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Effect of Imports on PNW Power Supply Adequacy

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RETI Western Outreach Project
Portland, Oregon
August 12, 2016

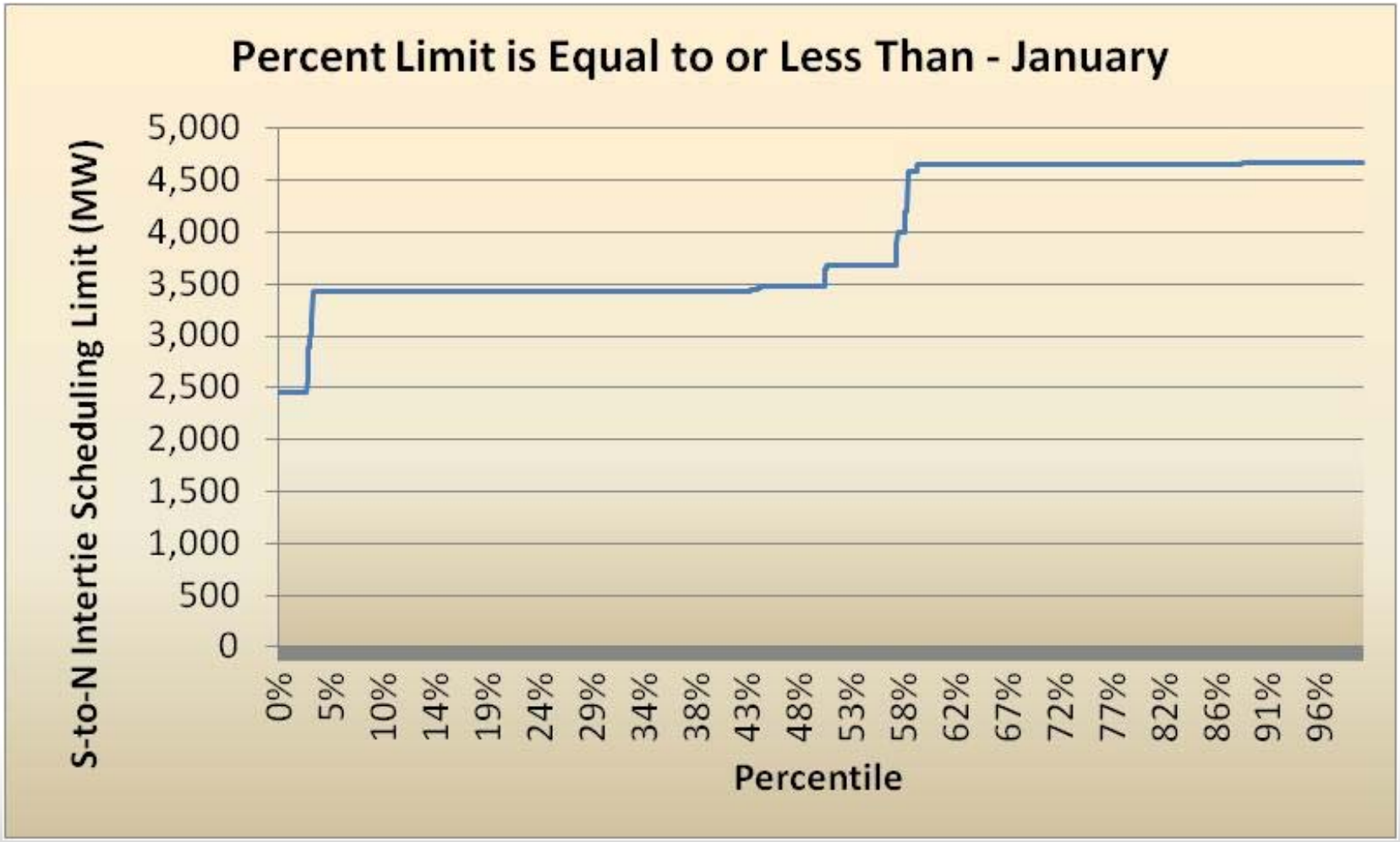
California Surplus Capacity

(Energy GPS Report)

Supply	Dec 2018	Jan 2019	Feb 2019
Demand Response	2,512	2,537	2,537
Hydro	3,244	2,483	2,431
Nuclear	2,066	2,203	1,933
Natural gas	37,229	37,098	33,425
Biomass, geo, etc	3,518	3,525	3,525
Wind	580	443	576
Solar	816	139	194
Pumped Storage	2,943	2,943	2,943
Other Storage	719	719	719
Non-PNW Imports	7,183	7,766	7,766
Total Supply	**60,809**	**59,855**	**56,049**
Demand[1]	(40,136)	(40,538)	(37,533)
Reserves - hydro	(162)	(124)	(122)
Reserves - other	(2,582)	(2,664)	(2,457)
Supply	60,809	59,855	56,049
Net Available	**17,929**	**16,529**	**15,937**

[1]CA demand during NW's peak demand hour.

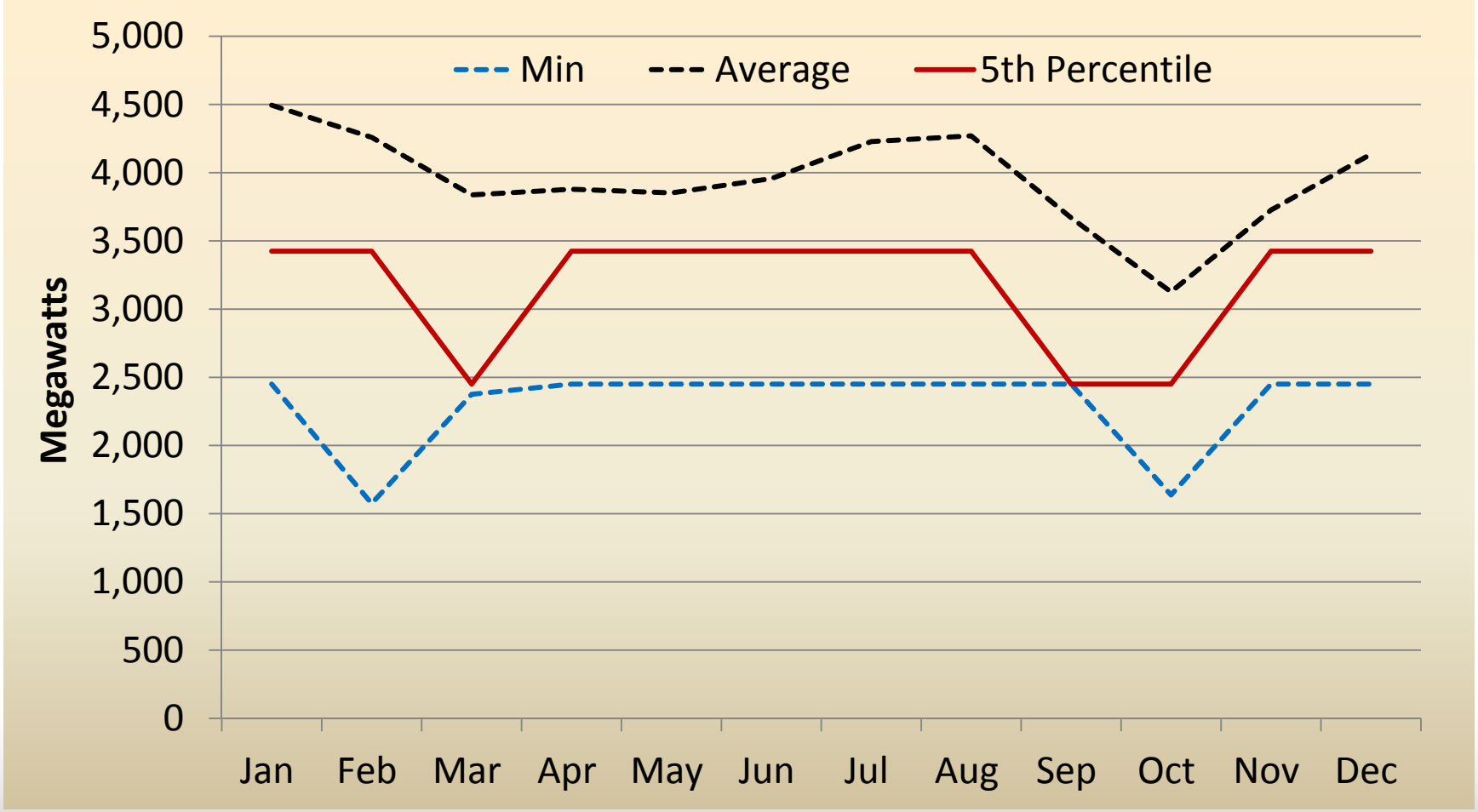
Historic S-to-N Intertie Limit
January



South-to-North Intertie Capacity

Month	Min	Average	5th Percent
Jan	2,450	4,495	3,425
Feb	1,575	4,259	3,425
Mar	2,375	3,837	2,450
Apr	2,450	3,879	3,425
May	2,450	3,852	3,425
Jun	2,450	3,957	3,425
Jul	2,450	4,228	3,425
Aug	2,450	4,270	3,425
Sep	2,450	3,669	2,450
Oct	1,637	3,126	2,450
Nov	2,450	3,726	3,425
Dec	2,450	4,135	3,425

South-to-North Intertie Capacity



Import Availability using 5th Percentile[1]

Month	Avail in SW	P5 Tie Limit	Avail to NW
Jan	16,529	3,425	**3,425**
Feb	15,937	3,425	**3,425**
Mar	17,316	2,450	**2,450**
Oct	21,923	2,450	**2,450**
Nov	20,264	3,425	**3,425**
Dec	17,929	3,425	**3,425**

[1]Celilo-Sylmar DC transmission line is scheduled to be upgraded from a maximum capacity of 3,100 MW to 3,800 MW before 2019.

Import Assumptions

Item	Spot Imports	Purchase Ahead
Available hours	All hours	Light-load Hours
Available Capacity – Winter	2,500 MW	3,000 MW
Available Capacity – Summer	0 MW	3,000 MW

PNW Adequacy Assessment for 2021

(Adequacy Standard: LOLP ≤ 5%)

		Imports		
	LOLP (%)	3400	2500	1700
Loads	High	22	24	26
	Med	8	10	12
	Low	2	4	6

Effects of DR on LOLP
(2500 MW import)

Standby ➡ / ⬇ Loads	Standby Gen. + exist DR + 121 MW DR	Standby Gen. + exist DR + 500 MW DR	Standby Gen. + exist DR + 1,257 MW DR
High Load	24	19	10
Med Load	10	8	5
Low Load	4	3	2

EUE (MW-hours)

(Lining up these results to the LOLP heat map
implies about a 1,000 MW-hour EUE threshold for a 5% LOLP)

Imports → / ↓Loads	3,400	2,500	1,700
High Load	6,400	8,700	11,800
Med Load	1,200	2,500	3,000
Low Load	200	700	1,600

LOLH (hours)

(Lining up these results to the LOLP heat map implies a 1-event-in-10-year threshold of 1.1 based on average event duration of 11 hours)

Imports ➡ / ⬇ Loads	3,400	2,500	1,700
High Load	8.2	9.4	10.7
Med Load	1.6	2.4	3.1
Low Load	0.3	0.7	1.3