



2008 Integrated Resource Plan: Resource Adequacy and Portfolios

IRP Stakeholders
January 31, 2008



Agenda

- Tidal and Wave Energy Assessment 4:00 – 4:30 PM
- Resource Adequacy 4:30 – 5:15 PM
- Break 5:15 – 5:30 PM
- Round 1 Portfolios 5:30 – 6:00 PM
- Scenarios 6:00 – 6:30 PM



Resource Adequacy



What is “Resource Adequacy?”

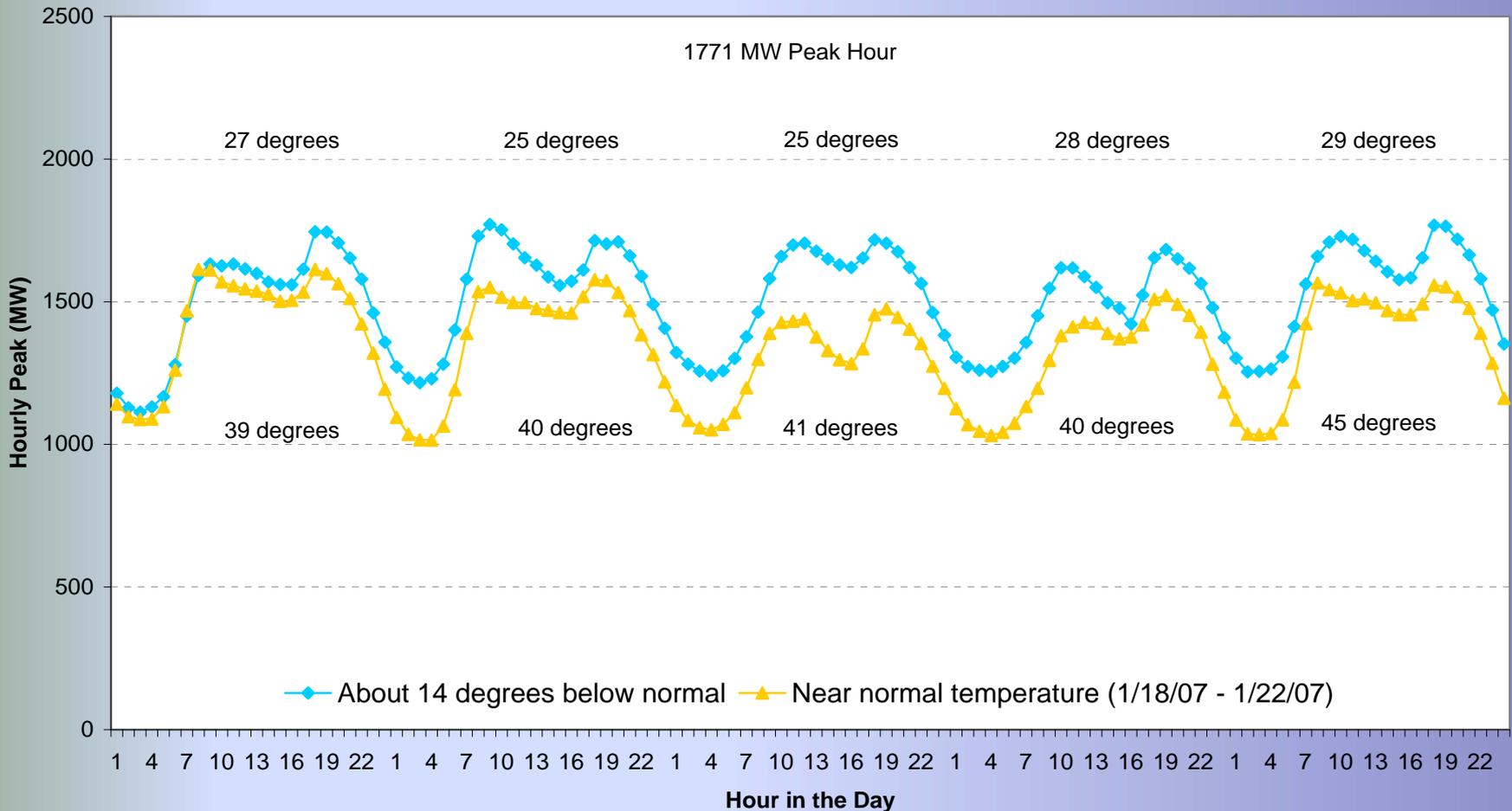
“The ability of the electric system to supply the aggregate electrical ***demand and energy requirements*** of the end-use customers ***at all times***, taking into account scheduled and reasonably expected unscheduled outages of system elements.” (emphasis added)

- *North American Electric Reliability Council*



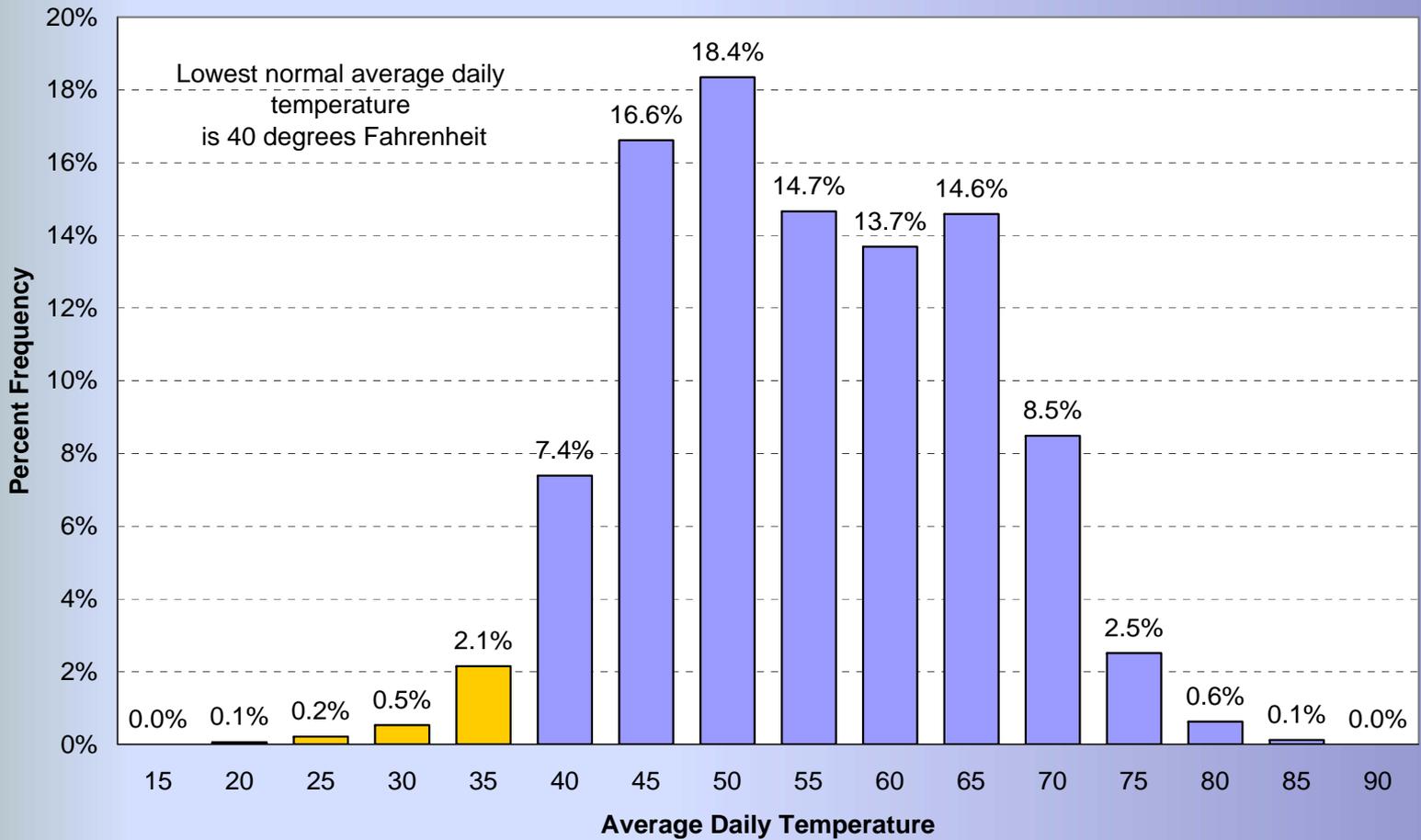
2007 Cold Snap

Thursday, Jan. 11 – Monday, Jan. 15





Seattle Average Daily Temperatures Frequency in Percent

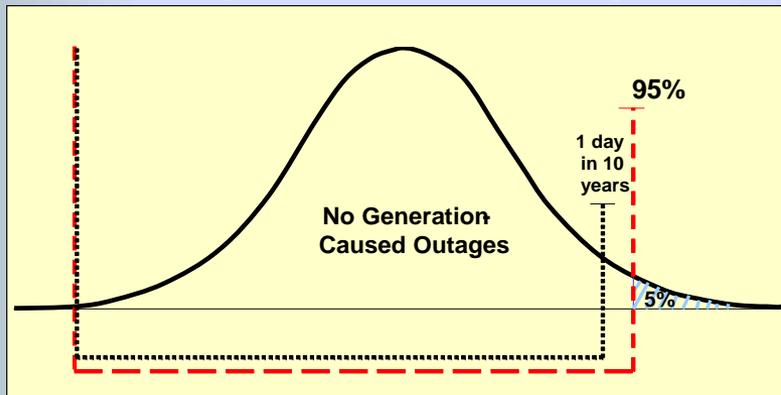




Resource Adequacy Criteria

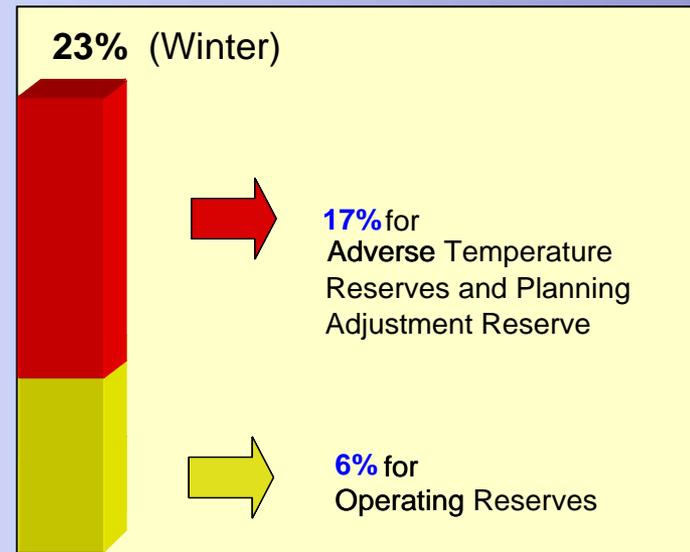
Energy and Sustained Peaking

Probabilistic Reserve Requirements (2006 SCL IRP)



Energy Standard
95% Confidence of No Unserved Energy

Example Deterministic Reserve Requirements



Draft Peaking Standard
For the Pacific Northwest
Northwest Power & Conservation Council



Varying Perspectives on Measures for PNW Reserve Margins

Organization	2008
NWPP (50 hrs. in 5 days) (PNW severe weather event, margin above operating reserve)	+9.2%
BPA January Energy (1-mo.) (50:50 peak, critical water, heavy load hours only)	-14%
PNUCC Average Energy (4-mo.) (PNW Dec.-Mar., 50:50 peak, critical water)	-11%
GED Average Energy (12-mo.) (Annual average energy, average water)	+44%
WECC (WECC NWPP winter, average water)	+31%



Assumptions Vary in PNW Resource Assessments

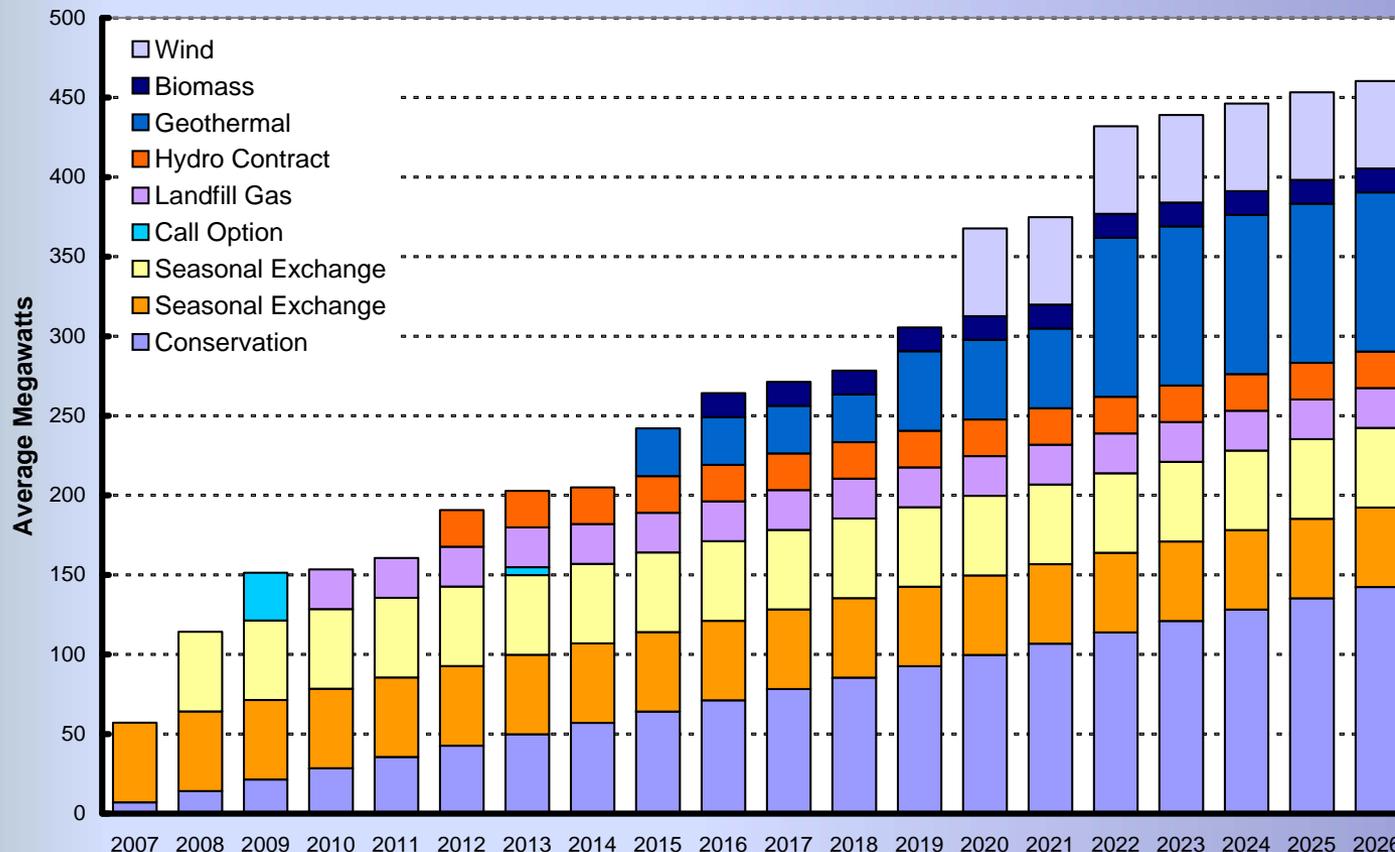
Assumption	PNUCC	NWPP	NPCC	BPA
Adverse temp. reserve (MW)	na	7,000*	3,740* (estimated)	na
Monthly Planning	4-Mo. Average	Yes *	Yes*	Yes
Critical Water Year	1936-37	1936-37	1936-37	1936-37
Hydro Flex (MW)	na	2,000	2,000	2,000
Available IPP Cap. (MW)	0	Yes	1,000	32
Peak Diversity	na	0	Yes	1,600
Interruptible Load	na	250	0	0
PNW Winter Imports	2,000	3,000	3,000	235

*Uses 50:50 peak for planning, but recommends maintaining additional reserves for high sustained peak events.
 Notes: Assumptions are often not fully documented, so that there may be material differences from this table.
 Sustained peak = the MW capacity needed above the forecast peak. All assume no hydro emergency is declared.



2006 IRP Preferred Portfolio* for January Energy Needs

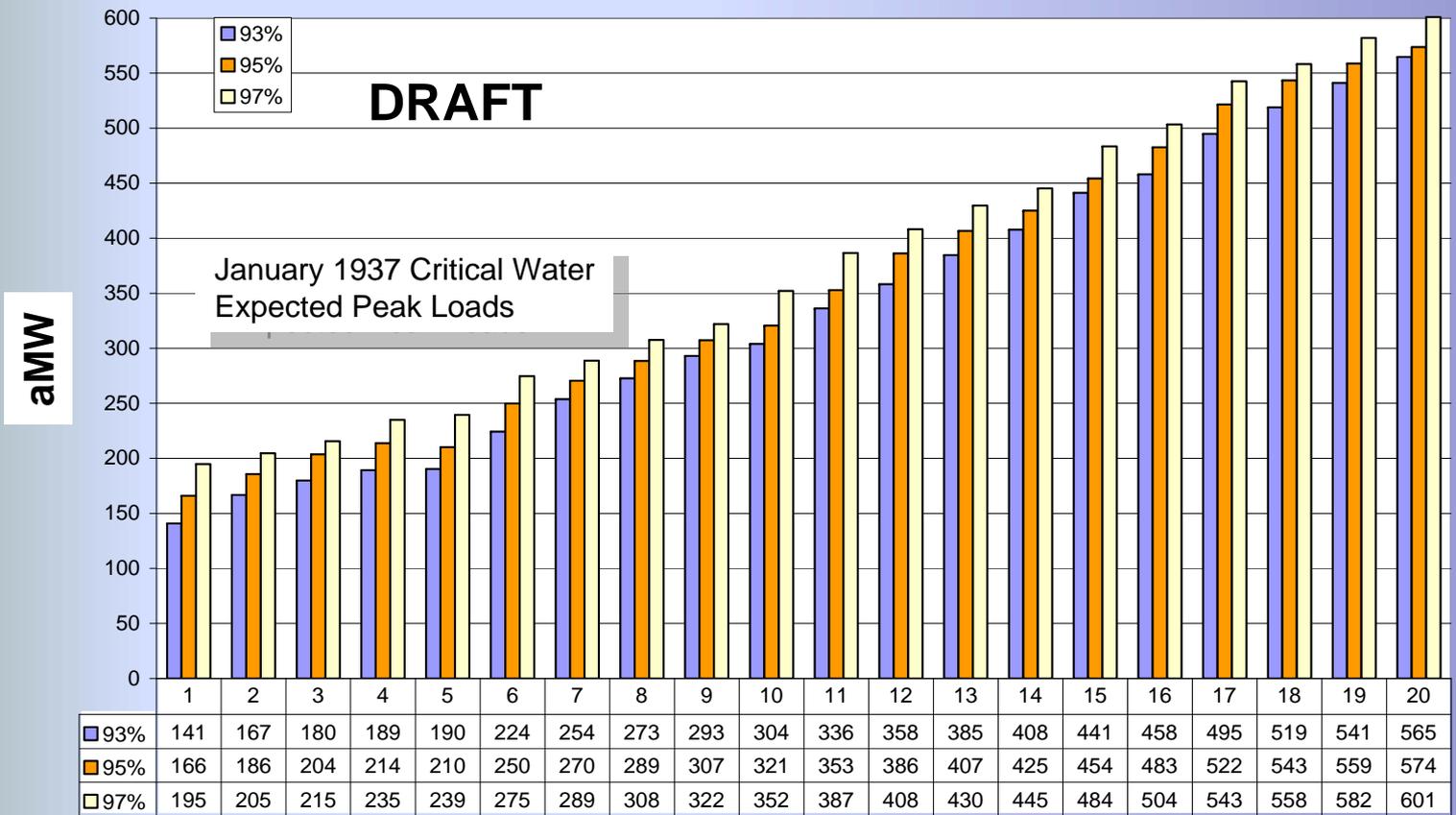
*Reduced for 100 aMW of Market Purchases





Estimate of January Energy Needs* Similar to 2006 IRP

*Not Reduced for 100 aMW of Market Purchases



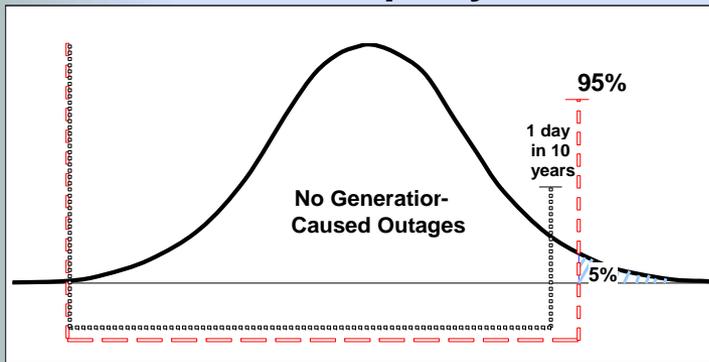


Round 1 Resource Portfolios

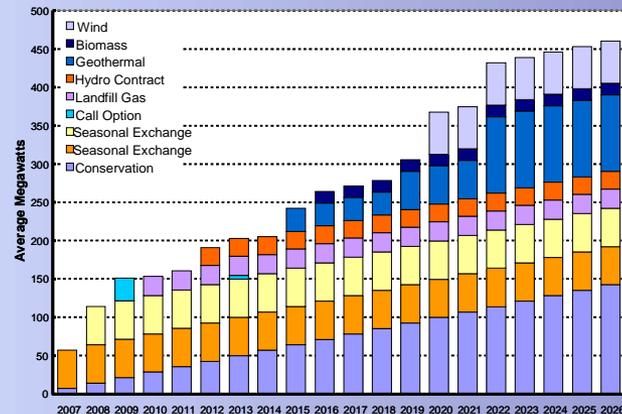


Determining SCL Resource Needs

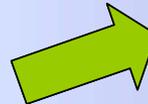
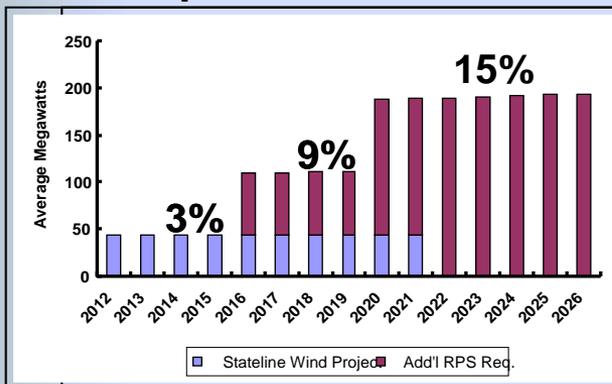
Resource Adequacy Needs



Round 1 Resource Portfolios



Compliance With I-937





Design Objectives for Resource Portfolios

- Design round 1 portfolios to be differentiated by intensive use of individual resources (e.g. wind, biomass, etc.) within limits
- Minimize the amount of resources required to meet resource adequacy requirement and if applicable, the RPS
- Use lower cost resources in the early years to maximize the net present value of the portfolios
- Avoid large resource commitments in the early years by using exchanges, options, conservation, and green exchanges



Design Objectives for Resource Portfolios (*continued*)

- Use scalable resources when possible as opposed to separate projects (e.g. wind, geothermal, combustion turbines)
- Ensure that there is sufficient new generation in summer months to meet proposed summer for winter exchanges
- Avoid resources in the early years that would require new transmission to be constructed on an unreasonably short timeline



Assumed Limitations on Resource Availability

Resource	aMW	Notes
Landfill Gas	35	Limited opportunities remain
Biomass	75	Transmission to distant resources
Geothermal	125	Hydro-thermal and potential EGS
Wind	150	Integration and hydro correlation issues
CHP	25	Limited industrial hosts in area
CCT	200	I-937 is the key limitation
SCT	100	I-937 is the key limitation
Exchange	150	Limited by firm transmission capacity
Capacity Purchase	100	Short-term substitute for generation



Draft Round 1 Portfolios

1. **Hi-LFG** Landfill Gas
2. **Hi-Geo** Geothermal
3. **Hi-Bio** Biomass
4. **Hi-Wind** Wind
5. **Hi-SCT** Simple Cycle Turbine
6. **Hi-CCT** Combined Cycle Turbine
7. **Hi-Exch** Exchanges



Scenarios for the 2008 IRP



Scenarios for 2008 IRP

- **Electric Vehicles**
 - EPRI electric vehicle market penetration assumptions
 - 60% of all new vehicles by 2040
- **Climate Change**
 - NPCC Fifth Power Plan hydro impacts
 - Uses elements of a UW climate change analysis from 2005
- **Carbon Dioxide: Cap and Trade**
 - Lieberman-Warner Bill
 - Duke University study adjusted for legislative revisions



Scenarios for 2008 IRP (*continued*)

- High Gas Prices
 - Global Energy Decisions high gas price forecast
 - 75% percentile, averaging about \$6.50/MMBTU in 2007 dollars
- High Demand Growth
 - Accelerated growth of Seattle Metro area



Studies of Resource Potential for the 2008 IRP

- Tidal and Wave Energy Assessment ✓
- Distributed Generation Assessment
- Demand Response Assessment