

Bonneville



Power Administration

Resource Adequacy Assessment Regional Perspective

USEA/USAID Tour

Mary Johannis

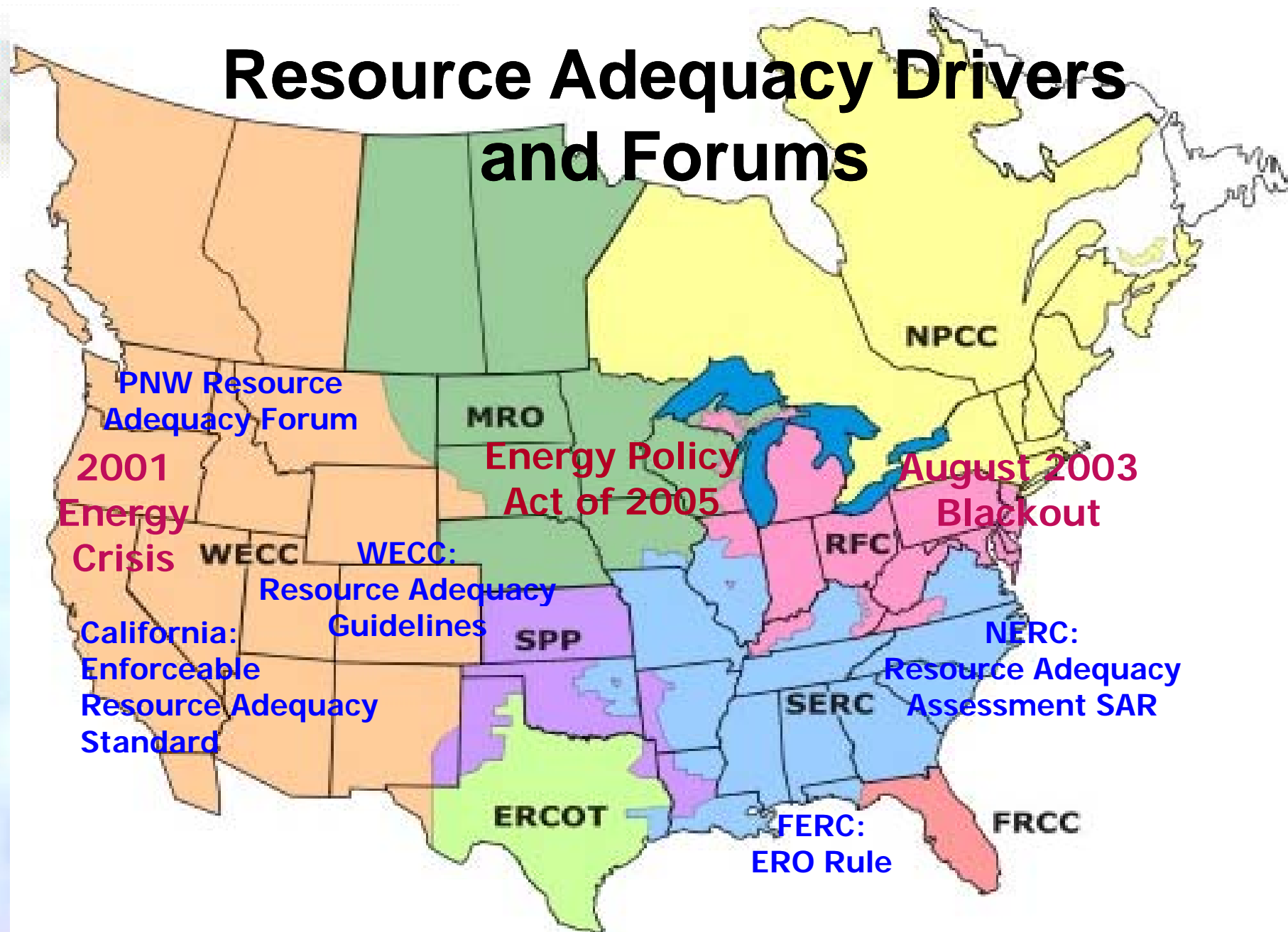
August 4, 2006



Presentation Overview

- ❑ National and Western Interconnection
Direction to Assess Resource Adequacy
- ❑ Pacific Northwest Resource Adequacy
Forum
 - Forum Goal & Principles
 - Adopted Energy Standard
 - Proposed Capacity Standard
 - Regional Power Supply: Mix of Resources
- ❑ Implementation Approach

Resource Adequacy Drivers and Forums





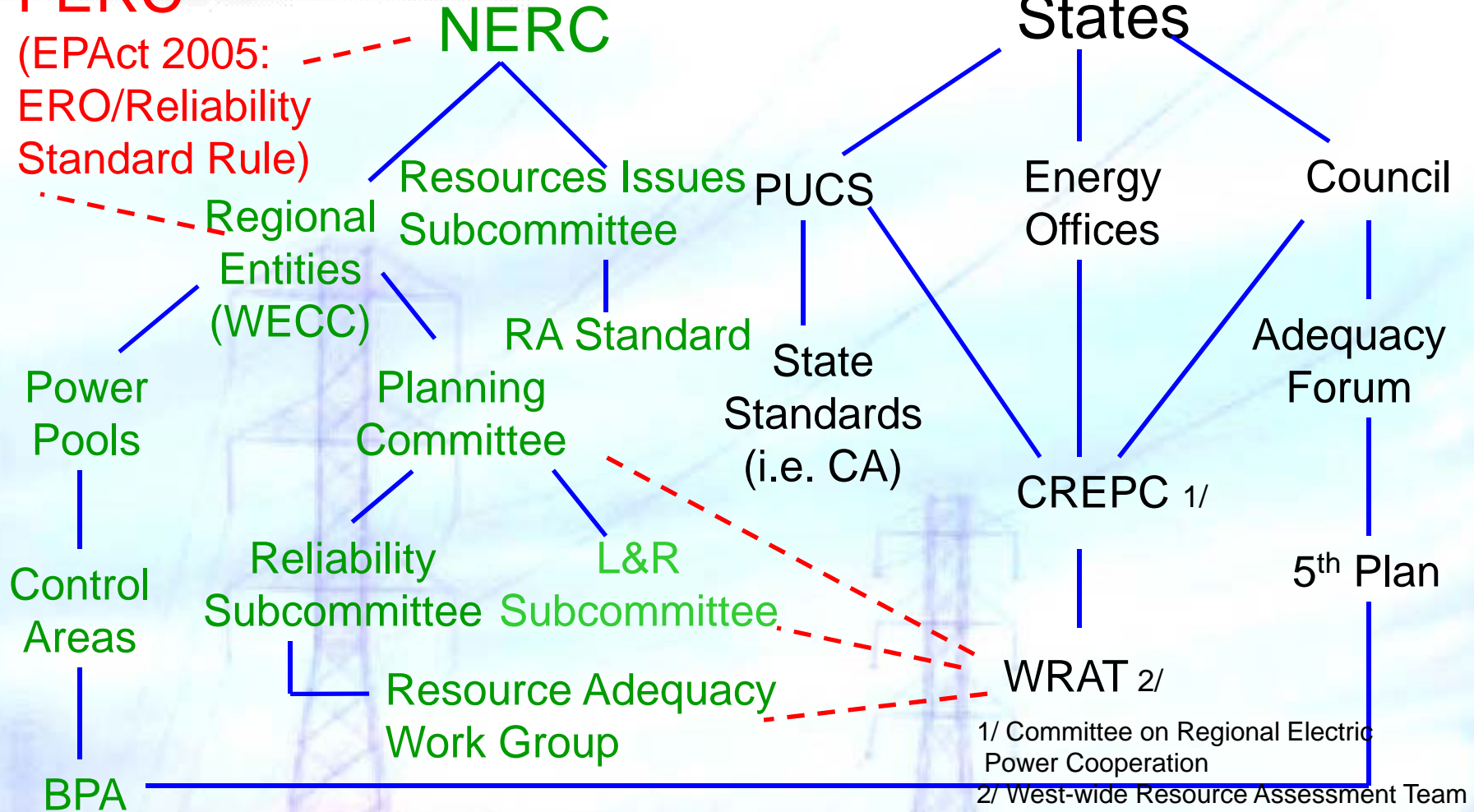
Institutional Landscape

FERC

(EPA Act 2005:
ERO/Reliability
Standard Rule)

NERC

States

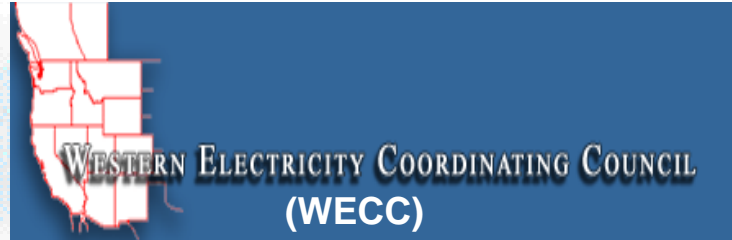




- ❑ **Federal Energy Regulatory Commission (FERC) has certified North American Electric Reliability Council (NERC) as Electric Reliability Organization (ERO)**
 - **Reliability standards are becoming Mandatory**
 - **Regional Delegation**
- ❑ **ERO Mandate to Conduct Periodic Assessments of Reliability & Adequacy of Bulk-Power System**
- ❑ **FERC/ERO Prohibition to order Infrastructure Construction or set Standards for Adequacy**



- ❑ NERC Resource Adequacy Assessment Standard is under Development
- ❑ Key Provisions:
 - Each Region to establish a framework by which to assess resource adequacy taking into consideration established state/multi-state/provincial resource adequacy requirements
 - Framework consists of criteria or guidelines, methodology, assumptions, approach and reporting requirements
 - Systematic approach for addressing uncertainties
 - Consider transmission, environmental & fuel supply constraints in assessment



- ❑ The predecessor of WECC, the WSCC had Power Supply Design Criteria (PSDC) until 2000, when PSDC were deemed to be inconsistent with deregulated markets
- ❑ WECC performs Power Supply Assessments (PSAs), but these do not determine whether the Western Interconnection (WI) is adequate
- ❑ The WECC Board Goal = Development of Resource Adequacy Guidelines
- ❑ WECC established Resource Adequacy Workgroup (RAWG) in April 2004 to formulate Resource Adequacy Criteria → Establishment of Loads & Resources Subcommittee (LRS) to formulate Guidelines



WECC RAWG Outcomes

- ❑ 7 meetings held from May 2004 --April 2005
- ❑ Consensus Recommendations:
 - “Voluntary Targets” approach
 - Consensus-Based Resource Adequacy Metrics and Targets
 - Common Protocols for Load & Resource Counting
 - Assessment of **Capacity and Energy Adequacy**
 - Extreme Weather, Economic/Demographics, Fuel Supply & Transmission Constraint Scenarios
 - Transparency of Information, Modeling & Results
 - Collaboration with other Entities is Vital



WECC and State Coordination

- ❑ State PUC Role is to grant cost recovery to IOUs for acquisition/construction of resources
 - PUCs are logical agencies to implement Resource Adequacy Guidelines
 - States need to be involved in Formulation of Metrics and Targets
- ❑ WECC-State Coordination is Ongoing
- ❑ Multi-state Entities such as Northwest Power and Conservation Council have important role in developing Resource Adequacy Framework



WECC and State Coordination

- ❑ Sub-areas within WECC are in the best position to recommend Resource Adequacy Metrics and Targets that reflect their particular mix of Resources, Loads and Transmission/Other Constraints. Hence, one of the reasons to develop the **PNW Resource Adequacy Framework**



PNW Resource Adequacy Forum Established

- In June, 2005, BPA & NWPPCC (Council) established Forum:
 - Steering Committee organized with representatives from Investor-Owned Utilities, Publics (Municipal Utilities/Cooperatives), State Regulators/Energy Offices, Merchant Power and Environmental Community
 - Technical Committee = ad hoc group with Participants from many of the Same Utilities, State Offices and Stakeholder Organizations



Overarching Goal

“Establish Resource Adequacy Framework for PNW to provide a clear, consistent and unambiguous means of answering the question of whether the Region has adequate deliverable resources to meet its loads reliably and to develop an effective implementation framework.”



Forum Principles

- 1. It is important to have regional resource adequacy (RA) metrics and targets. (i.e. ways to Assess Resource Adequacy-- Metrics, and How much is enough-- Targets)**
- 2. We should develop mechanisms to assess whether regional RA metrics and targets are met.**
- 3. There should be some mechanism reasonably to assure that the regional metrics and targets will be met going forward.**
- 4. Don't trample on jurisdiction of states or prerogatives of individual utilities in planning and acquiring resources to meet load.**

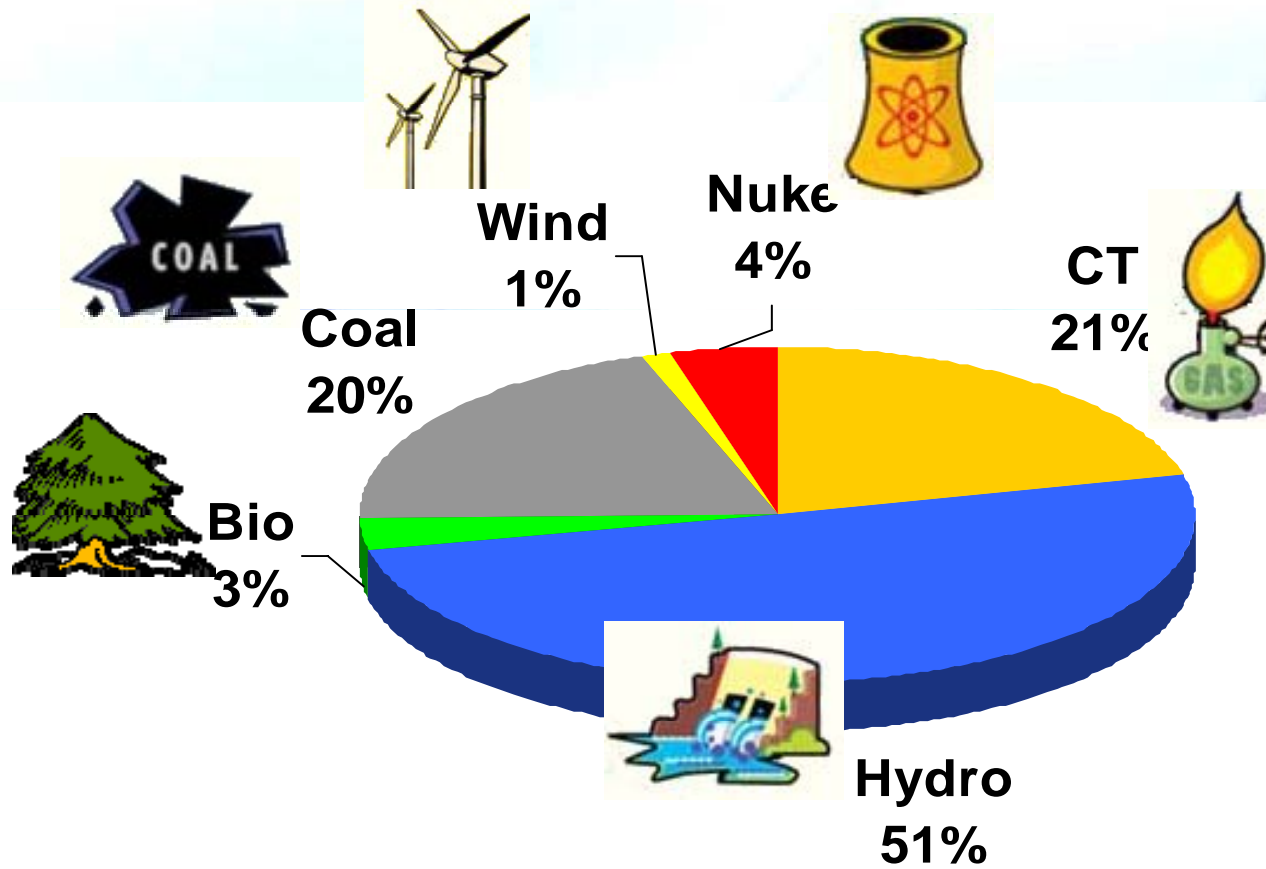


How to Assess Adequacy in PNW?

- ❑ Forum Recommended and Council Adopted a Regional Energy Metric and Target
 - Region is NW Power Act Footprint: OR, WA, ID & Western MT
 - Energy Metric & Target Methodology tied to Loss of Load Probability of 5%
- ❑ Steering Committee is considering Pilot Capacity Metric and Targets
- ❑ Forum Framework needs to be Compatible with NERC and WECC Resource Adequacy Assessment Standard/ Guidelines

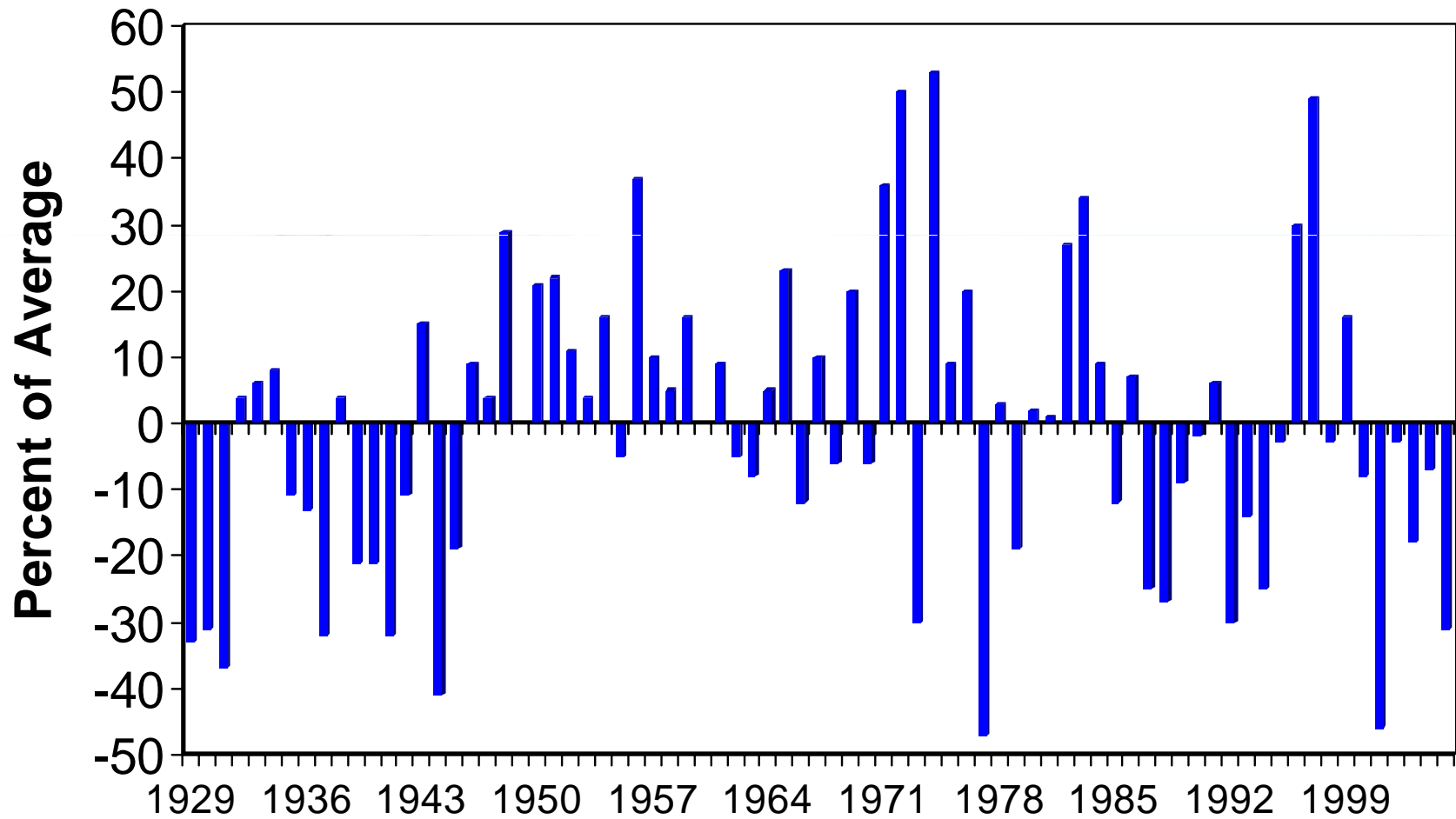


PNW Firm Generating Resources



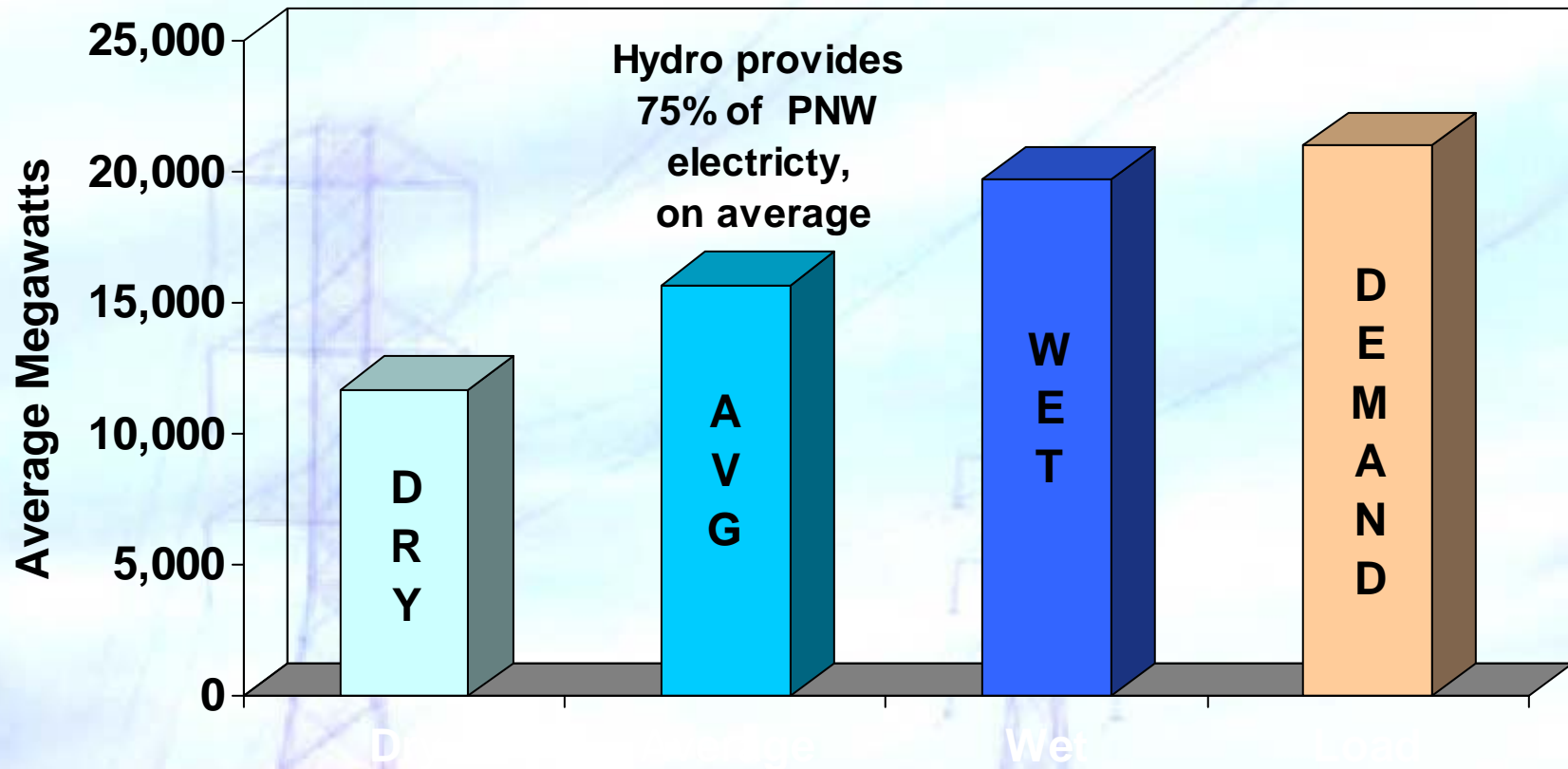


Historical Columbia River Runoff

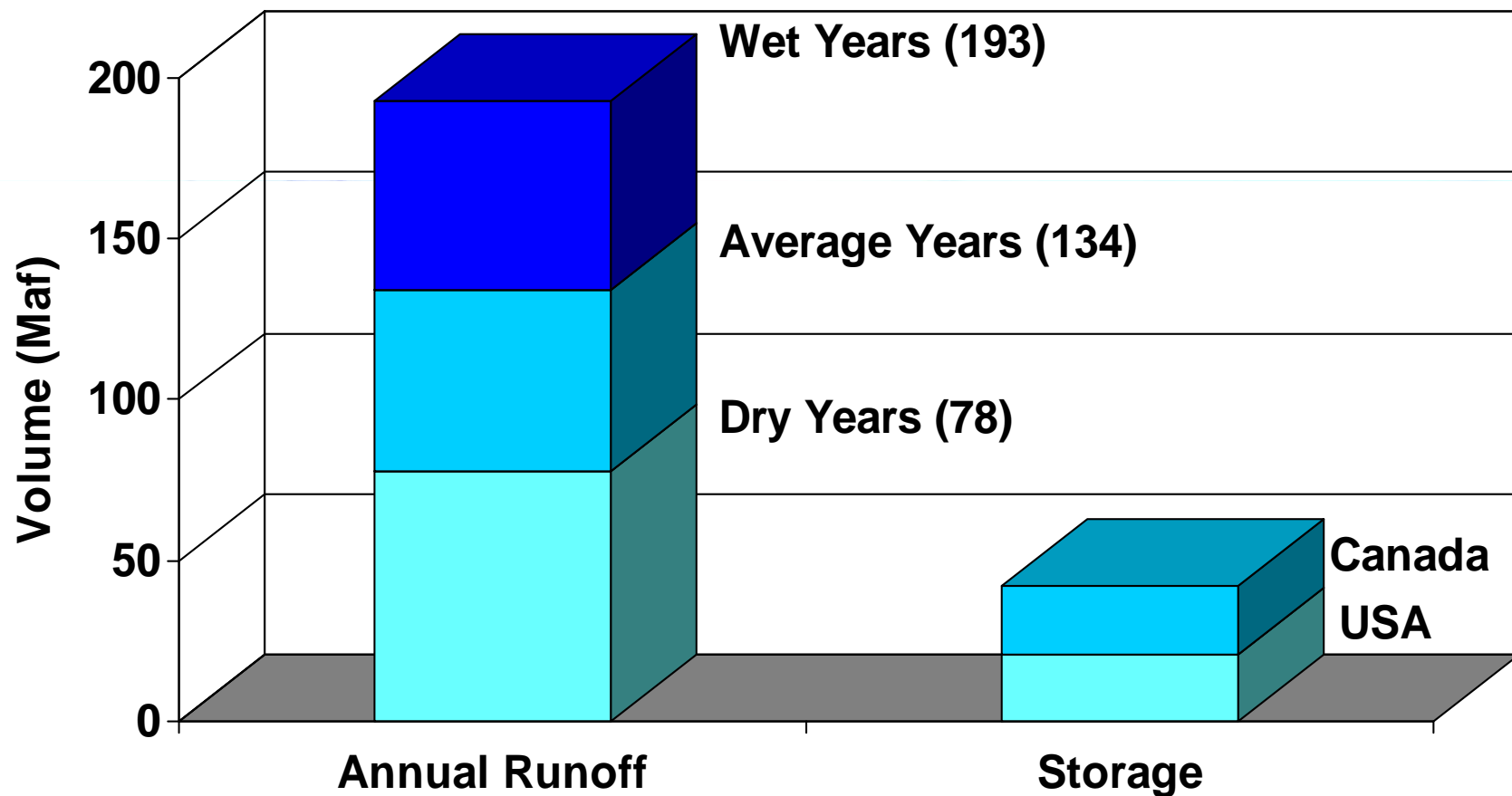




Variability in PNW Hydro Generation

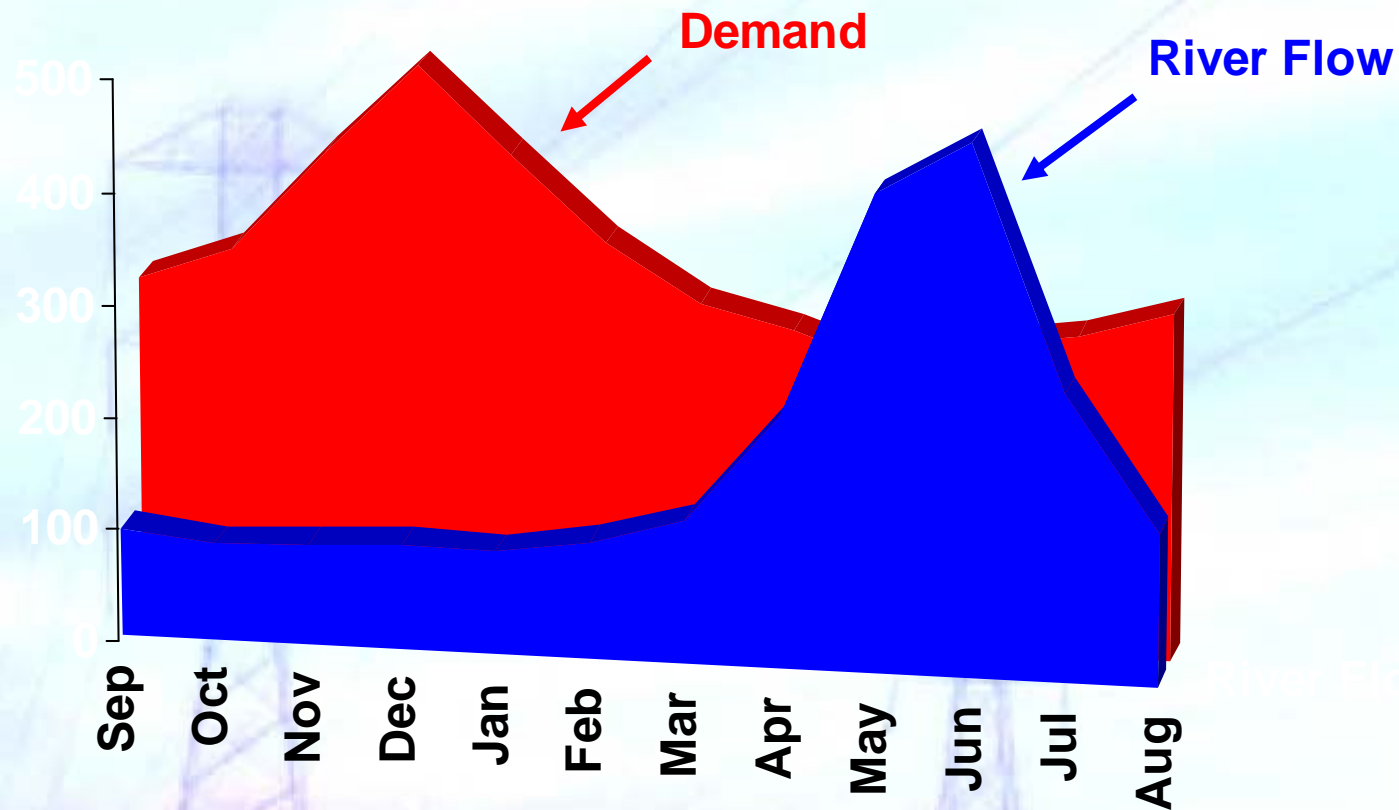


Comparison of Storage Volume to Variations in Runoff





Monthly Shape of River Flow and PNW Electricity Demand





Summary of Characteristics for the PNW Power Supply

- Energy limited (limited water supply)
- Capacity surplus (sufficient machines)
- Must plan hydro operation on driest year



Energy & Capacity Standards

Inadequate



Adequate



Adopted PNW Standard

Energy

- **Metric** – Annual average load/resource balance
 - **Load** = annual average load (normal weather)
 - + net firm inter-regional contracts
 - conservation savings
 - **Resource** = thermal generation (including IPP)
 - + renewable generation
 - + firm hydro (critical water)
 - + 1,500 aMW ^{1/} planning adjustment
- **Target** – Zero (Resources – Load = 0)

1/ aMW = 1 MW generating 8760 hours/year



Adopted PNW Standard

Energy

- 1,500 aMW is based on a winter season LOLP analysis with target of 5%
 - Assumes up to 3,000 MW of winter surplus capacity is available from out-of-region (most likely California)
 - Short-term flexibility to operate hydro reservoirs below fish refill curves to meet loads due to cold snaps or thermal outages
 - No summer surplus capacity assumed because California peaks in summer; whereas PNW peaks in winter



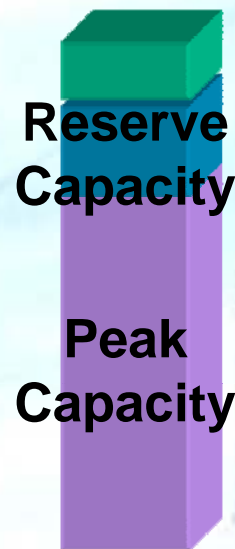
PNW Pilot Capacity Metric for Winter

CAPACITY METRIC:

- ❑ Planning Reserve Margin = Reserve Capacity divided by Peak Capacity expressed as a %

ASSUMPTIONS:

- ❑ Sustained Peaking Capacity available to meet load for 10 hours/ day over 5 days rather than 1 hour Peaking Capacity
- ❑ 1937 Water = Critical Hydro
- ❑ Up to 3,000 MW of Surplus Winter Capacity from California Available

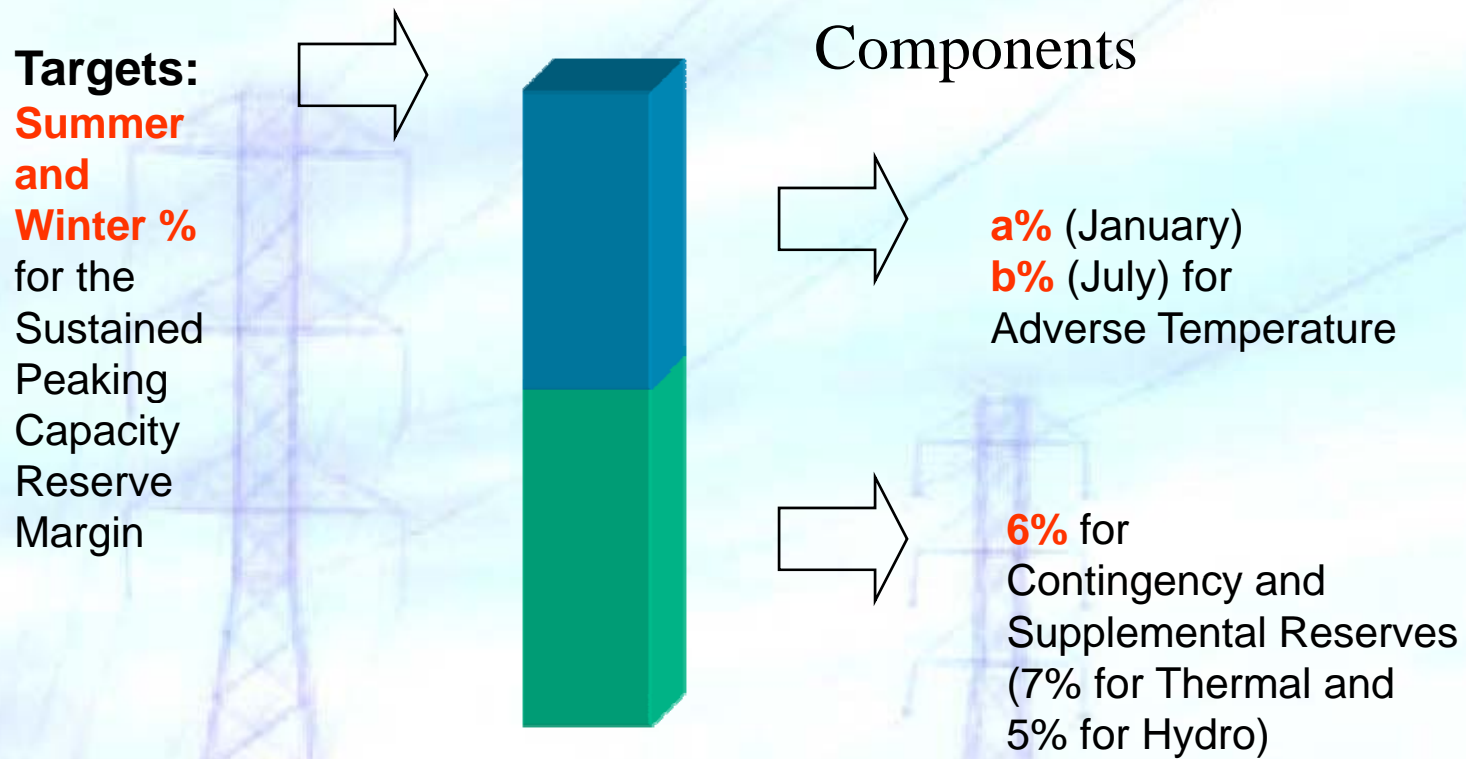


Sustained Peaking Capacity Available in Planning Timeframe to meet Load during times of Generator Outages or Adverse Temperature

Sustained Peaking Capacity Needed to meet 1 in 2 or Expected Loads in Planning Timeframe



Proposed Capacity Targets are Under Development





Forum Recommended Implementation Mechanisms

- ❑ Regional Awareness of Resource Adequacy Framework
 - Broad participation in Forum by IOUs, Public Utilities, State Regulators & Energy Stakeholders
 - Consensus Approach to development of Assessment Standard and Implementation Mechanisms
 - Adoption of Adequacy Standard by Council
- ❑ Establishment of Confidential Reporting Process for Forecasted Loads & Resources



Forum Recommended Implementation Mechanisms

- ❑ **Regional Assessments Against Standards**
 - Council to perform “top down” assessment
 - PNUCC to perform “bottom up” assessment
 - PNUCC & Council to reconcile any differences
- ❑ **Highly Visible Regional Resource Adequacy Status Reporting**
 - Green/yellow/red light reporting by Council and others if Regional Resource Adequacy Targets met or not
 - Strong utility and state awareness due to Council adoption and Regional Participation in PNW Resource Adequacy Forum



Forum Recommended Implementation Mechanisms

- ❑ Utilities given nonbinding Guidance for Utility-Specific Interpretation of Regional Resource Adequacy Standard
- ❑ **State Requirements to prepare Integrated Resource Plans (IRPs)**
- ❑ Council Power Plan provides further Guidance
- ❑ If Red Light on for Regional Resource Adequacy – Report which Regional Utilities Have Most Reliance on Spot Market
- ❑ Utilities will face Risk of High Spot Prices without short-term BPA backup if they have Inadequate Supply



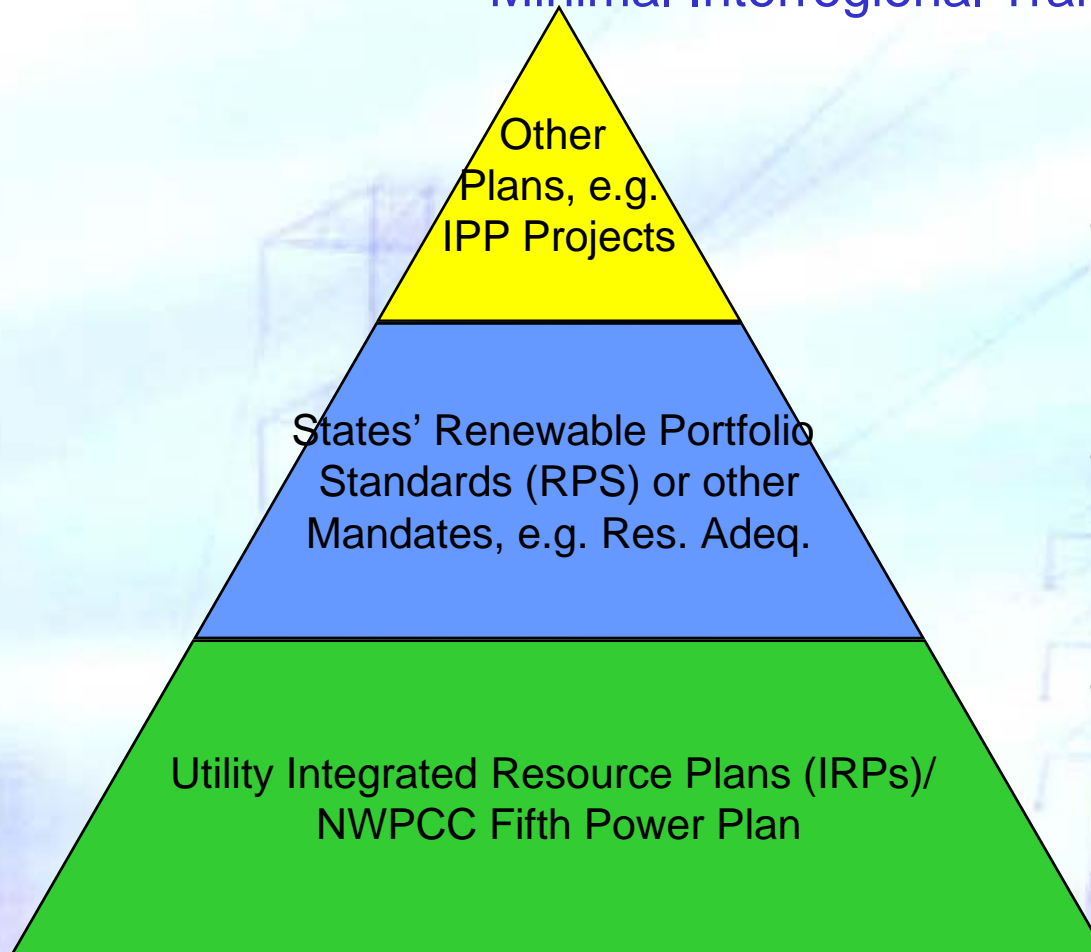
Example of Coordination between IRPs and Transmission Expansion Planning

- ❑ Seam Steering Group-Western Interconnection (SSG-WI) developed conceptual (high level) transmission expansion plans for Western Interconnection for “planned resource reference case”
- ❑ Economic Transmission Planning function is transitioning to WECC with Dissolution of SSG-WI



SSG-WI Planned Resource Reference Case Principles for Resource Additions (2008-2015)

“Minimal Interregional Transfer” Case



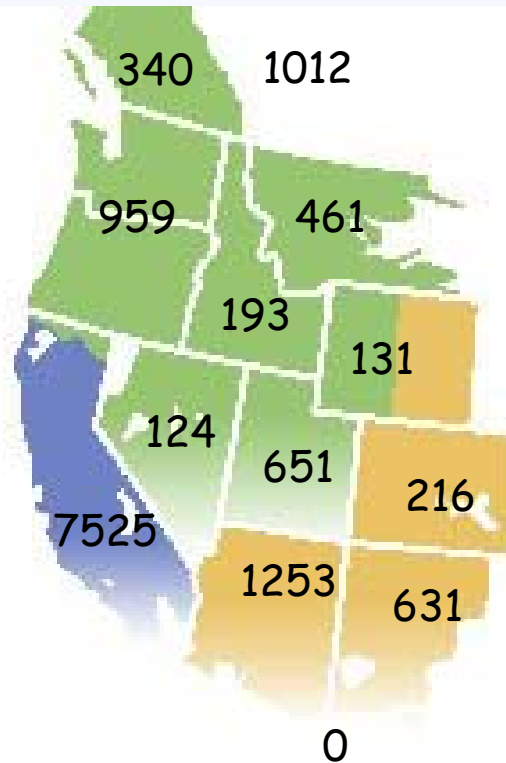
Principles:

- Incremental 2008-2015 resources from IRPs, to satisfy RPS and be consistent with other formal plans
- Incremental resources primarily to meet load growth in subareas, i.e. CA, NTAC, RMATS, SWAT & CCPG
- If existing through 2008 resources are for export to other subareas, then assume same level of export for 2015



Incremental Generation 2008 Base:

Resource Additions determined through process including Utilities, States, Sub-regional Planning Groups (e.g. NTAC) and Western Governors Association Staff



Net MWs to Grid



2008-2015 NW Resources Added

(in net MWs to Grid) ^{1/}

STATE/ PROVINCE	DSM	GAS	COAL	WIND/ HYDRO	TOTAL
Alberta	Not broken out	1204	2060	334	3600
British Columbia	Not broken out	1172	0	897/ 1379	3448
Idaho	100	92	500	590	1282
Montana	Not broken out	0	268	400	668
Oregon/	617	1123	1000 ^{2/}	1740/ 200 ^{3/}	4680

1/ Retirements not subtracted

2/ from Montana

3/ from B.C.