

Intermittency Analysis Project

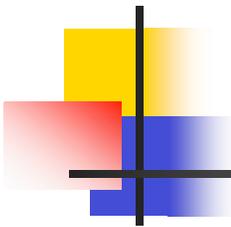
Characterizing New Wind Resources in
California

Work Performed by AWS Truewind

Dora Yen-Nakafuji,
Commission Project Manager

Energy Commission
PIER Staff Workshop
February 13th, 2007
Sacramento, CA

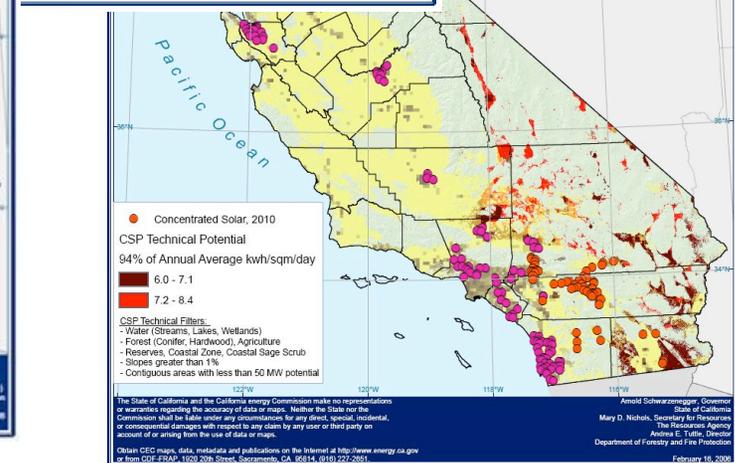
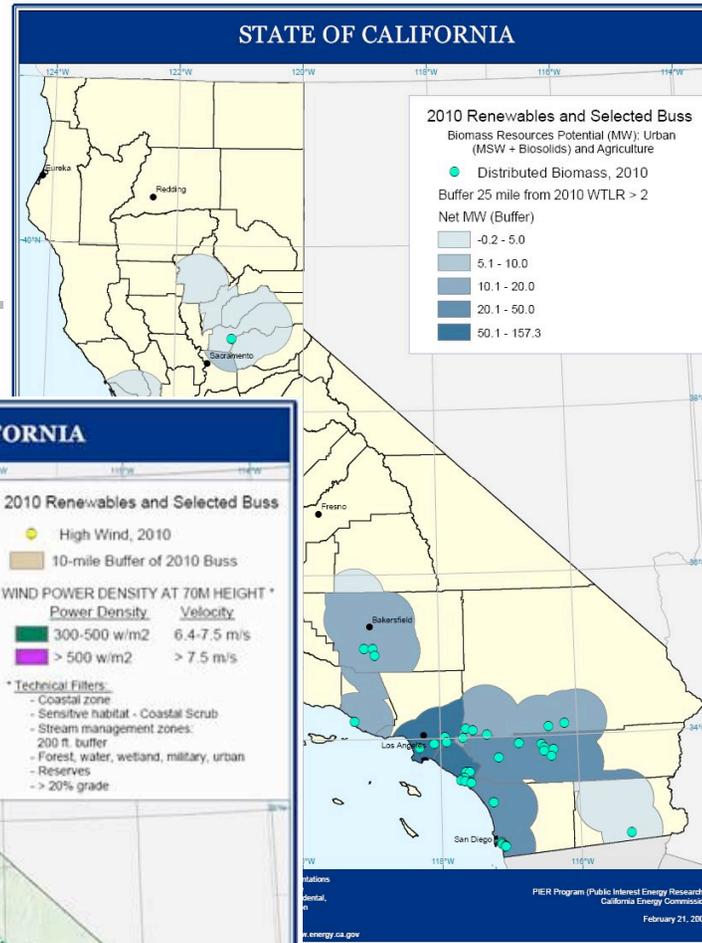




Overview

- Focus Areas
- Wind Turbine Technologies & Performance Measures
- Result Highlights
- Data & Report Pending

CA Renewable Resources

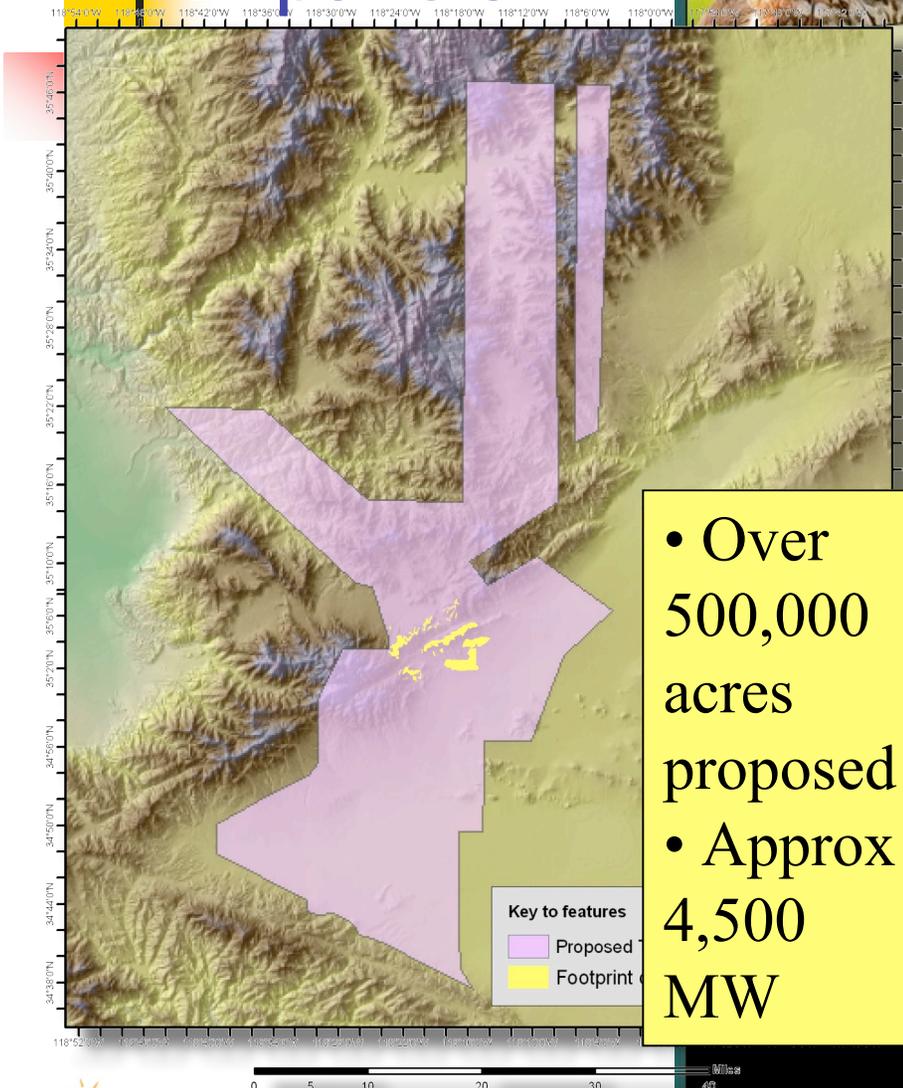


Techachapi Expansion

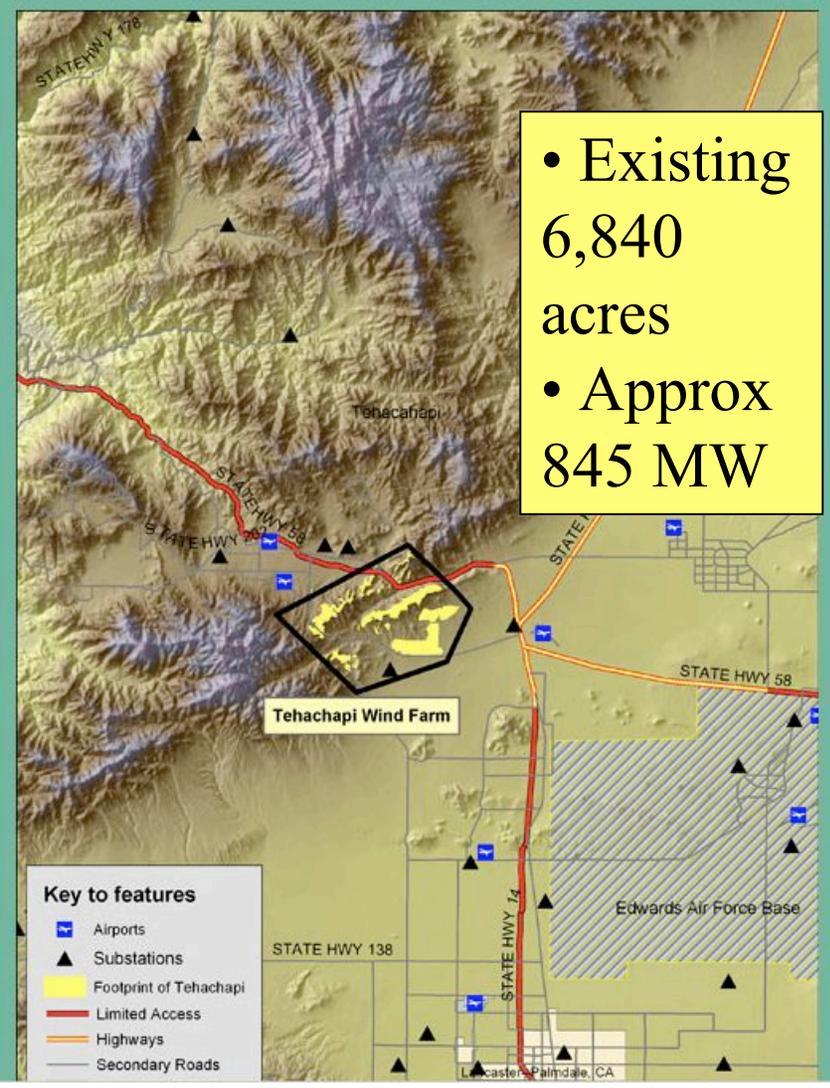


California Energy Commission
Wind Resource Analysis Site

Techachapi Wind Farm



- Over 500,000 acres proposed
- Approx 4,500 MW



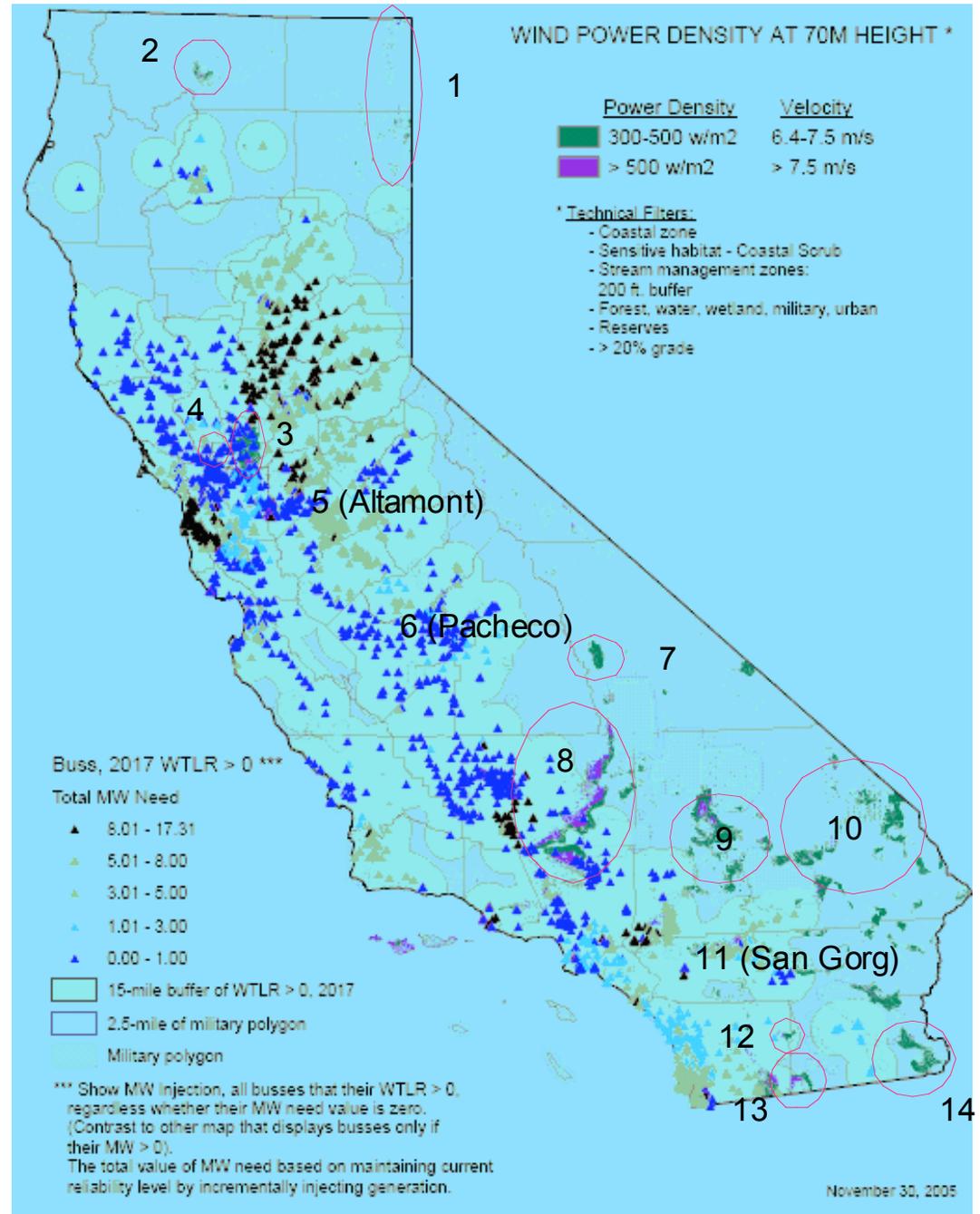
- Existing 6,840 acres
- Approx 845 MW





Exploring New Renewable Development Locations

- * forecasting
- * performance profiles
- * future turbine technologies



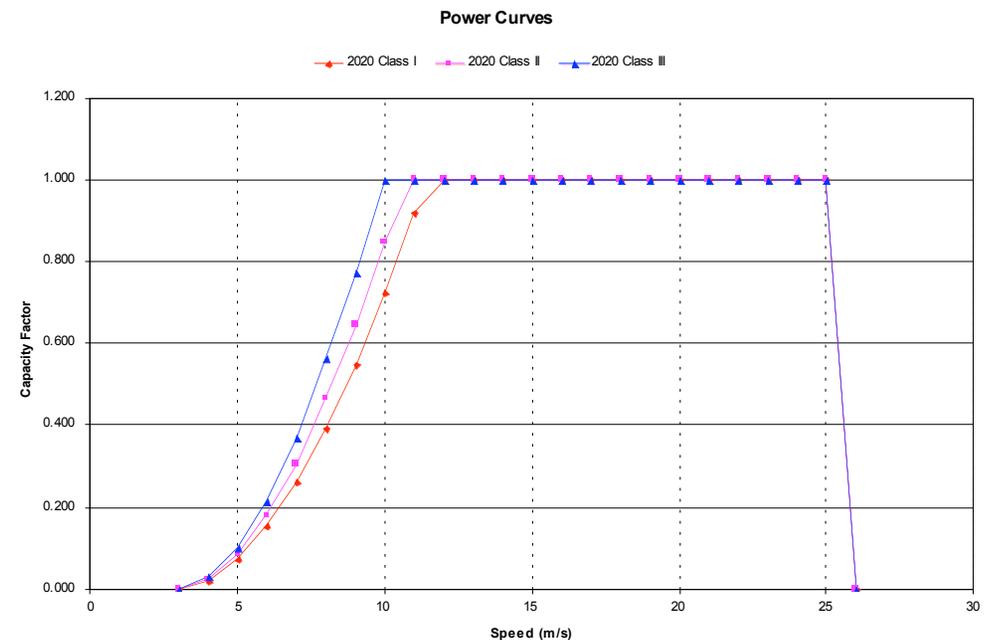
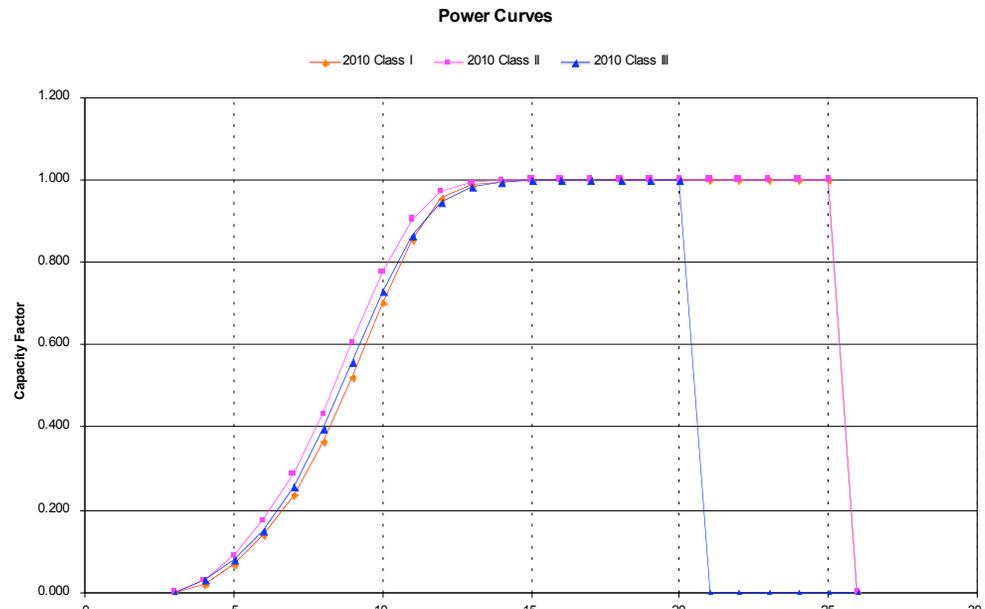
Sites & Rated Capacity:

Wind output & forecast for 3 years with over 22GW of new capacity

Region Number	Region Name	Total Number of Sites	Existing Capacity (MW)	New 2010 Scenario (MW)	New 2020 Scenario (MW)	Total Capacity (MW)
1	Warner	10	0	0	1049	1049
2	Shasta	1	0	0	0	0
3	Montezuma	23	210	165	2517	2892
4	Solano	3	0	0	305	305
5	Altamont	26	656	80	0	736
6	Pacheco	1	13	0	0	13
7	Sequoia	4	0	0	433	433
8	Tehachapi	73	760	3555	3720	8035
9	Western Mojave	34	0	0	3810	3810
10	Eastern Mojave	19	0	0	1994	1994
11	San Gorgonio	28	463	2002	0	2464
12	Vallecita	1	0	0	0	0
13	Jacumba	4	0	90	327	417
14	Yuma	6	0	0	634	634
Total		233	2102	5892	14788	22782

Projection of Wind Turbine Technologies

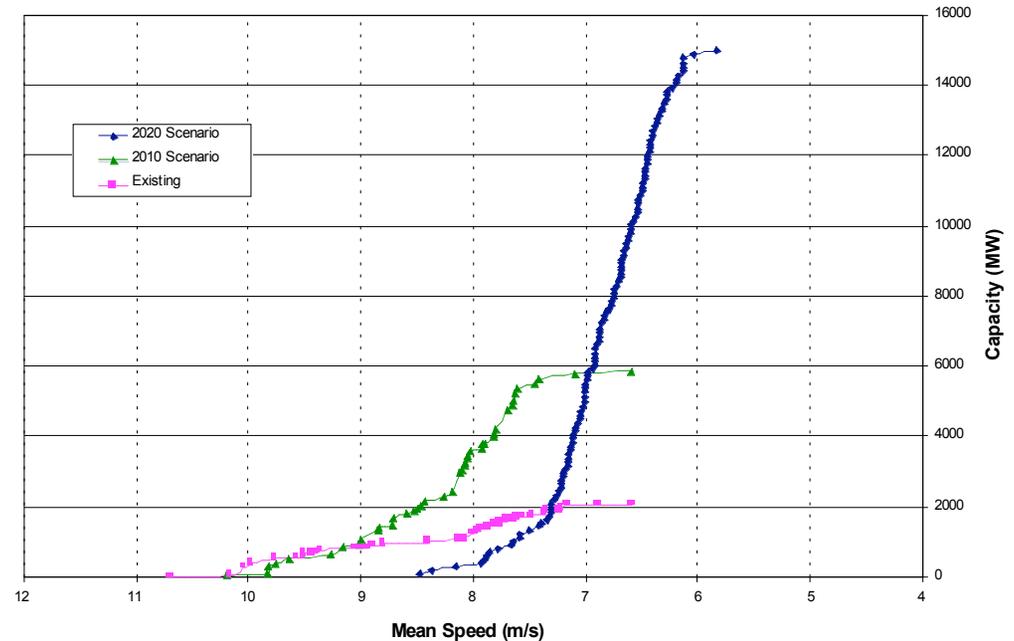
- 2010 derived composite plant power curve
 - Based on state-of-the-art technology (GE1.5, V80-100, G80-90)
- 2020 technology
 - 350 W/m² – 250 W/m² specific power
 - Captures low-speed wind



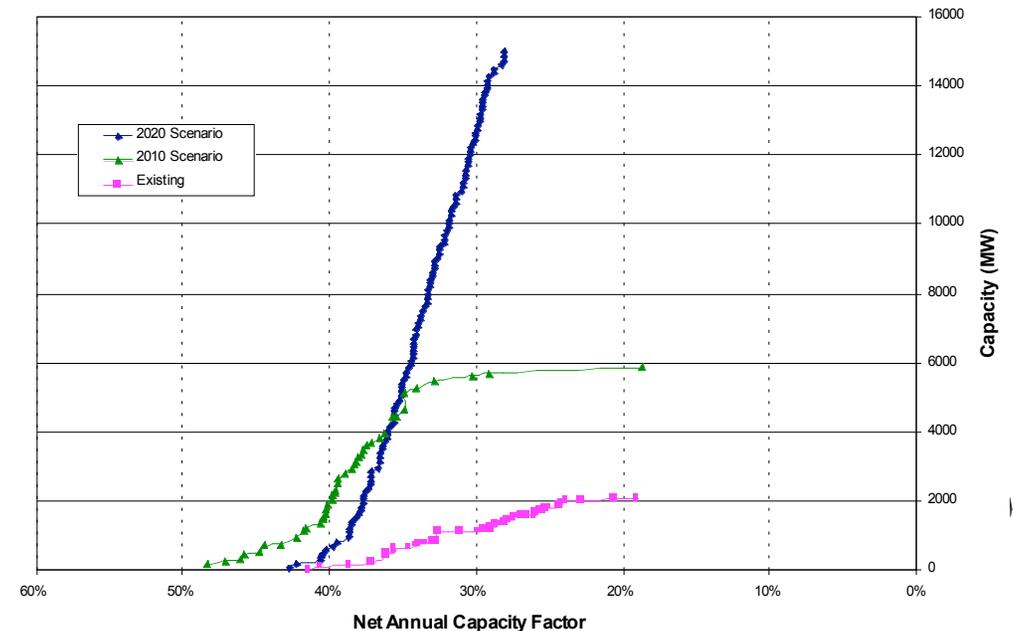
Existing & Future Turbine Technologies

- Comparison of Existing, 2010 and 2020 wind turbine technologies used in IAP analysis
 - Variation of resources among sites
 - 2020 expansion into low-wind regimes

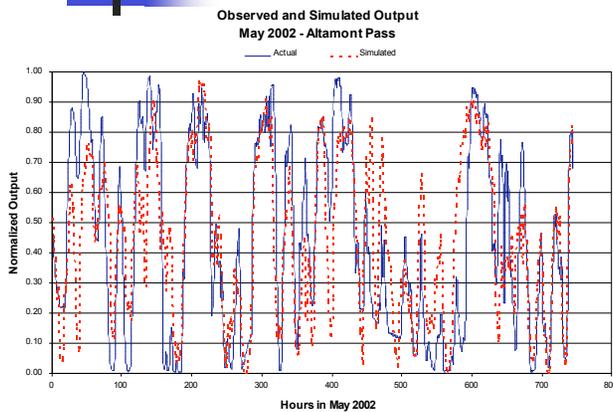
Cumulative Rated Capacity
Sites Available for Grid Impact Analysis



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Sites Available for Grid Impact Analysis

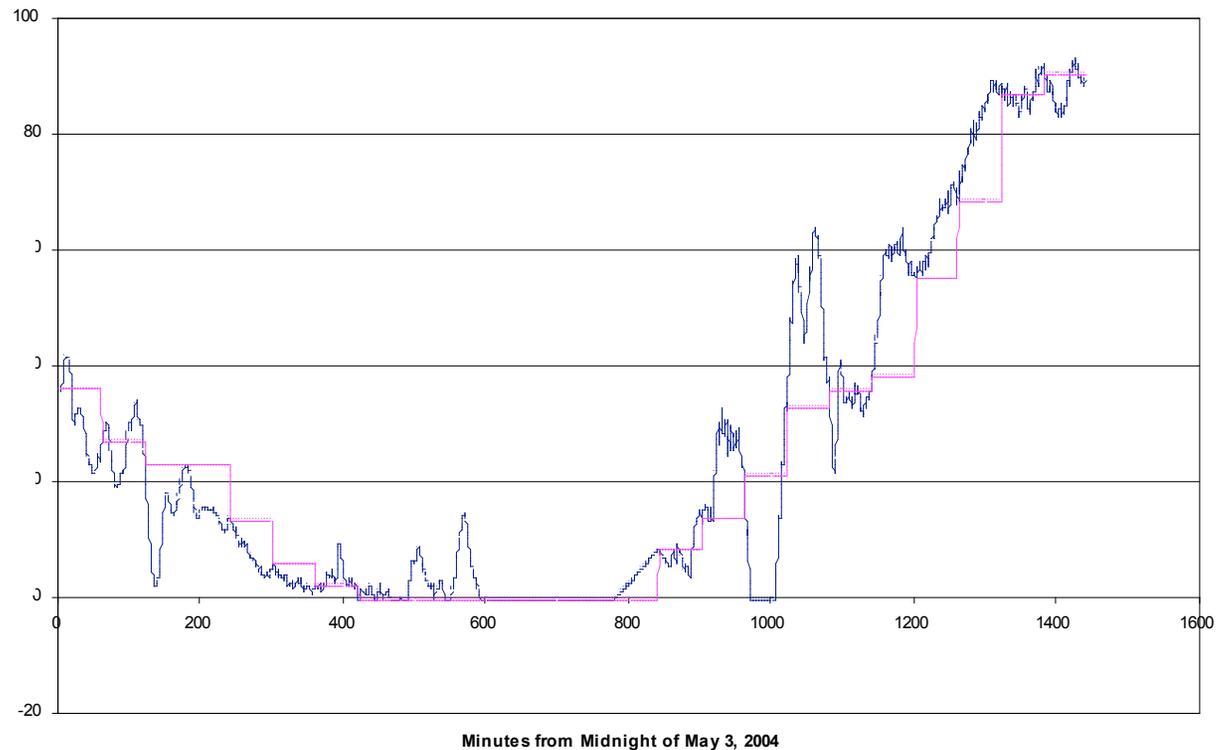


Forecasts & Validation



Region	Four-Hour Forecasts			Next-Day Forecasts		
	Existing	2010	2020	Existing	2010	2020
Tehachapi	9.4%	7.8%	7.5%	14.6%	12.2%	11.5%
San Geronio	8.9%	8.6%	NA	14.9%	14.6%	NA
Altamont	7.3%	8.1%	NA	11.3%	12.0%	NA
All	5.5%	6.3%	4.3%	8.7%	10.3%	6.5%

1-Minute Data Sample



Minutes from Midnight of May 3, 2004

- Forecasts validated using CaISO generation data from each wind region
- Addition of resources results in larger geographic diversity resulting in reductions of forecast errors