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: Overview

- Challenges
- Approaches
- Reserves concepts and metrics (LBL)
- Regional resource adequacy (WECC)
- Next steps?
- Discussion

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
  - Caveats: how widely applied, level, local market power
  - 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 and update data base
- 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

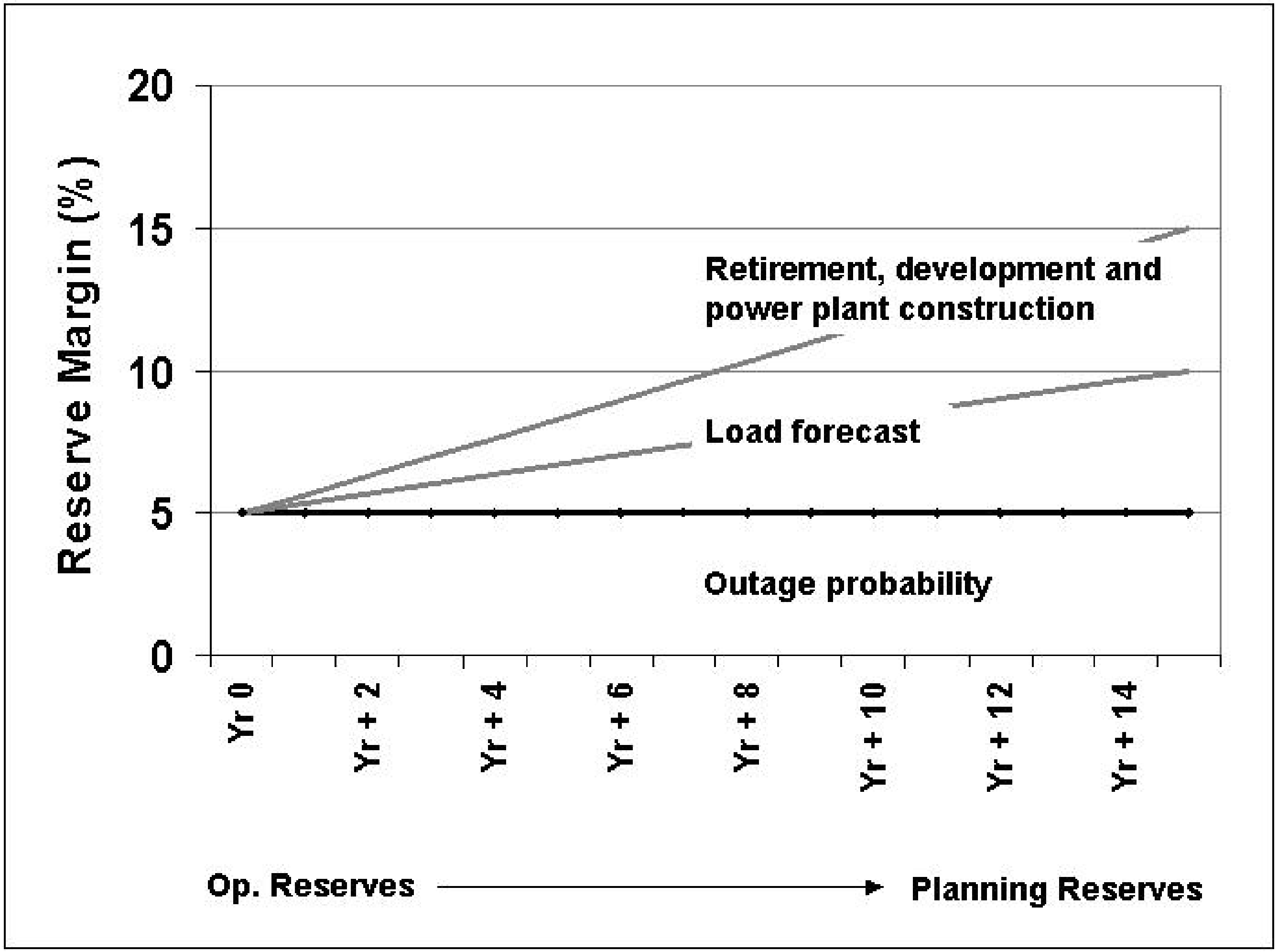
- Establish standards on an interconnection-wide basis
- Reflect intra-regional diversity
- Provide for sanctions, such as monetary penalties
- Require LSEs to meet appropriate regional/sub-regional standards

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 Reserves and Operating Reserves

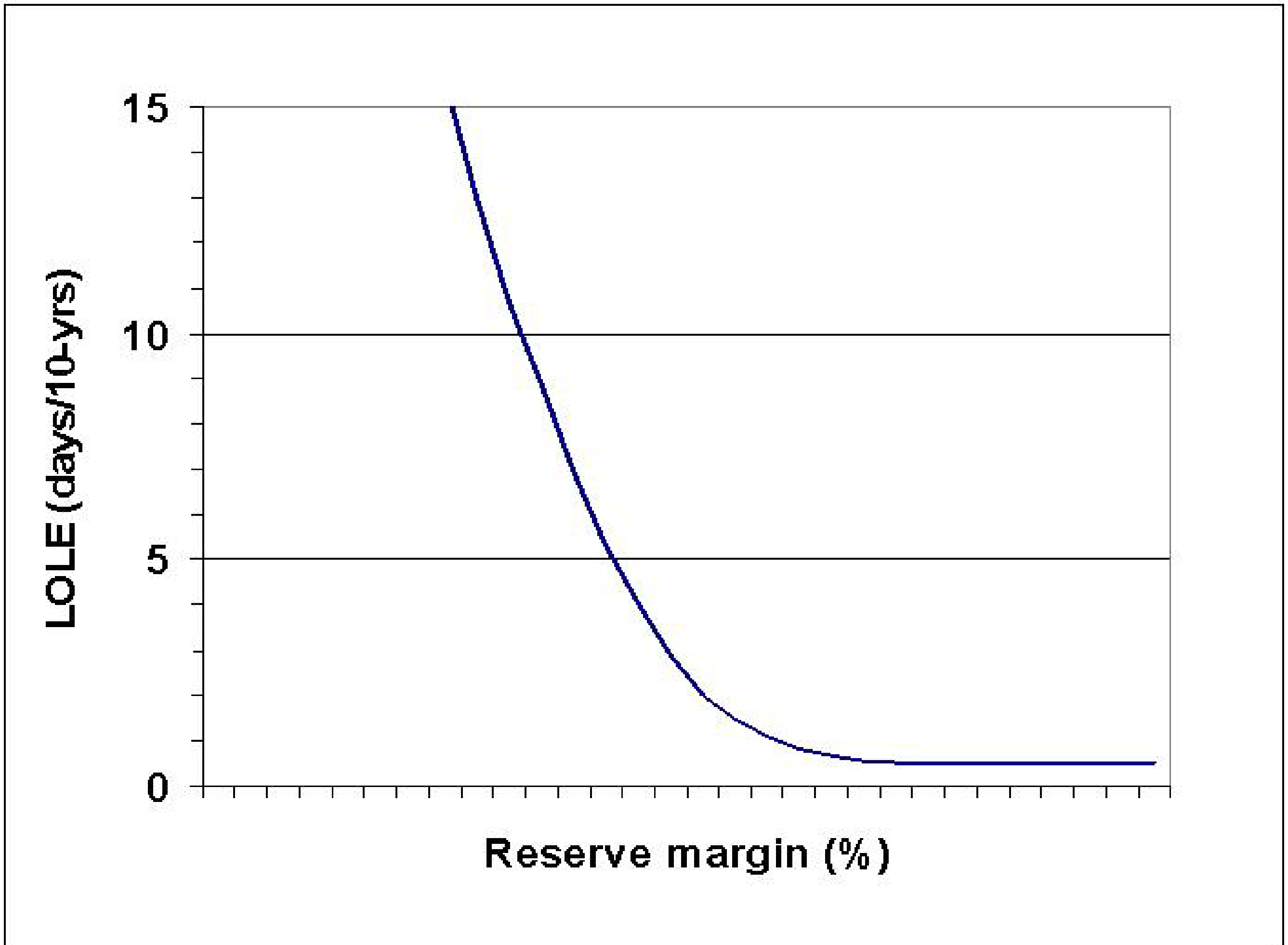


- Operating and planning reserves are key tools used to provide security and adequacy
- Timeframe is the distinguishing feature
- Key uncertainties include (1) plant development/retirements, (2) load forecasts, and (3) outage probability

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 (LOLP) 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 outages

Approaches to Determining whether *Capacity* Resources are Sufficient in IRPs

Nevada Power	12% planning reserve above peak load
Pacificorp	15% planning reserve above net obligations*
Avista	10% planning reserve above the peak hour load, plus 90 MW (equates to approximately 15% above peak)
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 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.

Approaches to Determining whether *Energy* Resources are Sufficient in IRPs

Nevada Power	No energy-related criteria (system is mostly thermal)
Pacificorp	Maintain generation capability under average water conditions
Avista	Maintain reserves to meet 1-in-10 year LOLP
Portland General Electric	Maintain generation capability under critical water conditions
Idaho Power	Maintain resources to meet energy demand each month at 70th percentile load and water conditions (1-in-3 load and water)
Puget Sound	Maintain generation capability under average water conditions
NorthWestern Energy	No reserves: "Quantity of long- vs. short-term energy resources is optimized as part of portfolio analysis"

Next Steps?

- Draft recommendations for CREPC action:
  - Resources for enhanced assessment
  - Action requests– WECC and SSG-WI
  - State Commissions
- Discussion—Handout (specific next steps)