September 3, 2014

MEMORANDUM

TO: **Power Committee Members**

FROM: **John Fazio, Senior Systems Analyst**

SUBJECT: **2019 Adequacy Assessment and the 6th Power Plan Strategy**

BACKGROUND:

Presenter: John Fazio, NWPCC (jfazio@nwcouncil.org, 503-222-5161)

Summary: The 6th power plan resource strategy calls for little new thermal resource development in the early years. Between 2010 and 2019, the plan calls for a maximum of 400 megawatts of new gas-fired generation in the most extreme future. However, in most other futures, little or no gas-fired generation is needed. The 2019 resource adequacy assessment, however, shows a need for about 1,500 megawatts of new dispatchable generation through 2019 in order to maintain an adequate supply. This discrepancy has led some to ask whether the 6th Plan resource strategy provides for an adequate power supply.

This presentation reviews the differences between the computer models and input assumptions that the Council used to develop the 6th Plan's twenty-year resource strategy and its most recent five-year adequacy assessment. Since both the time frame and goal of the Council's plans and its resource adequacy assessments are different the models used for these two analyses have different capabilities and functions. For example, the Council's resource portfolio model (RPM) compares the economic cost and risk of alternative resource plans in quarterly time steps while the Council resource adequacy assessment model (GENESYS) compares hourly loads with available resources, regardless of the cost to operate those resources.

Staff compared the 6th Plan's resource strategy with the 2019 Resource Adequacy Assessment to ascertain the reason for the difference between their findings regarding the anticipated need for near term resource development. Staff found that the key factor behind the difference in conclusions regarding the need for additional thermal generation in the 2014-2019 timeframe is the assumption made in each model regarding the amount of power imports available from California. The 6th Plan's resource strategy was built on the assumption that 6,000 megawatts of imports were available in every hour of every month. In contrast, the 2019 Resource Adequacy Assessment (RAA) assumed only 2,500 megawatts of power imports were availability during the peak winter hours and no power imports were availability during the peak summer hours. The RAA also assumed that 3,000 megawatts of power imports were available during off peak hours.

This difference in the assume limit on power imports from outside the region is the sole cause of the disparity in results between the findings from 6th Plan and the 2019 RAA. This difference also highlights a key policy questions that will need to be addressed during the development of the Council's Seventh Plan. That is, how much should the region rely on imports from outside the region? The resource adequacy model (GENESYS) can be used to determine the frequency and magnitude of resource shortages. In the 2019 RAA, over half of the resource shortfalls are less than four hours in duration. Once the frequency and magnitude of these resource shortfalls are estimated, the resource portfolio model (RPM) can be used to quantify the tradeoff between the cost and risk of reliance on power imports versus regional generation development to determine whether it makes more sense to rely on the market or build new peaking units that would only run a few hours per year.

Relevance: The Council's resource strategy serves as a blueprint for regional generating resource and energy efficiency resource acquisitions. The 2019 RAA, however, implies a different pace of generating resource development in the early years than the strategy put forth in the Council's 6th Plan. This discrepancy must be resolved in order to send the correct message to the Bonneville Power Administration and other regional utilities as they develop their integrated resource plans.

Work Plan: B. Assess adequacy for 2019

Background: The 6th Power Plan resource strategy (released in 2010) included an aggressive acquisition of energy efficiency savings but also indicated that not all load growth could solely be offset with efficiency measures. The strategy showed little thermal resource need through the first 9 years of the plan (through 2019). The 2019 adequacy assessment (released in

May of 2014), on the other hand, indicated that about 1,500 megawatts of thermal resource additions would be needed between 2010 and 2019 in order to maintain an adequate supply. This presentation discusses why these two conclusions differ and what key policy question must be answered for the development of the 7th plan.

More Info: http://www.nwcouncil.org/media/7084800/2014-04.pdf
http://www.nwcouncil.org/media/6344/SixthPowerPlan_Ch10.pdf

2019 Adequacy Assessment and the 6th Power Plan Strategy

Are the Messages the Same?

GENESYS RPM

Power Committee
September 9, 2014
Portland, Oregon

Outline

1. Differences between GENESYS and RPM
2. Implied GENESYS build out to 2019
3. 6th plan build out to 2019
4. Why is there a difference?
5. Conclusions

Differences: Genesys vs.RPM

- Genesys
  - Assesses power supply adequacy for 1 year
  - For a specific resource mix
  - Hourly time step
- RPM
  - Calculates average cost and tail-end cost
  - For various resource plans over 20 years
  - Quarterly time step

Differences: Genesys vs. RPM

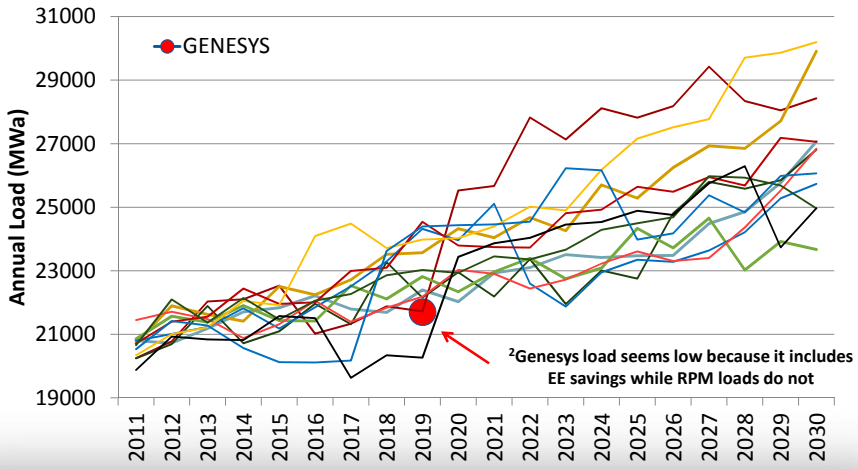
Item	GENESYS	RPM
Study Period	1 Year	20 Years
Simulation Time Step	Hourly	Quarterly
Hydro simulation	Project specific	Aggregate
Thermal	Project specific	Aggregate
Long-term load growth	No	Yes
Resource expansion	No	Yes
Winter peak import limit	2,500 MW	6,000 MW
Winter off-peak limit	3,000 MW	6,000 MW
Summer on-peak	0 MW	6,000 MW
Summer off-peak	3,000 MW	6,000 MW
Generating Resources	Current Database	2009 Database

Most critical difference

Uncertainties Modeled

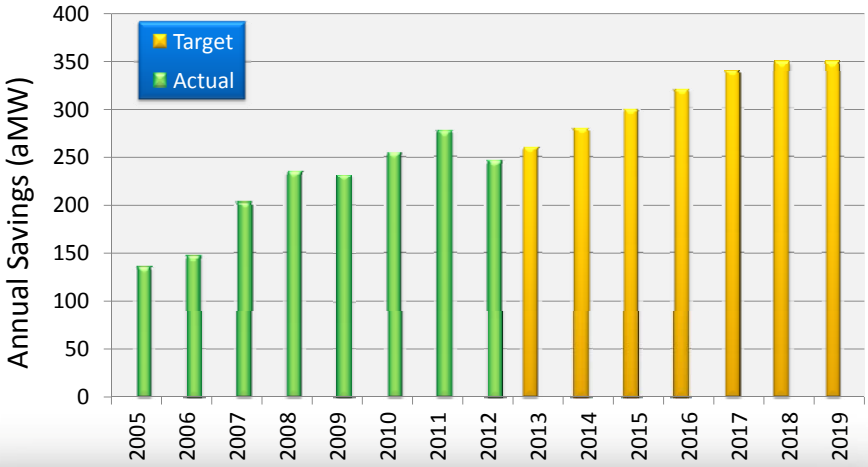
GENESYS	RPM
Hydro – Current BiOp, 80 water years	Hydro – 2008 BiOp, 70 water years
Wind – Hourly, temperature correlated	Wind – Fixed
Forced Outages	Forced Outages
Temperature (load variation)	
	Long-term load growth
	Fuel prices
	Carbon tax
	Tax credits
	Construction costs/delays
	Technology improvements
	Aluminum prices
	Energy efficiency costs/delays

RPM vs. GENESYS Loads[1,2]



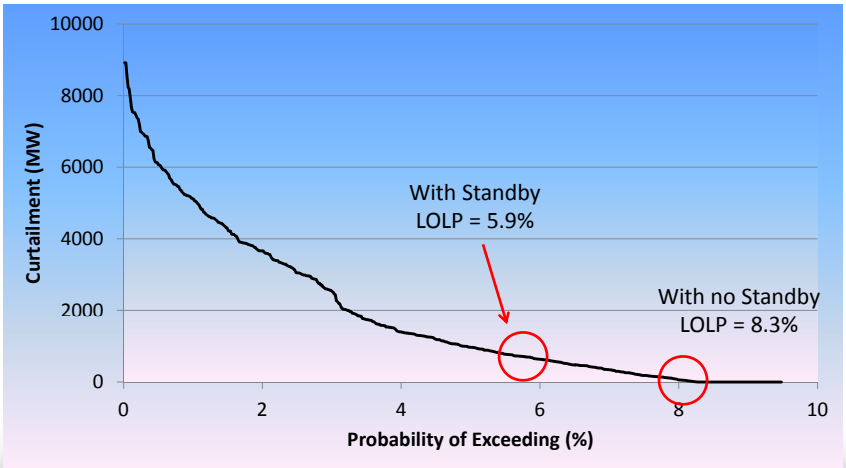
[1]Sample of 11 futures out of 750

Annual Efficiency Achievements and 6th Plan Targets in Genesys Load

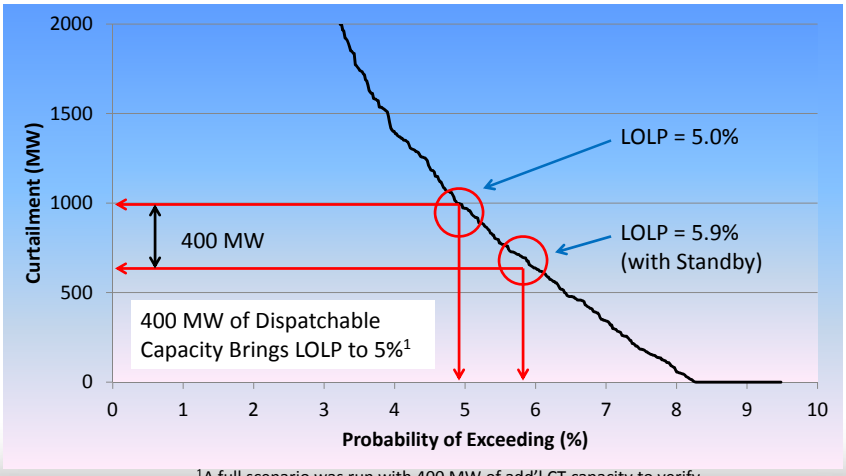


2019 Adequacy Assessment

(Peak Curtailment Probability Curve)

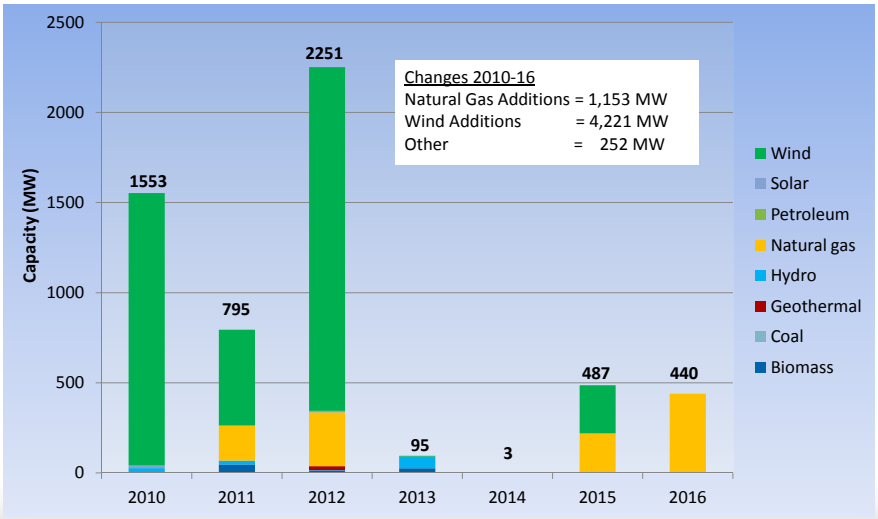


Getting to a 5% LOLP



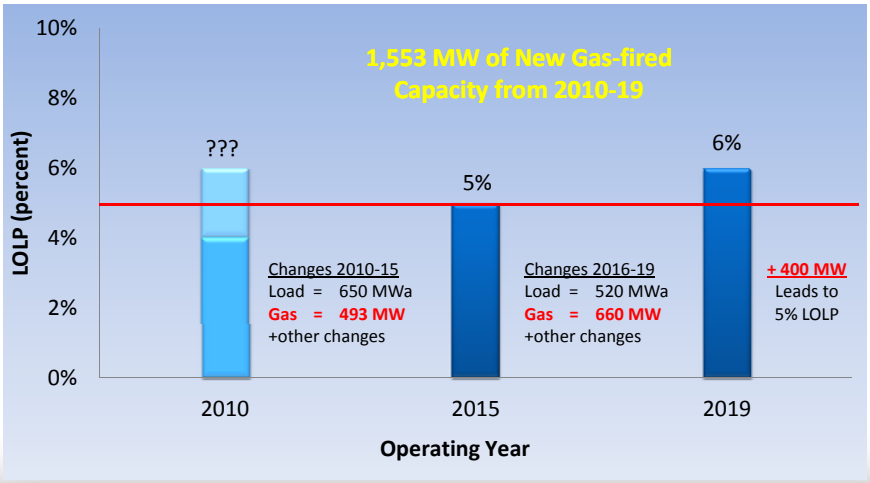
[1]A full scenario was run with 400 MW of add'l CT capacity to verify

Generating Resource Additions Actual and Planned



Regional Resource Adequacy

Council Standard: LOLP Maximum is 5%



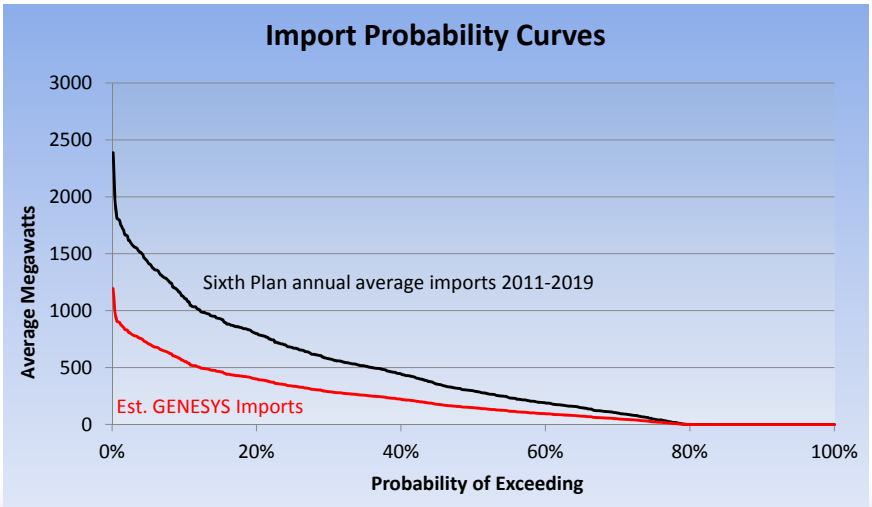
Gas Resource Needs 2010-2019[1]

- GENESYS
  - 2010-17: 1,150 MW (built or planned)
  - 2018-19: 400 MW (new)[2]
  - 2010-19 Total: 1,550 MW
- RPM[3]
  - Average build out 3 MW by 2019
  - Max build out 400 MW by 2019

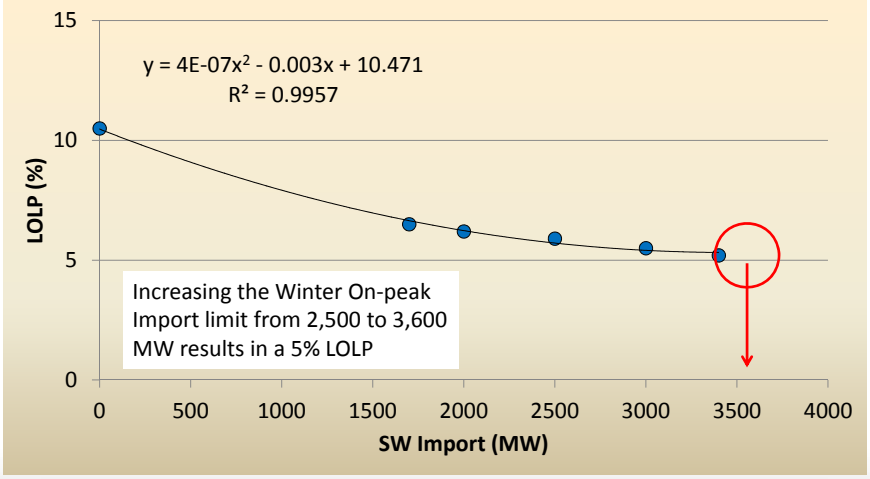
Why the difference?

[1]Wind has little effect on LOLP
[2]To get to a 5% LOLP by 2019
[3]From the 6th plan L831g scenario

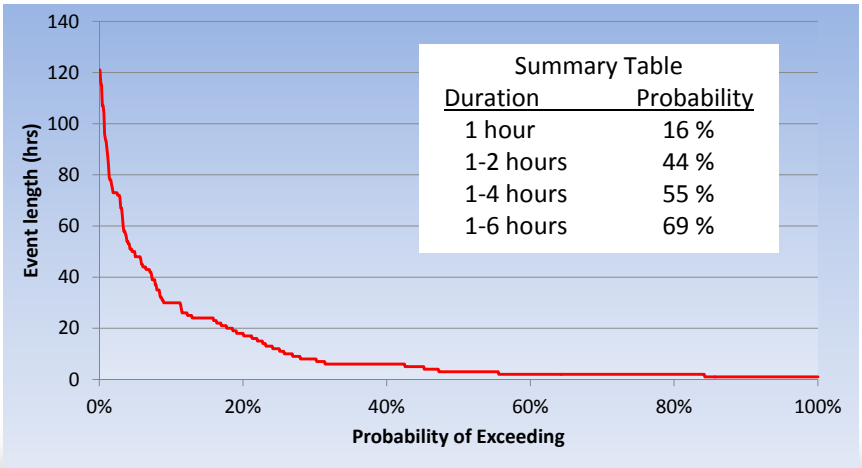
Answer: Import Assumptions



Increasing Imports in Genesys Reduces the Need to Build



GENESYS Curtailment Duration Probability
(RPM doesn't have this level of detail)



Conclusions

1. GENESYS and RPM address different issues

2. Key differences
   a. Import assumptions (6,000 vs. 2,500 MW)
   b. Dispatch time step (Quarterly vs. Hourly)

3. Key policy question for 7th plan:
   Given that most curtailments are of short duration,
   is it better to rely on the market (with its inherent risks)
   or to invest in peaking resources (including DR)?