Northwest **Power** and **Conservation** Council

April 29, 2014

MEMORANDUM

TO: Council Members

FROM: John Fazio, Senior Power Systems Analyst

SUBJECT: Council Decision to Release the 2019 Resource Adequacy Assessment

At the Council meeting on May 7, 2014, staff will brief the Council on the assessment of regional power supply adequacy for the operating year 2019. The Power Committee will have already discussed the assessment on May 6 and if they so recommend, the Council will vote on approving the adequacy assessment and on releasing the report.

The power supply for the Pacific Northwest is deemed adequate if the likelihood of future shortages, measured as loss of load probability or LOLP, is less than five percent. The Council approved the last adequacy assessment in December 2012. That assessment reported an LOLP of about 7 percent for 2017.

The current resource adequacy assessment shows a 6 percent LOLP for 2019. In 2021, after the Boardman and Centralia 1 coal plants (total 1,300 megawatts) are retired, the LOLP rises to 11 percent.

The LOLP results dropped from 7 percent for 2017 to 6 percent for 2019 primarily because anticipated resource additions are expected to be greater than forecast load growth. These results assume that the Council's annual energy efficiency savings target of about 350 average megawatts is achieved between 2017 and 2019.

Actions to bring the 2019 and 2021 power supplies into compliance with the Council's 5 percent LOLP standard will vary depending on the types of new generating resources or demand reduction programs that are considered. It is beyond the scope of this analysis to develop a resource acquisition strategy. That is done in the Council's power plan. However, PNUCC's 2014 Northwest Regional Forecast shows the sum of utility planned resources through 2024 to be about 1,800 megawatts.

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Resource Adequacy

Final Assessment for 2019

Council Meeting
Boise, Idaho
May 7, 2014

Outline

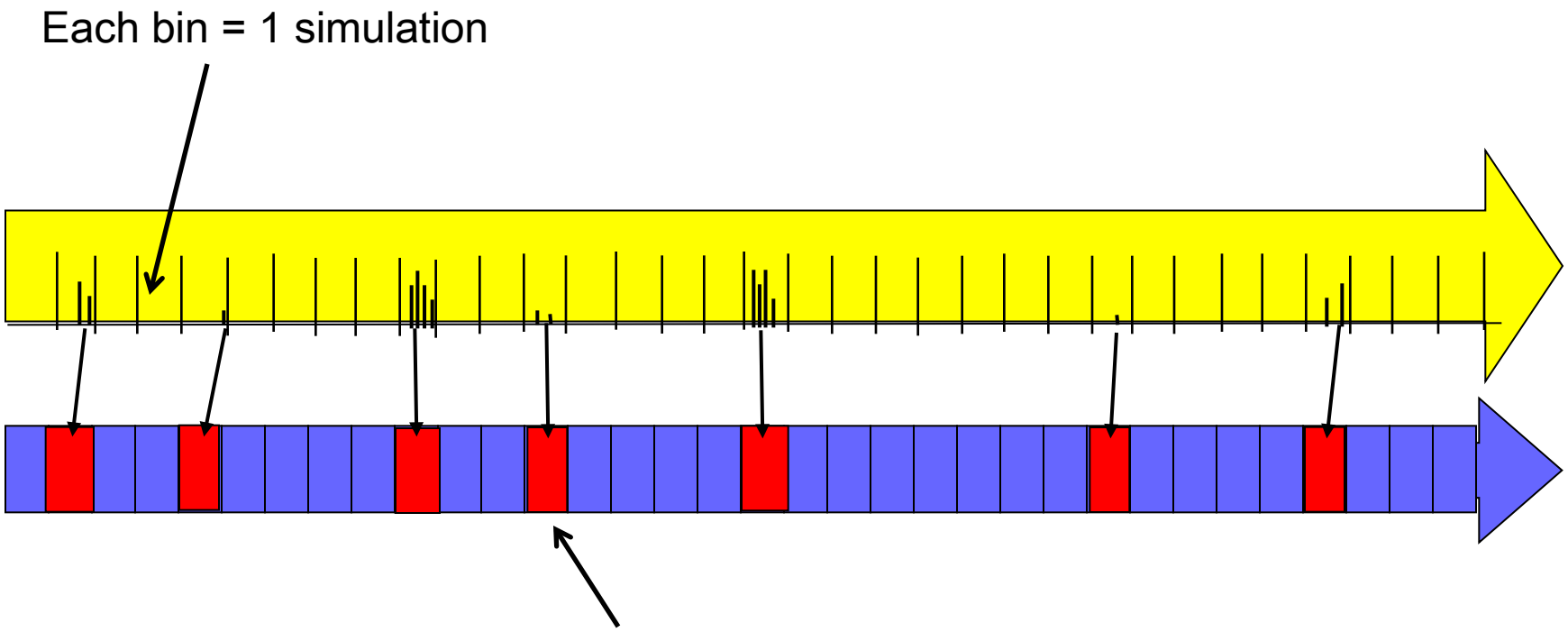
1. Council's Adequacy Standard
2. Adequacy Assessment History
3. Import Recommendation
4. 2019 and 2021 Assessments
5. EE Savings Impacts
6. Discussion of Final Report

Council's Adequacy Standard (Adopted in 2011)

- Metric = Loss of Load Probability
- Threshold = 5% (Max allowable LOLP)

- Other adequacy metrics:
  - Number of curtailments per year
  - Average size of curtailment
  - Average duration (hours) of curtailment

Loss of Load Probability



Out of 10,000 simulations, 500 had at least one curtailment event
Loss of Load Probability (LOLP) = 500/10,000 = 5 percent

Adequacy Assessment History

- **1998** – Large load/resource balance deficit concern
- **1999** – Ad-hoc committee recommended using LOLP
- **2000** – First assessment yields a 24% LOLP
- **2001** – West Coast energy crisis
- **2005** – Resource Adequacy Forum is created
- **2007** – Unofficial assessment: adequate power supply
- **2008** – Council adopts first NW adequacy standard
- **2009-10** – Adequacy methodology peer reviewed
- **2010** – Council's 6th power plan shows a 5% LOLP for 2015
- **2011** – Council revises the adequacy standard
- **2012** – 2017 assessment: LOLP 7%

GENESYS Northwest

Monte Carlo Simulation of the NW Power Supply

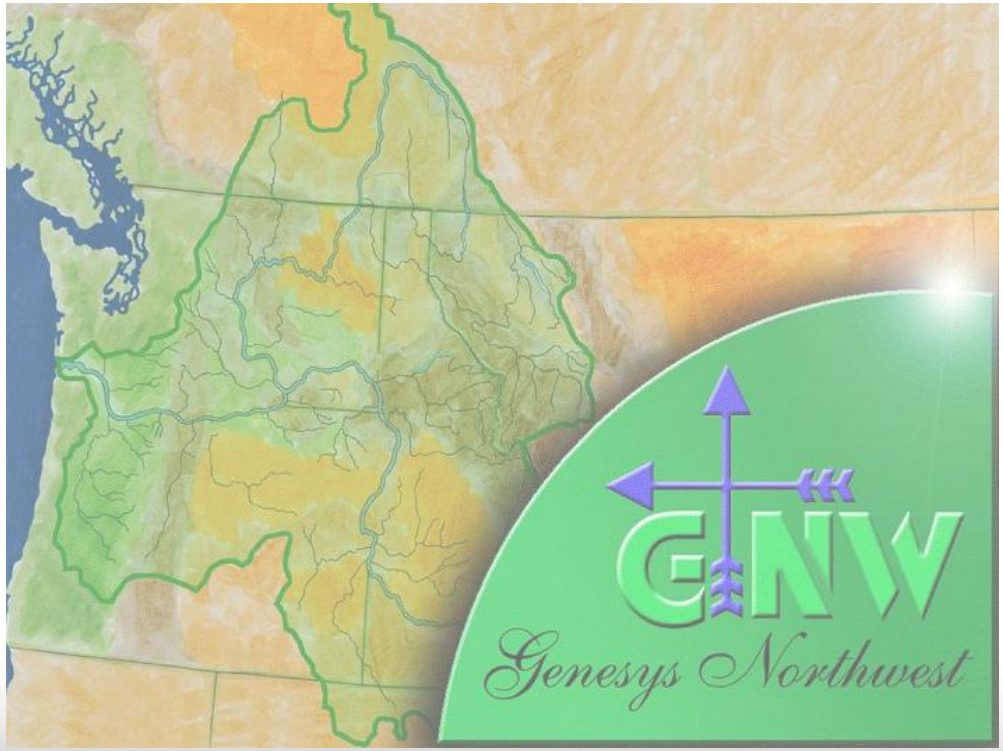
Project-level Monthly Hydro Simulation

Hourly Economic Dispatch (including hydro)

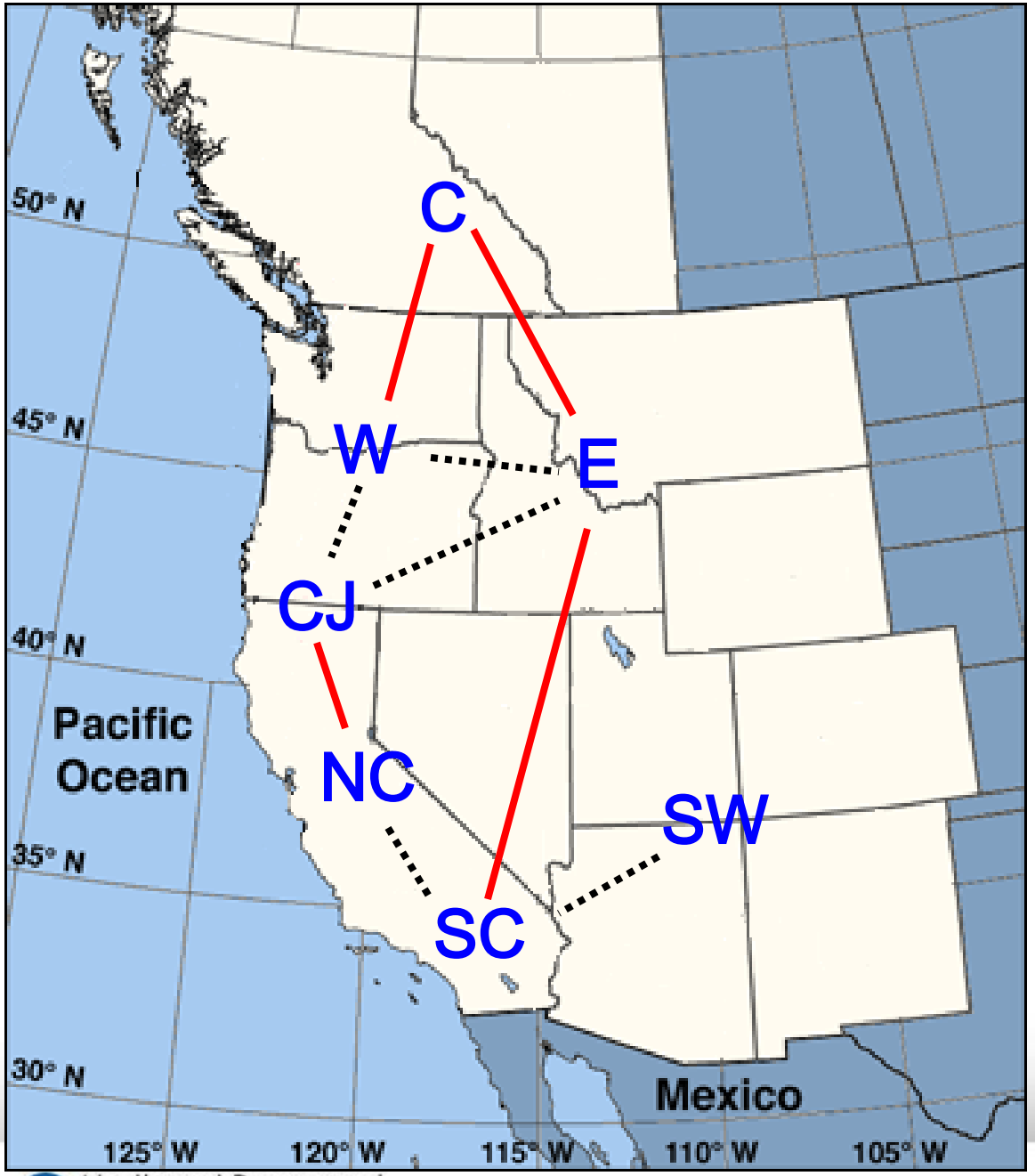
Inter-regional Transmission Capacity (but not forced outages)

Random Variables:

- Water Conditions
- Temperature/Loads
- Resource Forced Outage
- Wind



Transmission Modeled in GENESYS



NW region includes:

- East (E)
- West (W)
- Captain Jack (CJ)

Solid lines indicate transmission into and out of the region

Import Recommendation 2,500 MW

Import Availability and Tie Limits[1] (MW)

Month	SW Supply	5% Lowest Intertie	Assumed Limit
Jan	16,529	3,425	2,500
Feb	15,937	3,425	2,500
Mar	17,316	2,450	2,500
Oct	21,923	2,450	2,500
Nov	20,264	3,425	2,500
Dec	17,929	3,425	2,500

[1]Celilo-Sylmar DC transmission line is scheduled to be upgraded by up to 700 MW by 2019.

Changes Since 2017 Assessment

2017 LOLP: 7%

- Net Load Growth 206 MWa
  (including 700 MWa Energy Efficiency Savings)
- Southwest Imports 800 MW
- New Gas-Fired Generation 670 MW
- New Wind 260 MW
- Standby Energy - 42,200 MW-hours
- Standby Winter Capacity - 37 MW
- Standby Summer Capacity 113 MW

2019 LOLP: 6%

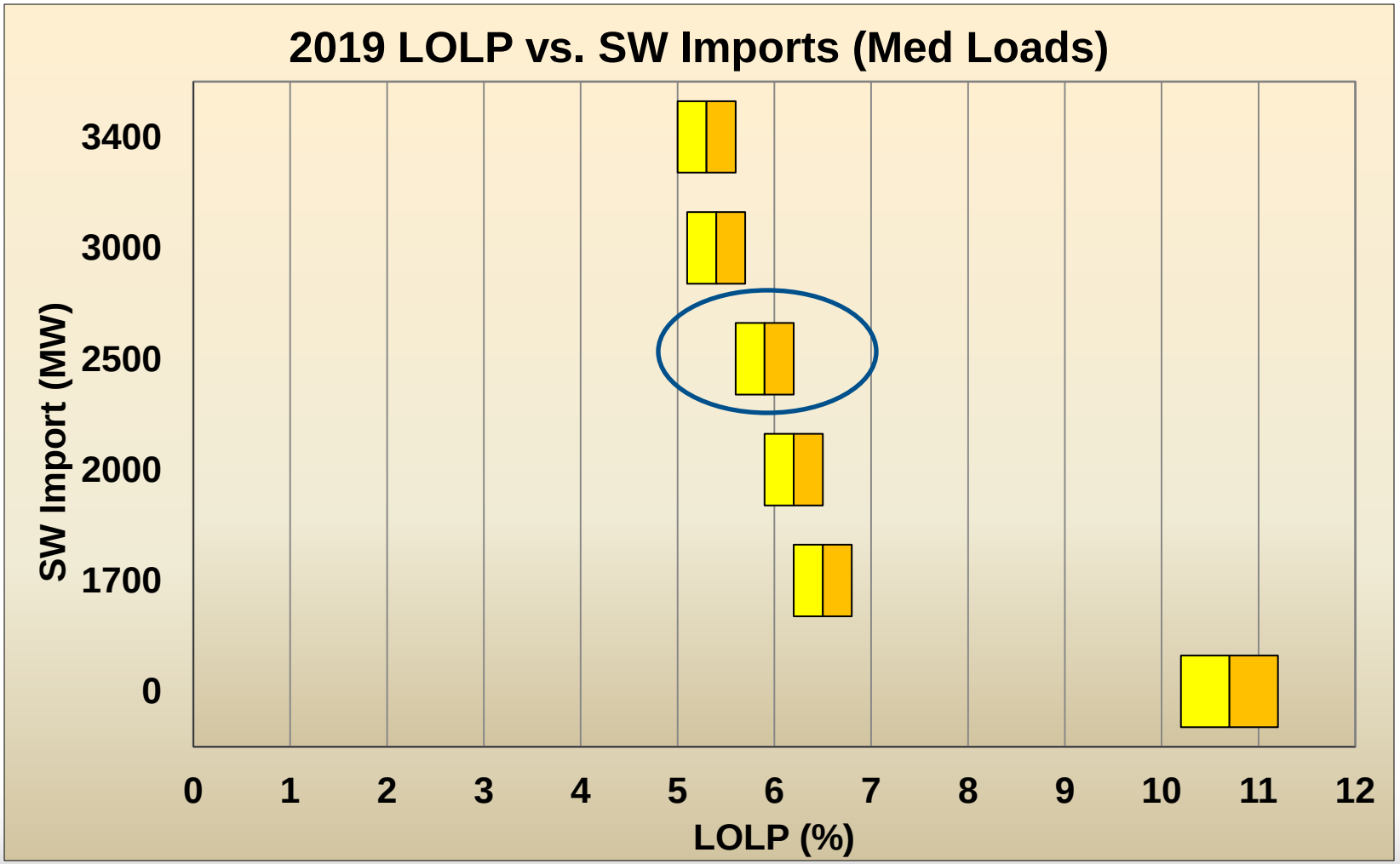
LOLP Sensitivities 2019 (%)

7.5	10.5	14.9
Low Load **0** Import	**Med** Load **0** Import	**High** Load **0** Import
4.0	5.9	8.5
Low Load **2500** Import	**Med** Load **2500** Import	**High** Load **2500** Import
3.7	5.3	7.7
Low Load **3400** Import	**Med** Load **3400** Import	**High** Load **3400** Import

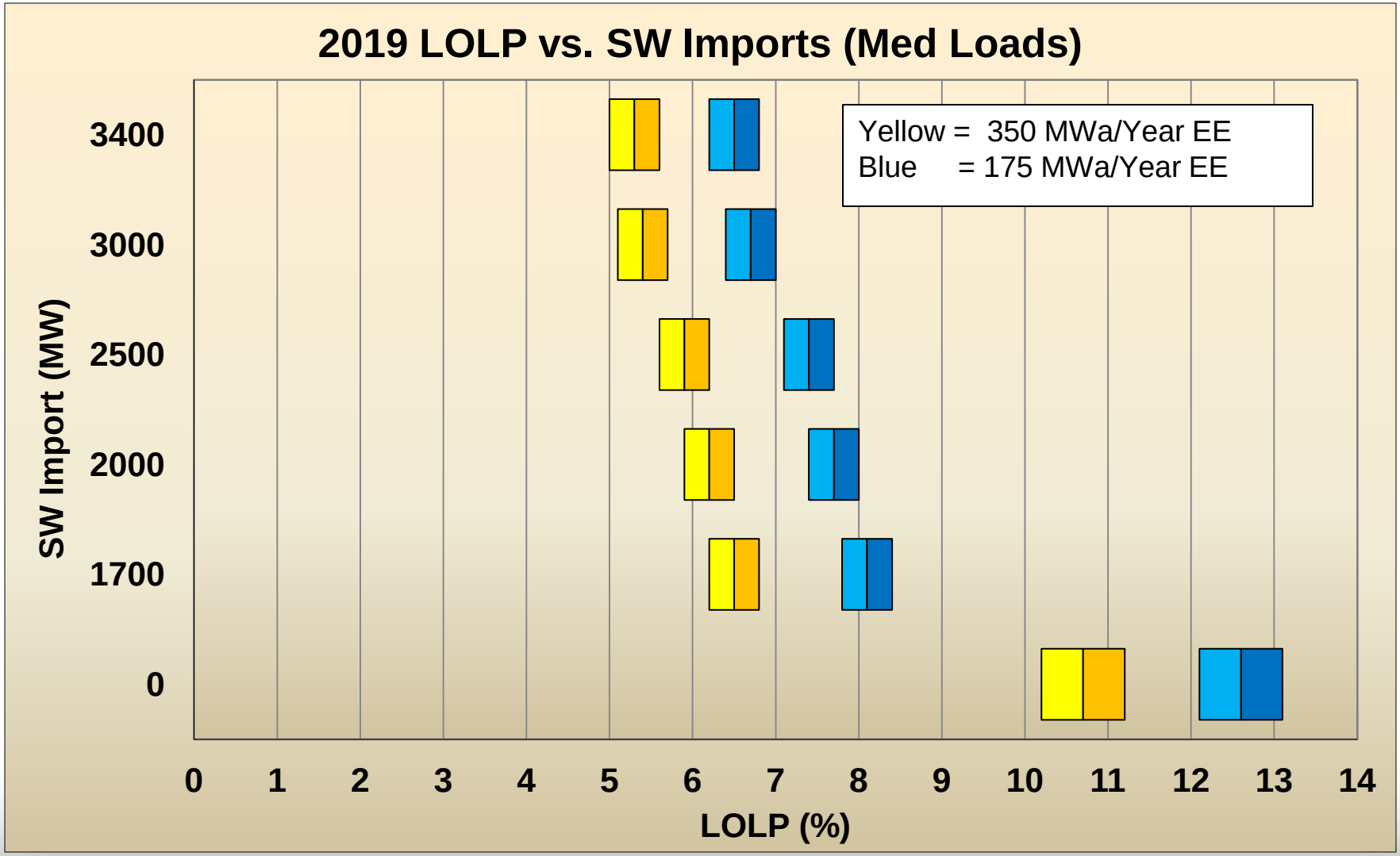
LOLP Results for 2019 (%)
(Effects of Load and Import Uncertainties)

Load / Import	-2.5%	-1.5%	Medium	+1.5%	+2.5%
0 (MW)	7.5	8.6	10.5	12.9	14.9
1700	4.5	5.3	6.5	8.0	9.3
2000	4.3	4.9	6.2	7.7	9.0
2500	4.0	4.7	5.9	7.2	8.5
3000	3.8	4.5	5.4	6.7	7.9
3400	3.7	4.4	5.3	6.4	7.7

Precision of LOLP ± 5% of Value



Effect of EE on LOLP (approx.)



2021 Assessment

2019 LOLP: 6%

- Net Load Growth 206 MWa
  (including 700 MWa Energy Efficiency Savings)
- Coal Retirements - 1,300 MW

2021 LOLP: 11%

Summary of Adequacy Report

1. 2019 LOLP = 6%
2. 2019 LOLP = 5% +400 MW capacity, or +300 MWa EE savings[1]
3. 2019 LOLP > 7% with half of EE savings
4. 2021 LOLP = 11% -1,300 MW coal capacity
5. PGE Boardman replacement strategy by 2019
6. Sum of utility planned new generating resources 1,800 MW by 2024
7. Assume EE shape = load shape, need better data
8. Lots of SW winter surplus power supply available: address new intertie transmission to help meet needs

[1]Estimated by reducing loads 300 MWa, since the EE hourly shape is the same as the load shape in our analysis.