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Grid Operations Update 2005 and 2006+

FERC Conference
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Energy Infrastructure and Investment in California

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Picture for Summer 2005

- The load is continuing to grow in California at 3 to 4% per year or faster
  - New home construction is continuing with corresponding need for new electric supplies
  - Large percentage of the growth is in the valley areas that are hot in the summer and require substantial air conditioning
  - Business and the economy is continuing to grow

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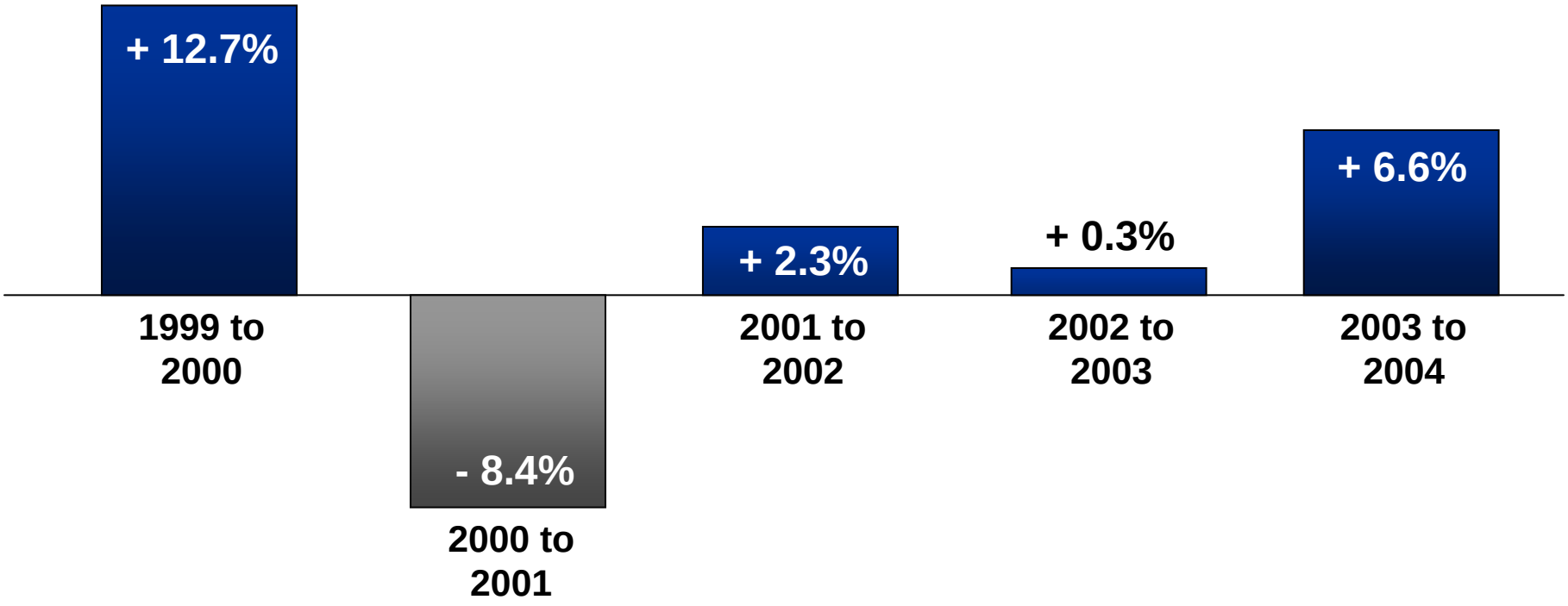
California's Electricity Growth Trend

Below are year-to-year changes in total consumption for the month of June:



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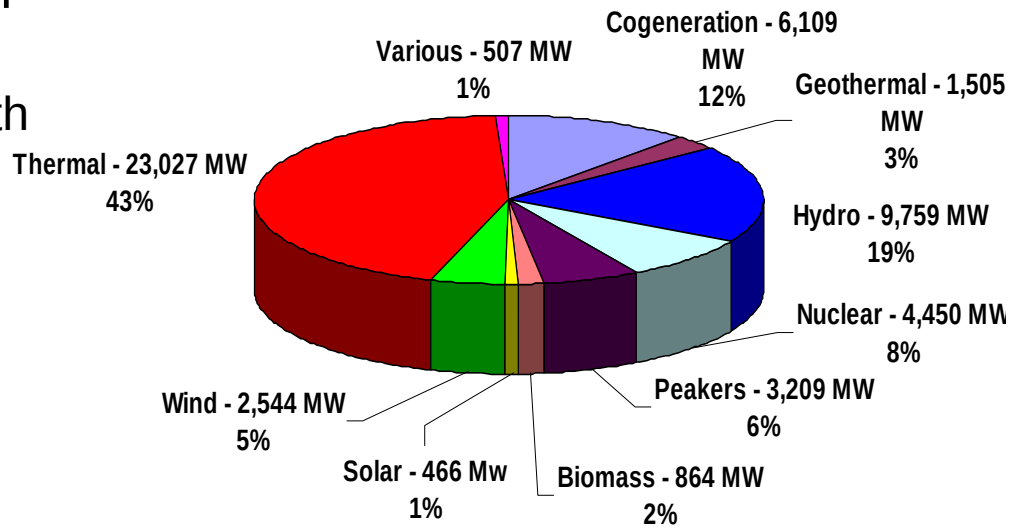
Generation Resources Picture

- Great hydro year in California
  - not as good in Pacific Northwest
- Thermal generation is predominately gas fired Combined Cycle Combustion Turbines
  - excellent base load units with low heat rates but minimum flexibility for quick start up/shut down, frequency response problems, high Pmin numbers
- Renewable resources are increasing – especially wind generation

52,440 MWs

(As of February 28, 2005 before de-rates for availability)

ISO Control Area Generation by Technology



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Changes in Generating Facilities within the ISO Control area since 2001

		2001	2002	2003	2004	2005	Total Through August 2005	Net NP26	Net SP26
New Generating Units by Sub-Regions									
	NP26	1,328	2,400	2,583	3	939	7,253	7,253	
	SP26	639	478	2,247	745	1,292	5,401		5,401
Total New Generating Units		1,967	2,878	4,830	748	2,231	12,654		
Retirements by Sub-Regions									
	NP26	-28	-8	-980	-4		-1,020	-1,020	
	SP26		-1,162	-1,172	-176	-450	-2,960		-2,960
Total Retirements		-28	-1,170	-2,152	-180	-450	-3,980		
Net Change in Capacity		1,939	1,708	2,678	568	1,781	8,674	6,233	2,441

Import/Export Picture for Summer 2005

- Expect lower *energy* imports (MWhrs) from neighboring areas over the summer; however, expect available import *capacity* (MWs) during ISO peak to be similar to 2004 levels.
- Several 2005 transmission projects will help increase ISO's simultaneous import capacity (Miguel, South of Lugo, etc.)
- Adverse conditions, such as a west wide heat wave (increasing neighboring areas' need to retain their own supplies) or repeated/sustained California peaks could strain availability of external supplies.

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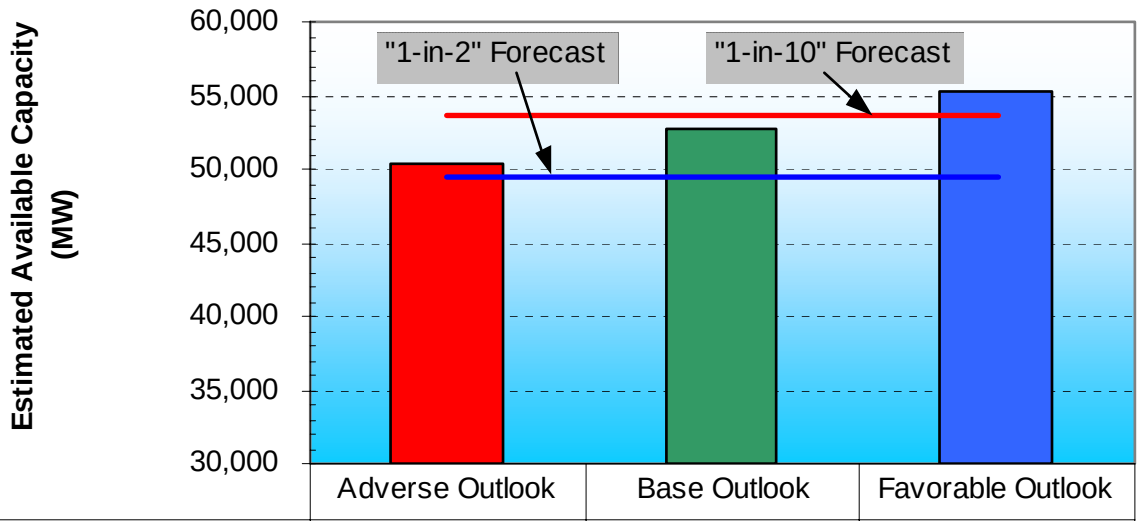
ISO Control Area 2005 Summer Peak Capacity Outlook



	Adverse Outlook	Base Outlook	Favorable Outlook
Estimated Available Capacity	50,309	52,809	55,309
Capacity Requirement including Reserves ("1-in-2" Forecast)	49,426	49,426	49,426
"1-in-2" - Surplus/(Deficiency)	882	3,382	5,882
Capacity Requirement including Reserves ("1-in-10" Forecast)	53,613	53,613	53,613
"1-in-10" - Surplus/(Deficiency)	(3,304)	(804)	1,696

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ISO 2005 Summer Assessment

- Adequate Resources to meet demand for expected "1-in-2" conditions; however, Southern California margins are *thin*.
- Deficiency challenges for Southern California and/or System, for "1-in-10" load condition.

	ISO Control Area	Northern CA (NP26)	Southern CA (SP26)
1-in-2 Load:	46,668	21,497	27,080
Surplus/(Deficiency)	**+ 3,383**	**+ 3,643**	**+ 409**
1-in-10 Load:	50,592	23,091	29,080
Surplus/(Deficiency)	**(- 804)**	**+ 1,943**	**(- 1,725)**

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Picture for Summer 2006

- Expect continuation of load growth
- Forecasted new generation and retired generation
  - By summer 2006, potentially as much as 1,700MW of new generation could be added; however, a nearly equal amount of generation is also slated for retirement! (Net gain of zero.)
  - 2006 is first year of CPUC Resource Adequacy; process for advanced, long-term procurement of resources may stabilize fate of other "at risk" generating units, and/or possibly encourage new investment.
- Forecasted Import/export picture for 2006
  - Few significant upgrades currently expected for transmission imports in 2006; most relief will not arrive until 2007-2008 timeframe.
  - Availability of external supply dependent upon neighboring regions' load growth, generation additions, and even rainfall.

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Long-Term Assessment: So. Calif.

2005 - 2008 Peak Summer Supply/Demand Scenario (SCE and SDG&E)

Line		Peak 2005	Peak 2006	Peak 2007	Peak 2008
1	Existing Generation[1]	20,154	20,249	19,238	17,928
2	Retirements (Known)		-916	0	0
3	Retirements (High Risk)	-676	-2,152	-1,310	-1,879
4	High Probability CA Additions	771	2,057	0	550
5	Forced Outages [2]	-1,200	-1,200	-1,200	-1,200
6	Zonal Transmission Limitation[2]	-800	-800	-800	-800
7	Net Interchange [3]	9,903	10,300	10,300	10,300
8	Total Supply (MW)	28,152	27,538	26,228	24,899
9	1-in-2 Summer Temperature Demand (Normal)	27,001	27,645	28,096	28,617
10	Projected Operating Reserve (1-in-2)**	6.7%	-0.6%	-10.5%	-20.3%
11	1-in-10 Summer Temperature Demand (Hot)	28,561	29,243	29,719	30,271
12	Projected Operating Reserve (1-in-10)**	-2.2%	-9.0%	-18.0%	-26.9%
13	MW need to meet 7.0% Reserves in SP26	1,715	2,955	4,772	6,690

14 Notes:

These numbers are suitable for projection/planning purposes and are best estimates as of Dec. 7, 2004.

"So. Calif." represents SCE and SDG&E service territories only. The peak summer month in So. Cal. typically occurs in September.

** Does not reflect uncertainty for "Net Interchange" or "Forced Outages" which can result in significant variationcin Operating Reserve.

[1] Dependable capacity includes 1,080 MW of generation located South of Miguel

[2] CAISO provided estimate.

[3] 2004 CAISO estimate for DC imports of 1,500 MW; Path 26 2,700 MW; SW imports 2,500 MW; Dynamics 1,003 MW, plus CEC estimate of LADWP imports of 1,000 MW. 2005 estimate increases DC imports by 500 MW, Path 26 by 300 MW and South of Miguel by 400 MW. Estimated 2006 increase of 400-500MW, due to PV-Devers/Hass.-N.Gila 500kV upgrades.

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Long Term Assessment: No. Calif.

2005 - 2008 Supply/Demand Scenario (PG&E Service Territory)

Line		Peak 2005	Peak 2006	Peak 2007	Peak 2008
1	Existing Generation	25,858	25,039	24,873	25,026
2	Retirements (Known)		-219	0	0
3	Retirements (High Risk)	-1,046	-1,016	0	-990
4	High Probability CA Additions	227	1,069	153	0
5	Forced Outages [1]	-1,600	-1,600	-1,600	-1,600
6	Zonal Transmission Limitation[1]	0	0	0	0
7	Net Interchange [2]	2,500	2,750	2,750	2,750
8	Total Supply (MW)	25,939	26,023	26,176	25,186
9	1-in-2 Summer Temperature Demand (Normal)	22,017	22,410	22,748	23,180
10	Projected Operating Reserve (1-in-2)**	20.1%	18.4%	17.1%	9.8%
11	1-in-10 Summer Temperature Demand (Hot)	23,469	23,888	24,249	24,709
12	Projected Operating Reserve (1-in-10)**	11.8%	10.1%	9.0%	2.2%
13	MW need to meet 7.0% Reserves in NP26	-1,002	-655	-422	1,060

14 Notes:

These numbers are suitable for projection/planning purposes and are best estimates as of Dec. 7, 2004.

The peak summer month in No. Cal. typically occurs in July.

** Does not reflect uncertainty for "Net Interchange" or "Forced Outages" which can result in significant variation

[1] CAISO-provided estimate.

[2] 2005 estimates based on CAISO-provided levels of NW and SMUD interchange values during June-July 2004. Path 26 flows assumed to be South-to-North for Northern California peak. 2006 estimate assumes exports to SMUD decrease by 250MW.

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Transmission Outlook

- Cost of Transmission Congestion
  - RMR = $552 Million
  - Congestion = $426 Million
  - Total cost is approximately $1 Billion
- Impact of mitigating congestion in real-time operations continues to be a concern.
  - There are 51 potential congestion locations on 2005 summer peak load days
- Need to build sufficient infrastructure to improve deliverability of energy to customer load centers.

Demand Response Programs

- Need two different types of programs
  1. Demand response – load reduction in forward markets to shave loads and prices on peak days
  2. Real time response of loads to dispatch notices for emergency load relief and participation in operating reserves. (i.e. interruptible pumping loads

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Conclusion

- Adequate resources for normal ("1-in-2") Summer 2005 demand conditions; possible challenges for Southern California and/or System, for more adverse load or resource conditions.
- Assessment's representation based upon physically installed capacity; does not reflect in-state/out-of-state contractual arrangements.
- Industry activity is required on all three investment fronts of the supply chain:

  Transmission; Generation; Demand Response
- Now is the time to shift focus to 2006 and beyond.

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Actions FERC Needs To Do

- **A Climate of Regulatory Certainty**, which includes clear statements of the long-term vision and principles that should guide this industry
- **A Vision for the Future**, which includes the recognition of limits.