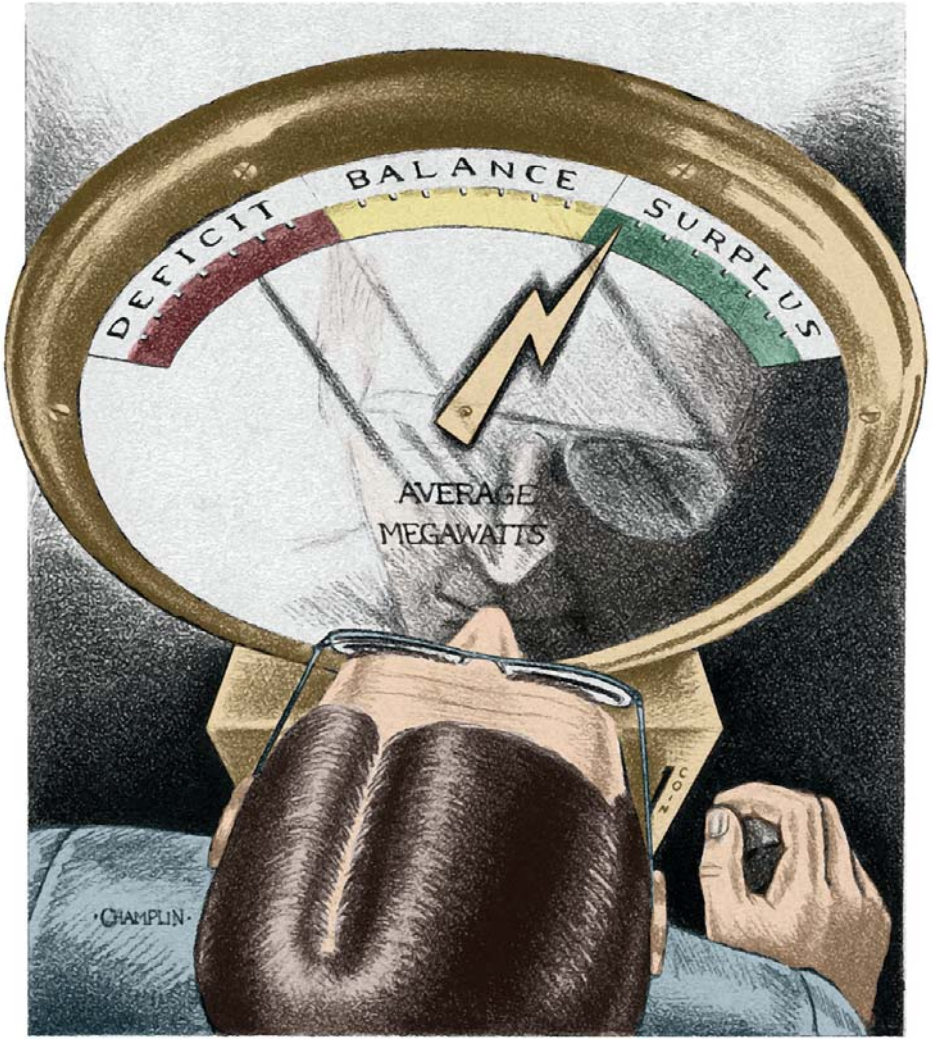
Northwest Power and Conservation Council



Pilot Capacity Standard

Resource Adequacy Forum

Steering Committee

October 3, 2006

Northwest Power and Conservation Council

Objective

- Decide whether to forward the proposed pilot capacity standard to the Council for consideration.
- The decision is primarily to recommend the proposed methodology, which is to use a “building block” approach for setting targets and to use an LOLP analysis to determine one of the target components.
- The targets are preliminary and will change as better data is obtained. The region is currently capacity surplus, which gives us time to refine those values.

Northwest Power and Conservation Council

Outline

- Review the Proposed Pilot Capacity Metric
- Develop Initial Winter and Summer Targets
- Assess the Region's Current Capacity Status
- Review Conditions during the July Heat Wave
- Optional: Computation of the Planning Adjustment Reserves

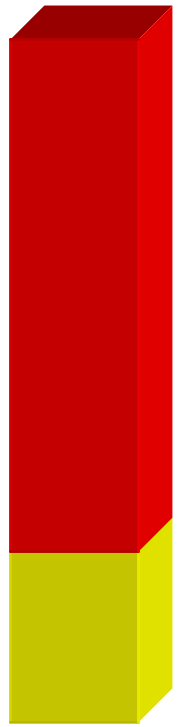
Northwest Power and Conservation Council

Proposed Capacity Metric

- Surplus generating capacity
- over the expected peak load,
- over the peak load duration period,
- in units of percent, also referred to as the *Surplus Sustained Peaking Capability* or the *Planning Reserve Margin (PRM)*

Proposed Winter Capacity Target

Target: 25%



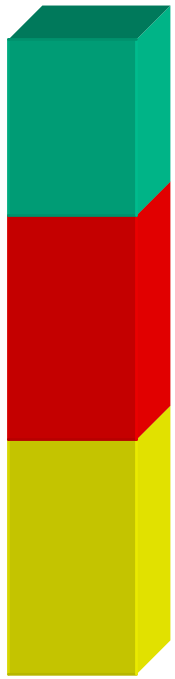
0% for
Planning adjustment reserves

19% for
Adverse temperature reserves

6% for
Operating reserves

Proposed Summer Capacity Target

Target: 19%



7% for
Planning adjustment reserves

6% for
Adverse temperature reserves

6% for
Operating reserves

Northwest Power and Conservation Council

Capacity Target Components
"Building Block" Approach

- A portion to cover operating reserves
- A planning adjustment reserve
- A portion to cover adverse temperature

Northwest Power and Conservation Council

Operating Reserves (OR)

- 5% for hydroelectric resources and 7% for thermal resources,
- or a percentage to cover the loss of the largest single resource
- In the northwest, hydro provides about 50% of the firm resource supply
- Portion for OR is **6%**

Northwest Power and Conservation Council

Planning Adjustment Reserves (AR)

- Derived from an LOLP analysis
- Additional reserves required to compensate for lack of non-firm supplies (such as out-of-region spot market and hydro flexibility)
- Portion for AR is **0% in winter**
- Portion for AR is **7% in summer**

Northwest Power and Conservation Council

Adverse Temperature Reserve (TR)

- Defined as the reserve required to cover the expected load deviation for a 1-in-20 year temperature event
- Calculated by dividing the 1-in-20 year load deviation by the expected peak load
- The **expected peak load** is the average load over the peak load period for the expected coldest (hottest) day
- The **expected coldest** (hottest) day is the median of the coldest (hottest) days over all years in the historical record (derived for each winter and summer month)
- Until better data is available, we will use daily average temperatures and loads to compute this reserve value.

Temperature Statistics

Regional Daily-Average Temperatures

	Dec	**Jan**	**Feb**	**Jul**	**Aug**
EPT	28.7	22.9	29.0	75.4	74.2
1-in-20	14.3	10.2	14.5	80.1	79.6
Diff	-14.4	-12.7	-14.5	4.7	5.4

In degrees Fahrenheit

Northwest Power and Conservation Council

Temperature – Load Relationship

(1995-2002 data, NWPCC assessment)

Month	Avg	T Dev	L Dev
December	-336	-14.4	4,838
January	-226	-12.7	2,870
February	-277	-14.5	4,016
July	236	4.7	1,109
August	253	5.4	1,366

Units are **daily-average megawatts** per degree change in **daily-average temperature** (Fahrenheit)

Northwest Power and Conservation Council

Adverse Temperature Reserve Margins

	Dec	Jan	Feb	Jul	Aug
Load	25,297	27,251	26,872	22,008	21,511
Dev	4,838	2,870	4,016	1,109	1,366
TR	**19%**	11%	15%	5%	**6%**

Units are in megawatt-days. TR = Temperature Reserve

Northwest Power and Conservation Council

Initial Capacity Targets

	Dec	Jan	Feb	Jul	Aug
TR	19%	11%	15%	5%	6%
OR	6%	6%	6%	6%	6%
AR	0%	0%	0%	7%	7%
PRM	**25%**	17%	21%	18%	**19%**

Units are in megawatt-days. **OR** = Operating reserve requirement
AR = Planning adjustment reserve requirement **TR** = Temperature reserve requirement
PRM = Total reserve requirement = Planning Reserve Margin = Capacity Target

Northwest Power and Conservation Council

Suggested Assumptions

Values in **bold blue** will be reviewed annually

- The **peak load period** is the **10-consecutive-hour** period over **five consecutive days**, which results in the highest load for that period
- **Expected peak load** is the average load over the peak load period based on the expected coldest or hottest period of the month
- Currently, historical data is not configured to provide an expected 50-hour peak load period temperature, so regional **daily** average temperatures and loads will be used
- Generating capacity is the sum of the generation from all regional resources and from out-of-region resources contractually obligated to meet regional load

Northwest Power and Conservation Council

Suggested Assumptions (cont'd)

Values in **bold blue** will be reviewed annually

- The net of firm imports and exports is added to the generating capacity
- Hydro generation is based on critical water conditions (1937)
- **2,000** megawatts of hydro flexibility is added for the winter and **1,000** megawatts for summer
- Generating capacity includes **3,000** megawatts of out-of-region capacity in winter and **0** megawatts in summer
- In winter **100%** of uncontracted regional resource generation (IPPs) will be counted but in summer only that portion of IPP generation that does not have direct access to inter-regional transmission will be counted (**1,000** megawatts will be used as a placeholder)
- Wind generation will be derated to **15%** of its nameplate capacity (this is a placeholder until better data is obtained)

Northwest Power and Conservation Council

Assessment of the Capacity Reserve Margin

Op Year 2007	**December**	**July**
Hydro (’37)	17,500	18,200
Hydro Flex	2,000	1,000
Non-hydro	10,400	10,400
Net Imports	-850	-2,500
IPP	3,500	1,000
Wind (15% of cap)	160	160
Spot Imports	3,000	0
Total Resource	35,710	28,260
Exp Peak Load	25,300*	22,000*
Balance	10,410	6,260
Reserve	**41%**	**28%**

*These load estimates come from the GENESYS HELM algorithm.

Energy vs. Capacity Assessment

Units in MW-days, unless noted	**Current System** L/R = 2,000 LOLP = 0%		**@ Energy Limit** L/R = -1,500 LOLP = 5%		**Note**
	Dec	**Jul**	**Dec**	**Jul**	To simulate a supply that just meets NW energy needs, 3,500 MW of resource generation was removed.
Resources	35,710	28,260	32,210	24,760	
Load	25,300	22,000	25,300	22,000	
Balance	10,410	6,260	6,910	2,760	
RM	41%	28%	27%	13%*	
Target	25%	19%	25%	19%	

*At the energy limit (i.e. LOLP = 5%), the summer reserve margin falls below the proposed target.

July 24, 2006
Heat Wave

Northwest Power and Conservation Council

Power Pool Hourly Loads for July 24, 2006

NWPP peak hourly load on 7/24	~ 54,600 mw
Expected NWPP peak hourly load*	~ 52,200 mw
Observed NWPP peak load deviation	2,400 mw
NWPP temp/load relationship	300 mw/degree
NWPP temp deviation on 7/24	8 degrees
Expected NWPP peak load deviation	2,400 mw

*This is the expected peak hourly load for the power pool under normal temperature conditions.

Northwest Power and Conservation Council

Estimate of PNW Hourly Loads for July 24th Based on NWPP Hourly Loads

Observed NWPP peak hourly load	~ 54,600 mw
PNW hourly load/NWPP hourly load	0.48
Est. observed PNW peak hourly load	~ 26,200 mw
Expected NWPP peak hourly load	~ 52,200 mw
Est. expected PNW peak hourly load	~ 25,050 mw

Northwest Power and Conservation Council

Estimate of PNW **Daily** Loads for July 24th and Comparison to HELM Output

Est. observed PNW peak **hourly** load	26,200 mw
Est. expected PNW peak **hourly** load	25,050 mw
Daily avg load/peak **hourly** load	0.885
Est. observed PNW **daily** load	~ 23,200 mw-days
Est. expected PNW peak **daily** load	~ 22,200 mw-days
Estimated **daily** load deviation	1,000 mw-days
Expected PNW peak **daily** load (HELM)	22,000 mw-days*

*The HELM estimates for daily average load is reasonable.

Northwest Power and Conservation Council

"Observed" PNW **Daily** Load Deviation Compared to the "Expected" Value for July 24th

Observed PNW daily load deviation	1,000 mw-days
July 24th PNW Temp deviation	4.8 degrees
PNW temp/load relationship (July)	236 mw-days/degree
Expected PNW daily load deviation	1,132 mw-days*

*The expected July 24th load deviation based on the Council staff's assessment of the relationship between temperature and load is reasonable.

Northwest Power and Conservation Council

July Planning Assumptions vs. July 24th "Observed" Values

	Planning	July 24, 2006	Diff
Hydro ('37)	18,200*	~ 17,200*	- 1,000
Hydro Flex	1,000	1,450	+ 450
Non-hydro	10,400	9,800	- 600
Net Imports	-2,500	-2,500	0
IPP	1,000	0	- 1,000
Wind	160	160	0
Spot Imports	0	0	0
Total Resource	28,260	~ 26,110	- 2,150
Exp Peak Load	~ 22,200**	~ 23,200**	+ 1,000
Balance	6,060	2,910	- 3,150
Reserve	**27%**	**13%**	

*The "planning" value includes 1998 BiOp spill, which is less than current spill operations.

**Using PNW loads based on NWPP estimates instead of the HELM estimates.

What if we were at the capacity limit on July 24th?

	@Cap Limit	July 24th
Hydro ('37)	18,200	17,200
Hydro Flex	1,000	1,450
Non-hydro	8,558	7,958
Net Imports	-2,500	-2,500
IPP	1,000	0
Wind	160	160
Spot Imports	0	0
Total Resource	26,418	24,268
Exp Peak Load	22,200	23,200
Balance	4,218	1,068
Reserve	**19%**	**5%**

The region's reserves would have fallen below the 6% operating reserve requirement but July 24th was outside of the 1-in-20 planning limit.

Computation of the Adjustment Reserve

Northwest Power and Conservation Council

Winter Capacity Target via LOLP Analysis is **25%**

Units in mw-days, unless noted	**@ Energy Limit** **Energy** LOLP = 5%	**@ Cap Limit** **Cap** LOLP = 5%
Resources	32,210	31,585*
Daily Load	25,300	25,300
Balance	6,910	6,285
RM	27%	**25%**
OR + TR		25%
Adjustment Reserve = RM - OR - TR		**0%**

*Resources must be reduced to get to a 5% capacity LOLP.

Northwest Power and Conservation Council

Summer Capacity Target via LOLP Analysis is **19%**

Units in mw-days, unless noted	**@ Energy Limit** **Energy** LOLP = 5%	**@ Cap Limit** **Cap** LOLP = 5%
Resources	25,510	26,130*
Daily Load	22,000	22,000
Balance	3,510	4,130
RM	13%	**19%**
OR + TR		12%
Adjustment Reserve = RM - OR - TR		**7%**

*Resources must be increased to get to a 5% capacity LOLP.