California's Electricity System Supply & Demand Overview

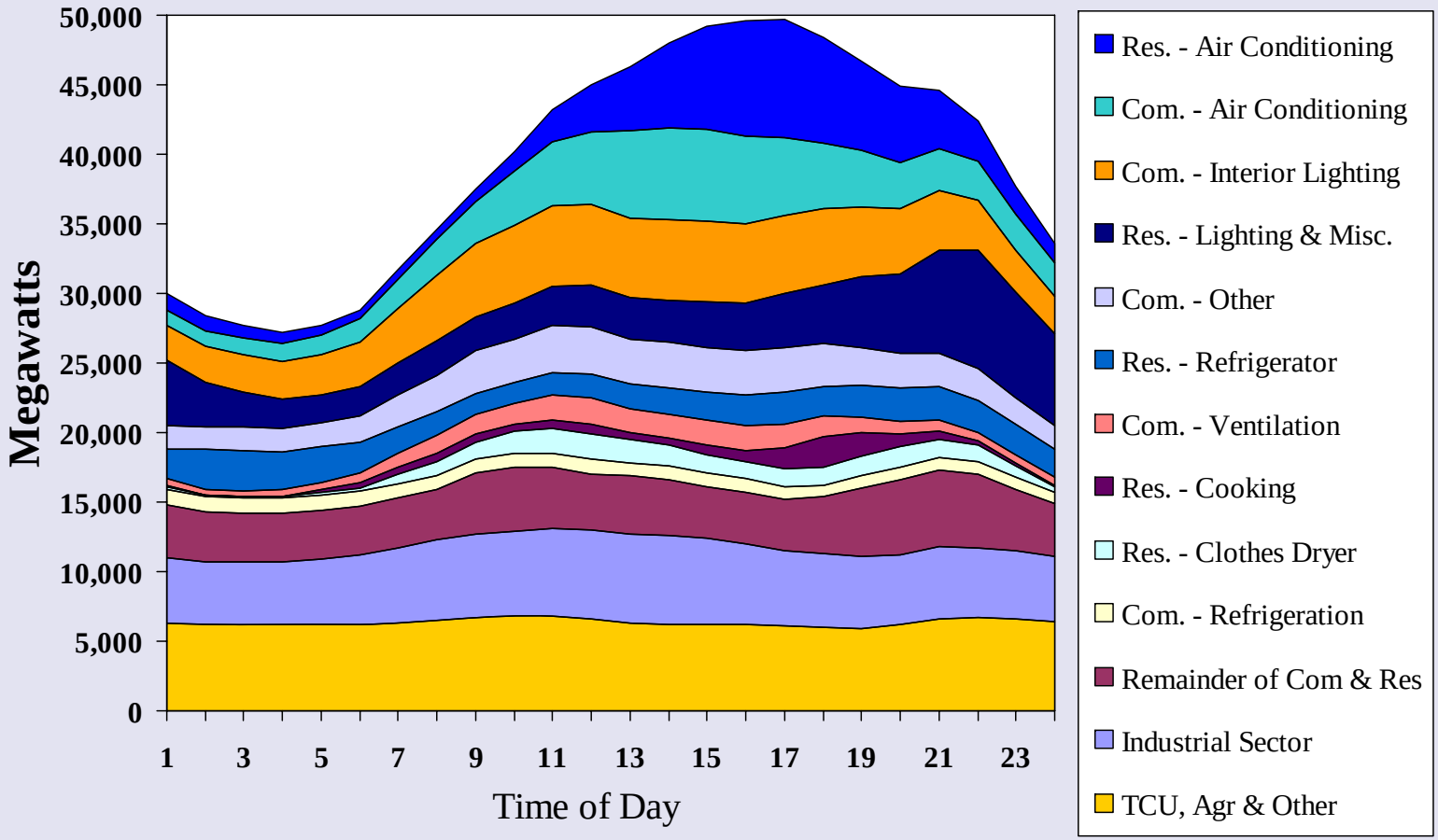
Jeffrey Byron, Commissioner
California Energy Commission

California State Assembly Utilities & Commerce Committee Informational Hearing
March 29, 2007

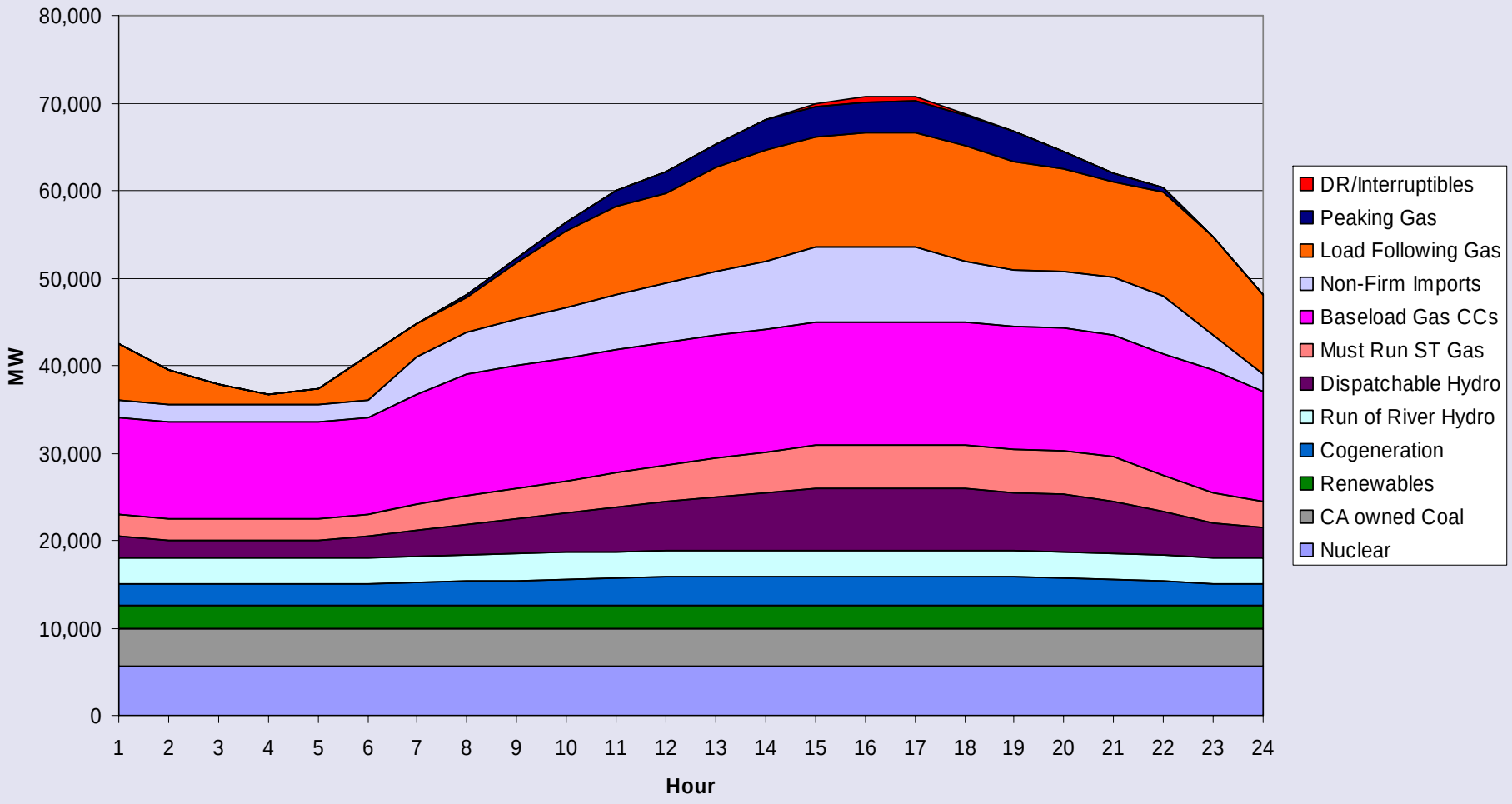
Presentation Topics

- Typical load profiles
- Summary of 2006 Heat Storm
- Review of CA ISO events previous 5 years
- Summer 2007 Outlook

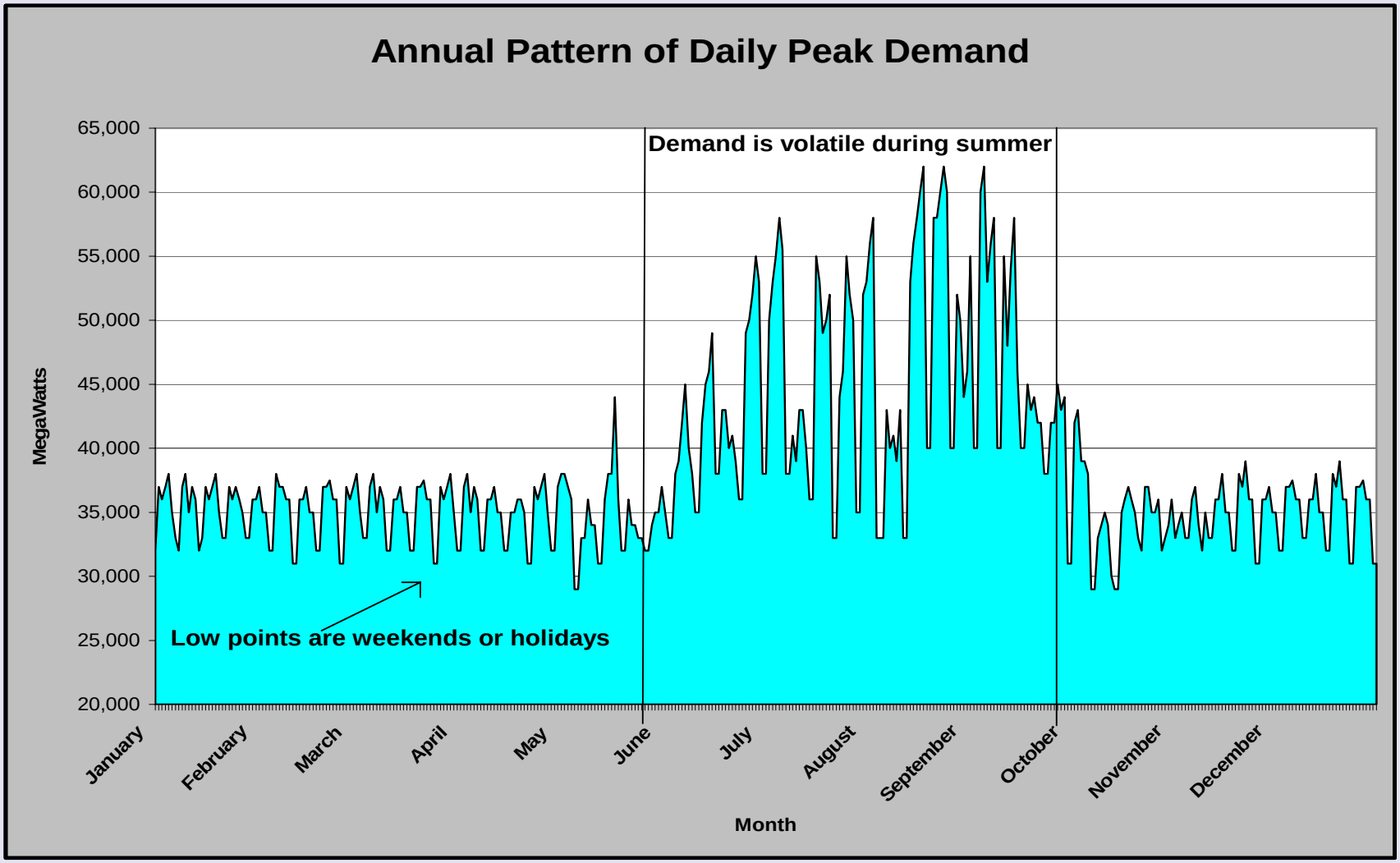
Typical Peak Day Demand Curve



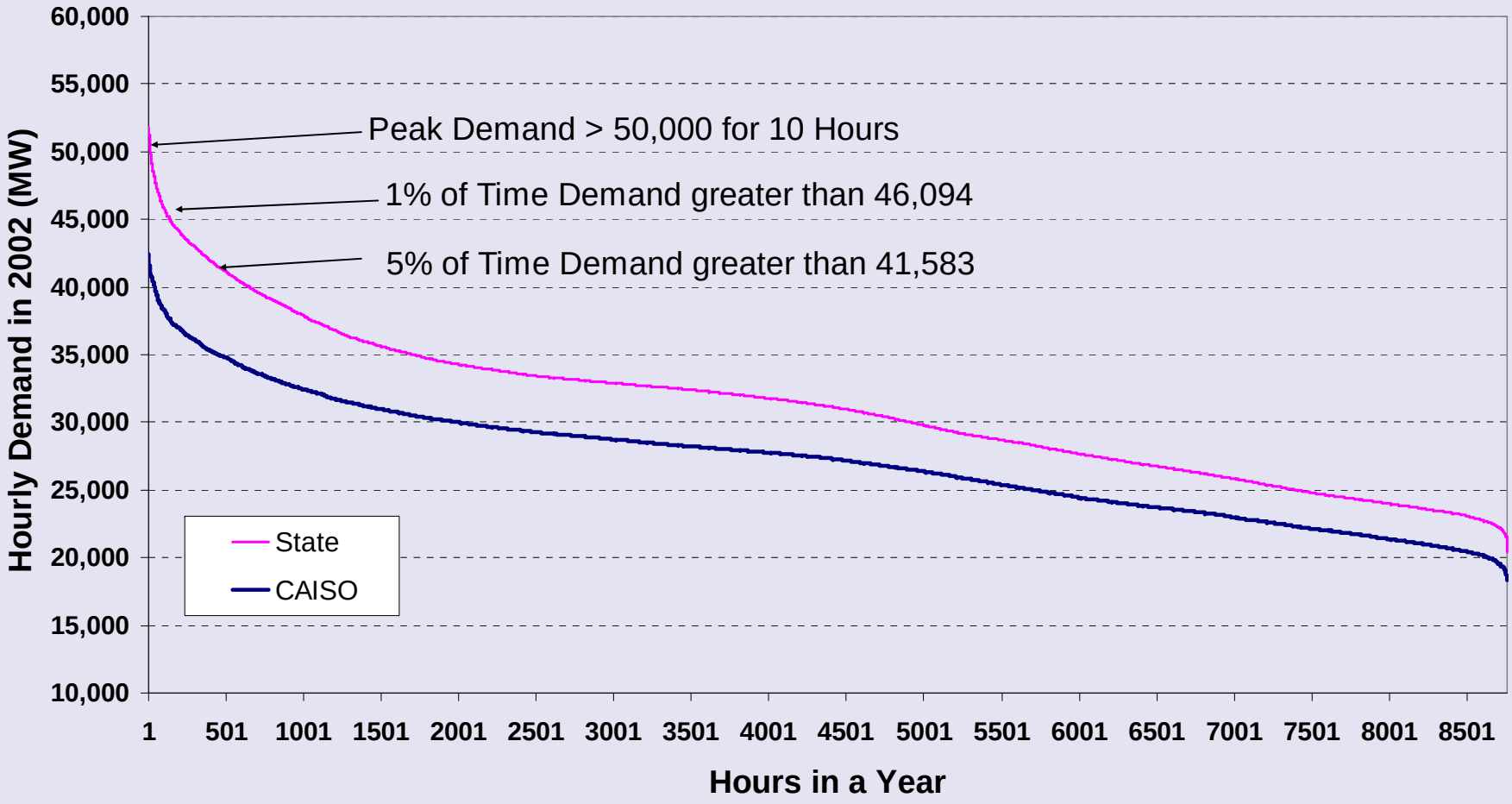
Typical Peak Day Resources



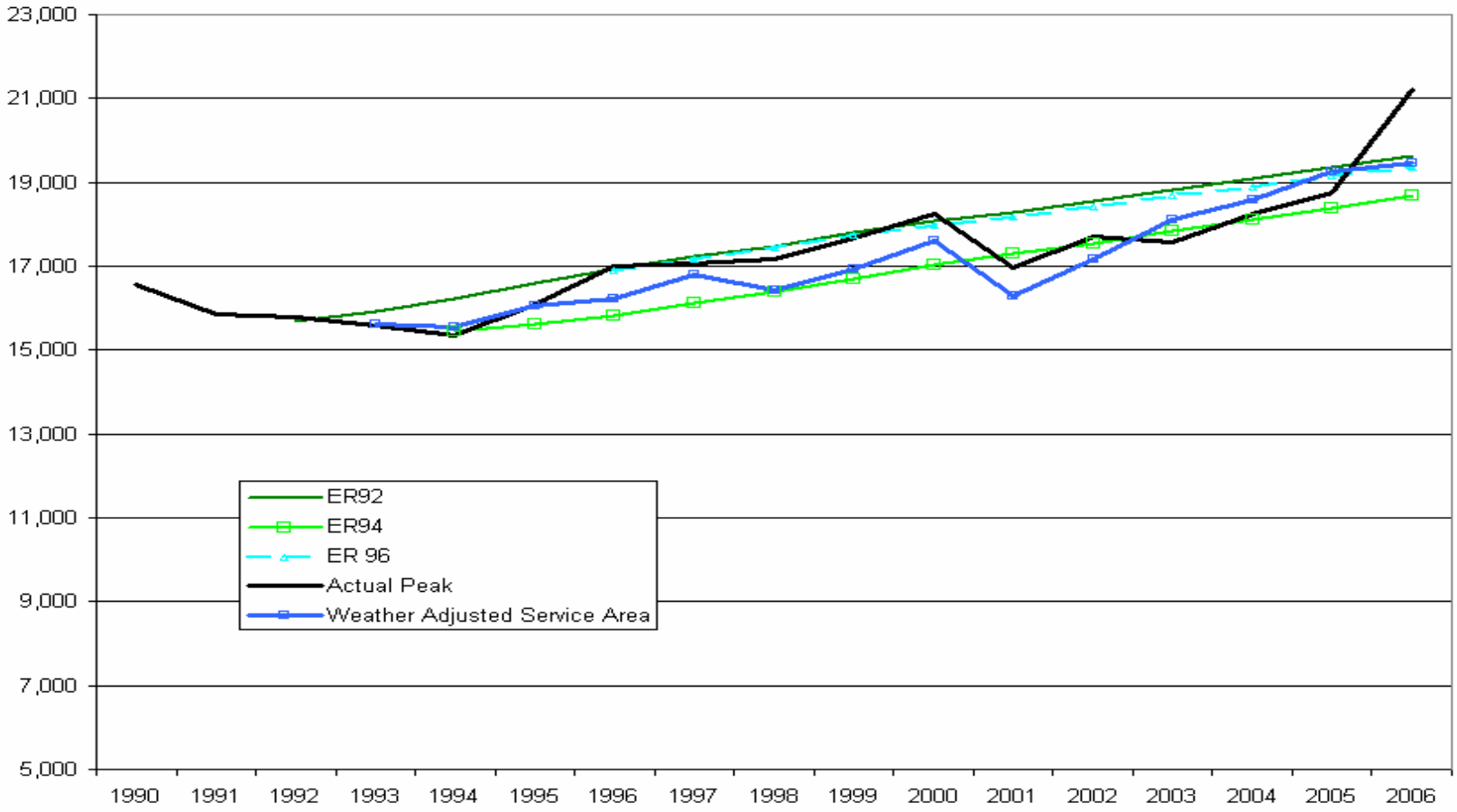
Demand is Volatile During Summer



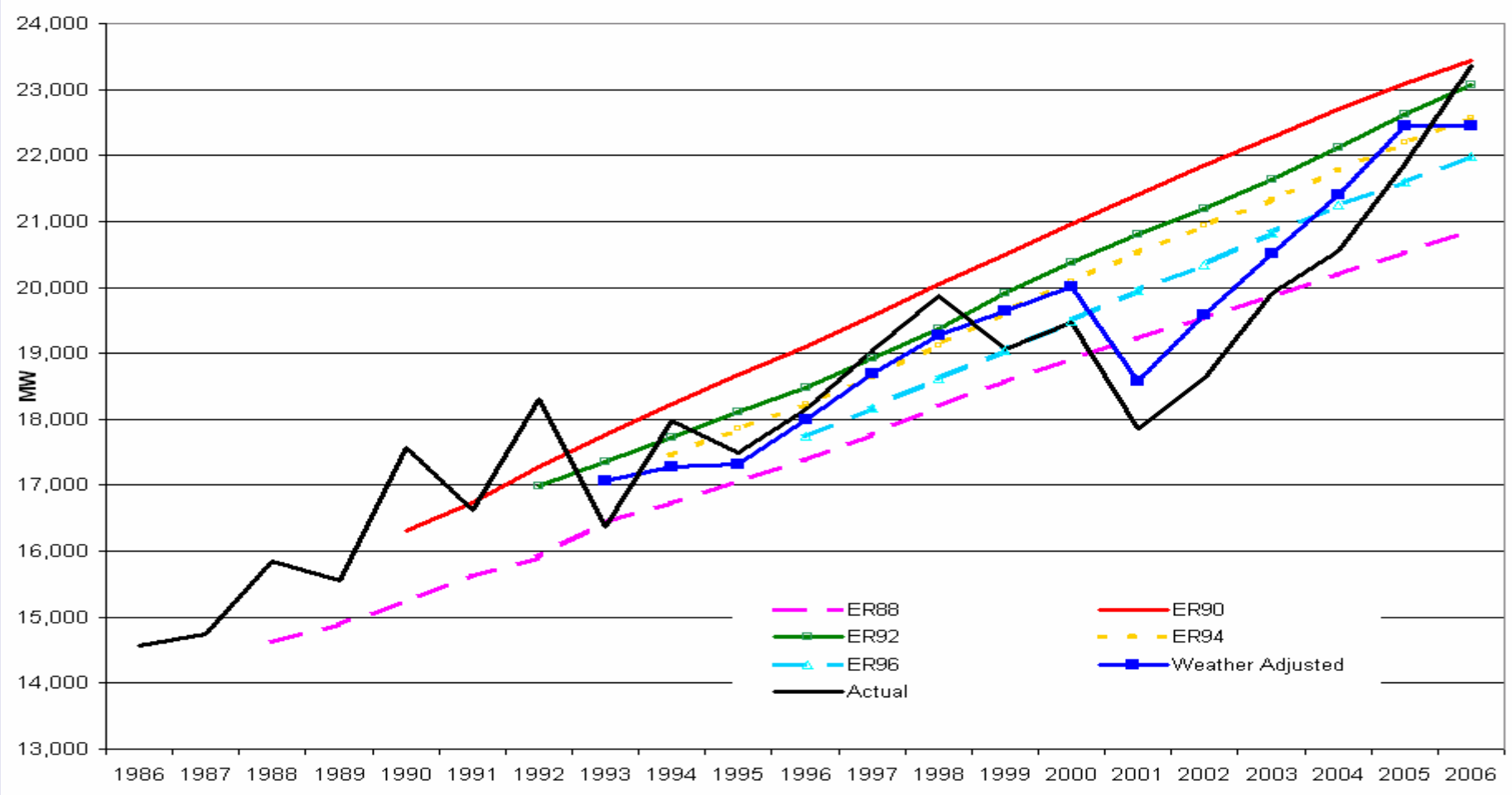
Statewide Load Duration Curve



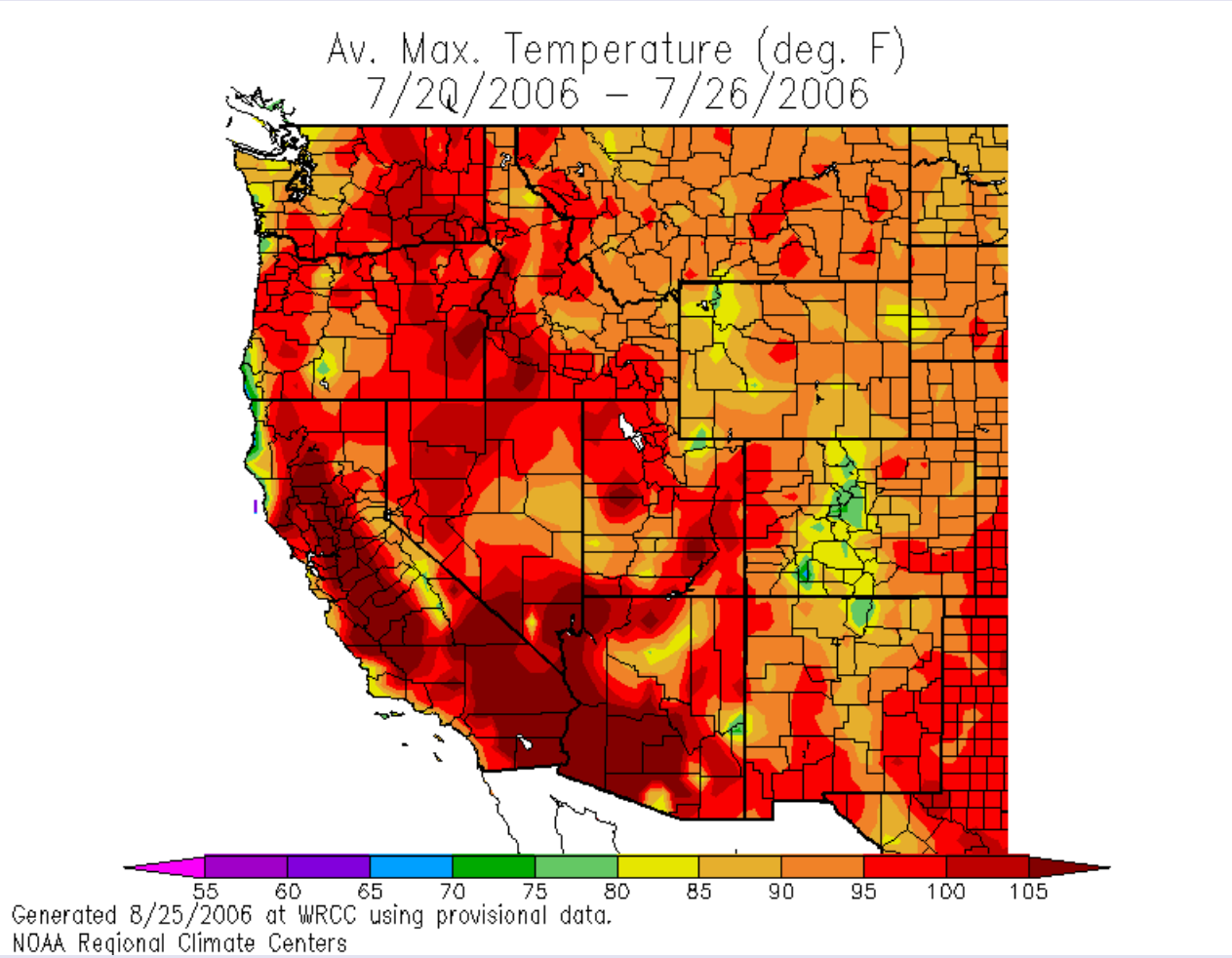
Forecast Versus Actual Peak Demand PG&E Planning Area



Forecast Versus Actual Peak Demand
SCE Planning Area

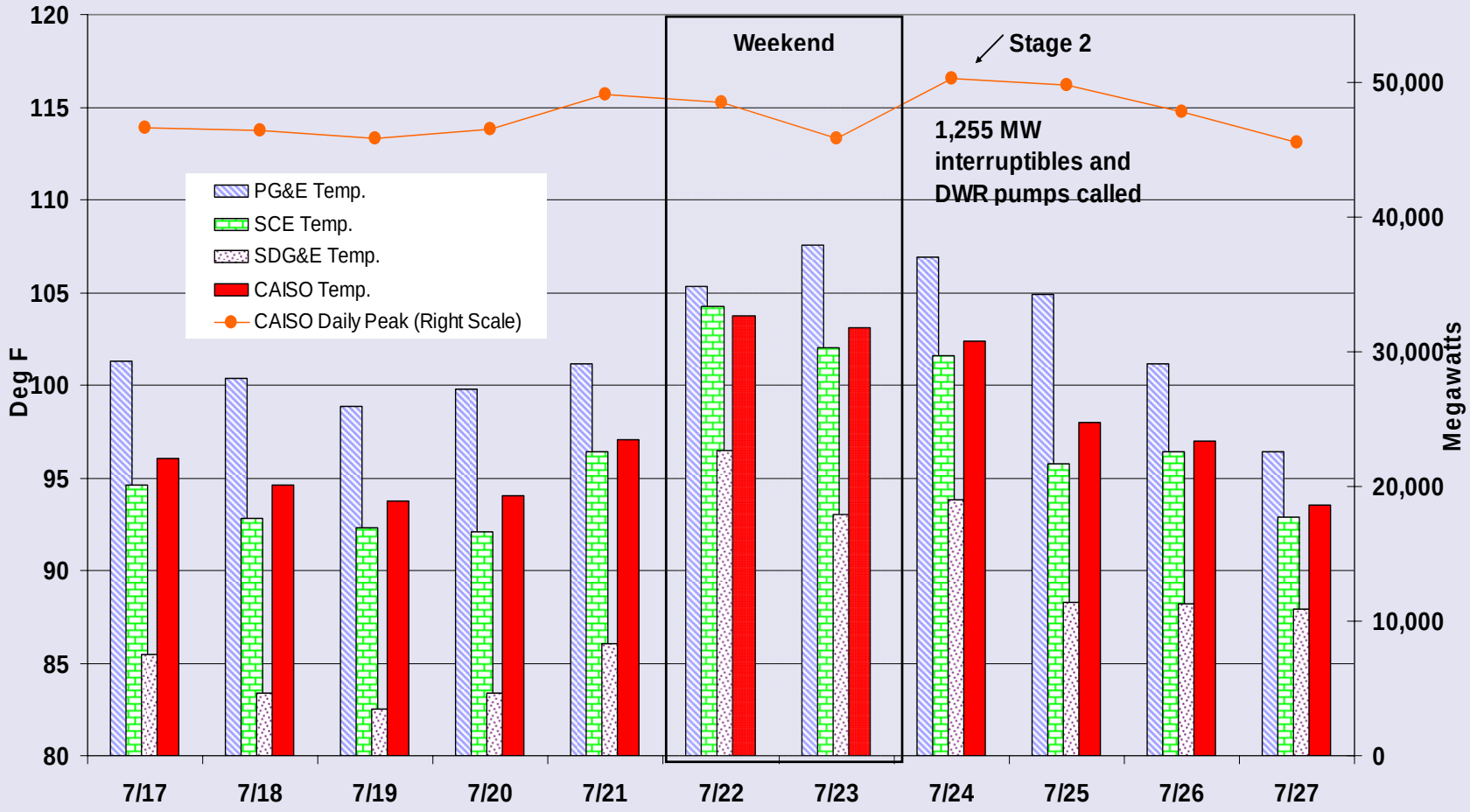


Summer 2006 Heat Storm Temperatures



Summer 2006 Heat Storm

July 17 to 27



Lessons From Heat Storm

<u>What Worked</u>:

- Planning, Coordination, and Communication between System Operators and Resource Providers
  - CA ISO planning efforts
  - Maximized generation and imports
- Demand Response and Interruptible Programs
- Voluntary Conservation
- Resource Adequacy Requirements

<u>What Caused Concerns</u>:

- Distribution System Outages

Looking Ahead To Summer 2007

Do we have enough resources?

The answer to this depends on the time scale:

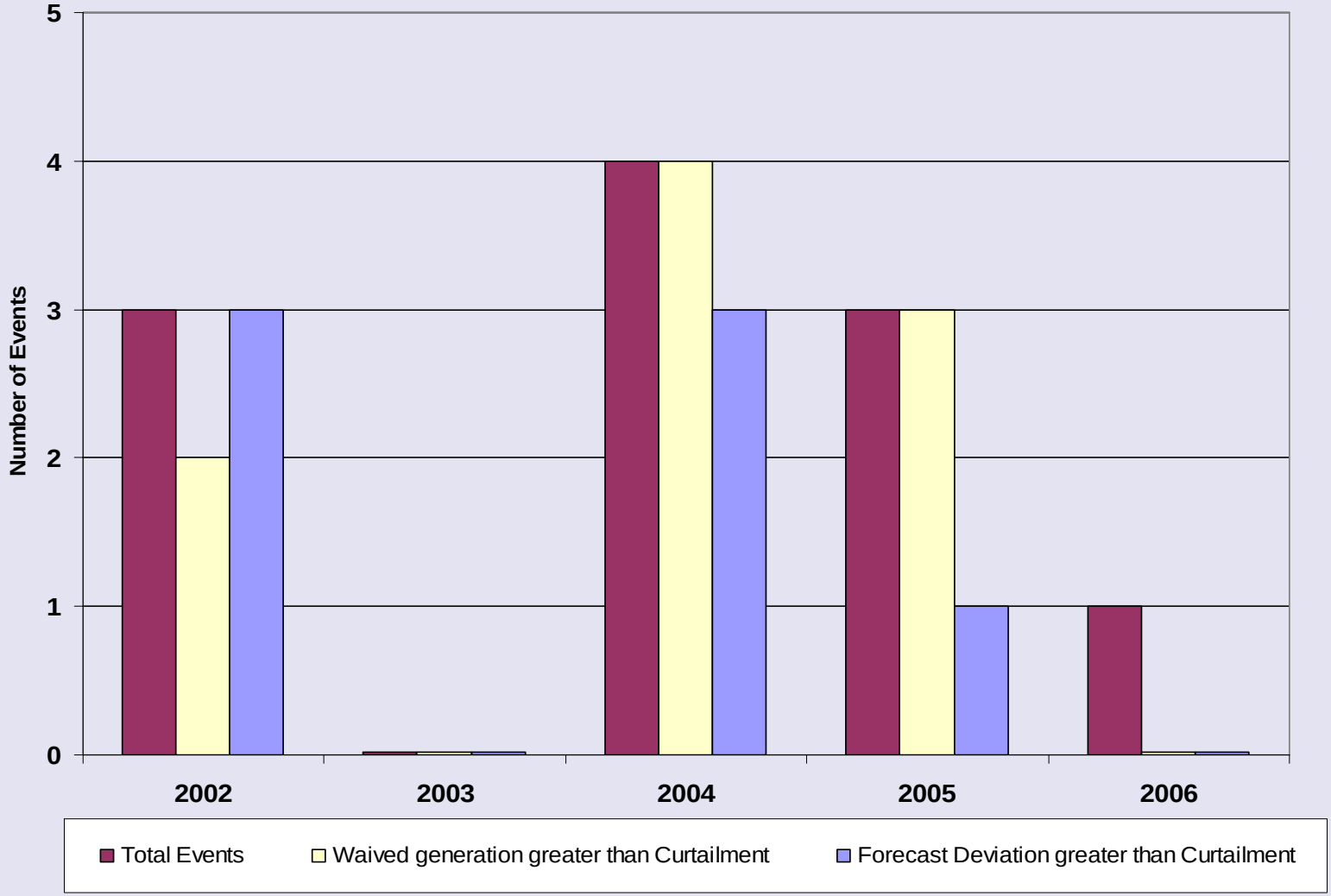
- Do we have enough for this summer?
- Do we have enough for tomorrow or the next hour?

Understanding how the system is operated will help understand how we'll do this summer.

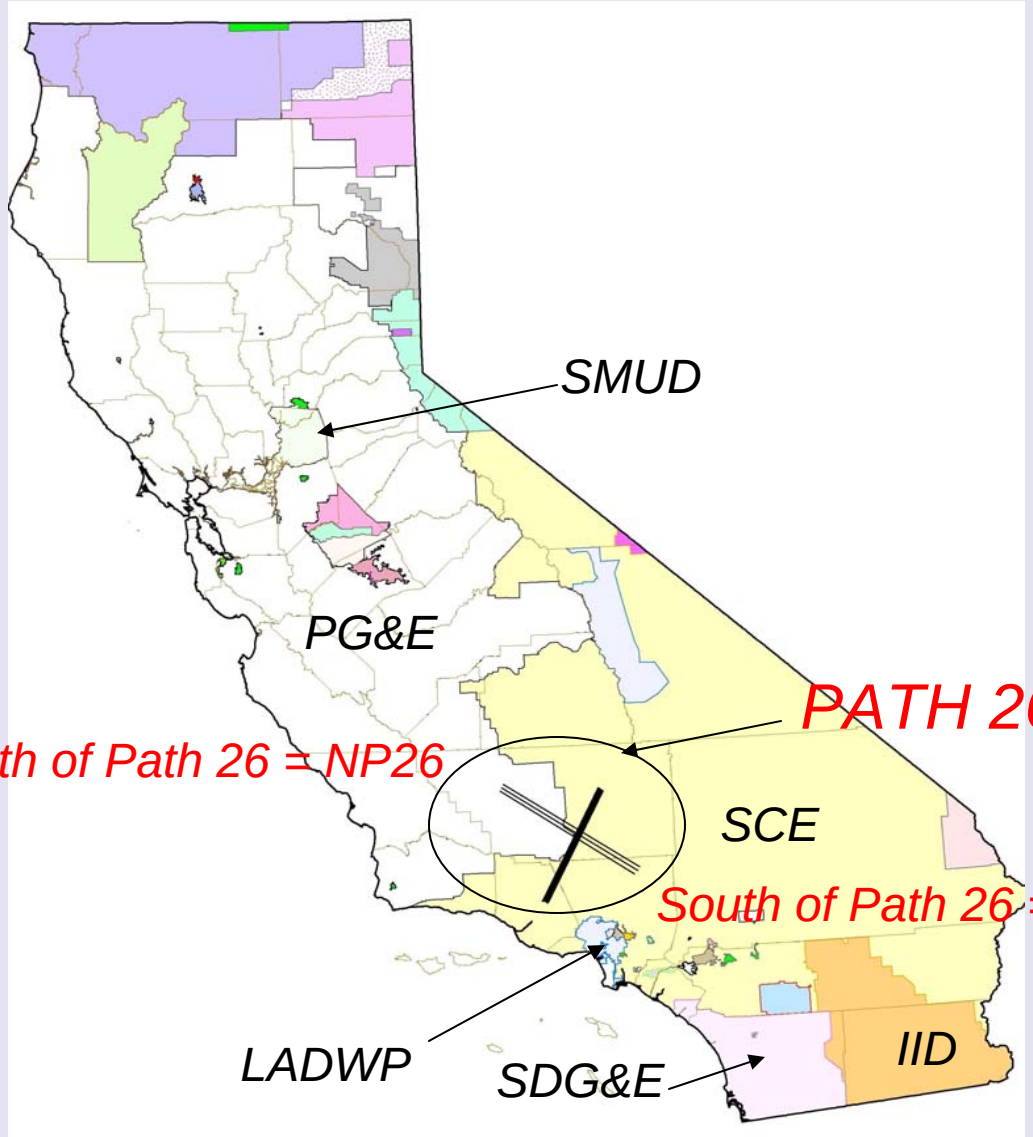
Operating The System

- ISO needs to predict the next day's weather and what transmission and generation will be available
- ISO can obligate some generators to be on-line the next day, but allows those not needed to be off-line to reduce costs
- Weather hotter than predicted the day before or unexpected outages can lead to insufficient resources on-line, even if the resources exist
- The ISO does this very well, and continues to improve
- The ISO's performance in 2006 helped avoid major problems in the system during the July heat storm

Summary Of CA ISO Load Curtailments



Transmission Nomenclature



Summary Of CA ISO Load Curtailments Previous 5 Years

- Two ***Involuntary*** curtailments previous 5 years:
  - 2004 (1) - March 8 (SP26)
  - 2005 (1) - August 25 (SP26)

- Eleven ***Voluntary*** (interruptible) load curtailments previous 5 years:
  - 2002 (3) - June 18 (SP 26), July 10, September 3
  - 2004 (4) - March 8 (SP26), May 3 (SP26), July 20 (SP26), September 14 (Humboldt)
  - 2005 (3) - July 21 (SP26), July 22 (SP26), August 25 (SP26)
  - 2006 (1) - July 24

Options To Reduce Frequency Of Staged Events

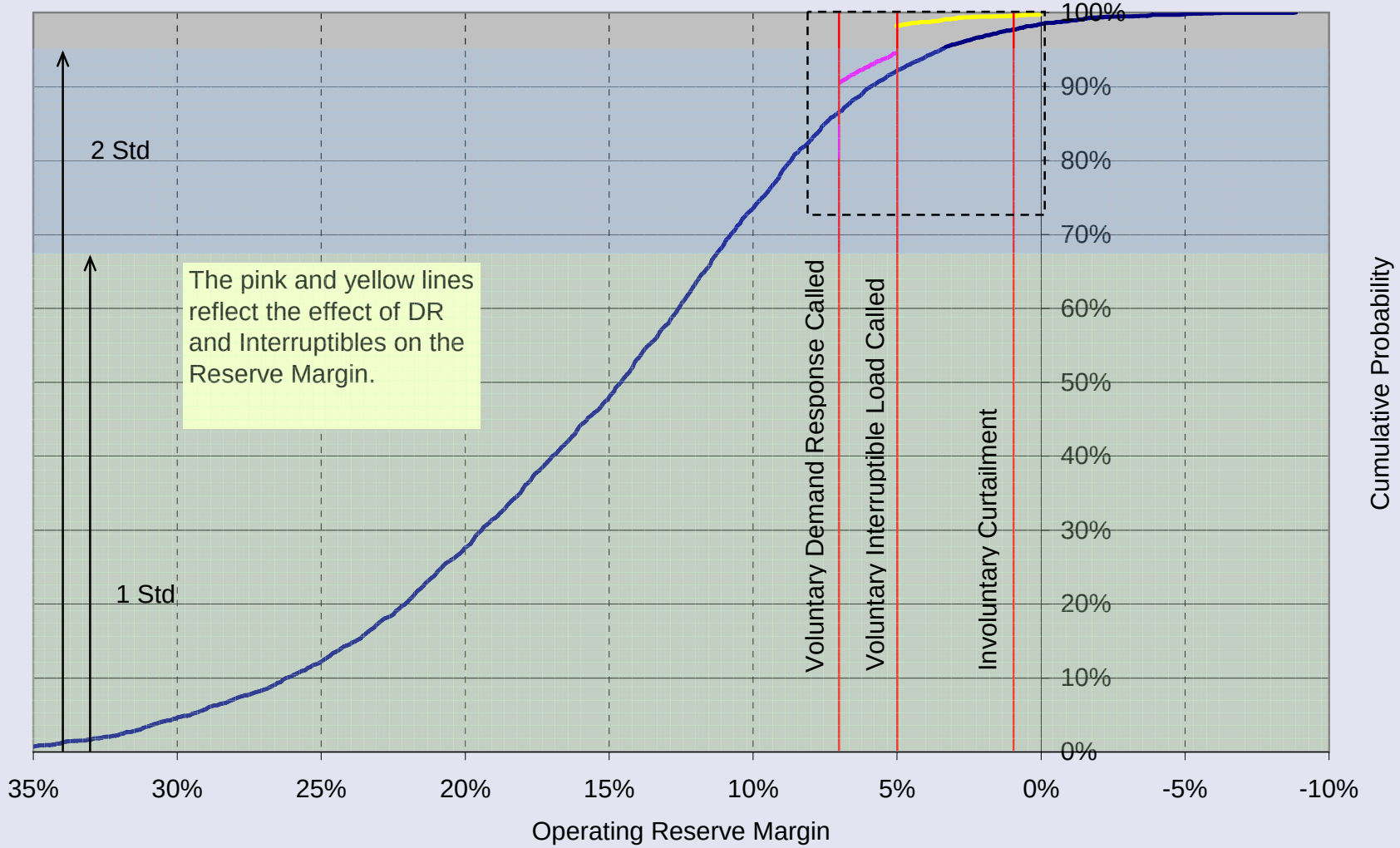
- **Increase Planning Reserve Margin**
  - Pros → - Provides more resources at all times
  - Cons → - Additional cost (at all hours)
    - May have minimal effect on reducing the number of events if resources not added strategically
- **Increase level of DR and Interruptibles**
  - Pros → - Provides greater reserve margins once emergency is called
    - Reduces need for additional generation resources.
  - Cons → - Additional cost (at all hours)
    - May have minimal effect on reducing the number of events
- **Change DR and Interruptible tariffs**
  - Pros → - Reduces probability of emergencies being called
    - Better Alignment of these resources with Loading Order
    - Public is altered less, only for true emergencies
  - Cons → - May increase the frequency of using of these resources
    - May reduce customer participation

How Does The 2007 Summer Look?

2007 California Statewide Summer Outlook

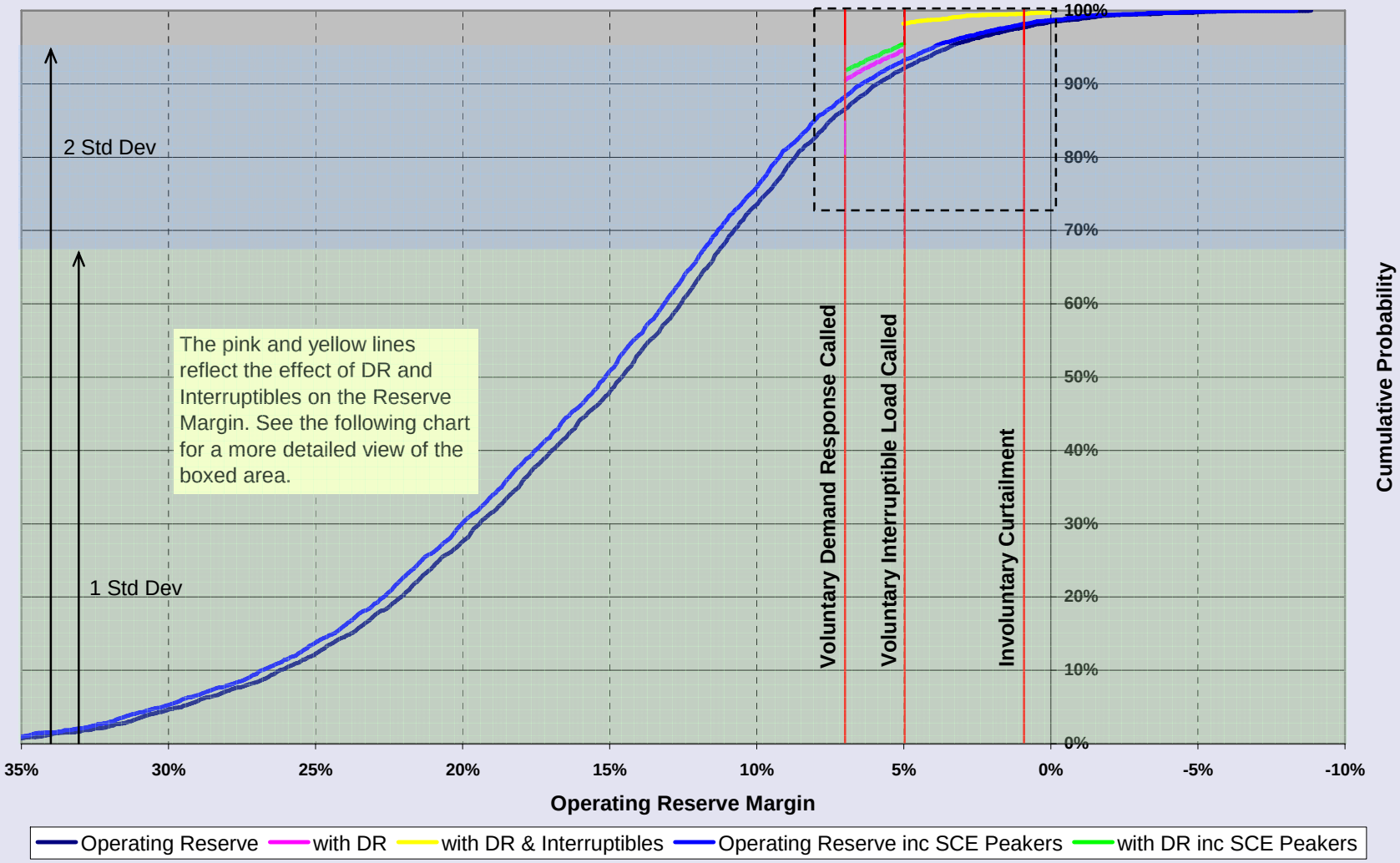
	Resource Adequacy Planning Conventions	June	July	August	September
1	Existing Generation[1]	57,897	57,971	58,209	58,538
2	Retirements (Known)	0	0	0	0
3	High Probability CA Additions	74	238	329	0
4	Net Interchange [2]	13,118	13,118	13,118	13,118
5	Total Net Generation (MW)	71,089	71,327	71,656	71,656
6	1-in-2 Summer Temperature Demand (Average)[3]	57,125	59,726	60,344	59,419
7	Demand Response (DR)	524	524	524	524
8	Interruptible/Curtailable Programs	1,603	1,603	1,603	1,603
9	Planning Reserve[4]	28.2%	23.0%	22.3%	24.2%
	Expected Operating Conditions				
	Total Net Generation (MW)	71,089	71,327	71,656	71,656
10	Outages (Average forced + planned)	-2,695	-2,695	-2,695	-2,695
11	Zonal Transmission Limitation[5]	-150	-150	-150	-150
12	Expected Operating Generation with Outages/Limitations[6]	68,244	68,482	68,811	68,811
13	Expected Operating Reserve Margin (1-in-2)[7]	24.7%	18.4%	17.6%	19.9%
	Adverse Conditions				
14	High Zonal Transmission Limitation	-250	-250	-250	-250
15	High Forced Outages (1 STD above average)	-1,160	-1,160	-1,160	-1,160
16	1-in-10 Summer Temperature Demand	60,573	63,330	64,040	63,005
17	Adverse Scenario Reserve Margin[7]	12.9%	7.3%	6.5%	8.6%
18	Adverse Scenario Reserve Margin w/DR and Interruptibles[8]	17.3%	11.5%	10.6%	12.8%
19	Resources needed to meet 7.0% Reserve (W/DR & Interruptible)	0	0	0	0
20	Surplus Resources Above 7.0% Reserve (W/DR & Interruptible)	4,997	2,284	1,854	2,961
21	Existing Aging Generation Without Capacity Contracts[9]	-2,070	-2,070	-2,070	-2,070

Probability Of Meeting Summer 2007 Operating Reserve In CA ISO*

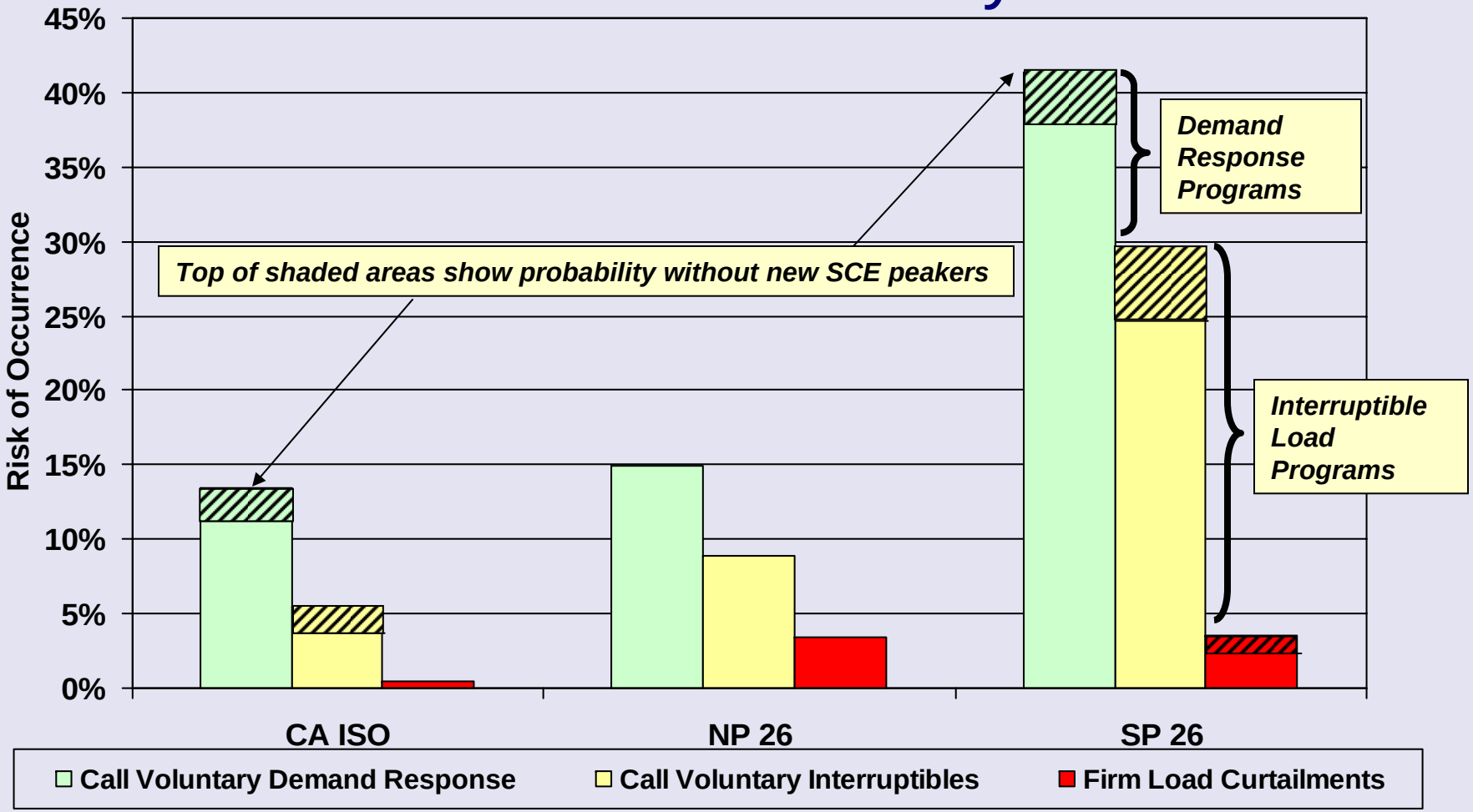


* Does not include new SCE Peakers

Probability Of Meeting Summer 2007 Operating Reserve In CA ISO



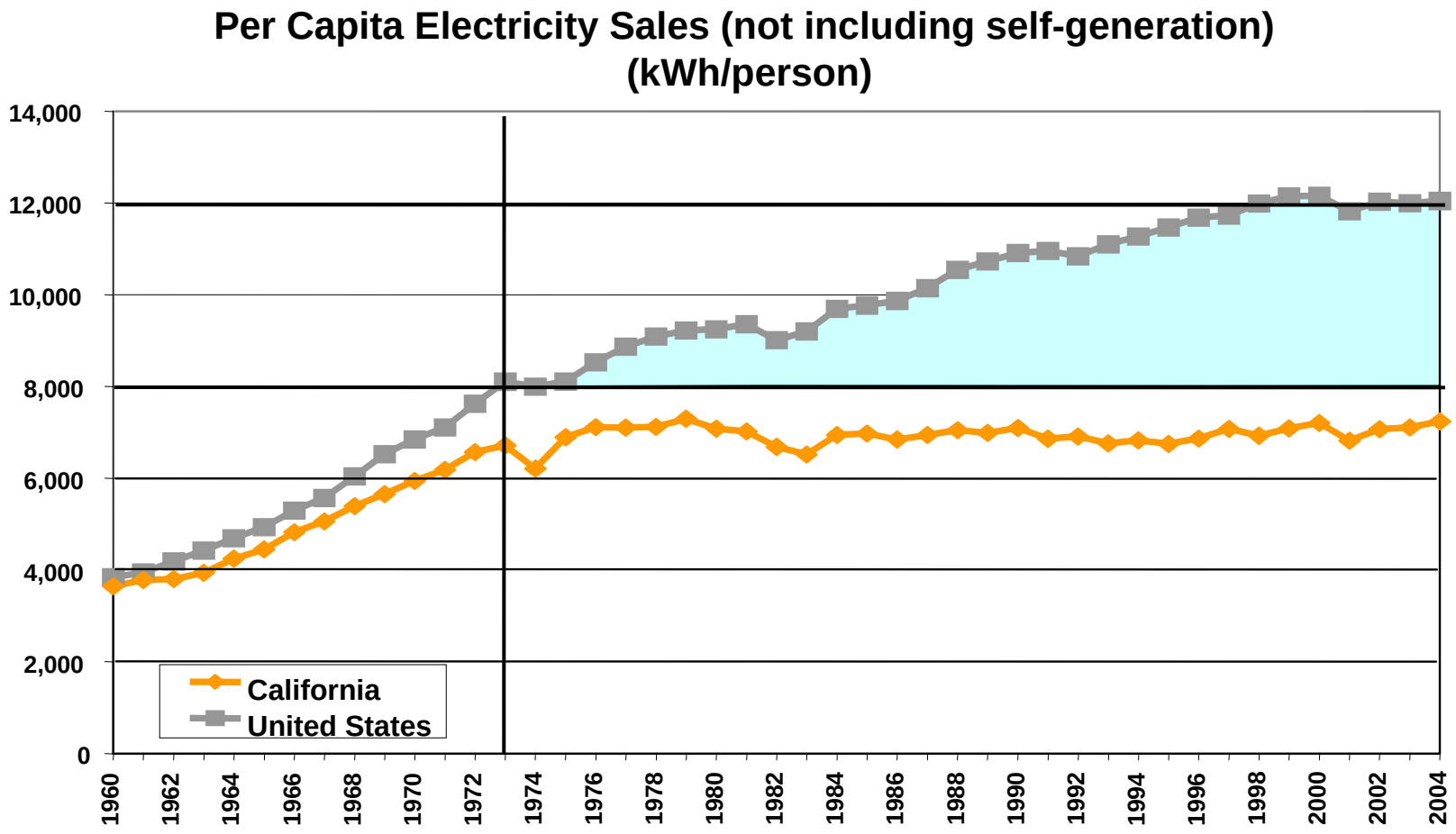
Probability Of Events For The 2007 Summer Peak Day



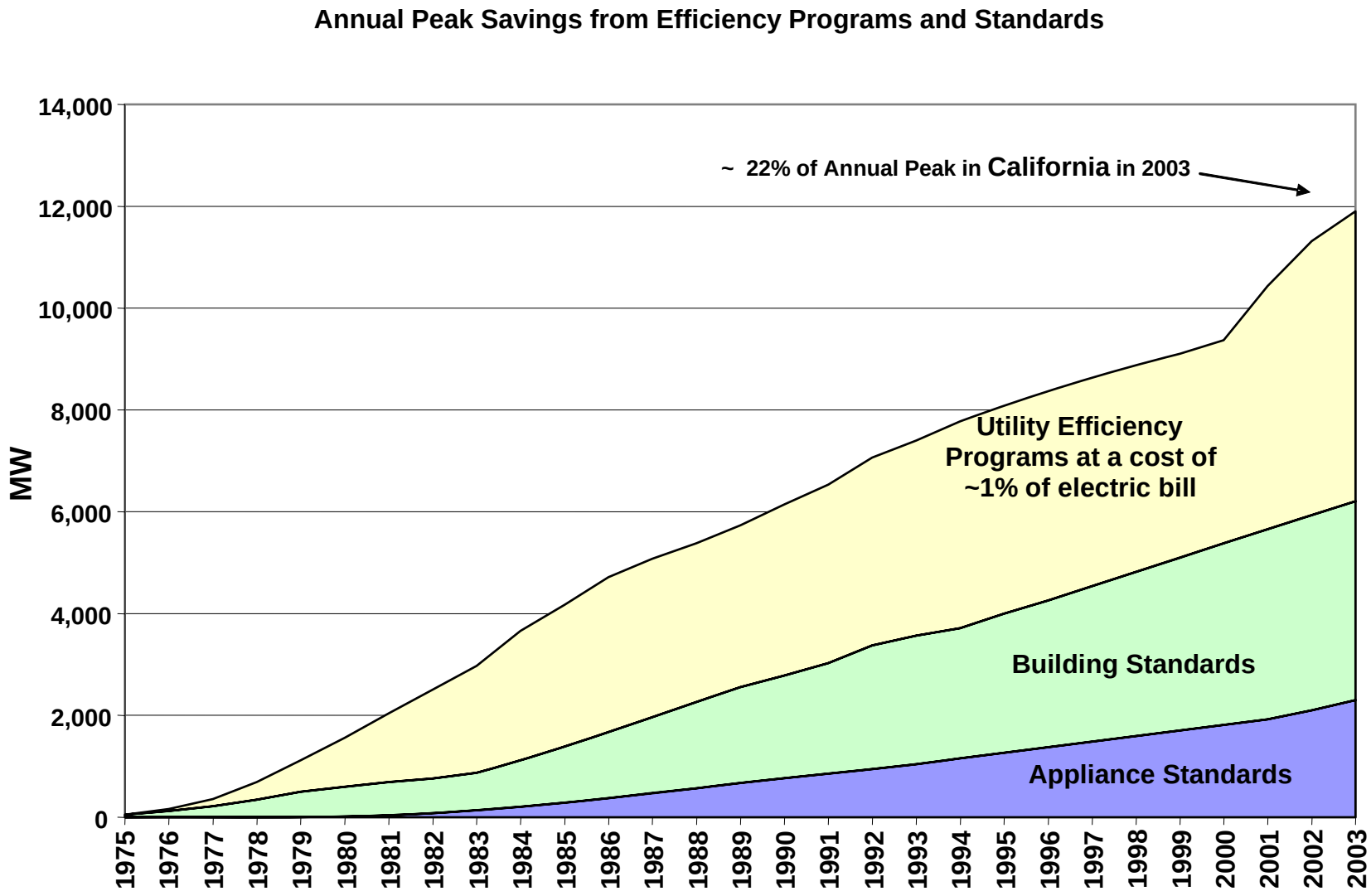
Preparing For Summer 2007

- CEC, CPUC, and CA ISO working together to ensure that we take all appropriate steps to prepare for the Summer of 2007
- Continued implementation of resource adequacy rules will help this summer

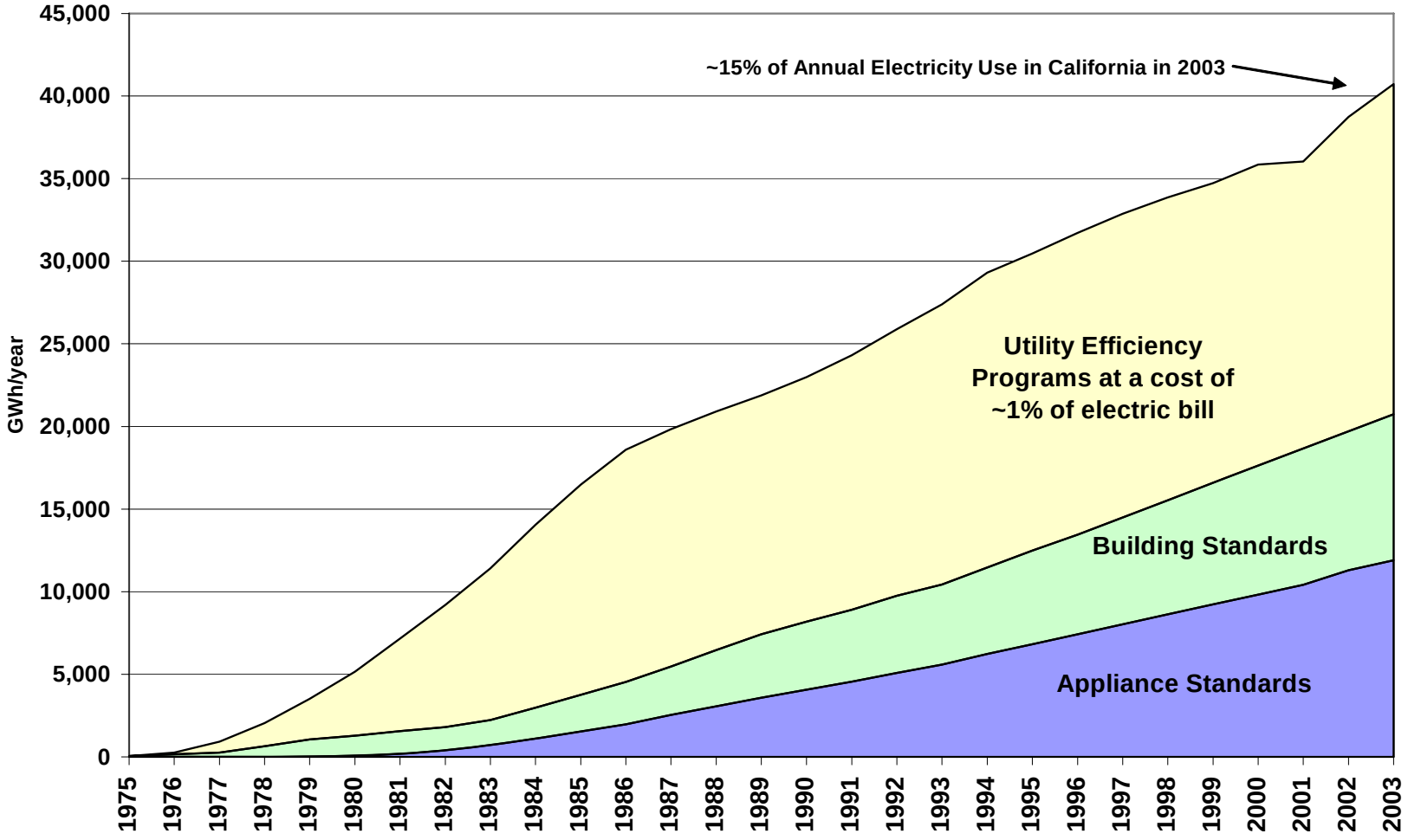
Per Capita Electricity Trends



California Energy Commission



California Energy Commission



CALIFORNIA ENERGY COMMISSION - ENERGY FACILITY STATUS

Updated: 02/26/2007

Color Key

- Operational Status
- Approved
- In Review
- On-line date is expected to be delayed beyond the date shown
- Expected and disclosed
- Expected but undisclosed
- On hold, suspended, cancelled, terminated by Commission order, or approval expired.
- According to developers, the new on-line date will be determined when the markets are favorable and financing is available.

	Projects On Line (Arranged By Online Date)	**Docket Number**	**Status**	**Capacity (MW)**	**Const. Completed (%)**	**Location**	**Date Approved**	**Const. Start Date**	**Original OnLine Date**	**Current / Actual Online Date**
	Sunrise Simple Cycle - Texaco & Edison Mission E.	1998-AFC-04	Operational	320	100	Kern	12/06/2000	12/07/2000	07/01	06/27/2001
	Sutter - Calpine	1997-AFC-02	Operational	540	100	Sutter	04/14/1999	07/01/1999	07/01	07/02/2001
	Los Medanos - Calpine	1998-AFC-01	Operational	555	100	Contra Costa	08/17/1999	09/17/1999	07/01	07/09/2001
	Wildflower Larkspur - Intergen	*2001-EP-01*	*Operational*	*90*	*100*	*San Diego*	*04/04/2001*	*04/05/2001*	*07/01*	*07/16/2001*
	Wildflower Indigo - Intergen	*2001-EP-02*	*Operational*	*135*	*100*	*Riverside*	*04/04/2001*	*04/05/2001*	*07/01*	*09/10/2001*
	Drews - Alliance	*2001-EP-05*	*Operational*	*40*	*100*	*San Bernardino*	*04/25/2001*	*04/26/2001*	*09/01*	*08/15/2001*
	Hanford - GWF	*2001-EP-07*	*Operational*	*95*	*100*	*Kings*	*05/10/2001*	*05/11/2001*	*09/01*	*09/01/2001*
	Century - Alliance	*2001-EP-04*	*Operational*	*40*	*100*	*San Bernardino*	*04/25/2001*	*04/26/2001*	*09/01*	*09/15/2001*
	Escondido - Calpeak	*2001-EP-10*	*Operational*	*50*	*100*	*San Diego*	*06/06/2001*	*06/07/2001*	*09/01*	*09/30/2001*
	Border - Calpeak	*2001-EP-14*	*Operational*	*50*	*100*	*San Diego*	*07/11/2001*	*07/12/2001*	*09/01*	*10/26/2001*
			Subtotal On Line 2001	*1,914*						
	King City - Calpine	*2001-EP-06*	*Operational*	*50*	*100*	*Monterey*	*05/02/2001*	*05/03/2001*	*09/01*	*01/14/2002*
	Gilroy I - Calpine	*2001-EP-08*	*Operational*	*135*	*100*	*Santa Clara*	*05/21/2001*	*05/22/2001*	*09/01*	*02/20/2002*
	Delta - Calpine	1998-AFC-03	Operational	887	100	Contra Costa	02/09/2000	04/01/2000	07/02	05/10/2002
	Henrietta Peaker - GWF	2001-AFC-18	Operational	96	100	Kings	03/05/2002	03/08/2002	06/02	07/01/2002
	Moss Landing - L.S. Power	1999-AFC-04	Operational	1,060	100	Monterey	10/25/2000	11/28/2000	06/02	07/11/2002
1a	Huntington Beach Unit 3 - AES	2000-AFC-13	Operational	225	100	Orange	05/10/2001	05/31/2001	11/01	07/31/2002
2a	Valero Cogen Unit 1 - Valero	2001-AFC-05	Operational	51	100	Solano	10/31/2001	11/05/2001	06/02	10/18/2002
			Subtotal On Line 2002	*2,504*						
	La Paloma - Complete Energy Holdings	1998-AFC-02	Operational	1,124	100	Kern	10/06/1999	01/01/2000	03/02	03/07/2003
	Los Esteros Simple Cycle - Calpine	2001-AFC-12	Operational	180	100	Santa Clara	02/07/2002	07/08/2002	05/03	03/07/2003
	Los Esteros Simple Cycle recertification - Calpine	2003-AFC-02	Operational	0	100	Santa Clara	03/16/2005	07/08/2002	05/03	03/07/2003
	High Desert - Constellation	1997-AFC-01	Operational	830	100	San Bernardino	05/03/2000	05/01/2001	07/03	04/22/2003
	Tracy Peaker - GWF	2001-AFC-16	Operational	169	100	San Joaquin	07/17/2002	07/22/2002	04/03	06/01/2003
	Sunrise Comb. Cycle Amendment - Texaco & Edison Mission E.	1998-AFC-04C	Operational	265	100	Kern	11/19/2001	12/21/2001	06/03	06/01/2003
	Woodland II - Modesto Irrigation District	2001-SPPE-01	Operational	80	100	Stanislaus	09/19/2001	02/21/2002	05/03	06/06/2003
	Blythe I - FPL	1999-AFC-08	Operational	520	100	Riverside	03/21/2001	04/27/2001	04/03	07/15/2003
	Elk Hills - Sempra & Oxy	1999-AFC-01	Operational	500	100	Kern	12/06/2000	06/08/2001	12/02	07/24/2003
1b	Huntington Beach Unit 4 - AES	2000-AFC-13	Operational	225	100	Orange	05/10/2001	05/31/2001	11/01	08/07/2003
			Subtotal On Line 2003	*3,893*						
	Donald Von Raesfeld Power Plant (Pico) - Silicon Valley Power	2002-AFC-03	Operational	147	100	Santa Clara	09/09/2003	09/10/2003	12/04	03/24/2005
	Pastoria - Calpine	1999-AFC-07	Operational	750	100	Kern	12/20/2000	10/03/2001	01/03	07/05/2005
	Metcalf - Calpine	1999-AFC-03	Operational	600	100	Santa Clara	09/24/2001	01/15/2002	07/03	05/27/2005
	Kings River - Kings River Cons. Dist.	2003-SPPE-02	Operational	97	100	Fresno	05/19/2004	11/01/2004	05/05	09/19/2005
	Magnolia - So. Ca. Power Producers	2001-AFC-06	Operational	328	100	Los Angeles	03/05/2003	07/21/2003	05/05	09/22/2005
	Malburg - City of Vernon	2001-AFC-25	Operational	134	100	Los Angeles	05/20/2003	09/11/2003	11/05	10/17/2005
3a	Mountainview Unit 3 - SCE	2000-AFC-02	Operational	528	100	San Bernardino	03/21/2001	09/01/2001	06/03	12/09/2005
			Subtotal On Line 2005	*2,584*						
3b	Mountainview Unit 4 - SCE	2000-AFC-02	Operational	528	100	San Bernardino	03/21/2001	09/01/2001	06/03	01/19/2006
4a	Cosumnes Unit 1 - SMUD	2001-AFC-19	Operational	500	100	Sacramento	09/09/2003	10/31/2003	06/05	02/24/2006
	Walnut - Turlock Irr. Dist.	2002-AFC-04	Operational	250	100	Stanislaus	02/18/2004	03/15/2004	04/06	02/28/2006
	Palomar Escondido - SDG&E	2001-AFC-24	Operational	546	100	San Diego	08/06/2003	06/01/2004	03/06	04/01/2006
5a	Riverside En. Res. Cntr. Unit 1, Unit 2 - City of Riverside	2004-SPPE-01	Operational	96	100	Riverside	12/15/2004	02/23/2005	11/05	07/26/2006
	Ripon - Modesto Irrigation Dist	2003-SPPE-01	Operational	95	100	San Joaquin	02/04/2004	04/01/2005	04/05	06/21/2006
			Subtotal On Line 2006	*2,015*						
			ON-LINE TOTAL	**12,910**						

Approved / Under Construction (Arranged By Online Date)	**Docket Number**	**Status**	**Capacity (MW)**	**Const. Completed (%)**	**Location**	**Date Approved**	**Const. Start Date**	**Original OnLine Date**	**Current / Actual Online Date**
Bottle Rock Geothermal Restart	1979-AFC-4C	**Under Construction**	20	**10**	Lake	12/18/2006	**12/19/2006**	06/07	06/07
Roseville Combined Cycle - Roseville Electric	2003-AFC-01	Under Construction	160	**84**	Placer	04/13/2005	08/18/2005	12/07	07/07
Niland Peaker - IID	2006-SPPE-1	Pre-construction	93	0	Imperial	10/11/2006		05/08	05/08
Inland Empire - GE & Calpine	2001-AFC-17	Under Construction	800	**44**	Riverside	12/17/2003	08/26/2005	12/05	06/08
SF Reliability Project - CCSF	2004-AFC-01	Pre-construction	145	0	San Francisco	10/03/2006		06/06	**12/08**
El Centro Unit 3 Repower - IID	2006-SPPE-2	Pre-construction	85	0	Imperial	01/03/2007		05/09	05/09
Gateway - PG&E	**2000-AFC-01**	**Under Construction**	**530**	**7**	**Contra Costa**	**05/30/2001**	**08/30/2001**	**08/03**	**06/09**
		Under Construction Subtotal	***1,833***						

Approved / Not Under Construction (Arranged By Online Date)	**Docket Number**	**Status**	**Capacity (MW)**	**Const. Completed (%)**	**Location**	**Date Approved**	**Const. Start Date**	**Original OnLine Date**	**Current / Actual Online Date**
Chula Vista 2 - Ramco	*2001-EP-03*	*Cancelled*	*62*	*0*	*San Diego*	*06/13/2001*	*Cancelled*	*Cancelled*	*Cancelled*
Otay Mesa - Calpine	1999-AFC-05	Construction On-Hold	590	9	San Diego	04/18/2001	09/10/2001	07/03	Construction On-Hold
Morro Bay - L.S. Power	2000-AFC-12	On-Hold	1,200	0	San Luis Obispo	08/02/2004	On Hold	On Hold	On-Hold
Tesla - FPL	2001-AFC-21	On-Hold	1,120	0	Alameda	06/16/2004	On Hold	On Hold	On-Hold
El Segundo Repower - NRG	2000-AFC-14	On-Hold	630	0	Los Angeles	02/02/2005	On Hold	On Hold	On-Hold
Los Esteros Combined Cycle - Calpine	2003-AFC-02	Approved	140	0	Santa Clara	10/11/2006	On Hold	On Hold	On-Hold
Pegasus Energy - Delta Power	*2001-EP-09*	*Cancelled*	*181*	*0*	*San Bernardino*	*06/06/2001*	*Cancelled*	*Cancelled*	*Cancelled*

CALIFORNIA ENERGY COMMISSION - ENERGY FACILITY STATUS

	Hanford Energy Park - GWF	2000-SPPE-01	Cancelled	99	0	Kings	04/11/2001	Cancelled	Cancelled	Cancelled
	Blythe I Transmission Line - FPL	1999-AFC-8C	Approved	0	0	Riverside	10/11/2006	On Hold	06/07	On-Hold
	United Golden Gate - El Paso	2000-AFC-05	Not Built and License Expired	51	0	San Mateo	03/07/2001	On Hold	07/01	Not Built and License Expired
	Western Midway Sunset - Edison Mission Energy	1999-AFC-09	Not Built and License Expired	500	0	Kern	03/21/2001	On Hold	07/03	Not Built and License Expired
	Russell City - Calpine	2001-AFC-07	On-Hold	600	0	Alameda	09/11/2002	On Hold	12/04	On-Hold
	San Joaquin Valley - Calpine	2001-AFC-22	On-Hold	1,087	0	Fresno	01/14/2004	On Hold	01/06	On-Hold
	East Altamont - Calpine	2001-AFC-04	On-Hold	1,100	0	Alameda	08/20/2003	On Hold	07/05	On-Hold
	Pastoria Simple Cycle Addition - Calpine	2005-AFC-1	Approved	160	0	Kern	12/18/2006	On Hold	On Hold	On-Hold
2b	Valero Cogen - Valero	2001-AFC-05	Construction On-Hold	51	37	Solano	10/31/2001	02/01/2007	12/02	Construction On-Hold
	Three Mountain - Covanta	1999-AFC-02	Not Built and License Expired	500	0	Shasta	05/16/2001	On Hold	12/03	Not Built and License Expired
	Salton Sea - Cal Energy	2002-AFC-02	On-Hold	215	0	Imperial	12/17/2003	On Hold	01/06	On-Hold
	Blythe II - Caithness	2002-AFC-01	On-Hold	520	0	Riverside	12/14/2005	On Hold	On Hold	On-Hold
			Not Under Construction Subtotal	*8,806*						
			Approved Total	**23,549**						

Projects In Review (Arranged By Estimated Decision Date)	**Docket Number**	**Process**	**Capacity (MW)**	**Project Type**	**Location**	**Date Filed**	**Estimated Decision Date**		**Estimated On-line Date**
Walnut Peaker - Edison Mission E.	2005-AFC-02	12-mo AFC	500	Brownfield	Los Angeles	11/22/2005	06/07		08/08
Sun Valley Peaker - Edison Mission E.	2005-AFC-03	12-mo AFC	500	Greenfield	Riverside	12/01/2005	**08/07**		08/08
Russell City 2 - Calpine	2001-AFC-7C	Amendment	[600]	Brownfield	Alameda	11/17/2006	**08/07**		06/10
Highgrove Peaker - AES	2006-AFC-2	12-mo AFC	300	Expansion	San Bernardino	05/25/2006	**10/07**		09/08
South Bay Replacement - L.S. Power	2006-AFC-3	12-mo AFC	620	Replacement	San Diego	06/30/2006	**10/07**		05/10
Vernon Power Plant - City of Vernon	2006-AFC-4	12-mo AFC	943	Brownfield	Los Angeles	06/30/2006	**10/07**		08/09
EIF Panoche - Energy Investors Fund	2006-AFC-5	12-mo AFC	400	Greenfield	Fresno	08/02/2006	10/07		08/09
Humboldt Power Plant - PG&E	2006-AFC-7	12-mo AFC	163	Replacement	Humboldt	09/29/2006	12/07		10/08
Eastshore - Tierra Energy	2006-AFC-6	12-mo AFC	116	Brownfield	Alameda	09/22/2006	12/07		05/09
Colusa Generation Station - E&L Westcoast	2006-AFC-9	12-mo AFC	660	Greenfield	Colusa	11/06/2006	01/08		05/10
Bullard Energy Center - Energy Investors Fund (Bullard Energy Center, LLC)	2006-AFC-8	12-mo AFC	200	Brownfield	Fresno	11/06/2006	01/08		07/09
Starwood Midway Panoche - Starwood Power	2006-AFC-10	12-mo AFC	120	Greenfield	Fresno	11/17/2006	01/08		05/09
		Under Review Total	**4,522**						

Projects Anounced (Aranged by Estimated Filing Date)		**Process**	**Capacity (MW)**	**Project Type**	**Location**	**Estimated Filing Date**			
Hybrid Gas-Solar - City of Victorville		12-mo AFC	**570**	Greenfield	San Bernardino	**03/07**			
Chevron Refinery - Chevron		SPPE	63	Brownfield	Contra Costa	**03/07**			
Community Power Plant - Kings River Conservation Dist.		12-mo AFC	500	Greenfield	Fresno	**04/07**			
Etiwanda-Reliant		**12-mo AFC**	**600**	**Brownfield**	**San Bernardino**	**04/07**			
Ocotillo-Competitive Power Ventures		**12-mo AFC**	**800**	**Greenfield**	**Riverside**	**04/07**			
Stirling Solar Thermal Two - Stirling Energy		12-mo AFC	900	Greenfield	Imperial	**05/07**			
Hybrid Gas-solar - City of Palmdale		12-mo AFC	**570**	Greenfield	Los Angeles	05/07			
Encina - NRG		12-mo AFC	340	Brownfield	San Diego	05/07			
Stirling Solar Thermal One - Stirling Energy		12-mo AFC	850	Greenfield	San Bernardino	**07/07**			
Clean Hydrogen Power Project - BP Arco & Edison Mission Energy		12-mo AFC	500	Brownfield	Los Angeles	09/07			
4b Cosumnes - SMUD		12-mo AFC	500	Expansion	Sacramento	Unknown			
5b Riverside En. Res. Cntr. - City of Riverside		SPPE	96	Expansion	Riverside	Unknown			
Central Valley South Energy Center - Central California Power		12-mo AFC	217	Unknown	Tulare	Unknown			
MMC Chula Vista Expansion - MMC Energy, Inc.		12-mo AFC	94	Expansion	San Diego	Unknown			
Harper Lake Solar Plant - Harper Lake, LLC		12-mo AFC	500	Greenfield	San Bernardino	Unknown			
San Diego Community Power - ENPEX Corporation		12-mo AFC	750	Greenfield	San Diego	Unknown			
		Announced Total	**7,850**						

Projects Planned (Aranged by Estimated Filing Date)		**Process**	**Capacity (MW)**	**Project Type**	**Location**	**Estimated Filing Date**			
Municipal Combined Cycle 2		12-mo AFC	255	Comb Cycle	Unknown	Unknown			
Solar Thermal Project		12-mo AFC	101	Solar	Unknown	Unknown			
		Planned Total	**356**						

NOTES:

Bold text in table identifies a change from the previous report.
* Estimated on-line date if construction is not delayed.
** Estimated on-line date if approved & constructed as proposed.
Projects in italics and an "EP" Docket Number are emergency peakers
Megawatts in [ ] are not included in totals.
Morro Bay-1021 MW replaced with 1200 MW for a net increase of 179 MW
Hanford Energy Park- Approved but replaced by Hanford-GWF (01-EP-7).
Salton Sea - 30 MW organic rankine cycle amendment approved 5/11/05.
Inland Empire - 130 MW amendment approved 6/22/05.
Russell City 2 - Calpine needs to obtain an amended Decision for a new site for the Russell City Project (01-AFC-7).

DEFINITIONS:

Greenfield	Undeveloped
Brownfield	Developed site
Expansion	New unit at existing site, no loss of existing generation
Repower	Modification of existing equipment
Peplacement	Demolition of old plant and construction of new plant
On Hold	Applicant has suspended work
Suspended	Committee has suspended the proceeding