



Toward a Well-Functioning Western Electricity System

**Western Resource Adequacy:
Challenges - Approaches - Metrics**

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Committee on Regional Electric Power Cooperation

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Resource Adequacy: Presentation Overview



- Challenges
- Approaches
- Reserves concepts and metrics
- Discussion of next steps
- Regional adequacy criteria (WECC)

Resource Adequacy Challenges - 1



- Lack of a common understanding or definition
 - Focus: sufficiency of generating capacity / fuel
- Hybrid markets/regulatory structures lack explicit regulatory compacts and create uncertainty
 - Uncertainty about responsibility to provide resources
 - Uncertainty about cost recovery mechanism for generation developers
 - Incentives for LSEs/developers to withhold information
 - Little incentive to keep aging plants available

Resource Adequacy Challenges - 2



- Retail access reduces clarity of adequacy assessment and responsibility
 - Especially true if LSEs can return customers to default provider
 - Widespread retail access suggests mandatory adequacy standard and/or strong financial standard

Resource Adequacy Challenges - 3



- Price controls distort incentives on both supply/demand
 - Mute incentives to invest while shifting demand
 - Interaction between spot and forward markets
 - Mute incentives to create strong economic demand response programs
 - Value gap: benefit to LSE and participating customer
- Create incentives for free ridership, which lowers incentives for forward contracting

Resource Adequacy Challenges - 4



- Ability to waive natural resource protections limits incentives to provide adequate resources
 - River operation constraints for fish in the Northwest
 - Air quality constraints in California and elsewhere

Approaches to Resource Adequacy



- WRAT Briefing Paper identifies four approaches:
 - transparent information/consistent analyses
 - enhanced assessment with explicit metrics
 - voluntary targets
 - enforceable standards.

Approach 1: Transparent Information



- Develop and maintain transparent information load forecasts, generation, DSM/DR, transmission, and fuel availability
- Review information in a public forum
- Maintain information - portable, accessible
- Consistent analyses.

Approach 2: Information with Metrics



- Identify, quantify and review explicit metrics of supply and demand balance
- Regional and sub-regional levels
- Appropriate timeframes
- Risk associated with weather and fuel supplies

Approach 3: Voluntary Targets



- Select regional/sub-regional metrics
- Agree on voluntary adequacy targets for each metric
- Quantify system performance relative to metrics using consistent, transparent information
- Convene periodic summits of regional and state entities to review region and sub-region success

Approach 4: Enforceable Standards



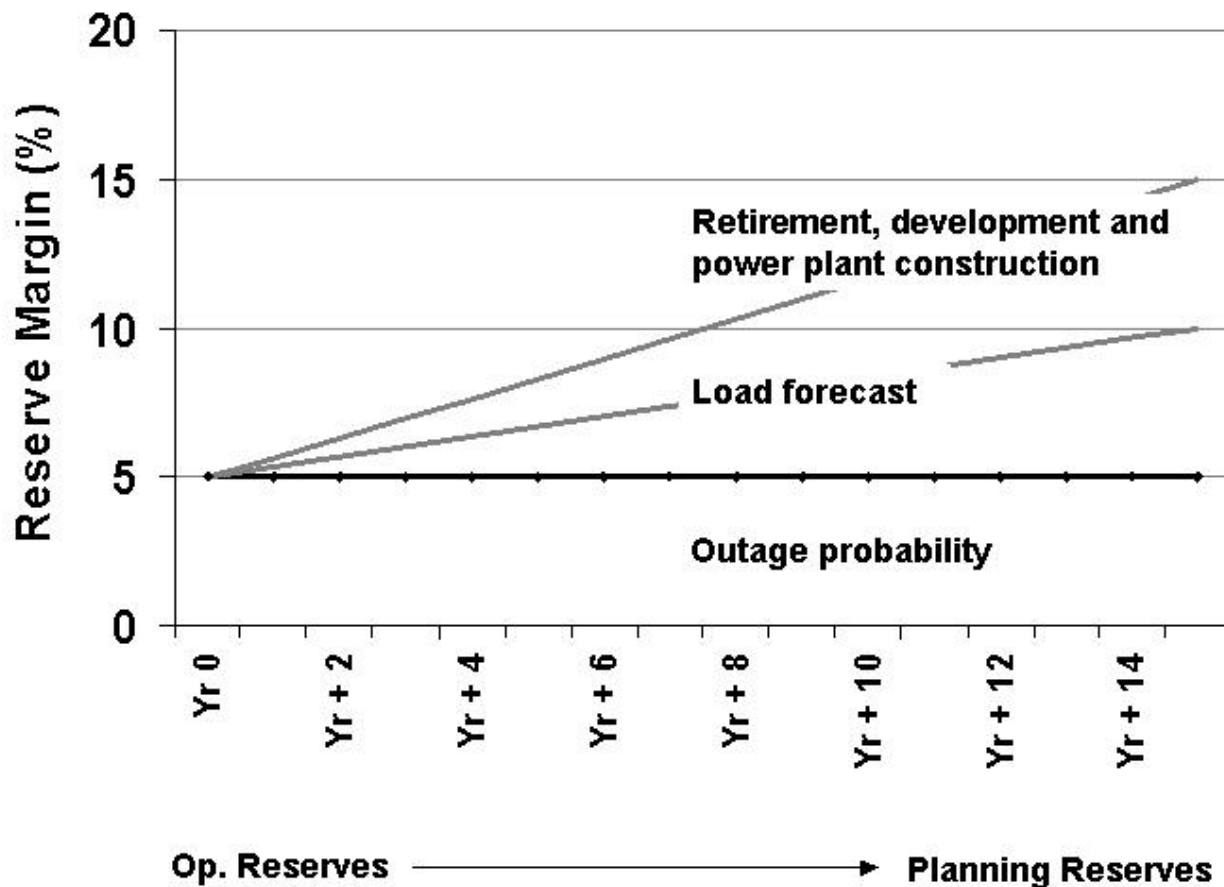
- Establish standards on an interconnection-wide basis
- Reflect intra-regional diversity
- Provide for sanctions, such as monetary penalties
- Require LSEs to meet appropriate regional/sub-regional standards

Reserves Concepts and Metrics

- Security and Adequacy are the two components needed to ensure system reliability:
 - Security: the ability to withstand sudden disturbances
 - Adequacy: sufficient resources to meet demand
- Adequacy assessment: involves *quantifying* the supply- and demand-side resources
- Resource adequacy: condition in which an LSE has acquired *sufficient resources* to reliably satisfy future load.

How do we determine what is “sufficient”?

Relationship between Planning and Operating Reserves



- Operating and planning reserves are key tools used to provide security and adequacy
- Timeframe is the distinguishing feature
- Key uncertainties include (1) plant development/retirements, (2) load forecasts, and (3) outage probability

Metrics used to Determine whether Resources are “Sufficient”

Largest single generator to be forced out during period x

System outage time, e.g., 60 minutes/yr

Winter energy - critical hydro, i.e., resources equal to loads under the worst historic hydro conditions

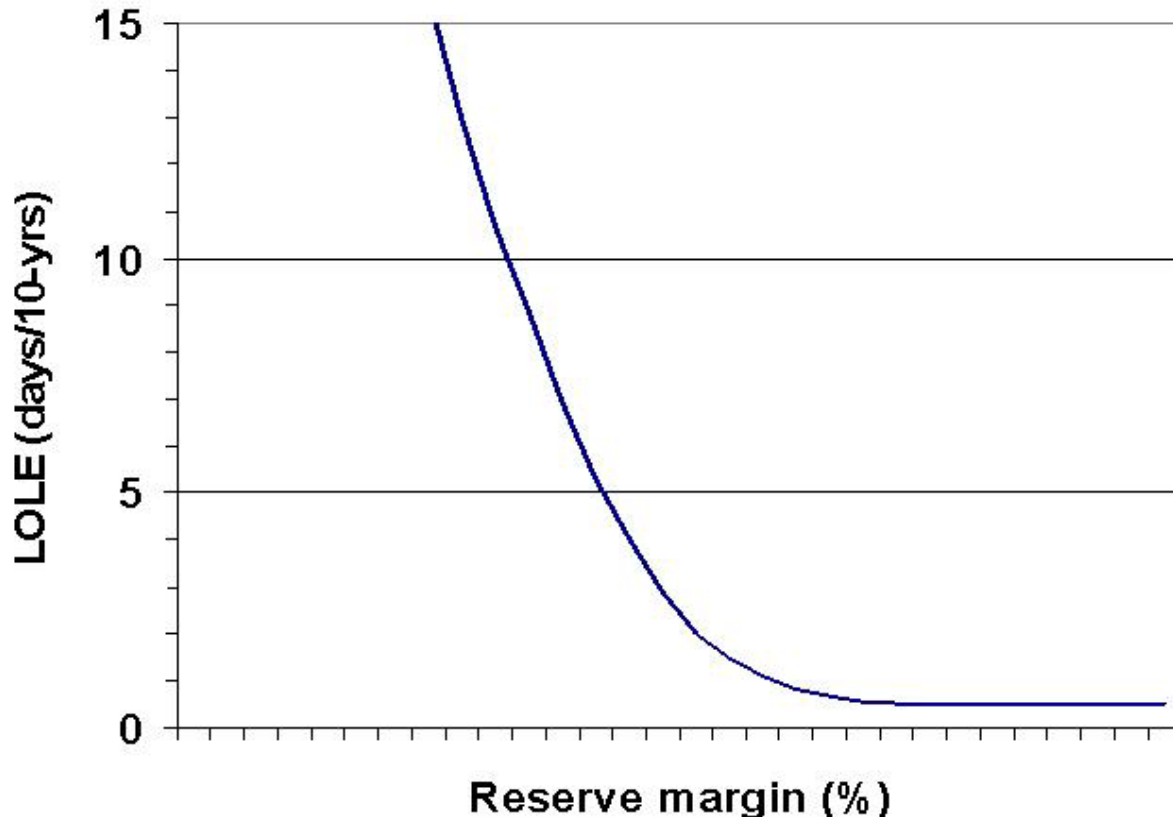
Reserve margin, usually based on summer peak

Probabilistic approaches, e.g., 1-in-10 year loss of load expectation (LOLE), or 0.9 probability of meeting all loads in a year (LOLP)

Expected unserved energy, e.g., 750 MWh/yr EUE

Costs associated w/ EUE, e.g., \$/kWh unserved energy

Loss of Load Expectation (LOLE) and Planning Reserve Margins



- LOLE is the *expected number of days* during which insufficient generating capacity is available to serve the daily peak load
- Typical to use 1 day in 10-year LOLE
- In practice, this translates to a planning reserve margin of 12-20 percent, allowing for both planned and forced outages¹⁵

Approaches to Resource Adequacy vary across the current Western IRPs

Nevada Power	12% planning reserve above peak load
Pacificorp	15% planning reserve above net obligations*
Avista	Maintain reserves to meet 1-in-10 year LOLP
Portland General Electric	Maintain resources to be 500 MW short of 1-in-2 peak load + 12% planning reserves**
Idaho Power	Maintain reserves above peak to cover unexpected loss of Idaho Power's share of two Bridger units
Puget Sound	Maintain resources to meet peak load plus operating reserves needed for lower-than-expected winter peak temperatures***
NorthWestern Energy	No reserves: "Quantity of long- vs. short-term capacity resources is optimized as part of portfolio analysis"

* Net obligations = load + long term sales - long term purchases; ** The "1-in-2 peak load" is expected to be met or exceeded in one of every two years.

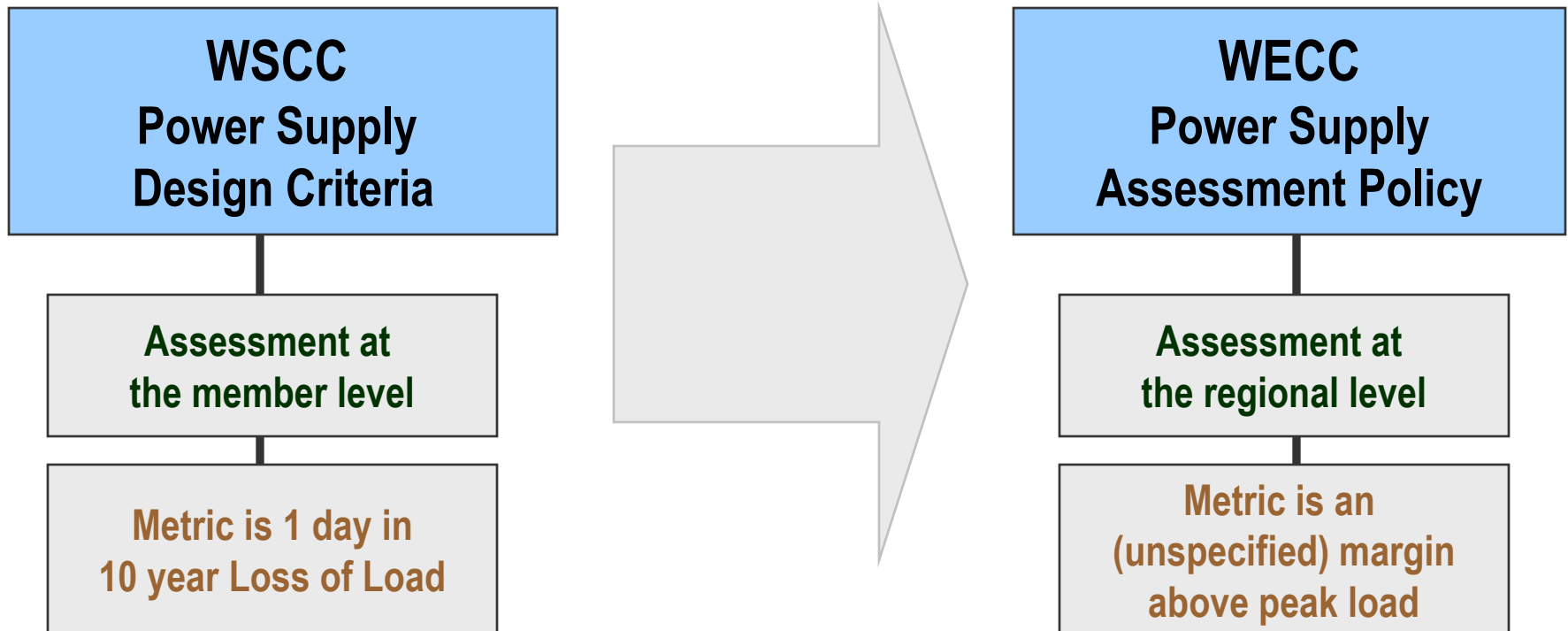
*** Puget Sound plans for load at 16 degrees Fahrenheit versus expected peak at 23 degrees.

WSCC/WECC's Approach to Metrics for Resource Adequacy

- **NERC Planning Standards requires Regions to review the existing and planned adequacy of their systems**
- **WSCC used the Power Supply Design Criteria:**
 - Addressed resource adequacy at the member level
 - Recommended a minimum long-term adequacy standard, based in part on 1-in-10 year LOLP
- **With formation of WECC, Design Criteria was suspended and replaced with the Power Supply Assessment Policy:**
 - In 2002, WECC Board unwilling to approve the first “Adequacy of Supply Assessment”; directed that any reference to “system adequacy” be removed from these assessments
 - Current “Power Supply Assessments” use reserve margins, rather than LOLP, in evaluating supply adequacy
 - 2003-04 WECC goal is to “Develop and publish adequacy criteria.”

WSCC/WECC's Approach to Metrics for Resource Adequacy

NERC's Planning Standards require each region to perform a regional assessment of existing and planned adequacy



Discussion: Next Steps



- Draft recommendations for CREPC action
 - To states
 - To WECC
- See handout for specific list