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April 2, 2013

MEMORANDUM

TO: Council Members

FROM: Charlie Black, Power Planning Division Director

SUBJECT: Briefing and primer on operating reserves and planning margins

This briefing continues the series of primers designed to provide background material for Council members and the public. It contains a similar level of detail as previous briefings made to the Council. Today's briefing focuses on operating reserves and planning margins.

Power system operators focus on having sufficient resources to maintain the second-to-second flow of power to customers. Power system planners are concerned about having sufficient resources to provide for anticipated long-term growth in demand.

Operators rely on operating reserves to maintain power flow. These reserves are surplus resources and demand-side actions that can be taken immediately to cover short-term mismatches between load and generation. For the region, the Northwest Power Pool defines the required operating reserves, which must be provided by each balancing authority.

Planners rely on planning margins to set a target for future resource or energy efficiency acquisition. Planning margins are always greater than operating reserves and are defined by individual utilities to cover their own long-term resource needs.

The primer will show that operating reserves and planning margins vary widely across the United States, depending on the particular shape of local demand and the mix of local resources. In addition, each region is likely subject to different future uncertainties that must be accounted for. For example, in the Northwest, operating reserves and planning margins must account for variance in the annual Columbia River runoff volume.

Presentation for Council Meeting

Operating Reserves and Planning Margins

Primer

John Fazio
Power Planning Division

April 10, 2013



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Outline

- Refresher on power system flexibility
- Operating reserves and planning margins
- Illustration of planning margins in various regions



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Basic Taxonomy for Power System Analysis

- **Energy**: power generated or conserved across a period of time to serve system demands for electricity
- **Peaking Capacity**: capability of power generating and demand-management resources to satisfy maximum system demands for electricity at a specific point in time
- **Flexibility**: ability to continuously and reliably match generating and demand-side resources to system demands for electricity



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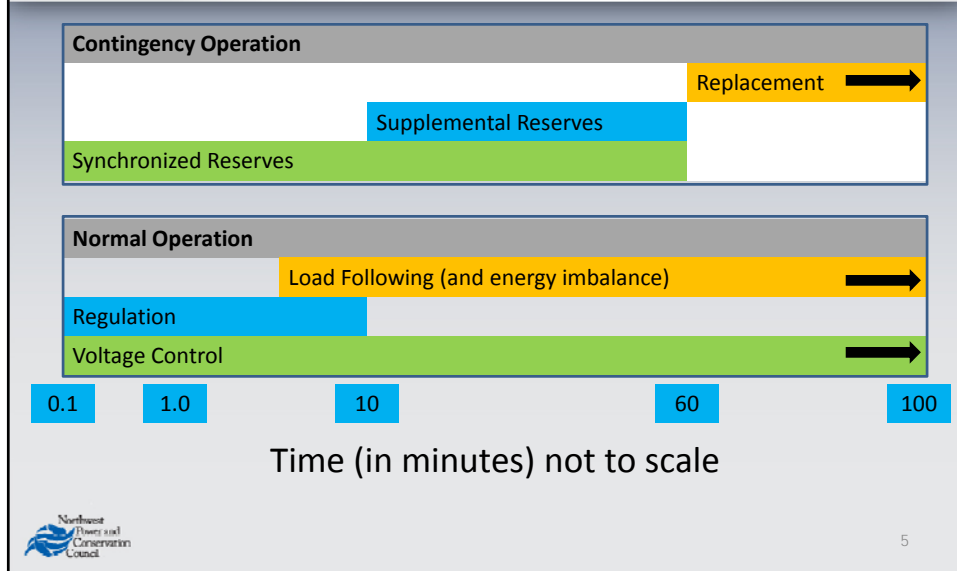
Ancillary Services: System Flexibility Provided by Balancing Authorities

1. Scheduling, system control and dispatch
2. Reactive power and voltage control
3. Regulation and frequency response service
4. Energy imbalance service
5. Operating reserve – synchronized reserve service
6. Operating reserve – supplemental reserve service



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Ancillary Services Timing



Operating Reserves and Planning Margins

- **Operating reserves** are used to cover short-term mismatches between load and resources
- **Planning margins** are used as long-term resource expansion targets
- Both are measured in megawatts
- Both can be made up of generating resources and/or load-management actions

Operating Reserves

- Made up of contingency reserves (synchronous and supplemental) and surplus reserves (basically surplus capacity)
- Used under both normal and contingency (generation or transmission failure) conditions
- For the Northwest, the Power Pool defines operating reserve; must be provided by each balancing authority



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Operating Reserves Northwest Power Pool

- Contingency reserves = 6% (roughly)
- Half must be synchronous
- Surplus capacity to cover variations due to short-term temperature deviations = 2%
- Total operating reserves are 8%
- Within the Pool, reserves can be shared



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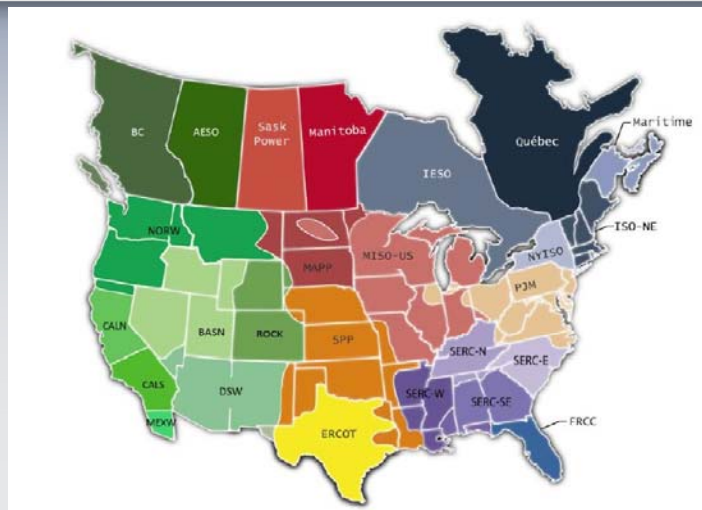
Planning Margins

- **Include operating reserves***
 - *Contingency reserves only cover the 1st hour
- **Plus enough surplus capacity to cover**
 - Variations in long-term economic growth
 - Extreme deviations in temperature
 - Prolonged resource/transmission outage
 - Variations in hydro and wind
- **Developed by individual utilities to satisfy their own planning needs**



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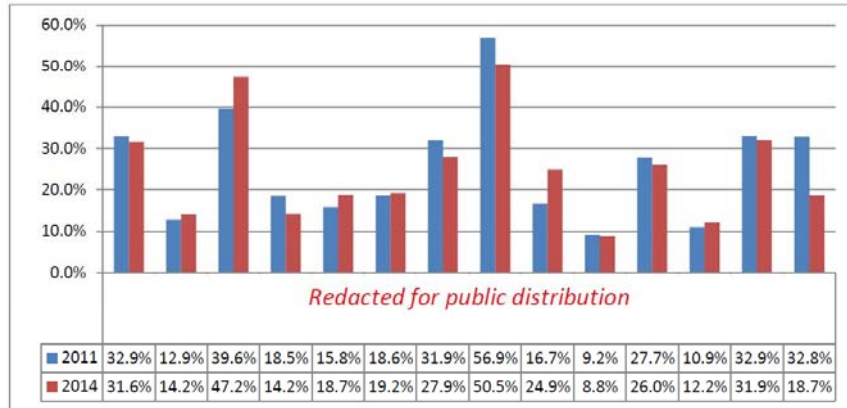
Illustration of Planning Margins



* The values shown in the following slides are for illustration only

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2012 NERC Planning Margins



Not all assessment areas reported



WECC



FRCC	Florida Reliability Coordinating Council
MRO	Midwest Reliability Organization
NPCC	Northeast Power Coordinating Council
RFC	ReliabilityFirst Corporation
SERC	SERC Reliability Corporation
SPP RE	Southwest Power Pool Regional Entity
TRE	Texas Reliability Entity
WECC	Western Electric Coordinating Council



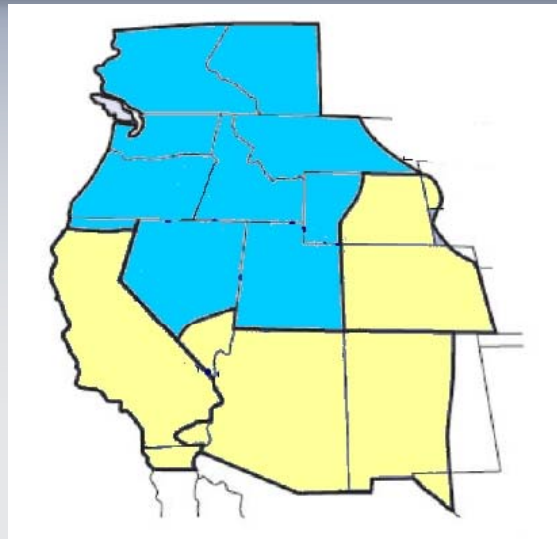
WECC Planning Margin

- Contingency reserves 6%
- Regulating reserves 5%
- Additional forced outages 4%
- Temperature adders 3%
- **Total 18%**



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Northwest Power Pool



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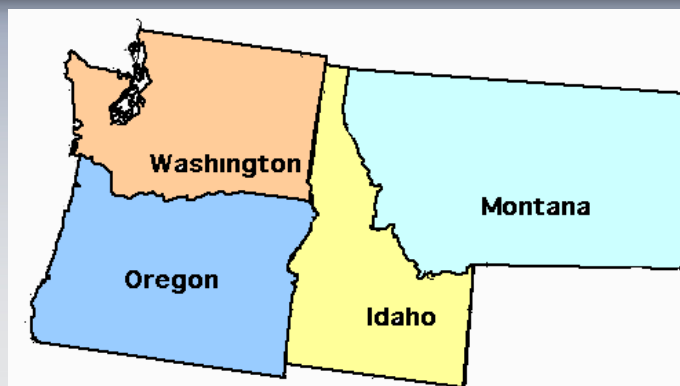
Northwest Power Pool Planning Margin

- Operating reserves = 8%
- Load forecast variation = 1% to 10%
- Prolonged outage = 3% to 10%
- Total planning margin ranges from 12% to 28%



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NW Power and Conservation Council



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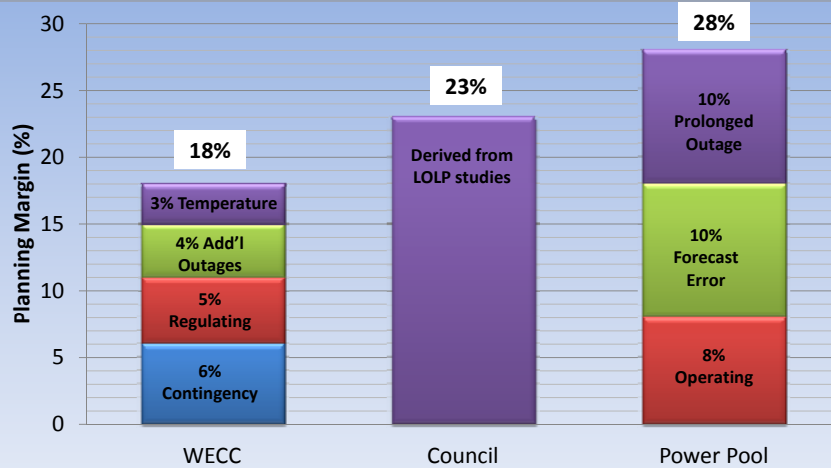
Council Planning Margin

- Based on Council adopted adequacy standard of 5% loss of load probability
- Derive the winter and summer planning margins from a system that just meets the 5% LOLP standard
- 6th power plan planning margins are about **23% winter** and **24% summer**
- These are fed into the Regional Portfolio Model as minimum build thresholds



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Comparison of Planning Margins



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Observations

- **Operating reserves and planning margins vary widely from region to region**
 - Different load shapes and resource types
 - Different sets of uncertainties
- **Planning margins usually created via “building block” (deterministic) approach**
- **Council uses a probabilistic approach – NERC is heading in that direction**