

Competitive generation: Looks easy on paper

Presentation at IAEE

10 July 2004

Washington, DC

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Naïve regulatory vision

- ☞ Restructure the industry
- ☞ Competitive generation
 - Free market will provide adequate supplies
- ☞ Competitive retail = customer choice
 - Lower costs, improved service, innovation
- ☞ Less regulation
 - Market discipline better than regulations

Problematic generation

- ☞ Looks easy on paper
 - Elegant economic theory
- ☞ Not so easy in practice
 - Price volatility
 - Boom & bust cycles
 - Resource adequacy
- ☞ Question:
 - Can we rely on free market?

Problematic retail market

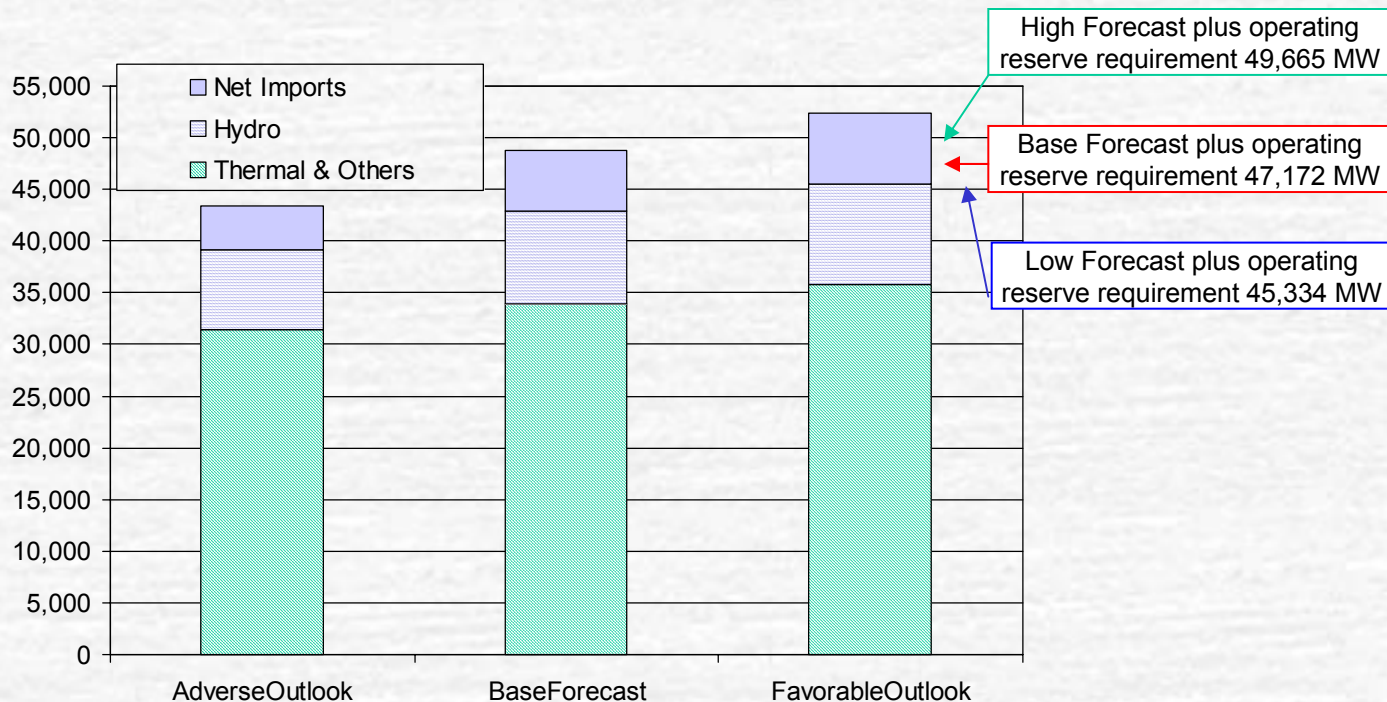
- Most US markets not successful
- Customers want choice but won't switch
- Lower prices?
- Improved service?
- Service/product innovation?
- Price volatility
- Uncertainty

Desirable market features

- ☞ Competitive, low prices?
 - Yes, in times of plenty
- ☞ Adequate investment?
 - Yes, following price spikes
- ☞ Sustainable?
 - Not so sure
- ☞ Adequate capacity?
 - Not so sure

CA context

2004 CA supply & demand forecast, CAISO, MW



Outline

- Theory vs. practice
- Experience to date raises questions about
 - Boom & bust
 - Price volatility
 - Sustainability?
 - Market power?
 - Resource adequacy?
- What have we learned?
- Where do we go?

Supply = Demand

- ☛ Three basic ways to get $S = D$
 - Adjust local generation to match local load
 - Traditional method
 - Augment with remote generation/trading
 - Requires transmission, losses, congestion
 - Adjust/manage local load
 - Peak shaving
 - RTP
 - Interruptible loads
 - DR
- ☛ Least expensive option?

Prior to 1973

- Adjust generation to serve native load
 - Vertically-integrated utility model
 - Cost-plus, regulated rate of return
 - Build & maintain peakers
 - Expensive but invisible
 - Blended prices
 - Customers oblivious to costs
 - Stable, fixed tariffs
- Limited import/export/trading

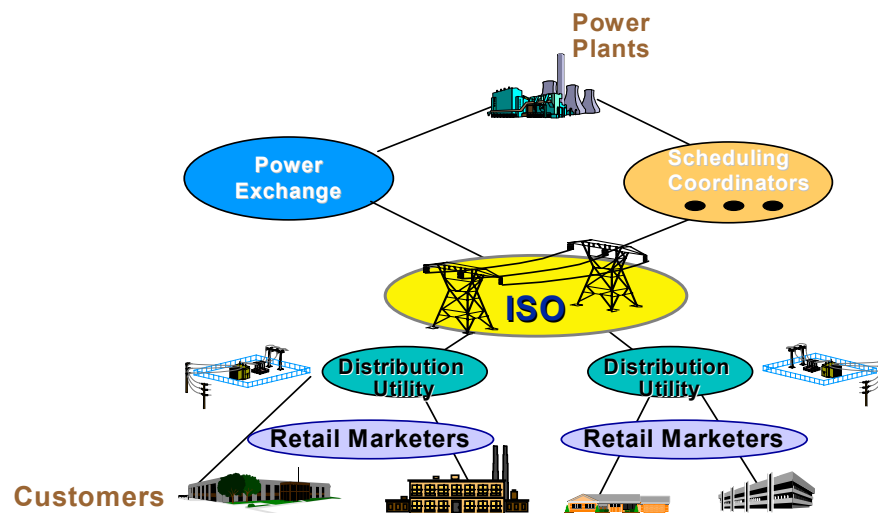
PURPA, EAct & FERC

- ☛ Trigger: 1973 Arab Oil Embargo
- ☛ 1978 PURPA
- ☛ 1992 EAct
- ☛ 1994 Restructuring debate
- ☛ 1996 Order 888, 889
- ☛ 1998 Customer choice in CA, MA, etc
- ☛ 2002 SMD

CA restructuring euphoria

- ☞ April 1993 The Yellow Book
- ☞ April 1994 The Blue Book
- ☞ Aug 1996 AB 1890
- ☞ April 1998 CA market opens
- ☞ 1998-99 Quiet before the storm
- ☞ 2000-2001 The crisis
- ☞ 2001-2003 Damage control
- ☞ 2004 Recovery?

California's New Industry Structure



The perfect storm

California wholesale electricity prices*, 1998-2001, monthly means, \$/MWh

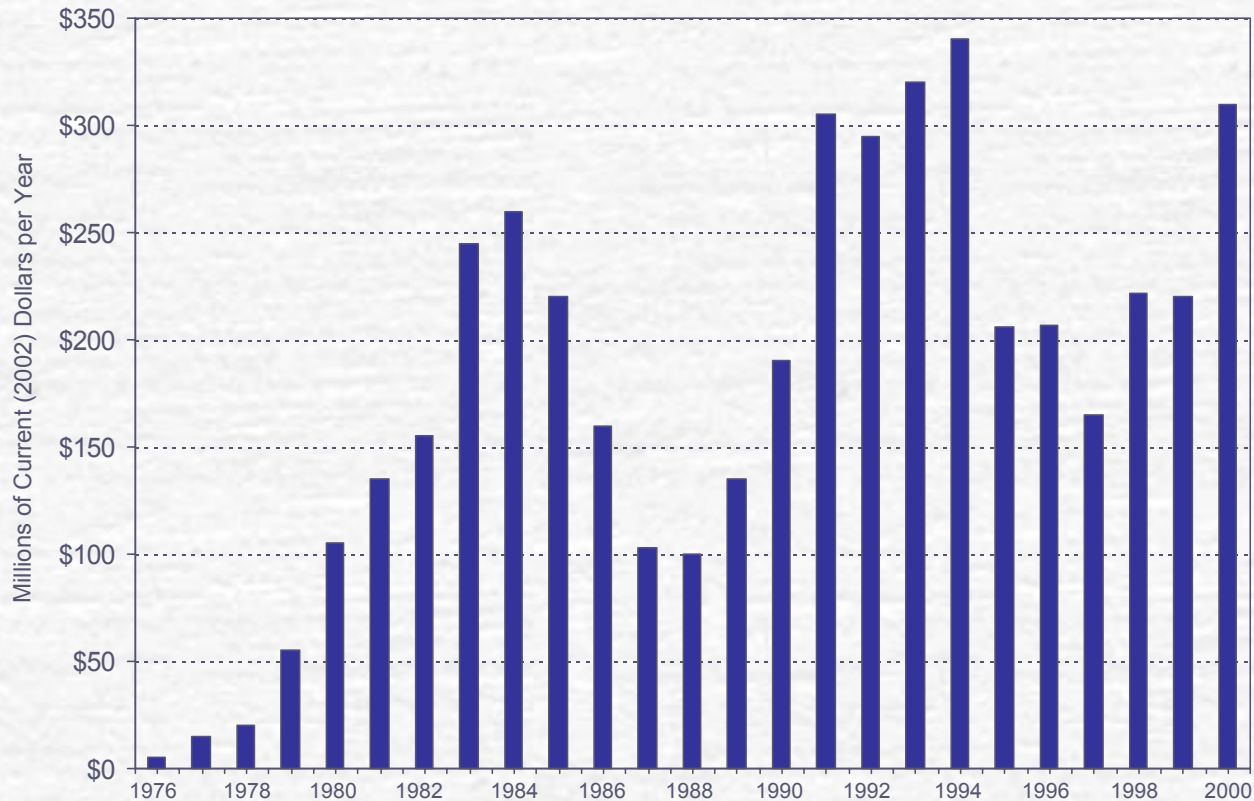
	1998/9	1999/00	2000/1	2001
Apr	23.3	24.7	27.4	265.9
May	12.5	24.7	50.4	239.5
Jun	13.3	25.8	132.4	159.8
Jul	35.6	31.5	115.3	137.8
Aug	43.4	34.7	175.2	120.1
Sep	37.0	35.2	119.6	126.8
Oct	27.3	49.0	103.2	69.4
Nov	26.5	38.3	179.4	74.8
Dec	30.0	30.2	385.6	69.6
Jan	21.6	31.8	272.0	
Feb	19.6	18.8	304.4	
Mar	24.0	29.3	249.0	
Mean	26.2	31.2	176.2	

* Prices for 98-00 are not strictly comparable to 2001 prices

Source: The History of Electricity Restructuring in California, Blumstein, Friedman and Green, Center for the Study of Energy Markets, Aug 2002

California Roller Coaster

Annual IOU conservation spending, \$ Million

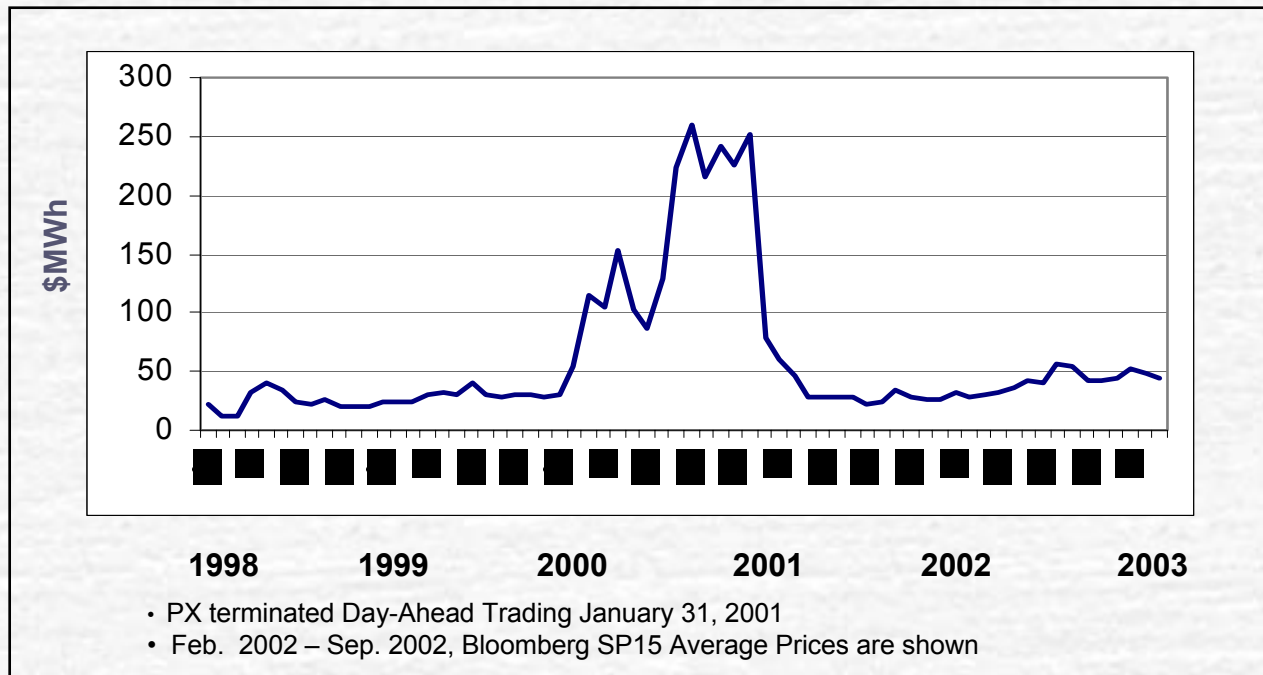


CA electricity crisis 2000-01

- ☞ Chronic capacity shortages
 - Physical or economic?
- ☞ Unusual price spikes
 - Price manipulation & profiteering
- ☞ High price volatility
- ☞ Interruptible customers abused
- ☞ IOUs not credit-worthy

Market eventually calms down

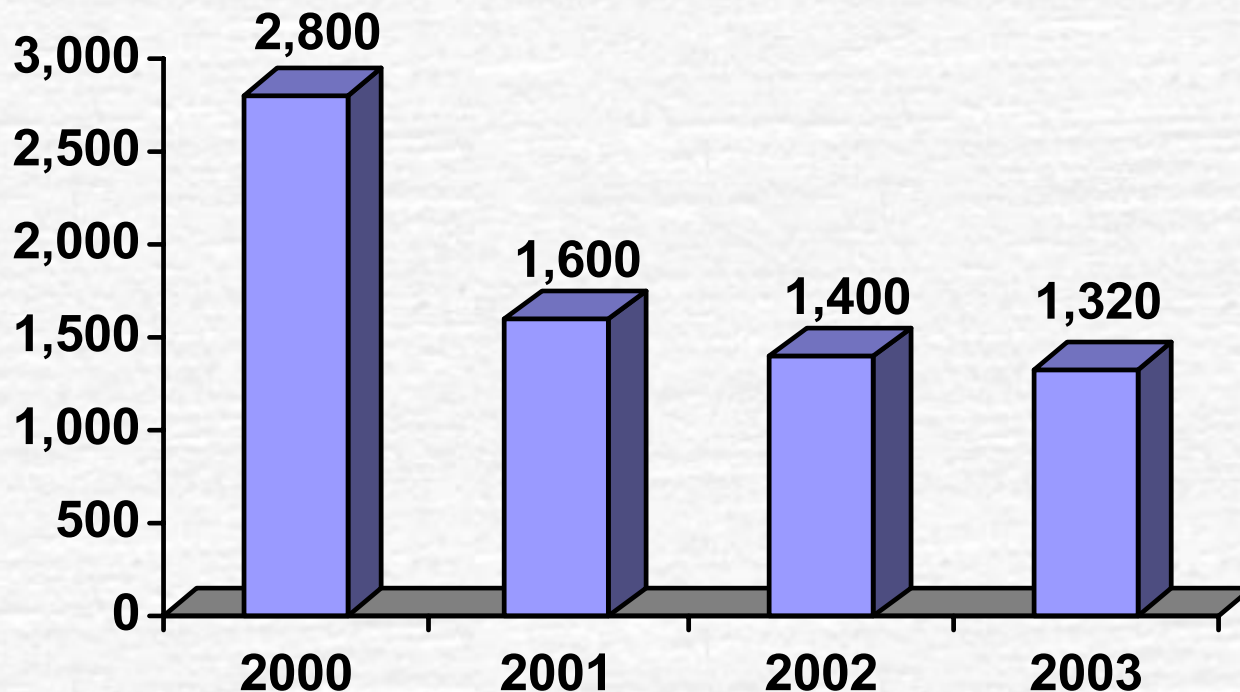
Wholesale electricity prices in California, \$MWh



Source; Gary Stern, Southern California Edison Company

Abuse of interruptible loads

Interruptible loads under IOU control, MW, 2000-03



Regulatory push

- CPUC OIR 02-06-001, 6 June 2002
 - Policies & practices for advanced metering, demand response & dynamic pricing
 - Phase 1: assess options for 2003 summer
 - 3 working groups
 - Phase 2: investigate benefits of advanced metering infrastructure (AMI)
 - Started in 2004
- Status report: 16 Jan 2003

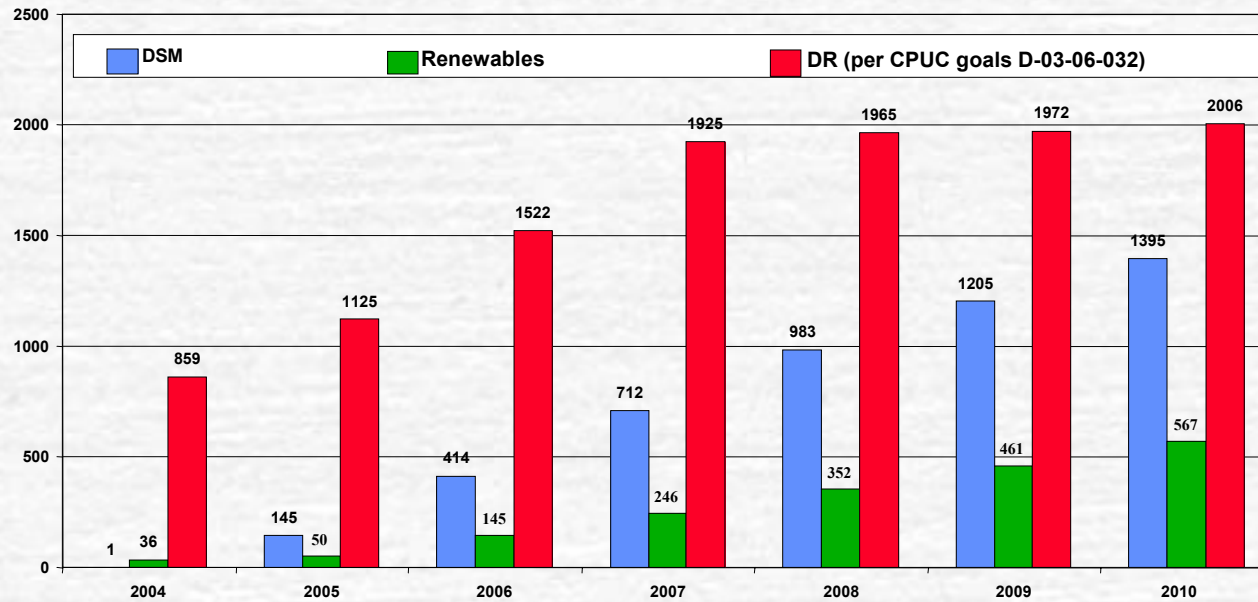
DR Goals

Goals established by CPUC Decision 03-06-032

Year	Utility		
	PG&E	SCE	SDG&E
2003	150	150	30
2004	400	400	80
2005	3% of annual system peak demand		
2006	4% of annual system peak demand		
2007	5% of annual system peak demand		

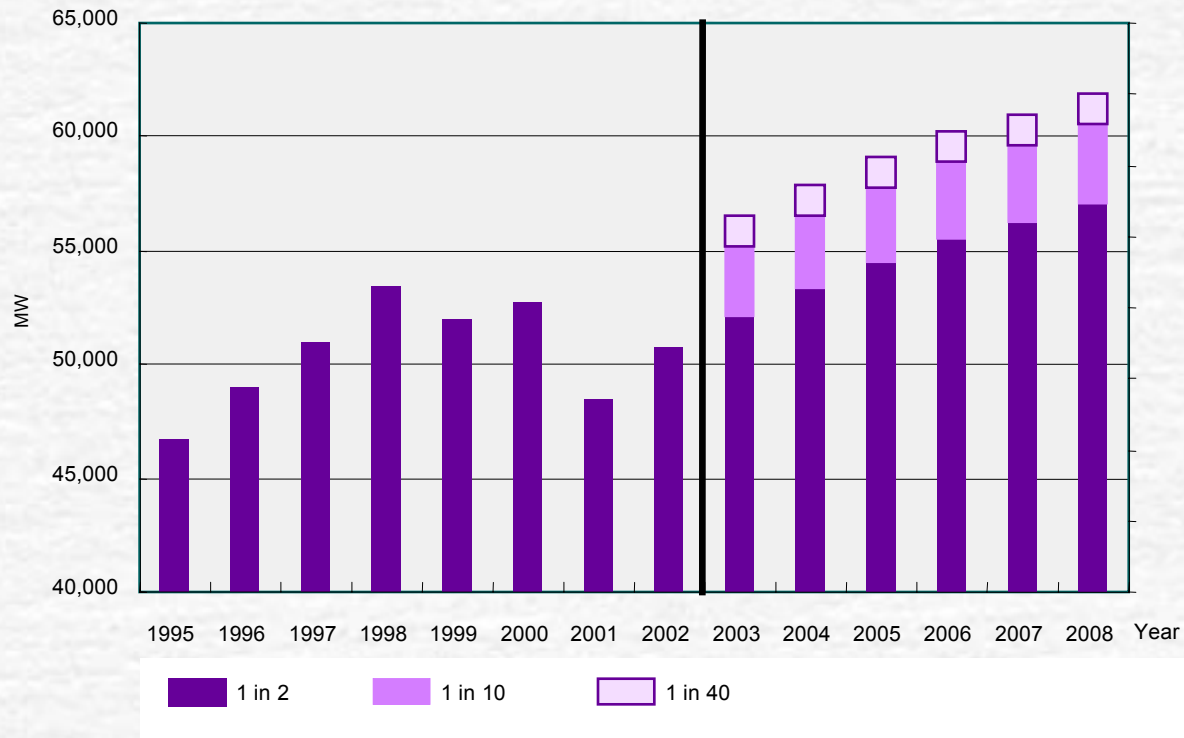
DSM, DR & Renewables

Goals established by CEC, 2004-10



Growing again

Statewide coincident peak demand, MW, 1995-2008

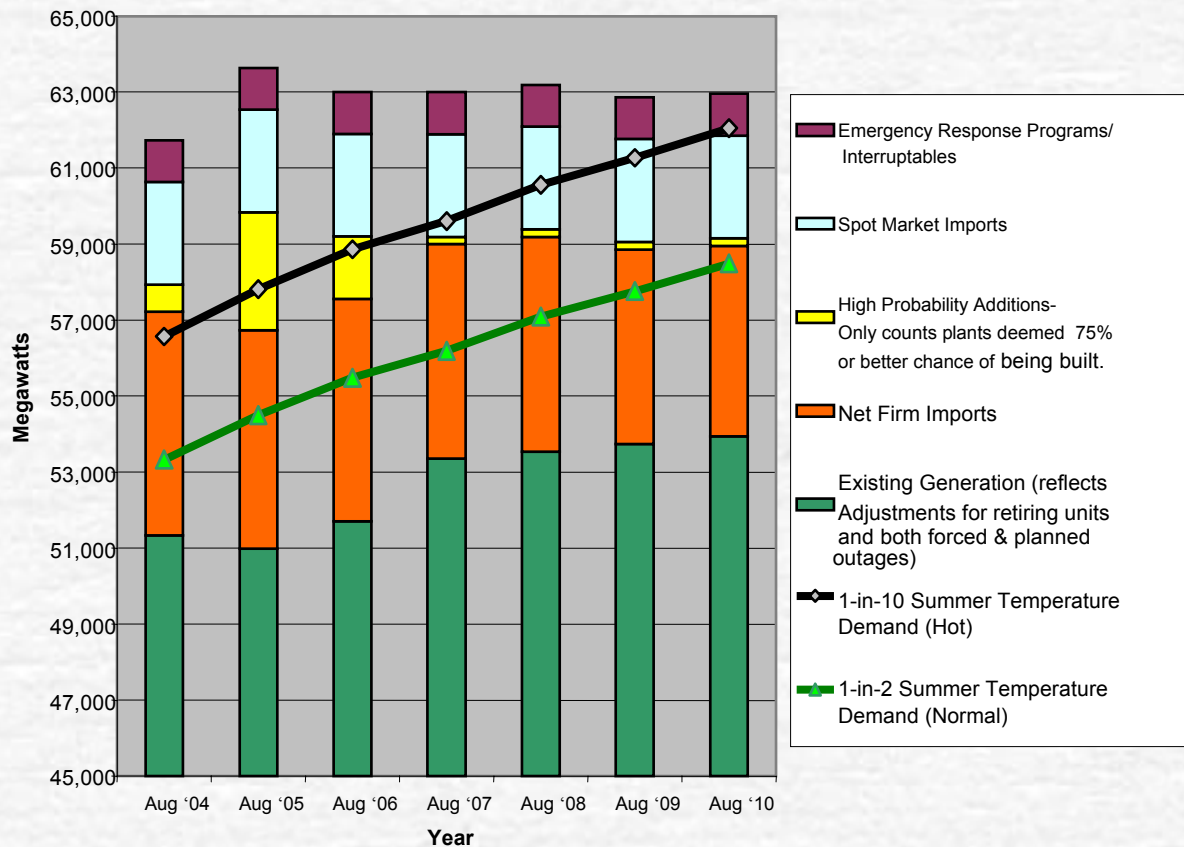


* the bars show 1 in 2 (considered normal), 1 in 10 (considered hot), and 1 in 40 (considered extremely hot) probabilities for 2003-08

Source: California Energy Commission

Imminent shortages?

CA projected reserve margin Aug 04-10, CEC



Hybrid Model?

- ☞ Competitive wholesale market
 - IOU financed generation
 - Competitive power procurement
- ☞ Regulated retail market
 - Core vs. non-core markets
 - Regulated tariffs for most
- ☞ Practical/sustainable/desirable?

Original focus of IRP: Demand-side participation

- Force demand-side participation
 - Negawatts may be cheaper than megawatts
- Uphill battle on DSM
 - IOU's incentives: build & rate-base
 - Conservation was counter-intuitive & financially ruinous
 - "Petrol stations do not sell nega-gallons, why should we?"
- IRP designed to force a balanced view
 - Only went so far
 - Schizophrenic organizations
 - Would ESCOs & performance contracting take off?

Brief history of EE & DSM in California

Four phases

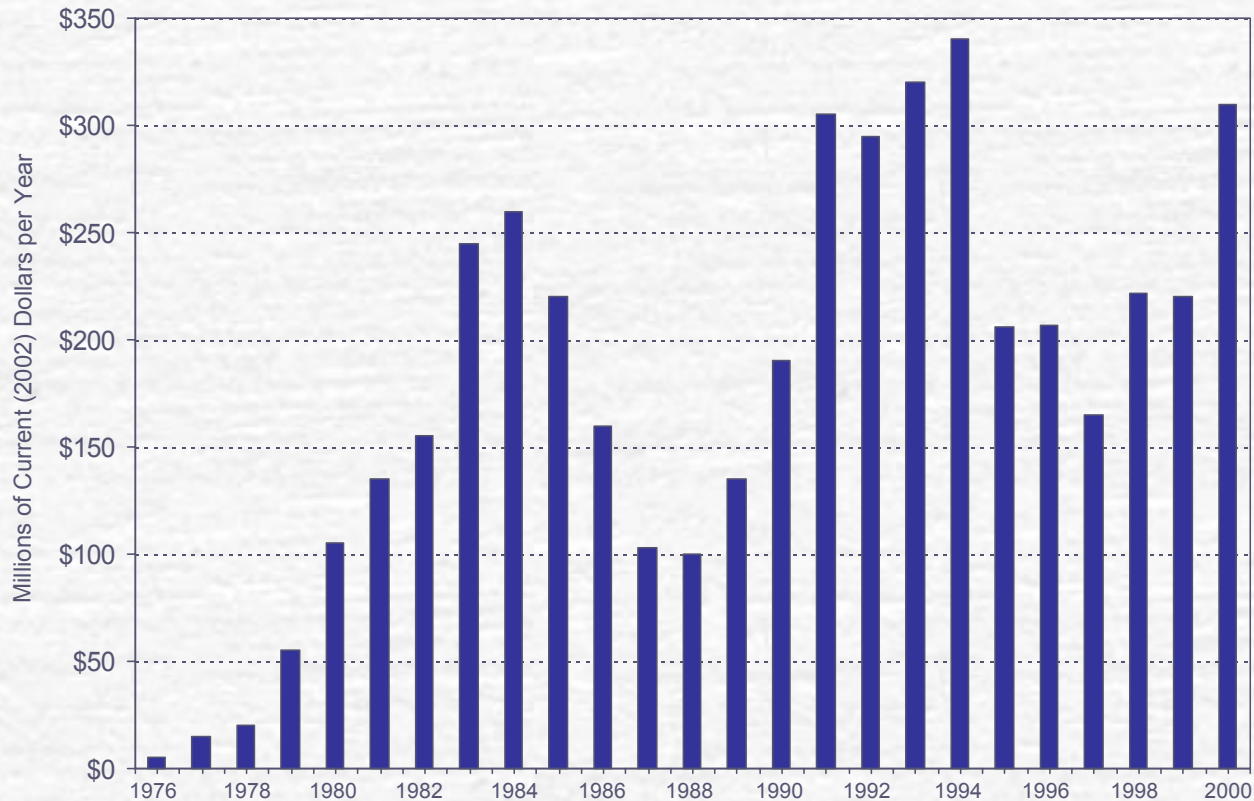
- Pre 1973 – what conservation?
- First wave – CEC's first hurrah
 - Pick the low hanging fruit
- Second wave – failure of excessive DSM
 - 1996: AB 1890 ended the era
- Post California meltdown – new reality sinks in

CEC vs. CPUC

- CEC: the more the merrier
- CPUC: but who will foot the bill?

California Roller Coaster

Annual IOU conservation spending, \$ Million



Problematic DSM

Swimming against the current

- Spend money to market & promote programs
- Spend money on subsidies/incentives
- Spend time & money on M&E
 - Nickel-and-dime with CPUC
- Raise average rates to account for lower kWh sales
 - Non-participants complain as do others

Its one side of company against another

- Would create friction within IOUs

How many negawatts to save?

- Not a simple question to address
- Several steps to find out the answer
 - Determine technical potential
 - Determine the costs
 - Determine cost-effectiveness
 - Compared to megawatts
 - Based on whose perspective?
 - Design programs to capture negawatts
 - Integrate into IRP
 - Document & report results
 - Get independent audit
 - Submit to CPUC for approval

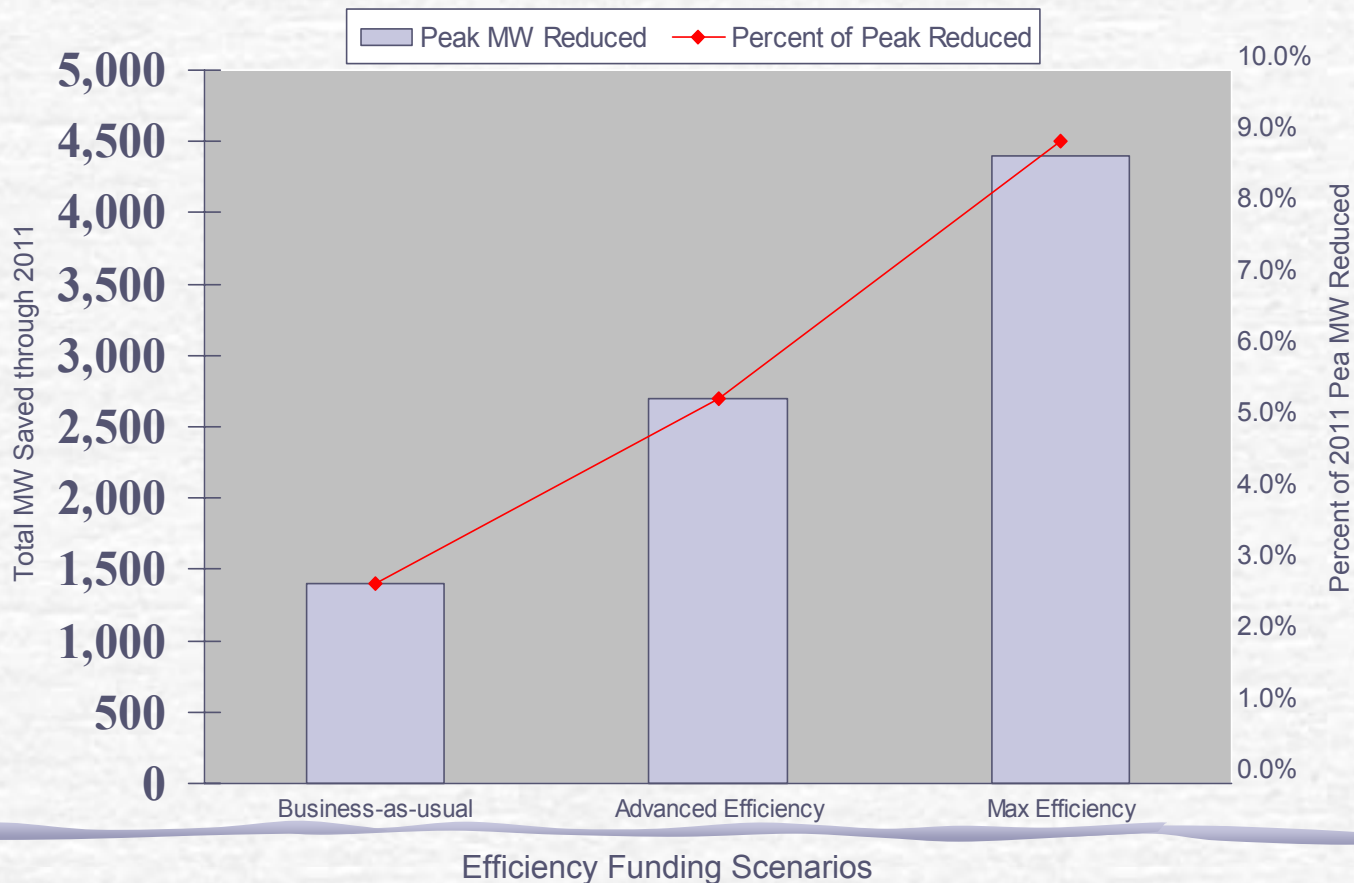
Energy Foundation Study

- CA can save up to 3,500 MW by 2011
- \$8 billion net savings
- How? Restore funding to 1994 levels
- 3 scenarios considered

<u>Scenario 02-11</u>	<u>Spending</u>	<u>Net Savings</u>
Business as usual	~\$4 b	\$5.5 b
Advanced efficiency	~\$7 b	\$8.6 b
Maximum efficiency	~ \$12 b	\$11.0

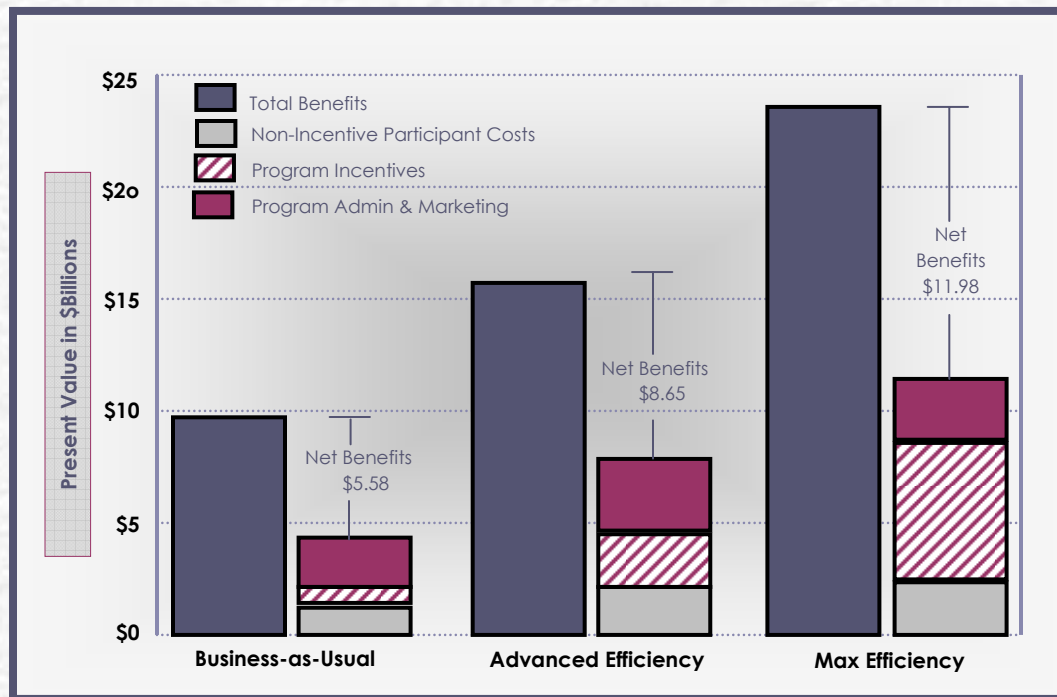
Big potential, but ...

Peak load reduction achievable in CA, 2002-11, MW & %



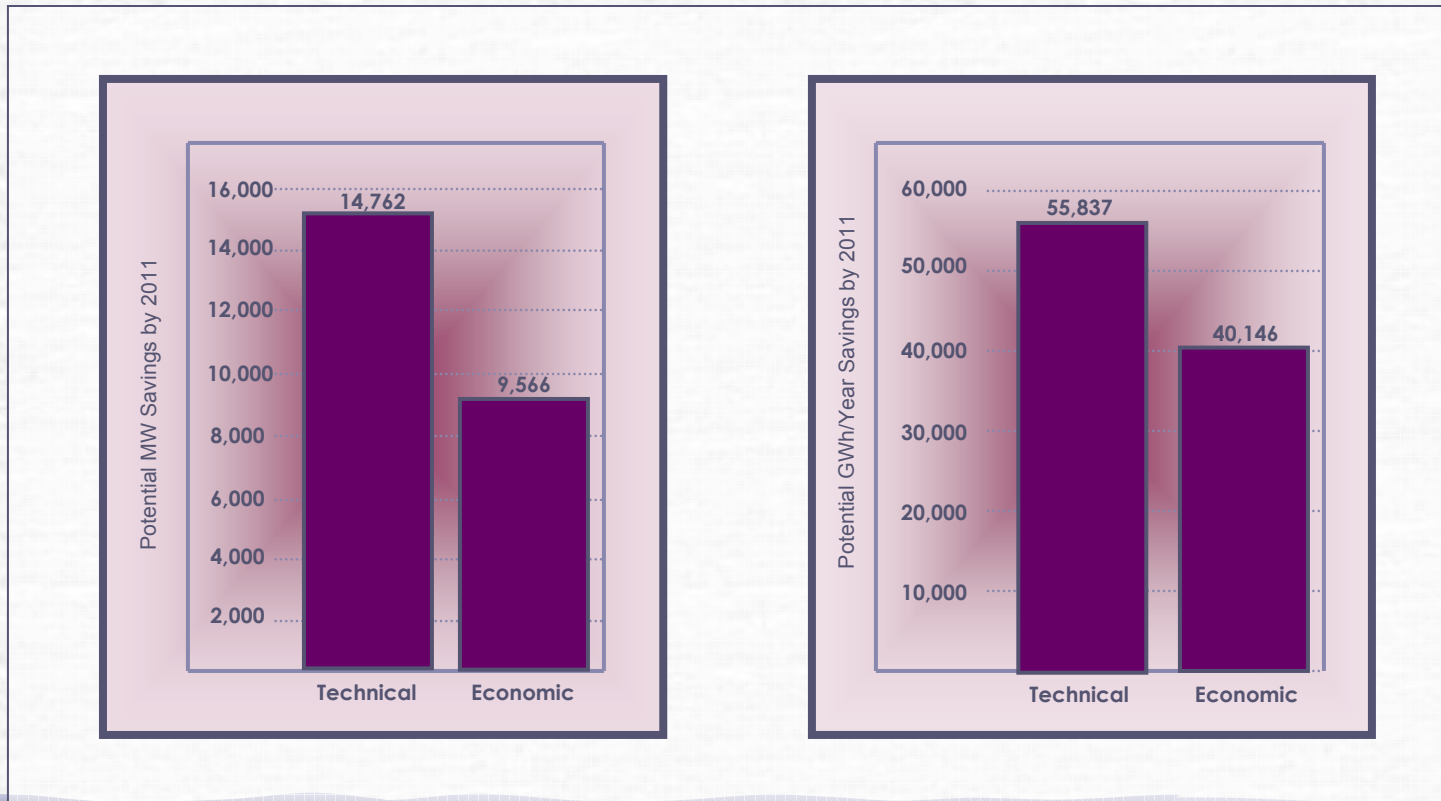
Cost effective?

Total estimated cost of programs & net savings



Possible but not economical

Estimates of technical & economic potential for 2011, MW & GWh/yr



At what costs?

Business as usual

- 53,000 MW in 2002 to 63,000 MW in 2011

Results depend on assumptions

<u>Levelized cost</u>	<u>GWh saving potential in 2011</u>
5 cents/kWh	28,000 GWh
8.5* cents/kWh	40,000 GWh
Tech potential	56,000 GWh

* breakeven point under TRC test

New debate about costs & benefits

CEC's position

Staff Report, 27 Oct 2003

- In support of CA 2003 Integrated Energy Policy Report

New recommended goals for CA

7,000 GWh/yr of annual savings by 2006

13,000 2008

30,000 2013

per capita electricity consumption

7,145 kWh/cap in 2003 6,930 by 2013

Cost-effectiveness of EE not the limiting factor

But other structural limits including sustaining rapid increases in program funding within (changing) regulatory environment

Will new governor support these goals?