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Idaho

Tom Karier
Washington

Dick Wallace
Washington



Bruce A. Measure
Vice-Chair
Montana

Rhonda Whiting
Montana

Melinda S. Eden
Oregon

Joan M. Dukes
Oregon

July 1, 2009

MEMORANDUM

TO: Council Members

FROM: John Fazio, Senior Power Systems Analyst

SUBJECT: Resource Planning Perspectives: Regional vs. Utility

Utilities have raised numerous questions regarding preliminary results from the Council's power plan analyses. In particular, they are concerned about the apparently large resource surplus and the plan strategy to aggressively acquire conservation and RPS resources in a period of surplus. The surplus that utilities are referring to is the load/resource balance defined by the Resource Adequacy Forum and includes a large amount of non-firm generation.

For an "adequacy" assessment, all available resources should be considered, price notwithstanding. Because of the large supply of in-region and out-of-region market resources combined with a high likelihood of better than critical hydro conditions, the region has access to ample supplies to "keep the lights on" through 2014. However, the minimum resource threshold for an adequacy assessment is not intended to be a resource needs planning target.

For a "needs" assessment, the first approximation should only count firm resources against firm loads. Once a need has been established, planners can decide how to satisfy that need, which could include some reliance on market resources. Calculating the regional load/resource balance using only firm resources shows a slight deficit in 2010 that grows to a substantial deficit by 2030 if no new resources are added. Adding the plan's expected build-out of new resources reduces the near-term deficit substantially and generates about a 1,200 average megawatt surplus by 2030. (See the attached paper.)

But resource planning is more complicated than just maintaining a certain level of load/resource balance. The power plan must contain a resource strategy that is also low cost, has minimum economic risk and addresses environmental concerns, such as fish and wildlife survival and air quality. In the near term, aggressive acquisition of conservation and RPS resources still leave the region slightly deficit, however, from an economic point of view this makes sense from a regional perspective because of the large supply of market resources to draw from. Individual utilities will face different choices due to limited market access or different risk preferences. In the long term, however, market supplies are more uncertain and acquiring the appropriate types of resources to hedge against potential future carbon penalties makes sense. Thus, by 2030 the

plan's resource strategy would have the region slightly surplus because of non-carbon producing resources, which displace generation from coal plants. (Coal plants are displaced but not retired so their contribution to the load/resource balance keeps the region surplus in the long-term.)

Attachment

Resource Planning Perspectives: Regional vs. Utility

July 14, 2009

Adequate vs. Optimal Power Supply

There has been considerable confusion about the relationship between the resource recommendations in the Council's power plan and the results of the Council's resource adequacy analysis using procedures developed by the Resource Adequacy Forum. The adequacy assessment concludes that the region's power supply is adequate through at least the next five years. Yet the Council's plan calls for aggressive acquisition of conservation and reinforces the need for state mandated renewable resource portfolio standards.

While these perspectives appear inconsistent with one another, each is valid for the particular purpose it serves. The adequacy assessment is meant to be an early warning system to alert the region if and when resource development falls dangerously short -- it is not intended to be a resource planning target. The region is deemed to be adequate because it has access to a large (although sometimes high-priced) market supply, which is expected to be available during periods of unexpectedly high demand.

Unlike the adequacy assessment, the power plan is intended to provide guidance to regional utilities regarding the types and amounts of resources to acquire. The Council uses sophisticated analytical tools to develop its resource strategy, which is designed to keep costs low and to minimize economic risk. Plan analysis indicates that relying too much on market supplies is not in the best interest of the region. Thus, even though the region's power supply is deemed to be adequate, the plan suggests acquiring resources for economic reasons and as a hedge against potential future carbon polices.

Interpreting Load/Resource Balance in the Power Plan

Regional utilities have consistently used the annual average load/resource balance as a quick and simple metric to get an indication of their resource needs. For the region, the load/resource balance reported in PNUCC's NRF provides an aggregate look at utility resource needs. That calculation assumes firm loads and resources, which include critical hydro generation but no market resources. The general takeaway from this simple metric is that when the average annual load is greater than the firm supply, additional resources are likely needed. For a resource "needs" assessment this assumption makes sense. However, once a need is identified, the decision regarding how to fill that need requires a more sophisticated analysis.

While the power plan provides a general indication of the types and quantities of cost effective resources for the region, each utility's situation is unique and may require a different solution. For example, some may not have full access to market supplies (i.e. transmission limitations); others may want to limit their exposure to volatile market prices or may want more control over the resources they rely on. A full integrated resource plan assessment must be made to determine the operational reliability and cost of different resource combinations, to help lay out strategies to mitigate major risks that utilities face (such as dealing with carbon emissions) and to detail the types and quantities of required resources.

Nonetheless, the load/resource balance still provides a useful guide in assessing the status of the power supply. Figure 1 shows the annual average load/resource balance for the regional power supply. The Council begins by counting only firm loads and existing firm resources. That assessment, illustrated in Figure 1 as the curve labeled “Firm Balance,” indicates that the region currently is in approximate firm load/resource balance and becomes quite deficit by 2030 -- thus indicating a resource need. Adding new resources derived from the Council’s plan raises the balance to positive values in later years but leaves the region somewhat deficit during the first 5 year period.

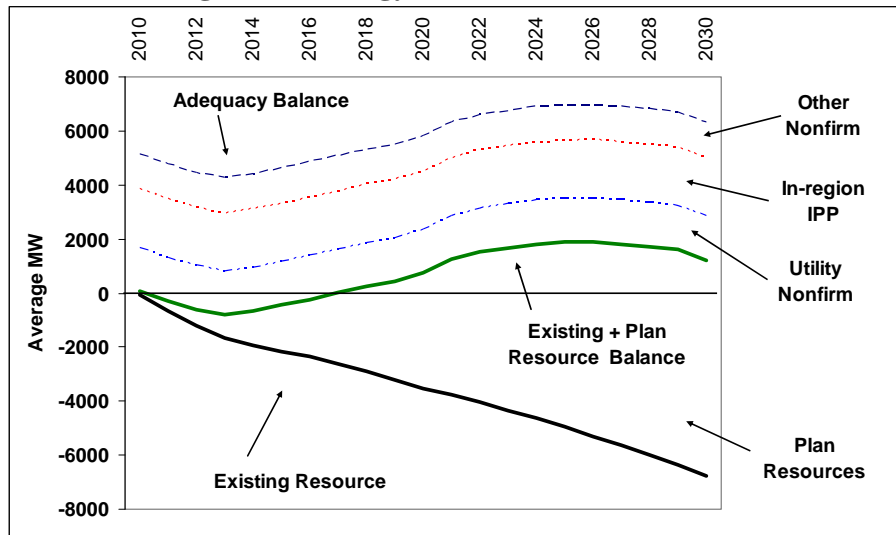
This is acceptable from an adequacy point of view because the amount of non-firm resources required to fill gap in the first 5 years is a fraction of the available market supply. In Figure 1, the regional market supply is labeled “In-region IPP” and refers to the uncommitted independent power producers in the region. All uncommitted IPP generation is assumed to be available for Northwest use during winter but only 1,000 average megawatts is assumed to be available in the summer (because of competition with the Southwest). On an annual average basis this amounts to 2,156 average megawatts.

Another source of “non-firm” generation comes from existing regional firm resources that are not expected to be fully dispatched. For example, a utility may have a simple cycle combustion turbine that it intends to use for peaking purposes only. The firm part of this resource may only be 5 percent of its availability but the other 95 percent should be available during periods of unexpectedly high demand. The area in Figure 1 labeled “Utility Nonfirm” represents the amount of this type of non-firm regional resource. On average this value is about 1,600 average megawatts.

Finally, there remains the out-of-region market supply and availability of non-firm hydroelectric generation. A loss-of-load probability analysis is used to assess how much the region should rely on these resources. That amount is reflected in the area labeled “Other Nonfirm” in Figure 1 and on average is 1,300 average megawatts. Putting all these pieces together yields the load/resource balance used for an adequacy assessment, which is labeled “Adequacy Balance” in Figure 1.

The adequacy load/resource balance in Figure 1 is 5,180 average megawatts (MWa) in 2010. Subtracting the non-firm contributions results in a near zero load/resource balance for the needs assessment, which is consistent with the NRF value. Looking toward the future, the Council’s power plan and utility plans (in aggregate) all indicate a need for new resources. The Council’s planning approach, which is similar to methods used by many utilities, indicates that adding lost-opportunity and discretionary conservation is very effective in reducing both long-term cost and economic risk. In addition, the Council’s plan includes renewable resources that would be acquired under the renewable resource portfolio standards that have been adopted in three of the four Northwest states.

Figure 1 - Energy Load/Resource Balance



The resource strategy outlined in the plan can be a useful starting point for utilities in terms of identifying the types and amount of new resources that may be cost effective for them. Of course, each utility’s situation is different and may require more or different types of resource to address their own particular needs. For example, the Bonneville Power Administration, which is a balancing authority, must provide reserves to accommodate within-hour balancing operations. This may require that Bonneville acquire additional resources to provide this service.

Assessing Hourly Needs

Although not used as often in the past, capacity load/resource balances (usually computed as reserve margins) are becoming more important for assessing the need for new resources. The combination of rapidly growing summer loads and decreasing summer hydroelectric capability is pushing the region to consider more carefully its peaking needs in summer months. Figure 2 and Figure 3 show the sustained peak reserve margin (over the 6 highest load hours for 3 consecutive days) calculations for January and July, respectively. Based on existing firm resources only, the 2010 reserve margins are 23 percent for January and 27 percent for July. Without counting any new or non-firm resources, these reserve margins decline rapidly over the 20-year study horizon. It has not yet been clearly defined what the minimum reserve requirement should be for a firm sustained peak reserve margin calculation. In other regions, a 15 to 17 percent reserve margin is typically used but that is based on a single hour peak requirement in mostly thermal systems.

For adequacy assessments, minimum sustained peak reserve margin thresholds have been estimated using a loss-of-load probability analysis. Those thresholds are 23 percent for January and 24 percent for July. However, these minimum thresholds cannot be compared to the firm reserve margin values because they include contributions from non-firm resources, which are illustrated in Figures 2 and 3. For winter months, in-region IPP generation is assumed to be fully available at 3,550 megawatts but for summer months that availability is reduced to 1,000 megawatts. Additional hydroelectric generation, in excess of critical period generation, is assumed to be 2,000 megawatts in winter and 1,000 megawatts in summer. Finally, a maximum

of 3,000 megawatts of out-of-region supply is assumed for winter but none for summer. Adding the non-firm components and the plan's new resource additions to the firm reserve margin calculation yields 54 percent for January and 35 percent for July, both above the minimum thresholds required for system adequacy.

Figure 2 - January Sustained Peaking Reserve Margin

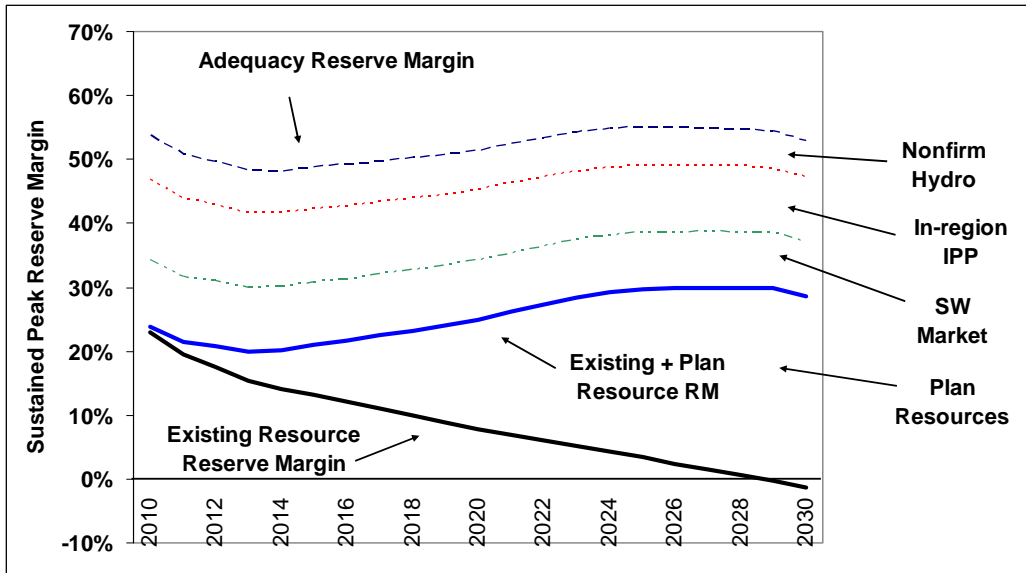
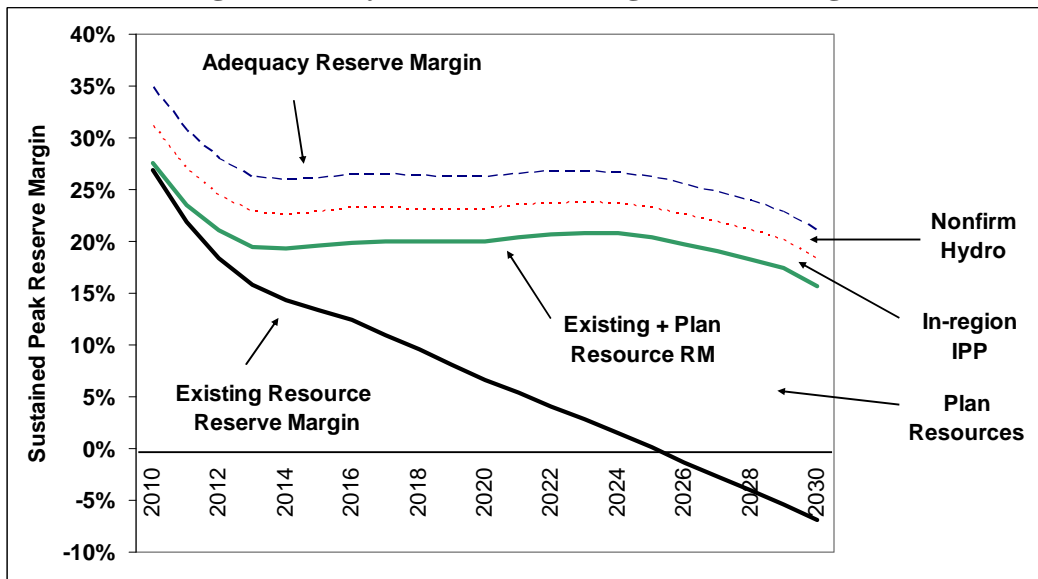
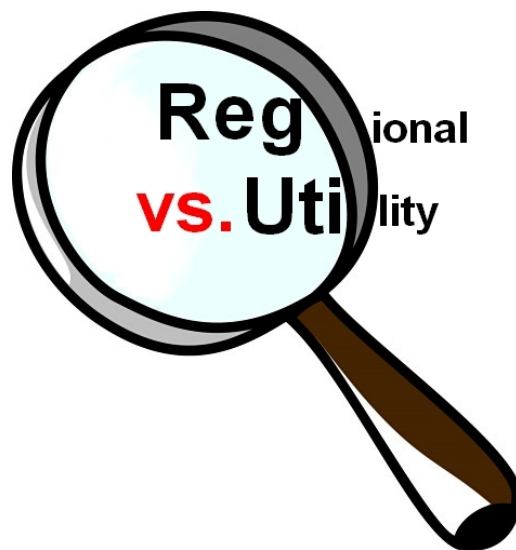


Figure 3 - July Sustained Peaking Reserve Margin



Regional vs. Utility Planning



Council Meeting
Portland, Oregon
July 14, 2009

Discussion Points

- Adequate vs. Economic*
- Interpreting the Load/Resource Balance*
- Assessing Hourly Needs*

Adequate vs. Economical

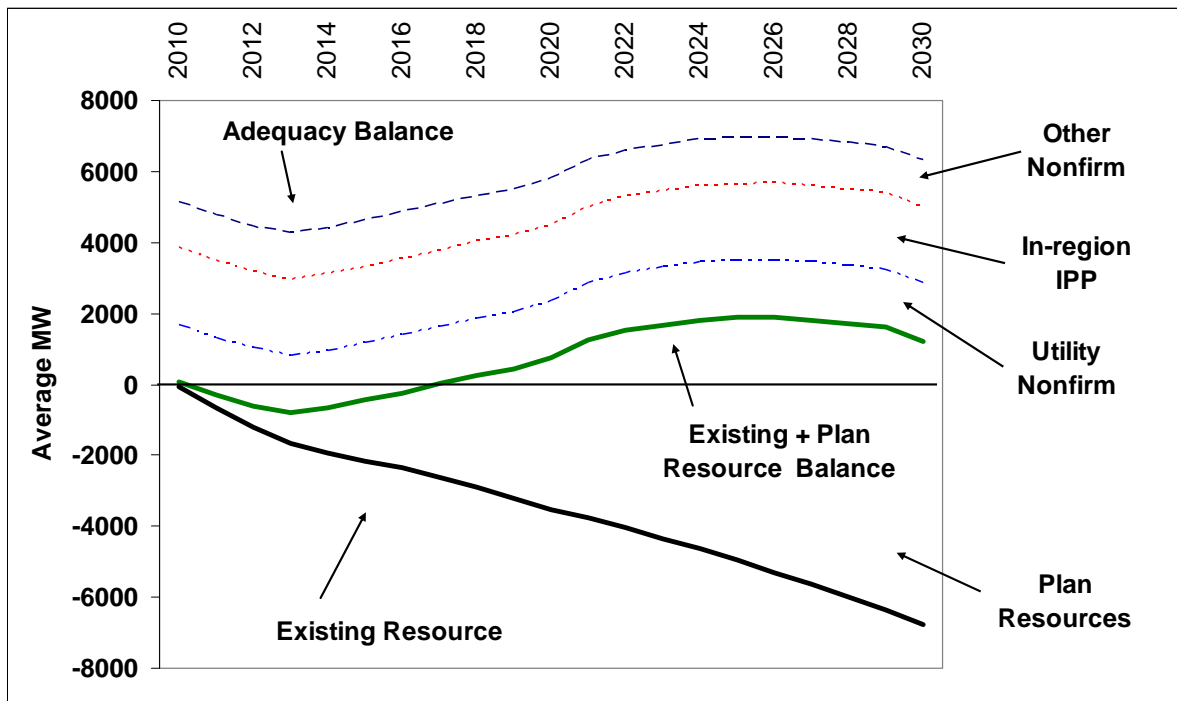
- Issue:
 - Adequacy assessment says power system OK
 - Plan shows need to acquire (conservation and RPS)
- Discussion:
 - Adequate because of large market supply
 - Plan recognizes
 - RPS is required
 - Conservation is very cost effective
 - Shouldn't depend too much on the market
- Conclusion:
 - Adequacy is an early warning system, not a target
 - Plan is the desired resource strategy

Interpreting L/R Balance

- Issue:
 - Utility L/R Balance shows deficit
 - Adequacy L/R Balance shows large surplus
- Discussion:
 - Utility balance includes firm utility resources only
 - Adequate balance includes
 - In-region IPP market supply
 - Out-of-region market supply
 - Non-firm hydro
 - Full availability for resources
 - Least-risk plan resources
- Conclusion:
 - Adequacy balance only useful as an early warning system
 - Utility balance can be useful as an initial assessment for need

Energy Load/Resource Balance

Expected Build-Out Schedule



July 14, 2009

Council Meeting

5

Assessing Hourly Needs

- Issue:
 - Adequacy RM is very high
 - Utilities believe capacity surplus is much smaller
- Discussion:
 - Adequacy RM
 - Includes non-firm resources
 - Targets based on LOLP analysis
 - Based on 18-hour sustained period
 - Does not include within-hour needs
 - Utilities
 - Are more familiar with single hour RM
 - Include firm resources only
- Conclusion:
 - Adequacy Forum will review methodology
 - Firm RM useful for needs assessment but threshold not defined
 - Will need to incorporate within-hour needs somehow

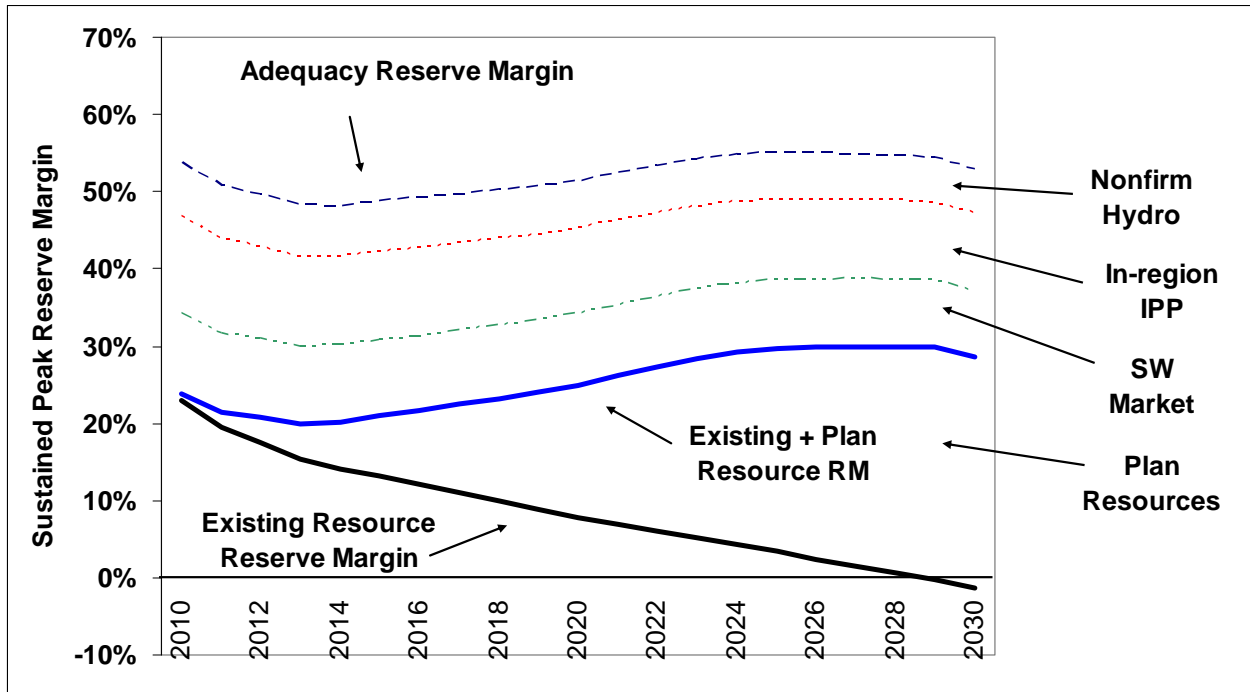
July 14, 2009

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6

January Capacity Reserve Margin

Expected Build-Out Schedule



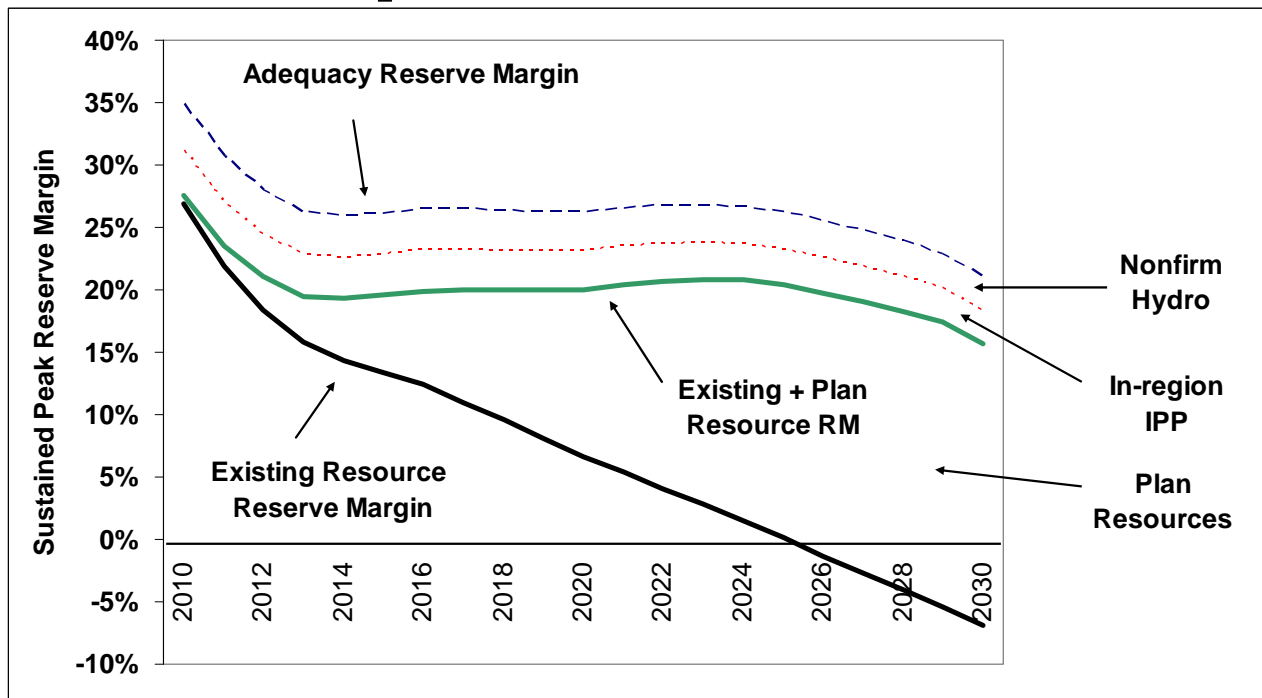
July 14, 2009

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7

July Capacity Reserve Margin

Expected Build-Out Schedule



July 14, 2009

Council Meeting

8