971	31,795	32,797	32,333	32,022	31,055	30,882	31,799	32,022
	No. CA	29,900	30,380	30,923	32,400	31,298	31,102	30,841	30,962	31,488
	So. CA	39,065	40,878	39,522	40,853	39,711	40,261	40,003	40,771	41,023
	Mex	2,855	3,200	2,886	3,068	2,630	2,573	2,639	2,558	2,365
	Total	202,761	207,761	210,430	212,930	210,098	210,091	209,859	211,884	213,321
Power Supply Margin	Canada	3,521	3,032	2,856	2,685	2,552	2,658	1,743	1,462	764
	Northwest	4,423	3,818	4,025	3,118	2,911	2,723	3,050	2,973	2,751
	Basin	3,042	3,206	3,363	3,484	3,154	2,458	2,108	1,560	2,292
	Rockies	4,786	4,711	5,540	4,758	3,902	3,859	3,907	3,844	3,529
	Desert SW	10,907	12,481	13,094	12,285	11,323	9,917	9,300	9,822	9,677
	No. CA	10,368	10,039	10,109	11,244	10,634	10,095	9,511	8,587	8,518
	So. CA	13,805	15,164	13,226	14,104	12,648	12,732	11,983	12,272	11,814
	Mex	1,232	1,496	1,098	1,195	676	523	496	317	29
	Total	52,084	53,947	53,312	52,872	47,800	44,966	42,098	40,838	39,373

Table 24 – Sub-region Summary - Case #5

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	17,182	17,701	18,988	20,336	19,757	20,245	20,617	21,592	22,567
	Northwest	24,547	24,771	25,056	25,371	25,492	25,732	25,943	26,281	26,619
	Basin	13,983	14,323	14,277	14,043	14,999	15,220	15,432	15,265	15,099
	Rockies	9,861	10,040	10,811	9,078	10,767	10,981	11,200	10,587	9,974
	Desert SW	27,742	28,112	29,611	29,922	29,994	30,694	31,383	32,411	33,439
	No. CA	25,196	24,215	24,190	25,412	26,758	27,170	27,565	27,452	27,338
	So. CA	31,094	31,523	32,192	34,085	33,266	33,712	34,153	35,465	36,777
	Mex	2,118	2,219	2,473	2,565	2,562	2,683	2,801	3,000	3,198
	Total	151,722	152,904	157,599	160,812	163,594	166,437	169,093	172,052	175,011
Building Block Reserve Requirement	Canada	2,124	2,188	2,347	2,514	2,442	2,502	2,548	2,584	2,789
	Northwest	4,396	4,436	4,488	4,544	4,566	4,609	4,646	4,688	4,767
	Basin	1,762	1,805	1,799	1,769	1,890	1,918	1,944	1,978	1,902
	Rockies	1,445	1,471	1,584	1,330	1,577	1,609	1,641	1,664	1,461
	Desert SW	3,753	3,804	4,006	4,048	4,058	4,153	4,246	4,333	4,524
	No. CA	3,706	3,562	3,558	3,738	3,936	3,997	4,055	3,865	4,021
	So. CA	4,708	4,773	4,874	5,160	5,036	5,104	5,171	5,233	5,568
	Mex	251	263	293	304	304	318	332	347	379
	Total	22,145	22,038	22,656	23,104	23,505	23,891	24,251	24,345	25,034
Load Requirement	Canada	19,306	19,889	21,335	22,850	22,199	22,747	23,165	24,176	25,356
	Northwest	28,943	29,207	29,544	29,915	30,057	30,341	30,589	30,969	31,386
	Basin	15,744	16,127	16,076	15,812	16,888	17,138	17,376	17,243	17,001
	Rockies	11,306	11,511	12,395	10,408	12,344	12,590	12,841	12,251	11,435
	Desert SW	31,495	31,916	33,617	33,970	34,052	34,847	35,629	36,744	37,964
	No. CA	28,902	27,776	27,749	29,150	30,694	31,166	31,620	31,317	31,360
	So. CA	35,802	36,296	37,066	39,245	38,302	38,816	39,324	40,698	42,345
	Mex	2,369	2,482	2,766	2,869	2,866	3,001	3,133	3,346	3,577
	Total	173,867	175,205	180,548	184,220	187,403	190,646	193,677	196,744	200,425
Net Base Resource Capacity	Canada	26,171	26,253	26,447	27,598	29,135	29,001	28,949	29,153	28,132
	Northwest	39,091	38,798	39,386	39,888	40,387	39,487	39,808	40,327	40,049
	Basin	14,648	14,832	14,580	14,885	15,024	14,701	14,397	14,462	14,105
	Rockies	14,709	14,566	14,927	15,302	14,639	14,639	14,558	14,463	14,568
	Desert SW	39,439	40,023	39,901	40,547	39,709	39,575	39,558	39,511	39,055
	No. CA	33,979	34,951	36,832	38,863	38,990	38,842	38,803	38,600	38,269
	So. CA	35,716	40,124	42,463	42,751	41,900	42,860	42,544	42,456	42,868
	Mex	2,874	2,979	3,223	3,320	3,375	3,372	3,370	3,371	3,371
	Total	206,627	212,525	217,759	223,153	223,159	222,477	221,987	222,343	220,418
Net Imports (+) (negative if exporting)	Canada	-2,200	-2,200	-2,200	-1,680	-3,200	-2,200	-2,200	-2,285	-1,815
	Northwest	-5,622	-6,123	-3,695	-3,301	-6,547	-6,022	-5,776	-5,557	-5,185
	Basin	1,870	3,061	3,375	2,921	3,673	3,723	3,756	3,286	2,733
	Rockies	-984	106	498	-1,281	1,369	1,064	1,031	469	-1,178
	Desert SW	-1,340	-1,939	-216	-132	22	7	912	1,115	2,227
	No. CA	2,825	2,825	97	-272	2,325	2,724	2,478	2,323	1,944
	So. CA	5,450	4,270	2,063	3,350	2,145	312	-584	327	869
	Mex	0	0	78	395	213	391	383	323	405
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	23,971	24,053	24,247	25,918	25,935	26,801	26,749	26,868	26,317
	Northwest	33,469	32,675	35,691	36,587	33,840	33,465	34,033	34,770	34,864
	Basin	16,518	17,893	17,955	17,806	18,698	18,424	18,153	17,748	16,838
	Rockies	13,725	14,672	15,425	14,021	16,008	15,703	15,589	14,932	13,390
	Desert SW	38,099	38,084	39,685	40,415	39,730	39,582	40,470	40,626	41,282
	No. CA	36,804	37,776	36,929	38,591	41,315	41,566	41,281	40,922	40,213
	So. CA	41,166	44,394	44,526	46,101	44,045	43,172	41,959	42,782	43,737
	Mex	2,874	2,979	3,301	3,714	3,588	3,764	3,754	3,694	3,776
	Total	206,627	212,525	217,759	223,153	223,159	222,477	221,987	222,343	220,418
Power Supply Margin	Canada	4,666	4,164	2,912	3,069	3,736	4,053	3,583	2,692	961
	Northwest	4,526	3,468	6,148	6,672	3,783	3,125	3,444	3,801	3,478
	Basin	774	1,765	1,879	1,994	1,809	1,287	777	504	-163
	Rockies	2,419	3,161	3,030	3,613	3,663	3,113	2,749	2,680	1,955
	Desert SW	6,604	6,168	6,067	6,444	5,679	4,735	4,841	3,883	3,319
	No. CA	7,902	9,999	9,180	9,441	10,621	10,400	9,661	9,606	8,853
	So. CA	5,365	8,098	7,460	6,855	5,742	4,356	2,636	2,085	1,392
	Mex	505	496	535	845	723	763	621	348	199
	Total	32,760	37,320	37,211	38,933	35,756	31,831	28,311	25,600	19,993

Table 25 – Sub-region Summary - Case #6

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	21,891	22,478	23,338	24,102	24,801	25,340	25,764	26,130	26,464
	Northwest	29,816	30,091	30,344	30,597	30,868	31,151	31,412	31,704	32,015
	Basin	11,756	12,022	12,292	12,522	12,720	12,925	13,119	13,334	13,515
	Rockies	9,630	9,839	10,000	10,241	10,534	10,789	11,021	11,244	11,394
	Desert SW	16,743	16,963	17,305	17,608	18,180	18,566	18,956	19,303	19,626
	No. CA	17,461	18,184	18,607	18,913	18,473	18,779	19,068	20,003	20,535
	So. CA	22,751	23,160	23,683	24,092	24,374	24,795	25,236	25,667	26,307
	Mex	1,466	1,539	1,615	1,692	1,765	1,852	1,936	2,024	2,110
	Total	131,514	134,276	137,184	139,765	141,714	144,197	146,512	149,409	151,965
Building Block Reserve Requirement	Canada	3,073	3,156	3,277	3,384	3,482	3,558	3,617	3,669	3,716
	Northwest	5,918	5,973	6,023	6,073	6,127	6,183	6,235	6,293	6,355
	Basin	1,586	1,622	1,658	1,689	1,716	1,744	1,770	1,799	1,823
	Rockies	1,527	1,560	1,586	1,624	1,671	1,711	1,748	1,783	1,807
	Desert SW	2,321	2,351	2,398	2,440	2,519	2,572	2,626	2,674	2,719
	No. CA	2,071	2,157	2,207	2,243	2,191	2,227	2,262	2,372	2,435
	So. CA	2,509	2,555	2,612	2,657	2,688	2,735	2,784	2,831	2,902
	Mex	157	165	173	181	189	198	207	217	226
	Total	19,163	19,538	19,934	20,292	20,583	20,929	21,249	21,638	21,982
Load Requirement	Canada	24,964	25,634	26,615	27,486	28,283	28,898	29,381	29,799	30,180
	Northwest	35,734	36,065	36,368	36,670	36,995	37,334	37,647	37,997	38,370
	Basin	13,342	13,644	13,950	14,211	14,435	14,669	14,889	15,133	15,338
	Rockies	11,157	11,399	11,586	11,865	12,205	12,500	12,769	13,027	13,201
	Desert SW	19,064	19,314	19,703	20,048	20,699	21,139	21,582	21,977	22,345
	No. CA	19,532	20,340	20,814	21,156	20,664	21,006	21,330	22,375	22,970
	So. CA	25,260	25,715	26,296	26,749	27,063	27,530	28,019	28,498	29,208
	Mex	1,623	1,704	1,788	1,873	1,954	2,050	2,143	2,241	2,336
	Total	150,677	153,814	157,118	160,058	162,297	165,126	167,760	171,047	173,947
Net Base Resource Capacity	Canada	28,135	29,089	30,219	30,495	31,358	31,691	31,921	32,050	31,803
	Northwest	42,092	43,267	43,942	45,582	43,512	43,677	44,012	45,145	45,896
	Basin	14,923	15,510	15,374	16,243	14,838	14,772	14,466	15,087	15,888
	Rockies	15,666	15,264	15,412	15,371	15,648	15,198	15,533	15,158	15,193
	Desert SW	37,984	38,356	37,937	37,769	38,086	38,249	37,725	38,144	37,791
	No. CA	31,540	32,355	34,106	34,563	34,143	34,287	34,409	34,527	34,432
	So. CA	32,919	34,883	35,340	35,742	35,327	35,535	35,142	35,624	36,629
	Mex	2,863	3,191	3,041	3,140	3,150	2,733	2,883	3,044	2,736
	Total	206,122	211,915	215,373	218,905	216,062	216,142	216,092	218,778	220,367
Net Imports (+) (negative if exporting)	Canada	185	4	200	808	733	787	617	641	699
	Northwest	-1,871	-3,561	-3,254	-5,191	-3,185	-3,297	-3,355	-4,160	-4,761
	Basin	1,355	1,466	1,922	1,408	2,848	2,596	3,388	2,196	2,449
	Rockies	161	1,133	1,714	816	686	1,453	1,206	1,714	1,484
	Desert SW	-5,888	-4,876	-3,421	-2,497	-4,938	-6,001	-5,494	-4,694	-4,172
	No. CA	-1,276	-1,375	-2,771	-1,442	-2,061	-2,070	-2,624	-2,265	-1,571
	So. CA	7,343	7,200	5,653	6,170	6,161	7,068	6,506	7,020	6,240
	Mex	-8	9	-42	-72	-244	-535	-244	-451	-368
	Total	0	0	0	0	0	0	0	0	0
Available Resources including Transfers	Canada	28,320	29,093	30,420	31,303	32,091	32,477	32,537	32,690	32,502
	Northwest	40,220	39,706	40,688	40,391	40,328	40,380	40,657	40,985	41,135
	Basin	16,278	16,976	17,295	17,651	17,686	17,368	17,855	17,283	18,337
	Rockies	15,826	16,397	17,126	16,187	16,334	16,651	16,740	16,872	16,677
	Desert SW	32,096	33,480	34,516	35,272	33,148	32,248	32,231	33,450	33,619
	No. CA	30,264	30,980	31,335	33,121	32,082	32,217	31,786	32,262	32,861
	So. CA	40,261	42,083	40,993	41,911	41,488	42,603	41,648	42,644	42,869
	Mex	2,855	3,200	2,999	3,068	2,906	2,198	2,639	2,592	2,368
	Total	206,122	211,915	215,373	218,905	216,062	216,142	216,092	218,778	220,367
Power Supply Margin	Canada	3,355	3,459	3,805	3,818	3,808	3,580	3,156	2,891	2,323
	Northwest	4,486	3,641	4,321	3,722	3,333	3,046	3,010	2,988	2,765
	Basin	2,936	3,333	3,346	3,440	3,251	2,699	2,966	2,150	2,998
	Rockies	4,669	4,998	5,540	4,322	4,130	4,151	3,971	3,844	3,476
	Desert SW	13,032	14,167	14,813	15,224	12,449	11,109	10,649	11,473	11,274
	No. CA	10,732	10,640	10,521	11,965	11,418	11,210	10,456	9,887	9,891
	So. CA	15,001	16,368	14,698	15,163	14,425	15,073	13,628	14,146	13,660
	Mex	1,232	1,496	1,211	1,195	952	147	496	352	32
	Total	55,444	58,101	58,254	58,847	53,765	51,016	48,332	47,731	46,420

Table 26 – Sub-region Summary - Case #7

Parameter	Sub-region	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Demand	Canada	17,182	17,701	18,988	20,336	19,757	20,245	20,617	21,592	22,567
	Northwest	24,547	24,771	25,056	25,371	25,492	25,732	25,943	26,281	26,619
	Basin	13,983	14,323	14,277	14,043	14,999	15,220	15,432	15,265	15,099
	Rockies	9,861	10,040	10,811	9,078	10,767	10,981	11,200	10,587	9,974
	Desert SW	27,742	28,112	29,611	29,922	29,994	30,694	31,383	32,411	33,439
	No. CA	25,196	24,215	24,190	25,412	26,758	27,170	27,565	27,452	27,338
	So. CA	31,094	31,523	32,192	34,085	33,266	33,712	34,153	35,465	36,777
	Mex	2,118	2,219	2,473	2,565	2,562	2,683	2,801	3,000	3,198
	Total	151,722	152,904	157,599	160,812	163,594	166,437	169,093	172,052	175,011
Demand Escalation (or assumed reserve margin)	Canada	2,577	2,655	2,848	3,050	2,964	3,037	3,093	3,239	3,385
	Northwest	3,682	3,716	3,758	3,806	3,824	3,860	3,891	3,942	3,993
	Basin	2,097	2,148	2,142	2,106	2,250	2,283	2,315	2,290	2,265
	Rockies	1,479	1,506	1,622	1,362	1,615	1,647	1,680	1,588	1,496
	Desert SW	4,161	4,217	4,442	4,488	4,499	4,604	4,707	4,862	5,016
	No. CA	3,779	3,632	3,629	3,812	4,014	4,075	4,135	4,118	4,101
	So. CA	4,664	4,728	4,829	5,113	4,990	5,057	5,123	5,320	5,517
	Mex	318	333	371	385	384	402	420	450	480
	Total	22,758	22,936	23,640	24,122	24,539	24,966	25,364	25,808	26,252
Load Requirement	Canada	19,759	20,356	21,836	23,386	22,721	23,282	23,710	24,831	25,952
	Northwest	28,229	28,486	28,814	29,177	29,316	29,592	29,834	30,223	30,612
	Basin	16,080	16,471	16,419	16,149	17,248	17,503	17,746	17,555	17,364
	Rockies	11,340	11,546	12,433	10,440	12,382	12,628	12,880	12,175	11,470
	Desert SW	31,903	32,329	34,053	34,410	34,493	35,298	36,090	37,273	38,455
	No. CA	28,975	27,847	27,819	29,224	30,771	31,245	31,700	31,570	31,439
	So. CA	35,758	36,252	37,021	39,198	38,256	38,769	39,276	40,785	42,294
	Mex	2,436	2,552	2,844	2,950	2,946	3,085	3,221	3,449	3,678
	Total	174,480	175,839	181,239	184,934	188,133	191,402	194,457	197,860	201,263
Net Base Resource Capacity	Canada	24,848	24,478	24,570	24,464	24,948	24,779	24,729	24,544	24,464
	Northwest	38,759	37,945	38,388	38,668	39,279	38,656	38,755	38,627	39,179
	Basin	13,039	13,154	12,974	13,025	13,405	13,163	12,663	12,695	12,601
	Rockies	14,614	14,492	14,504	14,343	14,227	14,184	14,072	14,020	14,021
	Desert SW	37,772	37,841	37,640	37,594	37,406	37,304	37,313	37,331	37,206
	No. CA	32,485	31,959	32,811	33,465	33,844	33,711	33,653	33,392	33,315
	So. CA	33,126	33,830	34,324	33,427	33,752	33,822	33,768	33,427	33,420
	Mex	2,753	2,755	2,720	2,717	2,716	2,718	2,716	2,717	2,717
	Total	197,397	196,452	197,931	197,704	199,577	198,336	197,667	196,753	196,922
Net Imports (+) (negative if exporting)	Canada	-2,200	-2,200	-2,112	-936	-2,193	-2,155	-2,146	-2,199	-498
	Northwest	-6,123	-4,623	-4,708	-5,649	-6,130	-6,168	-6,177	-6,353	-7,061
	Basin	3,757	3,713	2,862	2,461	3,137	3,518	3,533	3,663	2,873
	Rockies	-736	-649	-674	-2,442	-437	-159	-583	-478	-2,236
	Desert SW	-2,584	-2,763	-71	-880	-1,696	-1,976	-843	-662	831
	No. CA	2,825	1,825	1,321	1,342	2,825	2,825	2,825	2,604	3,562
	So. CA	5,055	4,697	3,360	5,960	4,402	3,907	2,983	2,975	2,530
	Mex	6	0	21	143	92	208	408	450	0
	Total	0	0	0	0	0	0	0	0	0
Available Resources	Canada	22,648	22,278	22,458	23,529	22,755	22,624	22,582	22,345	23,966
	Northwest	32,636	33,322	33,680	33,019	33,149	32,488	32,578	32,274	32,117
	Basin	16,796	16,867	15,836	15,486	16,542	16,681	16,196	16,358	15,474
	Rockies	13,878	13,843	13,830	11,901	13,789	14,025	13,489	13,542	11,785
	Desert SW	35,188	35,078	37,569	36,714	35,710	35,327	36,470	36,669	38,037
	No. CA	35,310	33,784	34,133	34,808	36,669	36,536	36,478	35,997	36,876
	So. CA	38,180	38,527	37,683	39,387	38,155	37,729	36,751	36,402	35,950
	Mex	2,760	2,755	2,741	2,860	2,808	2,926	3,124	3,167	2,717
	Total	197,397	196,452	197,931	197,704	199,577	198,336	197,667	196,753	196,922
Power Supply Margin	Canada	2,889	1,921	622	143	35	-658	-1,127	-2,486	-1,986
	Northwest	4,407	4,835	4,866	3,842	3,833	2,896	2,744	2,051	1,506
	Basin	716	396	-583	-663	-707	-822	-1,550	-1,197	-1,890
	Rockies	2,538	2,297	1,398	1,462	1,407	1,397	609	1,367	315
	Desert SW	3,285	2,749	3,516	2,304	1,217	29	380	-603	-418
	No. CA	6,335	5,938	6,314	5,584	5,898	5,291	4,778	4,427	5,437
	So. CA	2,422	2,275	662	189	-101	-1,040	-2,525	-4,383	-6,343
	Mex	324	203	-103	-90	-138	-160	-98	-283	-961
	Total	22,917	20,613	16,692	12,770	11,444	6,934	3,210	-1,107	-4,341

Attachment 4: WECC Power Supply Assessment Policy

Western Electricity Coordinating Council
Power Supply Assessment Policy

INTRODUCTION

The Western Electricity Coordinating Council was established to promote the reliable operation of the interconnected bulk power system by the coordination of planning and operation of generating and interconnected transmission facilities.

The Planning Coordination Committee (PCC) assigned the Load and Resource Subcommittee (LRS) the task of developing an Adequacy of Supply Assessment Methodology. This document establishes the policy for conducting power supply assessments using the methodology developed by the LRS. This policy shall be periodically reviewed and revised as experience indicates.

PURPOSE OF POWER SUPPLY ASSESSMENT

To ensure the reliability of the interconnected bulk electric system, it is necessary to assess both the security and the adequacy of the overall Western Interconnection. This document is focused on the portion of the assessment dealing with the adequacy of power supply. As electric industry restructuring has altered the traditional model of the vertically integrated utility, the responsibility for maintaining the adequacy of the power supply is distributed among multiple private and public entities, in part relying on market mechanisms. Though there may not be specific entities entrusted to plan for adequate resources, there exists a need to assess whether projected resources will be sufficient to reliably meet demand. Such information will allow regulators and policy makers to anticipate potential shortfalls. Determinations can be made as to whether impediments or insufficient incentives exist in the market and whether utility integrated resource planning is bringing resources on line in a timely manner. Additionally, a high quality assessment can support efficient sharing of resources among subregions where feasible, and can inform transmission expansion planning efforts of the WECC Transmission Expansion Planning Policy Committee.

It is not the intent of an adequacy assessment to replace the market, create sanctionable criteria, or anticipate future energy prices. Its purpose is to project whether enough physical resources exist, at any price, to meet load and possible reserves while considering the transmission transfer capabilities of major paths. Such an assessment will be consistent with the NERC Standards.

It is recognized that it is impossible to provide 100% adequacy of power supply over all future circumstances. It is the purpose of this document to establish a uniform policy for

assessing the adequacy of installed and identified future resources within the WECC region for the purposes of reporting within the Council, and to outside agencies. The assessments shall cover a period encompassing at least the next 5 years.

The Power Supply Assessment Methodology shall be developed and maintained by LRS. Adequacy of supply may be defined and measured in terms of generating reserve margins and transmission limitations between load and resource areas and/or based on probabilistic methods. Assessments shall consider both capacity and energy adequacy. Appropriate technical tools shall be developed and utilized in conducting the assessments. The assessments shall account for diversity of load and generation, and account for transmission constraints between load and resource areas. To the extent that fuel supply interruptions are judged to be a valid and significant source of uncertainty this vulnerability should also be assessed.

CAPACITY ASSESSMENT METHODOLOGY AND RESOURCE ASSESSMENT GUIDELINES

As approved by the Board of Directors in July 2007, development of resource adequacy numerical guidelines for use in capacity (MW) assessments will use the Building Block approach. Components of the Building Block approach approved by the board include the following: provisions for contingency reserves, regulating reserves (both of which are required operating reserve components), additional forced outages to cover additional contingencies and temperature-induced load variations beyond expected peak loads. The method for determining a numerical value for subregions of WECC using these Building Blocks, and other influences on reliability, shall be determined by LRS with the concurrence of PCC.

DATA REQUIREMENTS:

To aid WECC in assessing resource adequacy, the following general kinds of information shall be provided by WECC members:

Load Forecasts

- Electricity demand and energy forecasts, including uncertainties
  - Variations due to weather
  - Variations due to other factors affecting forecasts

Demand-Side Management (DSM) Programs

- Existing and planned demand-side management programs
  - Direct controlled interruptible loads
  - Aggregate effects of multiple DSM programs

Resource Information

- Supply-side resource characteristics, including uncertainties
  - Consistent generator unit ratings, including seasonal variations and environmental considerations affecting hydro and thermal units
  - Availability of generating units
  - Fuel type
  - Fuel Supply risks

Transmission Information

- Capabilities, availability of transmission capacity, and other uncertainties

REPORTING OF POWER SUPPLY ADEQUACY

The assessment of generating reserve margins and transmission limitations between load and resource areas, accounting for uncertainties, shall be developed and the results reported on a seasonal basis. The assessment shall be consistent with the requirement for maintaining operating reserves as defined in the WECC Minimum Operating Reliability Criteria and NERC Operating Policies.

The results of this assessment should be packaged in a way to be useful to the WECC Board of Directors, regulatory and policy agencies of the states/provinces, and subregions that are interested in electricity reliability and adequacy throughout the footprint of the Western Interconnection. WECC should directly communicate the results to this community. In addition, WECC staff and LRS members should present the results to this community at meetings and other appropriate forums.

Prepared by Load and Resources Subcommittee ..... September, 2007

Approved by Planning Coordination Committee ..... October 26, 2007

Approved by Board of Directors ..... December 6, 2007

Attachment 5: 1-in-2 to 1-in-10 Calculation

EXAMPLE

	Summer Temp
1990	91.0
1991	94.0
1992	97.0
1993	89.3
1994	95.5
1995	92.7
1996	92.0
1997	88.2
1998	93.0
1999	99.2
2000	91.5
2001	98.3
2002	102.8
2003	102.0
2004	95.2
2005	95.8
2006	95.2

AVG	94.9
STD	4.1

z = (x - xbar)/s
x = xbar + z*s

z =	1.28
Temp =	100.121
Pr() =	0.900

Temp Increase	5.3
MW/Degree	7.030
MW Increase	37.0
MW Load	1,500
% Increase	2.5%

Attachment 6: Relationship of the Power Supply Assessment to Individual LSEs' Resource Adequacy Standards and Analyses

The values for reserve margins used in the PSA are not directly comparable to any values that might be used by individual Load-Serving Entities (LSE) or their regulators or local governing boards to evaluate their individual resource adequacy. Moreover, they are not intended to supplant any of those values. They are provided for the use of the WECC board and other users of the report to assess the overall state of the adequacy of the Western Interconnection.

A number of things make the reserve margins in the PSA not comparable to the values chosen by or applicable to an individual LSE.

First, any given LSE may use different Building Blocks or different values for the Building Blocks, or even an entirely different method to set its target reserve margin, than what is used in the PSA. For instance an LSE may include the effect of 1-in-20 weather in its margin, rather than the 1-in-10 weather used in the PSA. It may include a factor to account for delays in expected future plant construction, a concern that is addressed in a different way in the PSA.

Second, the data are collected and analyzed by BAs. There are 37 BA areas in WECC. In many cases the BA boundary is the same as that of an LSE, but in several significant instances, they are not. For instance, the CAISO BA area contains three very large LSEs, PG&E, SCE, and SDG&E, each of which may want to set their own reserve margins, subject to the regulation of the CPUC.

Further, there are 13 Electricity Service Providers (ESP) in California with no fixed customer service requirements and no obligation to plan loads and resources beyond those established by CPUC and CAISO year-ahead resource adequacy requirements. Finally, there are about 25 additional publicly-owned utilities, which encompass traditional utilities and joint power authorities operating much like an ESP. This amalgam of LSEs exists in conjunction with a generating industry that is partially merchant-owned and partially LSE-owned. Under these circumstances the CAISO has a more difficult job to project aggregate loads and to describe resource additions accurately than does an integrated utility also operating as a BA.

As an example of this effect, this BA exhibits substantial load diversity, which is moderated when looking at the BA's loads as a whole. This affects the Building Block component for 1-in-10 weather stresses. For instance, the California Bay area by itself would exhibit about a 7 percent weather adder for such a weather stress, but in the context of larger areas we see smaller adders, up to the overall CAISO BA area where we see an adder for the overall load that is lower than this. The PSA has included separate weather analyses of the three LSEs in the CAISO footprint.

Third, the “bubbles” that are the basic units for the analysis of the PSA, which employs the PROMOD model, are in a number of cases made up of several BAs, as well as some being identical to an individual BA, some being generator-only entities, and in one case, containing only a part of a BA. For instance, the IID bubble is only the Imperial Irrigation District area, the Four Corners bubble is generation only, the Arizona bubble is four BAs (APS, SRP, TEP and WALC), and the Northern California bubble consists of only a piece of the CAISO but more than one LSE. There are 20 bubbles in PROMOD. Fourth, the margins developed at the BA level are averaged across eight subregions that are larger (and in some cases, substantially larger) than individual BA areas and then the subregion averages are used for each of the bubbles in the subregions. The subregions used in the PSA are shown in Table 27 below, as well as the PROMOD bubbles that make up each subregion and the resulting values for winter and summer.

Table 27 **– Subregions in the PSA**

Sub-Region	Zones Included in Sub-Region	Summer Margin	Winter Margin
Canada	British Columbia, Alberta	12.4%	14.0%
Northwest	Pacific Northwest, Montana	17.9%	19.9%
Basin	Idaho, Northern Nevada, Utah	12.6%	13.5%
Rockies	Colorado, Wyoming	14.7%	15.7%
Desert Southwest	Arizona, New Mexico, Southern Nevada	13.5%	14.0%
Northern California	Northern California, San Francisco, SMUD	14.7%	11.9%
Southern California	Southern California Edison, San Diego Gas & Electric, LADWP, Imperial Irrigation District	15.1%	11.0%
Mexico	Comision Federal de Electricidad (CFE)	11.9%	10.7%
WECC Total		14.6%	14.6%

The sequence described above is done for several reasons, having to do primarily with constraints on the data and on the analytic method itself.

The primary data constraint is that we do not ask for, and cannot take account of, any contractual obligations between LSEs that might shift resources from one LSE or bubble to another. The PSA only accounts for the ownership splits for some jointly owned plants, those whose output is divided among LSEs that are incorporated into different bubbles. The PSA is a physical load and resource analysis and is not designed to evaluate the ability of any individual LSE to meet its load in the future.

The analytical limitation has to do with how PROMOD simulates economy transactions among bubbles, after individual bubble loads are met by resources in the bubble, subject to transmission limitations among the bubbles. The process for meeting deficit-bubble needs by surplus-bubble resources is governed by the internal algorithm of PROMOD, which essentially meets the needs of the closest bubble first. There are not economic or contractual drivers to this process.

Both of these considerations, as well as the aggregation of LSEs into bubbles, substantially limit the applicability of the analysis to individual LSEs, so as to make any attempt to derive individual LSE information from the analysis of very limited value. The level at which the analysis is meaningful and informative is the subregion level for which the results are reported.

Attachment 7: Generation Additions/Retirements

Class 1 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Canada	AESO	Suncor Firebag Stage 3	GT	170.00	170.00	NG	2011	12	V
Canada	AESO	Keephills 3	ST	450.00	450.00	SUB	2011	12	V
Canada	AESO	Suncor Wintering Hills	WT	88.00	88.00	WND	2011	12	U
Canada	AESO	UofC Cogeneration	GT	15.00	15.00	NG	2011	12	V
Northwest	AVA	Noxon Rapids	HY	7.00	7.00	WAT	2011	1	A
Canada	BCH	Lower Bear Hydro	HY	3.19	2.66	WAT	2011	12	
Canada	BCH	Upper Bear Hydro	HY	8.19	3.87	WAT	2011	12	
Canada	BCH	Barr Creek	HY	0.86	1.29	WAT	2011	12	P
Canada	BCH	Bone Creek Hydro	HY	14.57	1.21	WAT	2011	12	P
Canada	BCH	Raging River 2	HY	0.00	1.61	WAT	2011	12	P
Canada	BCH	Crowsnest Pass	OT	7.25	10.50	OTH	2011	12	P
Northwest	BPAT	Project 38	ST	20.00	20.00	WDS	2011	12	TS
Northwest	BPAT	Project 39	WT	150.00	150.00	WND	2011	12	V
Northwest	BPAT	Project 42	WT	260.00	260.00	WND	2011	12	U
No. CA	CISO	Queue Position #: 470	PV	16.00	1.00	SUN	2011	12	U
So. CA	CISO	Queue Position #: 135	WT	11.00	5.00	WND	2011	12	U
No. CA	CISO	Queue Position #: 340	PV	16.00	1.00	SUN	2011	12	U
So. CA	CISO	Queue Position #: 103	ST	27.00	27.00	MSW	2011	12	U
So. CA	CISO	Queue Position #: 13	HY	34.00	32.00	WTR	2011	12	U
No. CA	CISO	Queue Position #: 471	PV	16.00	1.00	SUN	2011	12	U
No. CA	CISO	Queue Position #: 479	PV	16.00	1.00	SUN	2011	12	U
So. CA	CISO	Queue Position #: 20	WT	53.00	25.00	WND	2011	12	U
So. CA	CISO	Queue Position #: 96	WT	106.00	50.00	WND	2011	12	U
No. CA	CISO	Queue Position #: 37	CT	67.00	68.00	NG	2011	12	U
No. CA	CISO	Queue Position #: 222	WT	14.00	6.00	WND	2011	12	U
Desert SW	EPE	Newman 5	CA	148.00	148.00	NG	2011	12	TS
Desert SW	EPE	NRG Solar	SO	17.00	10.67	SUN	2011	12	U
Desert SW	EPE	Hatch	SO	4.25	2.67	SUN	2011	7	U
Basin	IPCO	Magic Wind	WT	19.50	19.50	WND	2011	12	P
Basin	IPCO	Lava Beds	WT	18.00	18.00	WND	2011	12	P
Basin	IPCO	Notch Butte	WT	18.00	18.00	WND	2011	12	P
So. CA	LDWP	Haynes	ST	-322.00	-322.00	NG	2011	8	RT
So. CA	LDWP	Haynes	ST	-224.00	-224.00	NG	2011	8	RT
So. CA	LDWP	Wind_Milford Phase 2	WT	102.00	102.00	WND	2011	1	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Woodland 3	IC	8.20	8.20	NG	2011	12	V
No. CA	SMUD	Sun Power Solar Farm	PV-T	18.50	5.00	SUN	2011	3	T
Desert SW	NEVP	Allen	CC	484.00	524.00	NG	2011	1	U
Northwest	NWMT	Mill Creek Generating Station	GT	100.00	100.00	NG	2011	1	TS
Northwest	NWMT	Turnbull Hydro	HY	11.00	0.00	WAT	2011	1	V
Basin	PACE	Kettle Butte Dairy	ST	1.70	1.70	OBG	2011	1	
Northwest	PACW	Oak Lee Dairy	ST	0.17	0.17	OBG	2011	1	P
Northwest	PGE	STANDBY AGG.	IC	11.00	11.00	DFO	2011	12	P
Northwest	PGE	STANDBY AGG.	IC	21.00	21.00	DFO	2011	12	P
Desert SW	PNM	Abiquiu	HY	3.00	0.00	WAT	2011	12	P
Rockies	PSCO	Greater Sandhill	PV	16.10	16.10	SUN	2011	12	P
Rockies	PSCO	Cedar Creek II Wind	WT	250.00	250.00	WND	2011	1	V
Rockies	PSCO	2009 Biomass RFP	ST	2.00	2.00	OBG	2011	1	V
Desert SW	SRP	Coolidge Generating Station	GT	512.00	575.00	NG	2011	12	V
Desert SW	SRP	Coronado 2	ST	12.00	12.00	SUB	2011	12	D
Rockies	WACM	USAFA PV	PV	5.20	5.20	SUN	2011	12	U
Rockies	WACM	Dry Fork Station	ST	385.00	385.00	SUB	2011	12	U
		Additions for 2011		3,232.68	3,128.34				
Desert SW	AZPS	Solana	SO	250.00	250.00	SUN	2012	12	P
Northwest	AVA	Noxon Rapids	HY	7.00	7.00	WAT	2012	1	A
Canada	BCH	Tamihi Creek	HY	3.31	3.01	WAT	2012	12	P
Canada	BCH	Long Lake Hydro	HY	25.91	26.28	WAT	2012	12	P
Canada	BCH	Kookipi Creek	HY	1.43	1.89	WAT	2012	12	P
Canada	BCH	Log Creek	HY	3.02	1.05	WAT	2012	12	P
Canada	BCH	Sakwi Creek RoR	HY	0.96	1.04	WAT	2012	12	P
Canada	BCH	PGWE2008	BM	8.00	8.00	WDS	2012	12	P

Class 1 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Canada	BCH	Clint Creek Hydro	HY	1.53	2.62	WAT	2012	12	P
Northwest	BPAT	Project 44	WT	250.00	250.00	WND	2012	12	U
Northwest	BPAT	Project 45	WT	100.00	100.00	WND	2012	12	U
Northwest	BPAT	Project 53	WT	78.00	78.00	WND	2012	12	V
So. CA	CISO	Queue Position #: 95	WT	98.00	46.00	WND	2012	12	U
No. CA	CISO	Queue Position #: 108	WT	23.00	11.00	WND	2012	12	U
So. CA	CISO	Queue Position #: 68	PV	666.00	58.00	SUN	2012	12	U
No. CA	CISO	Queue Position #: 113	WT	5.00	2.00	WND	2012	12	U
No. CA	CISO	Queue Position #: 267	CC	245.00	253.00	NG	2012	12	U
So. CA	CISO	Queue Position #: 124	PV	470.00	41.00	SUN	2012	12	U
No. CA	CISO	Queue Position #: 45	CT	324.00	329.00	NG	2012	12	U
No. CA	CISO	Queue Position #: 67	CC	214.00	221.00	NG	2012	12	U
So. CA	CISO	Queue Position #: 233	ST	200.00	200.00	SUN	2012	12	U
So. CA	CISO	Queue Position #: 100	WT	21.00	10.00	WND	2012	12	U
No. CA	CISO	Queue Position #: 304	PV	39.00	3.00	SUN	2012	12	U
So. CA	IID	Salton Sea	GE	33.00	33.00	GEO	2012	12	P
So. CA	IID	Solar Photovoltaic	SP	20.00	20.00	SUN	2012	12	P
So. CA	LDWP	Haynes	GT	600.00	-445.00	NG	2012	1	U
So. CA	LDWP	Castaic Unit 1 Upgrade	PS	16.00	16.00	WAT	2012	1	P
So. CA	LDWP	Wind_2012	WT	100.00	100.00	WND	2012	1	P
Northwest	NWMT	Rainbow	HY	61.00	61.00	WAT	2012	12	P
Northwest	NWMT	Cochrane	HY	2.50	2.50	WAT	2012	12	P
Northwest	NWMT	Cochrane	HY	2.50	2.50	WAT	2012	12	P
Northwest	NWMT	WKN	WT	396.00	396.00	WND	2012	12	P
Desert SW	PNM	Las Vegas GT	GT	-18.00	-18.00	DFO	2012	6	RT
Desert SW	PNM	Lighting Doc Geothermal	GE	15.00	15.00	GEO	2012	12	U
Rockies	PSCO	Airport 1	GT	90.00	90.00	NG	2012	12	V
Rockies	PSCO	Airport 2	GT	90.00	90.00	NG	2012	12	V
Rockies	PSCO	Airport 3	CC	100.00	100.00	NG	2012	12	V
Rockies	PSCO	Airport 4	CC	100.00	100.00	NG	2012	12	V
Rockies	PSCO	Cedar Point	WT	252.00	252.00	WND	2012	1	U
Rockies	PSCO	Cogentrix	PV	30.00	30.00	SUN	2012	1	U
No. CA	SMUD	Solano Wind	WT	128.00	128.00	WND	2012	12	P
Desert SW	SRP	Coronado 1	ST	12.00	12.00	SUB	2012	12	D
No. CA	TIDC	Almond Power Plant	CT	50.00	58.00	NG	2012	12	U
No. CA	TIDC	Almond Power Plant	CT	50.00	58.00	NG	2012	12	U
No. CA	TIDC	Almond Power Plant	CT	50.00	58.00	NG	2012	12	U
		Additions for 2012		5,214.16	3,061.89				
Canada	AESO	Rainbow1	GT	-30.00	-30.00	NG	2013	7	RT
Canada	AESO	Rainbow2	GT	-40.00	-40.00	NG	2013	7	RT
Canada	AESO	Rainbow3	GT	-20.00	-20.00	NG	2013	7	RT
Northwest	AVA	Nine Mile	HY	8.00	8.00	WAT	2013	1	A
Northwest	AVA	Nine Mile	HY	6.00	6.00	WAT	2013	1	A
Canada	BCH	Mkw'alts Ck	HY	19.42	3.76	WAT	2013	12	P
Canada	BCH	Kwoiek Creek	HY	32.25	5.24	WAT	2013	12	P
Canada	BCH	Cape Scott	WT	26.04	23.81	WND	2013	12	P
Canada	BCH	Quality Wind	WT	51.55	34.13	WND	2013	12	P
So. CA	CISO	Queue Position #: 66	CT	449.00	456.00	NG	2013	12	U
So. CA	CISO	Queue Position #: 137	CC	227.00	235.00	NG	2013	12	U
So. CA	CISO	Queue Position #: 189	CC	227.00	235.00	NG	2013	12	U
No. CA	CISO	Queue Position #: 42	CT	269.00	273.00	NG	2013	12	U
No. CA	CISO	Queue Position #: 60	CT	84.00	86.00	NG	2013	12	U
No. CA	CISO	Queue Position #: 268	ST	145.00	145.00	NG	2013	12	U
So. CA	CISO	Queue Position #: 7	CC	551.00	569.00	NG	2013	12	U
So. CA	CISO	Queue Position #: 294	ST	1,000.00	1,000.00	SUN	2013	12	U
So. CA	CISO	Queue Position #: 365	ST	500.00	500.00	SUN	2013	12	U
No. CA	CISO	Queue Position #: 194	ST	190.00	190.00	SUN	2013	12	U
So. CA	CISO	Queue Position #: 412	PV	196.00	17.00	SUN	2013	12	U
No. CA	CISO	Queue Position #: 166	PV	165.00	14.00	SUN	2013	12	U
Basin	IPCO	Sawtooth Wind	WT	21.00	21.00	WND	2013	12	P
Desert SW	PNM	San Juan	ST	30.00	30.00	BIT	2013	12	V
		Additions for 2013		4,107.26	3,761.94				
No. CA	CISO	Queue Position #: 172	CC	444.00	459.00	NG	2014	12	U
No. CA	CISO	Queue Position #: 248	CC	59.00	61.00	NG	2014	12	U

Class 1 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
So. CA	CISO	Queue Position #: 468	PV	227.00	20.00	SUN	2014	12	U
No. CA	CISO	Queue Position #: 6	CC	1,011.00	1,045.00	NG	2014	12	U
So. CA	CISO	Queue Position #: 106A	WT	28.00	13.00	WND	2014	12	U
So. CA	LDWP	Water System Hydro	HY	4.00	4.00	WAT	2014	1	P
So. CA	LDWP	Wind_2014	WT	100.00	100.00	WND	2014	1	P
Desert SW	SRP	Desert Basin	CA	0.00	25.00	NG	2014	12	A
Desert SW	SRP	Coronado 2	ST	7.00	7.00	SUB	2014	12	D
			Additions for 2014	1,880.00	1,734.00				
Canada	BCH	Victoria Lake Hydro	HY	1.79	3.63	WAT	2015	12	P
So. CA	LDWP	Scattergood 3	ST	-445.00	-445.00	NG	2015	8	RT
So. CA	LDWP	Geo_2015	OT	80.00	80.00	GEO	2015	1	P
			Additions for 2015	-363.21	-361.37				

Class 2 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Canada	AESO	Bonnybrook Energy Centre	GT	165.00	165.00	NG	2011	12	L
Canada	AESO	Old Man River Wind	WT	47.00	47.00	WND	2011	12	T
Canada	AESO	Weyerhaeuser Biomass	BM	15.00	15.00	WDS	2011	12	P
Canada	AESO	Pteragen Peace Butte	WT	116.00	116.00	WND	2011	12	P
Canada	AESO	Castle Rock Ridge	WT	115.00	115.00	WND	2011	12	T
Canada	AESO	Al-Pac Pulp Mill	BM	13.00	13.00	WDS	2011	12	P
Canada	AESO	Keephills2-a	ST	23.00	23.00	SUB	2011	12	A
Canada	BCTC	Fort Nelson 1	GT	25.00	25.00	NG	2011	12	A
Canada	BCH	Cranberry Creek Power	HY	0.91	0.24	WAT	2011	12	P
Canada	BCH	Dokie Wind	WT	38.41	34.56	WND	2011	12	P
Canada	BCH	Fries Creek	HY	2.49	2.68	WAT	2011	12	P
Northwest	BPAT	Project 40	PV-T	4.00	4.00	SUN	2011	12	T
Northwest	BPAT	Project 41	PV-T	8.00	8.00	SUN	2011	12	L
Northwest	BPAT	Project 43	WT	200.00	200.00	WND	2011	12	T
Northwest	BPAT	Project 46	WT	120.00	120.00	WND	2011	12	L
No. CA	CISO	Queue Position #: 617	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 515	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 529A	CC	6.00	6.00	LFG	2011	12	T
No. CA	CISO	Queue Position #: 529A	PV	6.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 537A	WT	4.00	2.00	WAT	2011	12	T
No. CA	CISO	Queue Position #: 477	CC	3.00	4.00	LFG	2011	12	T
So. CA	CISO	Queue Position #: 540	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 614	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 150	CT	44.00	45.00	NG	2011	12	T
No. CA	CISO	Queue Position #: 489	WT	18.00	8.00	WND	2011	12	T
So. CA	CISO	Queue Position #: 474	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 531A	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 539	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 613A	WT	4.00	2.00	WND	2011	12	T
No. CA	CISO	Queue Position #: 534	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 530	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 642	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 633	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 49	WT	18.00	8.00	WND	2011	12	T
No. CA	CISO	Queue Position #: 484	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 495	HY	6.00	6.00	WAT	2011	12	T
No. CA	CISO	Queue Position #: 523	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 545	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 548	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 551	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 478	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 480	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 622	PV	8.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 550	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 640A	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 640B	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 650AC	PV	16.00	1.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 84	WT	60.00	28.00	WND	2011	12	T
So. CA	CISO	Queue Position #: 94	WT	32.00	15.00	WND	2011	12	T
So. CA	CISO	Queue Position #: 126	WT	266.00	124.00	WND	2011	12	T
So. CA	CISO	Queue Position #: 132	WT	53.00	25.00	WND	2011	12	T
No. CA	CISO	Queue Position #: 239	PV	196.00	17.00	SUN	2011	12	T
So. CA	CISO	Queue Position #: 614A	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 620	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 620A	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 625	PV	16.00	1.00	SUN	2011	12	T
No. CA	CISO	Queue Position #: 626	PV	16.00	1.00	SUN	2011	12	T
Desert SW	EPE	SunEdison	SO	10.20	6.40	SUN	2011	12	T
Basin	IPCO	Rockland	WT	80.00	80.00	WND	2011	12	P
Basin	IPCO	Grand View Solar One	PV-NT	20.00	20.00	SUN	2011	12	P
Desert SW	PNM	Reeves Solar PV	PV-NT	2.00	2.00	SUN	2011	12	V
Desert SW	PNM	Los Lunas Solar PV	PV-NT	5.00	5.00	SUN	2011	12	U
Desert SW	PNM	Las Vegas Solar PV	PV-NT	5.00	5.00	SUN	2011	12	T
Desert SW	PNM	Deming Solar PV	PV-NT	5.00	5.00	SUN	2011	12	T

Class 2 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Desert SW	PNM	Alamogordo Solar PV	PV-NT	5.00	5.00	SUN	2011	12	T
Desert SW	SRP	Solar PV	PV-T	20.00	20.00	SUN	2011	6	P
		Additions for 2011		2,201.00	1,355.88				
Canada	AESO	Mustus Energy	BM	30.00	30.00	WDS	2012	12	T
Canada	AESO	Greengate Harlkirk	WT	150.00	150.00	WND	2012	12	T
Canada	AESO	ECB Envir. North America	OT	3.00	3.00	OTH	2012	12	T
Canada	AESO	Blackspring Ridge Wind	WT	300.00	300.00	WND	2012	12	P
Canada	AESO	Meg Christina Lake Cogeneration Plant	CT	85.00	85.00	NG	2012	12	P
Canada	AESO	Keephills1-a	ST	23.00	23.00	SUB	2012	12	A
Canada	AESO	HR Milner Expansion	ST	500.00	500.00	SUB	2012	12	P
Canada	AESO	Swan Hills Sagitawah	CC	75.00	75.00	NG	2012	12	P
Canada	AESO	Willow Ridge Wind	WT	100.00	100.00	WND	2012	12	P
Canada	AESO	Nabiye	GT	170.00	170.00	NG	2012	12	P
Canada	AESO	Windlab Swan Hills Wind Project	WT	400.00	400.00	WND	2012	12	P
Canada	AESO	Windlab Hand Hills Project	WT	150.00	150.00	WND	2012	12	P
Canada	AESO	Windlab Monitor Creek Project	WT	120.00	120.00	WND	2012	12	P
Canada	AESO	Windy Point Wind Farm	WT	61.00	61.00	WND	2012	12	P
Canada	AESO	Acciona New Dayton	WT	99.00	99.00	WND	2012	12	P
Canada	BCH	Beaver River	HY	23.23	3.18	WAT	2012	12	P
Canada	BCH	Castle Creek	HY	5.94	2.63	WAT	2012	12	P
Canada	BCH	Dasque - Middle	HY	13.07	1.95	WAT	2012	12	P
Canada	BCH	Maroon Creek Hydro	HY	2.21	1.45	WAT	2012	12	P
Canada	BCH	Tumbler Ridge Wind	WT	18.24	11.33	WND	2012	12	P
Canada	BCH	Wildmare Wind	WT	27.01	18.58	WND	2012	12	P
Northwest	BPAT	Project 47	PV-T	20.00	20.00	SUN	2012	12	L
Northwest	BPAT	Project 48	PV-T	20.00	20.00	SUN	2012	12	L
Northwest	BPAT	Project 49	PV-T	10.00	10.00	SUN	2012	12	L
Northwest	BPAT	Project 50	WT	202.00	202.00	WND	2012	12	T
Northwest	BPAT	Project 51	WT	110.00	110.00	WND	2012	12	L
Northwest	BPAT	Project 52	ST	20.00	20.00	WDS	2012	12	
Northwest	BPAT	Project 54	WT	260.00	260.00	WND	2012	12	T
Northwest	BPAT	Project 55	WT	100.00	100.00	WND	2012	12	L
Northwest	BPAT	Project 56	WT	60.00	60.00	WND	2012	12	L
Northwest	BPAT	Project 57	WT	150.00	150.00	WND	2012	12	T
Northwest	BPAT	Project 58	PV-T	15.00	15.00	SUN	2012	12	T
Northwest	BPAT	Project 68	WT	100.00	100.00	WND	2012	12	L
Mexico	CFE	Baja California II TG Fase I	GT	39.68	39.68	NG	2012	1	
Mexico	CFE	Baja California II TG Fase I	GT	39.68	39.68	NG	2012	1	
Mexico	CFE	Baja California II TG Fase I	GT	39.68	39.68	NG	2012	1	
So. CA	CISO	Queue Position #: 486	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 526	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 532	ST	20.00	20.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 538	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 541	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 542	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 543	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 612	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 613	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 644	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 421	ST	50.00	50.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 645	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 138	WT	27.00	12.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 156	WT	36.00	17.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 161	CT	181.00	184.00	NG	2012	12	T
So. CA	CISO	Queue Position #: 297	ST	66.00	66.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 621A	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 622B	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 337	PV	20.00	2.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 482	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 647	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 648	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 552	PV	47.00	4.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 78	PV	235.00	20.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 219	CT	45.00	46.00	NG	2012	12	T
No. CA	CISO	Queue Position #: 254	CC	525.00	542.00	NG	2012	12	T

Class 2 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
No. CA	CISO	Queue Position #: 568	CC	22.00	23.00	NG	2012	12	T
No. CA	CISO	Queue Position #: 606	CC	17.00	18.00	NG	2012	12	T
No. CA	CISO	Queue Position #: 635	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 485	WT	4.00	2.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 609	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 631	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 334	CT	176.00	179.00	NG	2012	12	T
So. CA	CISO	Queue Position #: 510	PV	157.00	14.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 621	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 488	ST	92.00	92.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 32	WT	36.00	17.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 188	WT	35.00	17.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 383	CC	74.00	77.00	NG	2012	12	T
So. CA	CISO	Queue Position #: 546	PV	12.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 547	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 607	PV	47.00	4.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 610	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 617A	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 617B	PV	15.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 632B	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 632C	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 645A	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 93	WT	39.00	18.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 153	WT	18.00	8.00	WND	2012	12	T
No. CA	CISO	Queue Position #: 250	WT	12.00	5.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 409	WT	27.00	12.00	WND	2012	12	T
So. CA	CISO	Queue Position #: 490	ST	48.00	48.00	NUC	2012	12	T
No. CA	CISO	Queue Position #: 517	PV	16.00	1.00	SUN	2012	12	T
So. CA	CISO	Queue Position #: 522B	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 600	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 632	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 634	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 636	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 637	PV	16.00	1.00	SUN	2012	12	T
No. CA	CISO	Queue Position #: 638	PV	12.00	1.00	SUN	2012	12	T
Desert SW	EPE	SunEdison	SO	10.20	6.40	SUN	2012	6	T
Basin	IPCO	Langley Gulch	CC	280.00	300.00	NG	2012	12	U
Basin	IPCO	Langley Gulch	CD	30.00	30.00	NG	2012	12	U
Desert SW	PNM	Landfill PV	PV	2.00	2.00	SUN	2012	12	
Northwest	TPWR	North Fork Skokomish	HY	1.80	1.80	WAT	2012	1	P
Northwest	TPWR	North Fork Skokomish	HU	1.80	1.80	WAT	2012	1	P
		Additions for 2012		6,474.53	5,365.15				
Canada	AESO	Wild Rose Wind	WT	200.00	200.00	WND	2013	12	P
Canada	AESO	Hand Hills Wind	WT	80.00	80.00	WND	2013	12	P
Canada	AESO	Fred Olsen Wheatland Wind Project	WT	102.00	102.00	WND	2013	12	P
Canada	AESO	Ivanhoe Energy Inc. Tamarack	CT	26.00	26.00	NG	2013	12	P
Canada	AESO	Swan Hills Sagitawah	CT	344.00	344.00	NG	2013	12	P
Canada	AESO	Blood Tribe Wild Turnip Hill	WT	100.00	100.00	WND	2013	12	P
Canada	AESO	CNRL Primrose East BTF	CT	85.00	85.00	NG	2013	12	P
Canada	BCH	Box Canyon	HY	3.76	6.91	WAT	2013	12	P
Canada	BCH	Culliton Creek	HY	8.94	5.99	WAT	2013	12	P
Canada	BCH	Jamie Creek	HY	10.77	1.61	WAT	2013	12	P
Canada	BCH	Meikle Wind	WT	43.89	28.08	WND	2013	12	P
Canada	BCH	Northwest Stave River	HY	7.48	4.33	WAT	2013	12	P
Canada	BCH	Ramonas - CC Creek - Chickwat	HY	28.73	23.24	WAT	2013	12	P
Northwest	BPAT	Project 59	WT	70.00	70.00	WND	2013	12	L
Northwest	BPAT	Project 60	ST	65.00	65.00	WDS	2013	12	
Northwest	BPAT	Project 61	WT	200.00	200.00	WND	2013	12	T
Northwest	BPAT	Project 62	WT	200.00	200.00	WND	2013	12	L
Northwest	BPAT	Project 63	WT	40.00	40.00	WND	2013	12	T
Northwest	BPAT	Project 64	WT	250.00	250.00	WND	2013	12	T
Northwest	BPAT	Project 65	WT	159.00	159.00	WND	2013	12	T
Northwest	BPAT	Project 67	WT	100.00	100.00	WND	2013	12	L
Mexico	CFE	Baja California III CC-La Jovita	CC	282.24	282.24	NG	2013	1	
No. CA	CISO	Queue Position #: 356	PV	31.00	3.00	SUN	2013	12	T

Class 2 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
So. CA	CISO	Queue Position #: 584	PV	118.00	10.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 585	WT	27.00	12.00	WND	2013	12	T
No. CA	CISO	Queue Position #: 592	PV	196.00	17.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 646	PV	6.00	1.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 649	PV	9.00	1.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 560	PV	103.00	9.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 557	PV	15.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 190	CT	296.00	301.00	NG	2013	12	T
No. CA	CISO	Queue Position #: 272	CC	22.00	23.00	NG	2013	12	T
No. CA	CISO	Queue Position #: 272	PV	98.00	9.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 320	CT	90.00	91.00	NG	2013	12	T
No. CA	CISO	Queue Position #: 569	CC	525.00	542.00	NG	2013	12	T
So. CA	CISO	Queue Position #: 159A	WT	71.00	33.00	WND	2013	12	T
No. CA	CISO	Queue Position #: 586	ST	50.00	50.00	GEO	2013	12	T
So. CA	CISO	Queue Position #: 348	PV	31.00	3.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 349	PV	78.00	7.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 378	CC	105.00	108.00	NG	2013	12	T
No. CA	CISO	Queue Position #: 558	PV	15.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 573	PV	39.00	3.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 588	PV	157.00	14.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 193	ST	500.00	500.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 342	PV	39.00	3.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 602	PV	118.00	10.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 529	PV	16.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 589	PV	47.00	4.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 258	CC	569.00	588.00	NG	2013	12	T
So. CA	CISO	Queue Position #: 512	PV	20.00	2.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 553	PV	314.00	27.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 97	WT	28.00	13.00	WND	2013	12	T
So. CA	CISO	Queue Position #: 119	WT	89.00	41.00	WND	2013	12	T
No. CA	CISO	Queue Position #: 242	PV	118.00	10.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 493	WT	53.00	25.00	WND	2013	12	T
So. CA	CISO	Queue Position #: 521	PV	16.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 522	PV	16.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 522A	PV	16.00	1.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 522C	PV	16.00	1.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 554	WT	24.00	11.00	WND	2013	12	T
So. CA	CISO	Queue Position #: 576	PV	380.00	33.00	SUN	2013	12	T
No. CA	CISO	Queue Position #: 581	PV	78.00	7.00	SUN	2013	12	T
So. CA	CISO	Queue Position #: 628	PV	16.00	1.00	SUN	2013	12	T
Northwest	PACW	Jim Bridger	ST	3.70	3.70	SUB	2013	12	A
Rockies	PSCO	Zuni	ST	-65.00	-65.00	NG	2013	1	RT
Northwest	PSEI	Snoqualmie	HY	1.80	1.80	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	1.80	1.80	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	1.80	1.80	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	1.80	1.80	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	6.70	6.70	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	13.70	13.70	WAT	2013	1	A
Northwest	PSEI	Snoqualmie	HY	27.00	27.00	WAT	2013	1	A
Northwest	PSEI	Lower Baker	HY	31.00	31.00	WAT	2013	1	U
		Additions for 2013		6,986.11	4,916.70				
Canada	AESO	Enel Riverview	WT	115.00	115.00	WND	2014	12	P
Canada	AESO	ENEL Alberta HWY 785	WT	235.00	235.00	WND	2014	12	P
Canada	AESO	Pteragen Peace Butte	WT	75.00	75.00	WND	2014	12	P
Northwest	BPAT	Project 70	WT	150.00	150.00	WND	2014	12	T
Northwest	BPAT	Project 71	WT	200.00	200.00	WND	2014	12	T
Northwest	BPAT	Project 78	WT	250.00	250.00	WND	2014	12	T
So. CA	CISO	Queue Position #: 442	PV	98.00	9.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 183	WT	53.00	25.00	WND	2014	12	T
No. CA	CISO	Queue Position #: 559	PV	53.00	5.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 491	PV	180.00	16.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 240	ST	400.00	400.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 593	PV	243.00	21.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 513	ST	141.00	141.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 407	PV	255.00	22.00	SUN	2014	12	T

Class 2 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
So. CA	CISO	Queue Position #: 408	PV	255.00	22.00	SUN	2014	12	T
No. CA	CISO	Queue Position #: 577	PV	172.00	15.00	SUN	2014	12	T
So. CA	CISO	Queue Position #: 175	WT	115.00	54.00	WND	2014	12	T
So. CA	CISO	Queue Position #: 215	WT	75.00	35.00	WND	2014	12	T
Rockies	PSCO	Arapahoe	ST	-44.00	-44.00	BIT	2014	1	RT
Rockies	PSCO	Arapahoe	ST	109.00	109.00	BIT	2014	1	FC
Rockies	PSCO	Airport 5	GT	90.00	90.00	NG	2014	12	L
		Additions for 2014		3,220.00	1,945.00				
Canada	AESO	Saddlebrook Generating Station	CC	350.00	350.00	NG	2015	12	P
Canada	AESO	Shepard Energy Centre	CC	800.00	800.00	NG	2015	12	T
Canada	AESO	Old Elm & Pothole Creek Wind Farm	WT	300.00	300.00	WND	2015	12	P
Canada	AESO	Benign Energy Heritage Wind Farm	WT	350.00	350.00	WND	2015	12	P
Canada	AESO	Naturener Prairie Home Wind Farm	WT	100.00	100.00	WND	2015	12	P
Canada	AESO	TransAlta Sundance 7 Plant	CT	850.00	850.00	NG	2015	12	P
Basin	IPCO	Shoshone Falls	HY	-0.58	-0.58	WAT	2015	10	RT
		Additions for 2015		2,749.42	2,749.42				
So. CA	LDWP	Scattergood GT3	GT	200.00	200.00	NG	2016	1	P
So. CA	LDWP	Scattergood CC3	CC	312.00	312.00	NG	2016	1	P
So. CA	LDWP	Wind_Pine Canyon	WT	140.00	140.00	WND	2016	1	P
		Additions for 2016		652.00	652.00				
So. CA	LDWP	Geo_2017	OT	80.00	80.00	GEO	2017	1	P
		Additions for 2017		80.00	80.00				

Class 3 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Canada	BCH	Corra Linn	HY	2.30	2.30	WAT	2011	12	A
So. CA	CISO	Queue Position #: 41	CT	141.00	143.00	NG	2011	12	L
So. CA	CISO	Queue Position #: 653EF	WT	4.00	2.00	WND	2011	12	L
So. CA	CISO	Queue Position #: 632AA	PV	8.00	1.00	SUN	2011	12	L
So. CA	CISO	Queue Position #: 639	PV	16.00	1.00	SUN	2011	12	L
So. CA	CISO	Queue Position #: 640	PV	16.00	1.00	SUN	2011	12	L
No. CA	CISO	Queue Position #: 16	WT	10.00	5.00	WND	2011	12	L
So. CA	CISO	Queue Position #: 643AK	ST	6.00	6.00	GEO	2011	12	L
Desert SW	NEVP	CC Landfill Energy	BM	10.60	10.60	LFG	2011	1	P
Desert SW	NEVP	City of Las Vegas	PV	5.00	5.00	SUN	2011	1	P
Desert SW	NEVP	NextLight-Boulder City	PV	50.00	50.00	SUN	2011	1	P
Desert SW	NEVP	NextLight-Silver State	PV	50.00	50.00	SUN	2011	1	P
Desert SW	NEVP	Acciona	ST	92.00	92.00	SUN	2011	1	P
Desert SW	NEVP	Sempra	PV	140.00	140.00	SUN	2011	1	P
Desert SW	NEVP	Abengoa	ST	275.00	275.00	SUN	2011	1	P
Basin	PACE	Hunter	ST	10.30	10.30	BIT	2011	12	A
Basin	PACE	Hunter	ST	10.30	10.30	BIT	2011	1	A
Northwest	PACW	Solar	PV	1.75	1.75	SUN	2011	12	P
Basin	SPPC	Waste Management	ST	3.20	3.20	LFG	2011	1	P
Basin	SPPC	China Mountain	WT	150.00	150.00	WND	2011	1	P
Basin	SPPC	Clipper Red Springs	WT	150.00	150.00	WND	2011	1	P
Basin	SPPC	Great Basin	WT	120.00	120.00	WND	2011	1	P
		Additions for 2011		1,271.45	1,229.45				
Canada	BCH	Gordon M Shrum	HY	30.00	17.00	WAT	2012	12	T
No. CA	CISO	Queue Position #: 653E	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 58	ST	62.00	62.00	GEO	2012	12	L
No. CA	CISO	Queue Position #: 643G	ST	27.00	27.00	MSW	2012	12	L
No. CA	CISO	Queue Position #: 653EA	PV	16.00	1.00	SUN	2012	12	L
No. CA	CISO	Queue Position #: 653F	PV	9.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 72	HY	427.00	394.00	WAT	2012	12	L
No. CA	CISO	Queue Position #: 651	PV	16.00	1.00	SUN	2012	12	L
No. CA	CISO	Queue Position #: 653D	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 651A	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 643AD	ST	95.00	95.00	GEO	2012	12	L
So. CA	CISO	Queue Position #: 644A	PV	16.00	1.00	SUN	2012	12	L
No. CA	CISO	Queue Position #: 111	ST	16.00	16.00	MSW	2012	12	L
So. CA	CISO	Queue Position #: 658	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 660	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 662	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 590	PV	118.00	10.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 643AA	WT	35.00	17.00	WND	2012	12	L
No. CA	CISO	Queue Position #: 650AB	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 653BA	PV	16.00	1.00	SUN	2012	12	L
So. CA	CISO	Queue Position #: 664	PV	16.00	1.00	SUN	2012	12	L
Desert SW	NEVP	Searchlight 1	PV	17.50	17.50	SUN	2012	1	P
Desert SW	NEVP	Edison Mission	PV	50.00	50.00	SUN	2012	1	P
Desert SW	NEVP	First Solar	PV	141.50	141.50	SUN	2012	1	P
Desert SW	NEVP	Saguaro 2	CA	150.00	150.00	NG	2012	1	P
Basin	PACE	Hunter	ST	18.90	18.90	BIT	2012	12	A
Basin	PACE	Hunter	ST	18.90	18.90	BIT	2012	1	A
Northwest	PACW	Solar	PV	1.75	1.75	SUN	2012	12	P
Northwest	PACW	Roseburg Forest Products	ST	35.00	35.00	WDS	2012	1	P
Basin	SPPC	Spring Valley 1	WT	149.00	149.00	WND	2012	1	P
Basin	SPPC	Orion	WT	150.00	150.00	WND	2012	1	P
Basin	SPPC	Vulcan-Patua	ST	72.00	72.00	GEO	2012	1	P
Basin	SPPC	FPL	WT	250.00	250.00	WND	2012	1	P
Basin	SPPC	Ormat-McGinness	ST	38.00	38.00	GEO	2012	1	P
Basin	SPPC	USG	ST	45.00	45.00	GEO	2012	1	P
Basin	SPPC	Horizon	WT	140.00	140.00	WND	2012	1	P
		Additions for 2012		2,288.55	1,928.55				
Northwest	BPAT	Project 76	WT	150.00	150.00	WND	2013	12	P
No. CA	CISO	Queue Position #: 653	PV	16.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 653A	PV	16.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 649A	PV	11.00	1.00	SUN	2013	12	L

Class 3 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
No. CA	CISO	Queue Position #: 653G	PV	13.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 653ED	PV	16.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 653B	PV	16.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 654	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643R	PV	157.00	14.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643S	CT	44.00	45.00	NG	2013	12	L
So. CA	CISO	Queue Position #: 643S	PV	376.00	33.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643AJ	PV	78.00	7.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643AQ	PV	187.00	16.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643AS	PV	157.00	14.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 652	PV	16.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 643Y	PV	63.00	5.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 653EB	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 663	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643V	PV	196.00	17.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643Z	WT	142.00	66.00	WND	2013	12	L
So. CA	CISO	Queue Position #: 643Z	PV	157.00	14.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643AN	WT	12.00	5.00	WND	2013	12	L
So. CA	CISO	Queue Position #: 643AN	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 574	CT	276.00	281.00	NG	2013	12	L
So. CA	CISO	Queue Position #: 657A	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 657B	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 643AP	WT	44.00	21.00	WND	2013	12	L
So. CA	CISO	Queue Position #: 643AT	PV	190.00	17.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 649B	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 649C	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 650A	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 650AA	PV	12.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 653FA	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 653FB	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 653H	PV	8.00	1.00	SUN	2013	12	L
No. CA	CISO	Queue Position #: 656	PV	8.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 659	PV	16.00	1.00	SUN	2013	12	L
So. CA	CISO	Queue Position #: 661	PV	16.00	1.00	SUN	2013	12	L
Desert SW	NEVP	Fotowatio	PV	60.00	60.00	SUN	2013	1	P
Desert SW	NEVP	Bright Source	ST	440.00	440.00	SUN	2013	1	P
Northwest	PACW	Solar	PV	1.75	1.75	SUN	2013	12	P
Basin	SPPC	Silver State	ST	32.00	32.00	GEO	2013	1	P
		Additions for 2013		3,102.75	1,261.75				
Northwest	BPAT	Project 66	WT	202.00	202.00	WND	2014	12	P
Northwest	BPAT	Project 69	WT	150.00	150.00	WND	2014	12	P
Northwest	BPAT	Project 72	WT	240.00	240.00	WND	2014	12	P
Northwest	BPAT	Project 73	WT	100.00	100.00	WND	2014	12	P
So. CA	CISO	Queue Position #: 643AE	PV	114.00	10.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 643AG	PV	39.00	3.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 643AH	PV	133.00	12.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 643U	PV	392.00	34.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643X	PV	392.00	34.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643F	PV	172.00	15.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643I	PV	157.00	14.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643O	PV	98.00	9.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 643AM	PV	38.00	3.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: TBD	PV	235.00	20.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 561	PV	157.00	14.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 643AO	PV	157.00	14.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: TBD	PV	157.00	14.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643W	PV	157.00	14.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 583	WT	10.00	5.00	WND	2014	12	L
So. CA	CISO	Queue Position #: TBD	WT	35.00	17.00	WND	2014	12	L
So. CA	CISO	Queue Position #: 565	CT	180.00	182.00	NG	2014	12	L
So. CA	CISO	Queue Position #: 643AI	PV	235.00	20.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: 555	WT	16.00	8.00	WND	2014	12	L
No. CA	CISO	Queue Position #: 643	WT	27.00	12.00	WND	2014	12	L
No. CA	CISO	Queue Position #: 643A	PV	235.00	20.00	SUN	2014	12	L
No. CA	CISO	Queue Position #: 643D	PV	118.00	10.00	SUN	2014	12	L

Class 3 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
No. CA	CISO	Queue Position #: 643E	PV	157.00	14.00	SUN	2014	12	L
So. CA	CISO	Queue Position #: TBD	WT	128.00	60.00	WND	2014	12	L
Northwest	PACW	Solar	PV	1.75	1.75	SUN	2014	12	P
Basin	SPPC	Tonopah Solar	ST	190.00	190.00	SUN	2014	1	P
			Additions for 2014	4,422.75	1,441.75				
So. CA	CISO	Queue Position #: 643AB	ST	260.00	260.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 643AC	ST	750.00	750.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 643AL	ST	1,000.00	1,000.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 506	PV	235.00	20.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 503	PV	122.00	11.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: TBD	PV	235.00	20.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 429	ST	100.00	100.00	SUN	2015	12	L
No. CA	CISO	Queue Position #: 643H	PV	470.00	41.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 154	ST	250.00	250.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 241	ST	400.00	400.00	SUN	2015	12	L
No. CA	CISO	Queue Position #: 300	CC	350.00	362.00	NG	2015	12	L
So. CA	CISO	Queue Position #: 494	PV	274.00	24.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 467	ST	230.00	230.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 502	PV	16.00	1.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 643AF	PV	392.00	34.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 643T	CC	1,093.00	1,130.00	NG	2015	12	L
So. CA	CISO	Queue Position #: 643T	PV	549.00	48.00	SUN	2015	12	L
So. CA	CISO	Queue Position #: 163	PV	235.00	20.00	SUN	2015	12	L
Basin	PACE	Huntington	ST	18.00	18.00	BIT	2015	1	A
Northwest	PACW	Solar	PV	1.75	1.75	SUN	2015	12	P
			Additions for 2015	6,980.75	4,720.75				
So. CA	CISO	Queue Position #: 608	PV	196.00	17.00	SUN	2016	12	L
So. CA	CISO	Queue Position #: 643AR	ST	364.00	364.00	GEO	2016	12	L
			Additions for 2016	560.00	381.00				
Northwest	BPAT	Project 77	WT	150.00	150.00	WND	2017	12	L
Northwest	BPAT	Project 90	WT	150.00	150.00	WND	2017	12	T
			Additions for 2017	300.00	300.00				
Northwest	BPAT	Project 83	WT	200.00	200.00	WND	2018	12	L
So. CA	LDWP	Geo_2018	OT	80.00	80.00	GEO	2018	1	P
Northwest	PACW	Jim Bridger	ST	8.30	8.30	SUB	2018	12	A
			Additions for 2018	288.30	288.30				
Northwest	BPAT	Project 96	WT	200.00	200.00	WND	2019	12	T
Northwest	BPAT	Project 99	WT	200.00	200.00	WND	2019	12	L
So. CA	LDWP	Wind_2019	WT	130.00	130.00	WND	2019	1	P
			Additions for 2019	530.00	530.00				
So. CA	LDWP	Geo_2020	OT	80.00	80.00	GEO	2020	1	P
			Additions for 2020	80.00	80.00				

Class 4 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Canada	AESO	Daishowa-Marubeni DMI-TG2	BM	20.00	20.00	WDS	2011	12	P
Desert SW	TEPC	SGS Solar	PV	1.70	1.70	SUN	2011	12	P
Rockies	WACM	2007-G10	WT	124.50	124.50	WND	2011	12	P
Rockies	WACM	2009-G3	WT	30.00	30.00	WND	2011	12	P
Rockies	WACM	2006-G2	WT	100.50	100.50	WND	2011	12	P
Rockies	WACM	2009-G1	WT	200.00	200.00	WND	2011	12	P
Rockies	WACM	2009-G2	WT	200.00	200.00	WND	2011	12	P
Rockies	WACM	2010-G4	WT	60.00	60.00	WND	2011	12	P
Desert SW	WALC	Wind Farm 5	WT	600.00	600.00	WND	2011	12	P
Desert SW	WALC	Wind Farm 6	WT	150.00	150.00	WND	2011	12	P
		Additions for 2011		1,486.70	1,486.70				
Canada	AESO	Windfall Power	GT	16.00	16.00	NG	2012	12	P
Canada	AESO	Plasco Waste Conversion Facility	BM	15.00	15.00	MSW	2012	12	P
Canada	AESO	Otoka Gasification	ST	23.00	23.00	SUB	2012	12	P
Canada	AESO	GlenRidge Wind Farm Phase 1	WT	100.00	100.00	WND	2012	12	P
So. CA	IID	El Centro	CA	35.00	35.00	NG	2012	12	P
So. CA	IID	El Centro	CT	107.00	107.00	NG	2012	12	P
So. CA	IID	Unidentified	GE	30.00	30.00	GEO	2012	12	P
Rockies	PSCO	BHCE Wind-20	WT	20.00	20.00	WND	2012	12	L
Rockies	PSCO	BHCE Wind-60	WT	60.00	60.00	WND	2012	12	P
Rockies	PSCO	BHCE Solar 1	PV	2.00	2.00	SUN	2012	12	L
Rockies	PSCO	BHCE CT5	GT	62.30	69.20	NG	2012	12	L
No. CA	SMUD	FIT	PV-NT	66.00	7.00	SUN	2012	1	P
Desert SW	TEPC	SGS Solar	PV	1.00	1.00	SUN	2012	12	P
Rockies	WACM	2005-G1	WT	90.00	90.00	WND	2012	12	P
Rockies	WACM	2004-G4	WT	100.50	100.50	WND	2012	12	P
Rockies	WACM	2008-G9	WT	90.00	90.00	WND	2012	12	P
Rockies	WACM	2003-G1	WT	50.00	50.00	WND	2012	12	P
Rockies	WACM	2007-G5	WT	99.00	99.00	WND	2012	12	P
Rockies	WACM	2008-G4	WT	30.00	30.00	WND	2012	12	P
Rockies	WACM	2008-G5	WT	30.00	30.00	WND	2012	12	P
Rockies	WACM	2010-G3	ST	48.00	48.00	OBG	2012	12	P
Desert SW	WALC	Wind Farm 1	WT	500.00	500.00	WND	2012	12	P
Desert SW	WALC	Solar Thermal 6	SP	200.00	200.00	SUN	2012	12	P
		Additions for 2012		1,774.80	1,722.70				
Canada	AESO	Direct Energy Units 1 & 2	GT	175.00	175.00	NG	2013	12	P
Canada	AESO	Dunvegan	HY	100.00	100.00	WAT	2013	12	P
Canada	AESO	Stirling Wind Farm	WT	100.00	100.00	WND	2013	12	P
Canada	AESO	Battle River 3	ST	-148.00	-148.00	SUB	2013	7	RT
Canada	AESO	Battle River 4	ST	-148.00	-148.00	SUB	2013	7	RT
Canada	AESO	TransCanada Neutral Hills Wind Project	WT	150.00	150.00	WND	2013	12	P
Canada	AESO	TransCanada Provost Wind Farm	WT	150.00	150.00	WND	2013	12	P
Canada	AESO	Sequoia Oyen Wind Project	WT	100.00	100.00	WND	2013	12	P
Canada	AESO	Imperial Oil Kearl Oil Sands Project	ST	100.00	100.00	NG	2013	12	P
Canada	AESO	Windlab Bull Creek Wind Project	WT	130.00	130.00	WND	2013	12	P
Canada	AESO	Piikani Resource	WT	210.00	210.00	WND	2013	12	P
Canada	AESO	ATCO Electric MEG Energy Surmont	CT	85.00	85.00	NG	2013	12	P
Canada	AESO	Windcor Buffalo Atlee Wind Farm	WT	99.00	99.00	WND	2013	12	P
Canada	AESO	AIM Powergen Wrentham Wind Farm	WT	150.00	150.00	WND	2013	12	P
Canada	AESO	Geilectric Welsh Wind Farm	WT	69.00	69.00	WND	2013	12	P
Canada	AESO	AltaGas Glenridge Windfarm Phase II	WT	100.00	100.00	WND	2013	12	P
Canada	AESO	Fred Olsen Starland F Wind Project	WT	102.00	102.00	WND	2013	12	P
Canada	AESO	Naturener Wild Rose Wind Farm Phase :	WT	200.00	200.00	WND	2013	12	P
Canada	AESO	RHOVCubed Energy Ltd. Project	WT	150.20	150.20	WND	2013	12	P
Canada	AESO	Renewable Energy Services Ltd	WT	75.00	75.00	WND	2013	12	P
Canada	AESO	Acciona Fort McLeod Wind	WT	99.00	99.00	WND	2013	12	P
Canada	AESO	AOSC Dover West Leduc Insitu	CT	100.00	100.00	NG	2013	12	P
Canada	AESO	Fred Olsen Renewables Lethbridge	WT	299.00	299.00	WND	2013	12	P
Canada	AESO	Invenergy Schuler Wind Farm	WT	300.00	300.00	WND	2013	12	P
Canada	AESO	Wainwright Wind Project	WT	150.00	150.00	WND	2013	12	P
Canada	AESO	Suncor Hand Hills Wind Energy Project	WT	80.00	80.00	WND	2013	12	P
Canada	BCH	Bundle - BioMass (G003)	BM	21.45	21.45	WDS	2013	1	P
Desert SW	EPE	Rio Grande 9 (LMS-1)	GT	87.00	87.00	NG	2013	12	P
Desert SW	SRP	Solar	SP-S	125.00	125.00	SUN	2013	12	P

Class 4 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Desert SW	TEPC	Bowie	CC	500.00	500.00	NG	2013	12	P
Desert SW	TEPC	SGS Solar	PV	1.00	1.00	SUN	2013	12	P
Rockies	WACM	2007-G2	WT	300.00	300.00	WND	2013	12	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2013	12	P
Desert SW	WALC	Wind Farm 3	WT	65.00	65.00	WND	2013	12	P
Desert SW	WALC	Solar Thermal 1	SP	150.00	150.00	SUN	2013	12	P
Desert SW	WALC	Solar Thermal 3	SP	110.00	110.00	SUN	2013	12	P
Desert SW	WALC	Solar Thermal 4	SP	150.00	150.00	SUN	2013	12	P
Desert SW	WALC	Solar Thermal 5	SP	340.00	340.00	SUN	2013	12	P
Desert SW	WALC	Solar Thermal 8	SP	90.00	90.00	SUN	2013	12	P
		Additions for 2013		4,966.65	4,966.65				
Canada	AESO	Dover Operating Corp. Dover North	CT	85.00	85.00	NG	2014	12	P
Canada	AESO	Shell Wild Steer Butte Wind Project	WT	700.00	700.00	WND	2014	12	P
Canada	AESO	Suncor - Schuler Wind Energy Project	WT	80.00	80.00	WND	2014	12	P
Canada	BCH	Forrest Kerr	HY	169.61	44.13	WAT	2014	12	P
Canada	BCH	Mica G5	HY	500.00	465.00	WAT	2014	12	P
Canada	BCH	Bremner - Trio	HY	19.02	14.95	WAT	2014	12	P
Canada	BCH	Corrigan Creek	HY	0.13	2.03	WAT	2014	12	P
Canada	BCH	Gold River Power	BM	85.05	90.00	LFG	2014	12	P
Canada	BCH	Kokish River	HY	10.61	29.34	WAT	2014	12	P
Canada	BCH	Skookum Power	HY	11.06	8.28	WAT	2014	12	P
Canada	BCH	Upper Toba Valley	HY	60.84	7.38	WAT	2014	12	P
Canada	BCH	Bundle - Small Hydro (G018)	HY	36.00	7.20	WAT	2014	1	P
Canada	BCH	Bundle - Small Hydro (G019)	HY	35.00	7.00	WAT	2014	1	P
Canada	BCH	Bundle - Small Hydro (G027)	HY	32.00	6.40	WAT	2014	1	P
Canada	BCH	MSW01 Municipal Solid Waste	BM	6.63	6.63	LFG	2014	1	P
Canada	BCH	MSW01 Municipal Solid Waste	BM	6.12	6.12	LFG	2014	1	P
Desert SW	EPE	BIOMASS	BM	15.00	15.00	OBG	2014	12	P
So. CA	IID	Calipatria	GE	5.00	5.00	GEO	2014	12	P
Basin	PACE	CCCT F 2x1 w/DF	CC	637.00	637.00	NG	2014	1	P
Desert SW	TEPC	SGS Solar	PV	1.00	1.00	SUN	2014	12	P
Rockies	WACM	2007-G4	WT	300.00	300.00	WND	2014	12	P
Desert SW	WALC	Solar Thermal 2	SP	250.00	250.00	SUN	2014	12	P
Desert SW	WALC	Solar Thermal 9	SP	300.00	300.00	SUN	2014	12	P
		Additions for 2014		3,345.08	3,067.47				
Canada	BCH	Mica G6	HY	500.00	460.00	WAT	2015	12	P
Canada	BCH	Boulder Creek	HY	13.69	1.94	WAT	2015	12	P
Canada	BCH	Bullmoose Wind Project	WT	18.15	14.40	WND	2015	12	P
Canada	BCH	Tretheway Creek	HY	5.85	6.72	WAT	2015	12	P
Canada	BCH	Bundle - SolidWaste (G004)	BM	51.00	51.00	LFG	2015	1	P
Canada	BCH	Bundle - BC Wind (PC18)	WT	10.35	10.35	WND	2015	1	P
Northwest	BPAT	Project 75	WT	150.00	150.00	WND	2015	12	P
Northwest	BPAT	Project 85	WT	200.00	200.00	WND	2015	12	P
Desert SW	EPE	Caliente 1	CT	70.00	70.00	NG	2015	12	P
Desert SW	EPE	Caliente 1	CT	70.00	70.00	NG	2015	12	P
Desert SW	EPE	Caliente 1	CA	148.00	148.00	NG	2015	12	P
So. CA	IID	Calipatria	GE	40.00	40.00	GEO	2015	12	P
Basin	IPCO	Shoshone Falls Upgrade	HY-R	50.00	50.00	WAT	2015	12	C
Desert SW	PNM	Generic Wind 1	WT	70.00	70.00	WND	2015	12	P
Desert SW	PNM	Generic Solar PV	PV	30.00	30.00	SUN	2015	12	P
Desert SW	SRP	Gas (Peaking)	GT	182.00	202.00	NG	2015	12	P
Desert SW	TEPC	Unidentified	GT	180.00	180.00	NG	2015	12	P
Desert SW	WALC	Wind Farm 2	WT	370.00	370.00	WND	2015	12	P
Desert SW	WALC	Wind Farm 4	WT	500.00	500.00	WND	2015	12	P
Desert SW	WALC	Solar Thermal 7	SP	1,200.00	1,200.00	SUN	2015	12	P
Desert SW	WALC	Solar Thermal 10	SP	250.00	250.00	SUN	2015	12	P
		Additions for 2015		4,109.04	4,074.41				
Canada	BCH	Big Silver - Shovel Creek	HY	11.94	12.66	WAT	2016	12	P
Canada	BCH	North Creek Hydroelectric	HY	9.58	1.33	WAT	2016	12	P
Canada	BCH	Upper Lillooet River	HY	43.96	2.84	WAT	2016	12	P
Canada	BCH	MSW01 Municipal Solid Waste	BM	38.25	38.25	LFG	2016	1	P
Northwest	BPAT	Project 74	WT	150.00	150.00	WND	2016	12	P
Northwest	BPAT	Project 79	WT	150.00	150.00	WND	2016	12	P

Class 4 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Northwest	BPAT	Project 80	WT	100.00	100.00	WND	2016	12	P
Northwest	BPAT	Project 81	WT	150.00	150.00	WND	2016	12	P
Northwest	BPAT	Project 84	WT	100.00	100.00	WND	2016	12	P
Mexico	CFE	Baja California II - La jovita	CC	567.36	567.36	NG	2016	1	
So. CA	IID	Niland	GT	45.00	45.00	NG	2016	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2016	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2016	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2016	12	P
So. CA	IID	Calipatria	GE	15.00	15.00	GEO	2016	12	P
Basin	PACE	CCCT F 2x1 w/DF	CC	597.00	597.00	NG	2016	1	P
Rockies	PSCO	BHCE Solar 2	PV	2.00	2.00	SUN	2016	12	L
Rockies	PSCO	BHCE CT6	GT	29.00	32.00	NG	2016	12	L
Desert SW	SRP	Gas (Peaking)	GT	273.00	303.00	NG	2016	12	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2016	12	P
		Additions for 2016		2,467.09	2,451.44				
Canada	BCH	Bundle - Small Hydro (G014)	HY	27.00	5.40	WAT	2017	1	P
Canada	BCH	Bundle - Small Hydro (G023)	HY	81.00	16.20	WAT	2017	1	P
Canada	BCH	Bundle - Small Hydro (G031)	HY	91.60	18.32	WAT	2017	1	P
Canada	BCH	Bundle - Small Hydro (G032)	HY	66.00	13.20	WAT	2017	1	P
Canada	BCH	Bundle - BC Wind (PC13)	WT	10.13	10.13	WND	2017	1	P
Canada	BCH	Bundle - BC Wind (PC28)	WT	11.48	11.48	WND	2017	1	P
Northwest	BPAT	Project 86	WT	100.00	100.00	WND	2017	12	P
Northwest	BPAT	Project 87	WT	150.00	150.00	WND	2017	12	P
Northwest	BPAT	Project 89	WT	150.00	150.00	WND	2017	12	P
Northwest	BPAT	Project 91	WT	150.00	150.00	WND	2017	12	P
No. CA	CISO	Queue Position #: 643J	CT	44.00	45.00	NG	2017	12	P
No. CA	CISO	Queue Position #: 643J	PV	94.00	8.00	SUN	2017	12	P
No. CA	CISO	Queue Position #: 643K	CT	44.00	45.00	NG	2017	12	P
No. CA	CISO	Queue Position #: 643K	PV	188.00	16.00	SUN	2017	12	P
No. CA	CISO	Queue Position #: 643L	CT	44.00	45.00	NG	2017	12	P
No. CA	CISO	Queue Position #: 643L	PV	188.00	16.00	SUN	2017	12	P
No. CA	CISO	Queue Position #: 643M	CT	44.00	45.00	NG	2017	12	P
No. CA	CISO	Queue Position #: 643M	PV	188.00	16.00	SUN	2017	12	P
No. CA	CISO	Queue Position #: 643N	CT	44.00	45.00	NG	2017	12	P
No. CA	CISO	Queue Position #: 643N	PV	94.00	8.00	SUN	2017	12	P
Desert SW	EPE	Rio Grande 10 (LMS-2)	GT	87.00	87.00	NG	2017	12	P
So. CA	IID	Calipatria	GE	15.00	15.00	GEO	2017	12	P
Desert SW	SRP	Gas (Peaking)	GT	364.00	404.00	NG	2017	12	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2017	12	P
		Additions for 2017		2,325.21	1,469.73				
Canada	AESO	Slave River	HY	1,250.00	1,250.00	WAT	2018	12	P
Canada	BCH	Bundle - BC Wind (PC14)	WT	10.80	10.80	WND	2018	1	P
Canada	BCH	Bundle - BC Wind (PC16)	WT	7.43	7.43	WND	2018	1	P
Northwest	BPAT	Project 82	WT	200.00	200.00	WND	2018	12	P
Northwest	BPAT	Project 92	WT	150.00	150.00	WND	2018	12	P
Northwest	BPAT	Project 93	WT	200.00	200.00	WND	2018	12	P
Northwest	BPAT	Project 94	WT	200.00	200.00	WND	2018	12	P
Northwest	BPAT	Project 95	WT	150.00	150.00	WND	2018	12	P
Northwest	BPAT	Project 97	WT	200.00	200.00	WND	2018	12	P
Desert SW	EPE	Caliente 2	CT	70.00	70.00	NG	2018	12	P
Desert SW	EPE	Caliente 2	CT	70.00	70.00	NG	2018	12	P
Desert SW	EPE	Caliente 2	CA	148.00	148.00	NG	2018	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2018	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2018	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2018	12	P
So. CA	IID	Niland	GT	45.00	45.00	NG	2018	12	P
Rockies	PACE	Wind, WYNE, 35	WT	160.00	160.00	WND	2018	1	p
Rockies	PACE	Wind, WYNE, 35	WT	100.00	100.00	WND	2018	1	P
Rockies	PACE	Wind, WYNE, 35	WT	100.00	100.00	WND	2018	1	P
No. CA	SMUD	Iowa Hill	PS	390.00	390.00	WAT	2018	12	P
Desert SW	SRP	Gas (Peaking)	CC	540.00	540.00	NG	2018	12	P
Desert SW	SRP	Solar	PV-T	15.00	15.00	SUN	2018	12	P

Class 4 Additions

Area	Balancing Authority	Name	Unit Type	Capacity MW Summer	Capacity MW Winter	Fuel Type	Commercial Operations Dates Year	Month	Status
Desert SW	TEPC	Unidentified	GT	180.00	180.00	NG	2018	12	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2018	12	P
		Additions for 2018		4,371.23	4,371.23				
Canada	BCH	Bundle - BC Wind (PC19)	WT	8.78	8.78	WND	2019	1	P
Northwest	BPAT	Project 98	WT	200.00	200.00	WND	2019	12	P
Mexico	CFE	Baja California IV - SLRC	CC	271.20	271.20	NG	2019	1	
Mexico	CFE	Baja California IV - SLRC	CC	271.20	271.20	NG	2019	1	
Desert SW	EPE	Rio Grande 11 (LMS-3)	GT	87.00	87.00	NG	2019	12	P
Rockies	PACE	Wind, WYSW, 35	WT	200.00	200.00	WND	2019	1	P
Rockies	PACE	Wind, WYNE, 35	WT	100.00	100.00	WND	2019	1	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2019	12	P
		Additions for 2019		1,188.18	1,188.18				
Canada	BCH	Site C G1	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Site C G2	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Site C G3	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Site C G4	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Site C G5	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Site C G6	HY	150.00	150.00	WAT	2020	12	P
Canada	BCH	Bundle - BC Wind (VI14)	WT	2.59	2.59	WND	2020	1	P
Desert SW	EPE	Newman 6	CT	70.00	70.00	NG	2020	12	P
Desert SW	EPE	Newman 6	CT	70.00	70.00	NG	2020	12	P
Desert SW	EPE	Newman 6	CA	148.00	148.00	NG	2020	12	P
So. CA	IID	El Centro	ST	-80.00	-80.00	RFO	2020	12	P
So. CA	IID	El Centro	CA	80.00	80.00	NG	2020	12	P
So. CA	IID	El Centro	CT	107.00	107.00	NG	2020	12	P
Rockies	PACE	Wind, WYSW, 35	WT	100.00	100.00	WND	2020	1	P
Rockies	PACE	Wind, WYNE, 35	WT	100.00	100.00	WND	2020	1	P
Rockies	PSCO	BHCE Solar 3	PV	2.00	2.00	SUN	2020	12	L
Rockies	WACM	NewTSresource	CD	480.00	480.00	NG	2020	12	P
Rockies	WACM	NewTSresource	WT	50.00	50.00	WND	2020	12	P
		Additions for 2020		2,029.59	2,029.59				

Definitions of Generation Addition Codes

UNIT TYPE

HY ..... Hydro – Conventional
HY-R ... Hydro – Renewable
PS ..... Hydro – Pumped Storage
ST..... Steam Turbine – Non-Nuclear
NP ..... Steam Turbine – Nuclear
GT ..... Combustion Turbine
CA ..... Combined Cycle – Steam Portion
CT ..... Combined Cycle – Combustion Turbine Portion
CS ..... Combined Cycle – Single Shaft
CC ..... Combined Cycle – Total Unit
CD ..... Combined Cycle – Duct Firing
GE ..... Geothermal
IC .....Internal Combustion
FC .....Fuel Cell
BM .....Biomass
PV .....Solar Power – Photovoltaic
PV-T.....Solar Power – Photovoltaic with Tracking
PV-NT ...Solar Power – Photovoltaic W/O Tracking
SP .....Solar Power – Thermal
SP-S.....Solar Power – Thermal with Storage
SO.....Solar Power – Other
WT .....Wind Power
CE.....Compressed Air Energy Storage

FUEL TYPE

BIT..... Bituminous Coal
SUB ..... Sub-Bituminous Coal
LIG..... Lignite Coal
WC ..... Waste Coal
SC ..... Synthetic Coal-based Fuel
PC ..... Petroleum Coke
DFO..... Distillate Fuel Oil
JF ..... Jet Fuel
KER ..... Kerosene
RFO..... Residual Fuel oil
WO ..... Waste Oil
NG..... Natural Gas
PG ..... Propane
BFG..... Blast Furnace Gas
OG..... Other Gas (coke oven, refinery, etc.)
NUC..... Nuclear
GEO .... Geothermal Steam
WAT .... Water-base ratings on median hydro conditions
AB ..... Agriculture Crop Byproducts
BLQ ..... Black Liquor
LFG ..... Landfill Gas
MSW ... Municipal Solid Waste
OBL ..... Other Biomass Liquids
OBS..... Other Biomass Solids
OBG .... Other Biomass Gases (methane)
PUR..... Purchased Steam
SLW .... Sludge Waste
TDF ..... Tires
WDL .... Wood or Wood Waste, Liquid
WDS ... Wood or Wood Waste, Solid
SUN..... Sun
WND.... Wind

STATUS CODE (As reported by the BAs)

Class 1 Status Codes

U .....Under active construction, less than or equal to 50 percent complete (based on construction time to first electric date)

V .....Under active construction, more than 50 percent complete (based on construction time to first electric date)

TS ....Construction complete, but not yet in commercial operation (including low power testing of nuclear units)

A .....Generator capability increased (re-rated or relicensed)

D .....Generator capability decreased (re-rated or relicensed)

RT ....Existing generator scheduled for retirement

T.....Regulatory approval received but not under active construction

P .....Planned for installation but not under active construction

OT ....None of the Above

Class 2, Class 3, and Class 4 Status Codes

U .....Under active construction, less than or equal to 50 percent complete (based on construction time to first electric date)

TS ....Construction complete, but not yet in commercial operation (including low power testing of nuclear units)

A .....Generator capability increased (re-rated or relicensed) (Beyond Class 1 Timeframe)

D .....Generator capability decreased (re-rated or relicensed) (Beyond Class 1 Timeframe)

RT ....Existing generator scheduled for retirement

L.....Regulatory approval pending but not under active construction (started site preparation)

T.....Regulatory approval received but not under active construction

RP ....Proposed for life extension or repowering

P .....Planned for installation but not under active construction

OT ....None of the Above