

*Planning, Financing and Building*  
*Efficiency Power Plants:*

*Regulatory Practices in California and other States*

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*The Regulatory Assistance Project*

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## What This Presentation Covers:

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- What is an Efficiency Power Plant (EPP) and what is its advantage?
- What is California's experience with investments in EPPs? (*Lessons Learned*)
  - ***How has California and other States created a new “business model” for privately-owned, regulated utilities?***



## What is an Efficiency Power Plant (EPP)?

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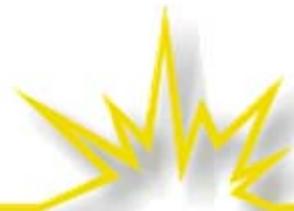
- An EPP is a bundled set of **energy efficiency (EE)** programs that are designed to deliver the energy and capacity equivalent of a large conventional power plant.
  - **Produces “negawatts” and “negawatt-hours” that are functionally equivalent to the kilowatts and kilowatt-hours produced by a conventional power plant.**
  - Can resemble a conventional peaking plant by emphasizing efficiency measures (and demand response) that reduce electricity during periods of peak power consumption.
  - Can resemble a base-load power plant by emphasizing measures to reduce consumption during all hours of the day.



## How is an EPP Different From a Conventional Power Plant?

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- It is built “measure by measure” on the customer side of the meter, right at the point of use.
- It involves individual customers making informed decisions about their energy choices.
- It is more challenging to “meter” than electrons generated by a power plant.



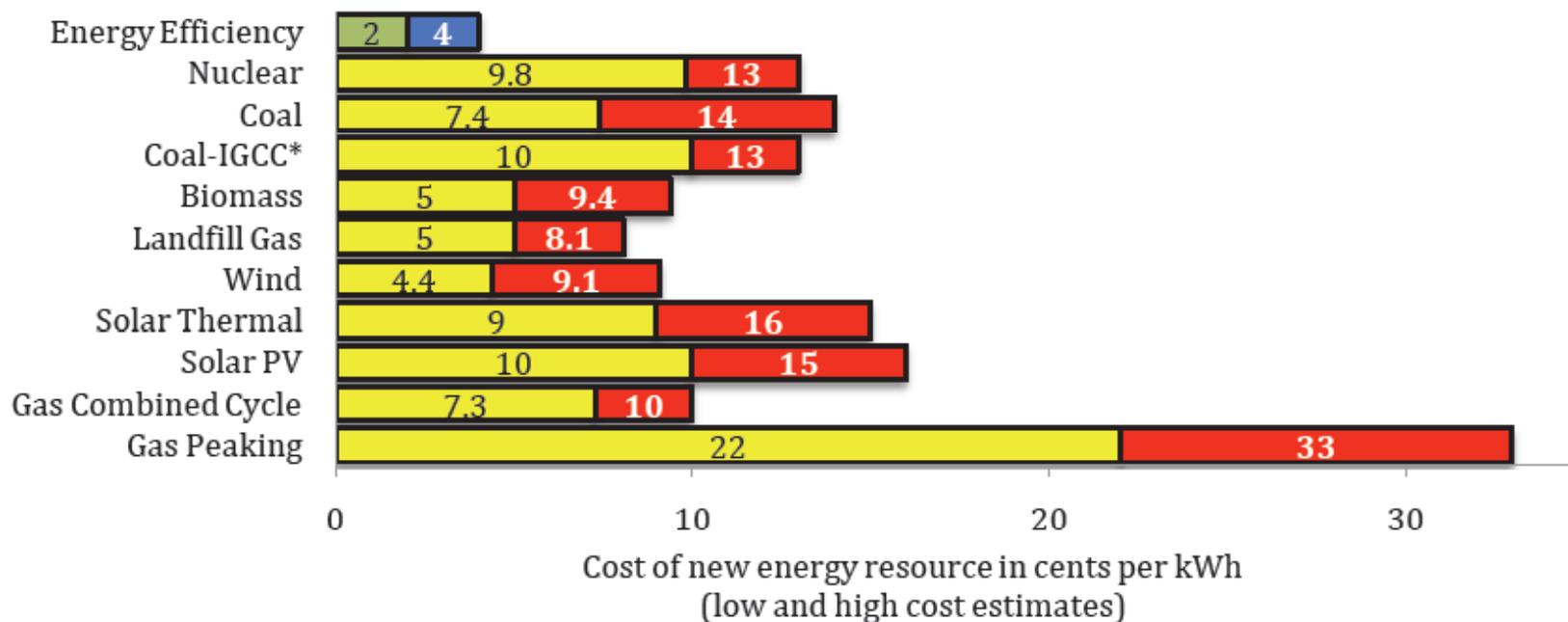
## Important Characteristics of EPPs:

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- *EPPs are the cheapest power plants you can build*
- Quickly implemented
- Circumvent expensive and intrusive transmission lines while bringing “negawatts” to load centers
- Operating costs are unaffected by world oil prices or fuel supply disruptions
- Cleaner than conventional power plants
- “*Buy time*” for the deployment of renewable supply-side technologies (e.g., solar, wind, biomass)
- *Least-cost way to prevent carbon “lock in”*

# EPPs are the Cheapest Power Plants—Even Without Considering “Externalities”

## Levelized Cost Comparison: Energy Efficiency and Supply-Side Alternatives



Sources: *Levelized Cost of Energy Analysis – Version 2.0*, Lazard Management, June 2008 and *National Action Plan for Energy Efficiency*, July 2006.

\*Cost estimates for Coal-IGCC do not include the cost of carbon capture and storage.

Assumes fuel price of \$8/MMBtu for gas-fired plants

**Estimates of conventional large hydroelectric plants in CA (2008 cents/kWh): 8.9 to 34.8**

Source: Table 4A. Levelized Cost for Ranking & Selection California Resources; E3 model inputs for CARB Draft Report on AB 32 Implementation

# EPPs played a critical role in California in response to “first” world energy crisis



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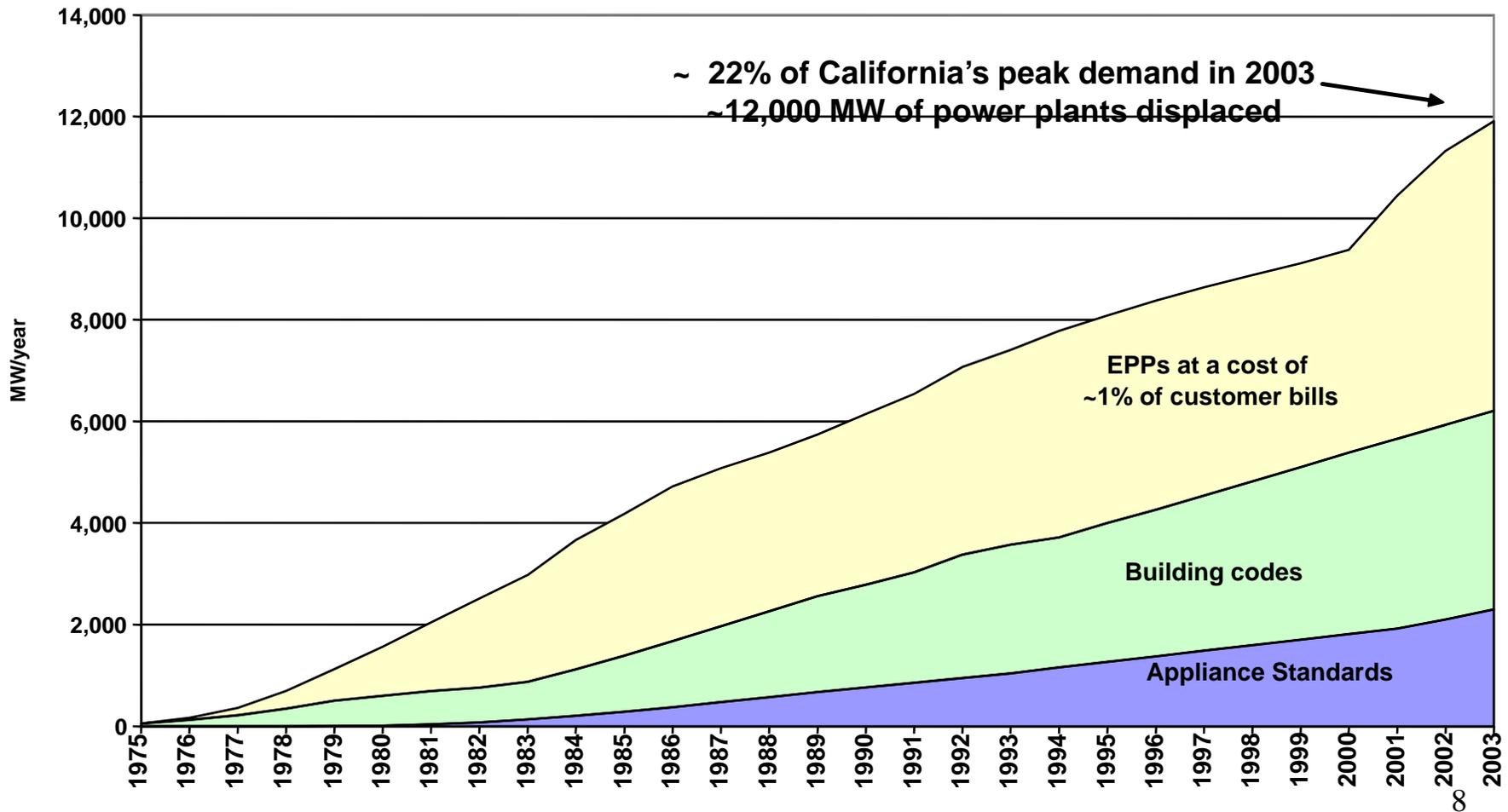
## **Situation in 1974**

- Electricity demand growth ~6%/year
- 75% of electricity generated from oil.
- Utilities planned 20 + nuclear plants
- Other stakeholders wanted alternatives explored, especially EE and renewables

## **Situation by 1990**

- Demand growth reduced to ~2%/year.
- 75% of new energy services provided by efficiency
- New generation (25%) provided by clean & efficient natural gas generation (mostly CHP) and renewables
- No new nuclear or coal plants

# California Annual Peak Demand Savings 1975-2003 have been met by Efficiency



Source: Table 4A. Levelized Cost for Ranking & Selection California Resources; E3 model inputs for CARB Draft Report on AB 32 Implementation



## The Good News is...

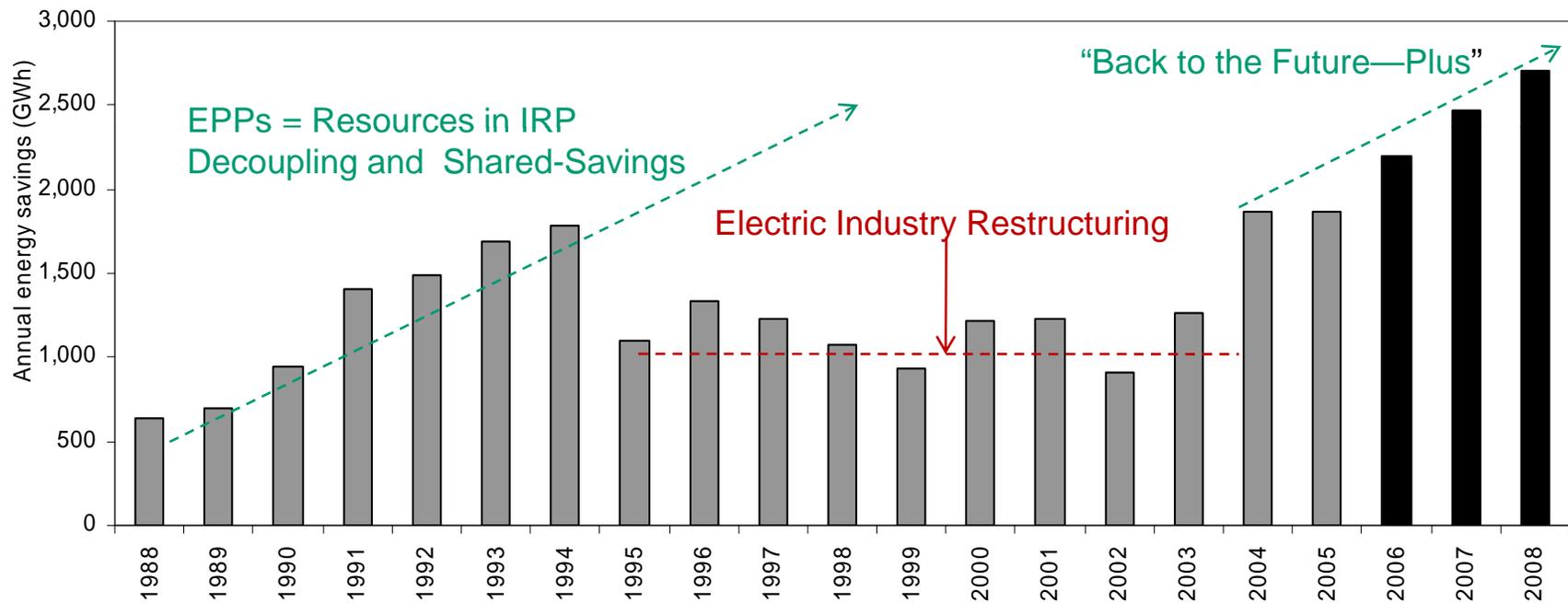
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- Since the mid-1970s, **California's economy quadrupled** while **per capita electricity consumption remained flat.**
- From the mid-1970s through 2003, EPPs in conjunction with efficiency standards **displaced 12 GW in power plant construction** (or 40 plants of 300 MW each)
- EPPs installed during the 1990s before electric restructuring produced **\$670 million in total net benefits to all California ratepayers** (i.e., resource savings minus costs).

**But the BAD NEWS is...**

# California Could Have Done Better: 1995-2002: The “Lost Years”

Historical and Projected Electric Efficiency Savings for California Investor-Owned Utilities



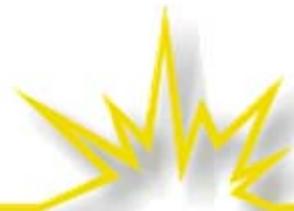
Sources: California Energy Commission; IOU Annual Reports; California Public Utilities Commission



## **Lessons Learned:** Market Barriers to EPPs Persist in Competitive Markets for Energy Services

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- **Insufficient information**
- **High capital costs and lack of capital**
- **Split incentives**
  - Landlord/tenant; Builder/buyer
- **Lack of transparent energy prices and total “costs” of power**
  - Energy prices facing consumers are not “real time”
  - **Market prices facing suppliers and consumers do not reflect externalities, e.g., the cost of carbon emissions**
- **Regulatory framework discourages investments in EPPs**
  - **“Throughput Disincentive”**: EPPs reduce sales, which reduces the utility’s ability to recover its investment costs, whether distribution-only or vertically integrated
  - **“Steel in the ground” investments create earnings for utility shareholders—not the provision of least-cost energy services.**



## “Back-to-the-Future Plus” Policies for Planning, Financing and Building EPPs in California

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- Policies, statutes and regulations that consistently **place EPPs “first in the loading order”** for meeting California’s energy needs.
- **A stable long-term source of funding** for meeting **aggressive EPP targets** (i.e., through non-bypassable distribution charges).
- **Improved price signals** to customers through “smart meters” and other approaches
- **Efficiency codes and standards** (e.g., appliances and new construction) continue to raise the bar for EPP performance.
- **Regulatory Reforms to Create a Business Model in the Power Sector that will Rapidly Deploy EPPs**



## Modifying the Utility Business Model: Removing “The Throughput” Disincentive

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- Decoupling (“sales true-up”) breaks the link between utility sales and revenues (profits) so that utilities make money by controlling costs, not by increasing sales
- In the US, many states have adopted (or are in the process of considering) decoupling so that utilities are not harmed financially by successful EE
  - California, Vermont, Colorado, Connecticut, Idaho, Arizona, Delaware (considering), Kansas (considering), Maryland, Massachusetts (considering), Michigan, Minnesota (considering), New Hampshire (considering), New Jersey (natural gas), New Mexico (in statute), New York (in Commission order), North Carolina (considering), Oregon, Utah (natural gas), Washington (considering), Wisconsin.



## Modifying the Utility Business Model: Providing Positive Financial Incentives for EE

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- **Shared Savings:** Utility earns for shareholders based on some percentage of the “net” benefits (resource savings minus costs) of EPPs, often tied to a minimum threshold of kwh/kW reductions
  - California, Arizona (one utility), Georgia (one program), Hawaii, Minnesota, Texas, Wisconsin (one utility), Idaho (pilot), Ohio (% of avoided costs, not net benefits)
  
- **Management Fees:** Utility earns a management fee (% of program costs) linked to achieving or exceeding savings goals or participation levels.
  - Colorado, Connecticut, Georgia (one utility), Massachusetts, New Hampshire, Rhode Island



## Modifying the Utility Business Model: Positive Financial Incentives for EE (continued)

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- **Cost-Capitalization:** Utility capitalizes annual EE programs costs (that are traditionally expensed without any return to shareholders) and earns the authorized rate of return on equity (ROE) for other utility investments. May include a bonus (ROE) for capitalized EE costs.

- Nevada (500 basis points bonus ROE), Wisconsin (one utility)

- **Financial Incentive Mechanisms Authorized by Statute or Rulemaking/Under Consideration in Other States**

- Florida (HB7135), Kansas (Docket 08-GIMX-441-GIV), Maryland (PSC may approve), Michigan (statute permits cost-capitalization plus bonus), New Mexico (2007 amendments to 2005 Act), North Carolina (by proposal)



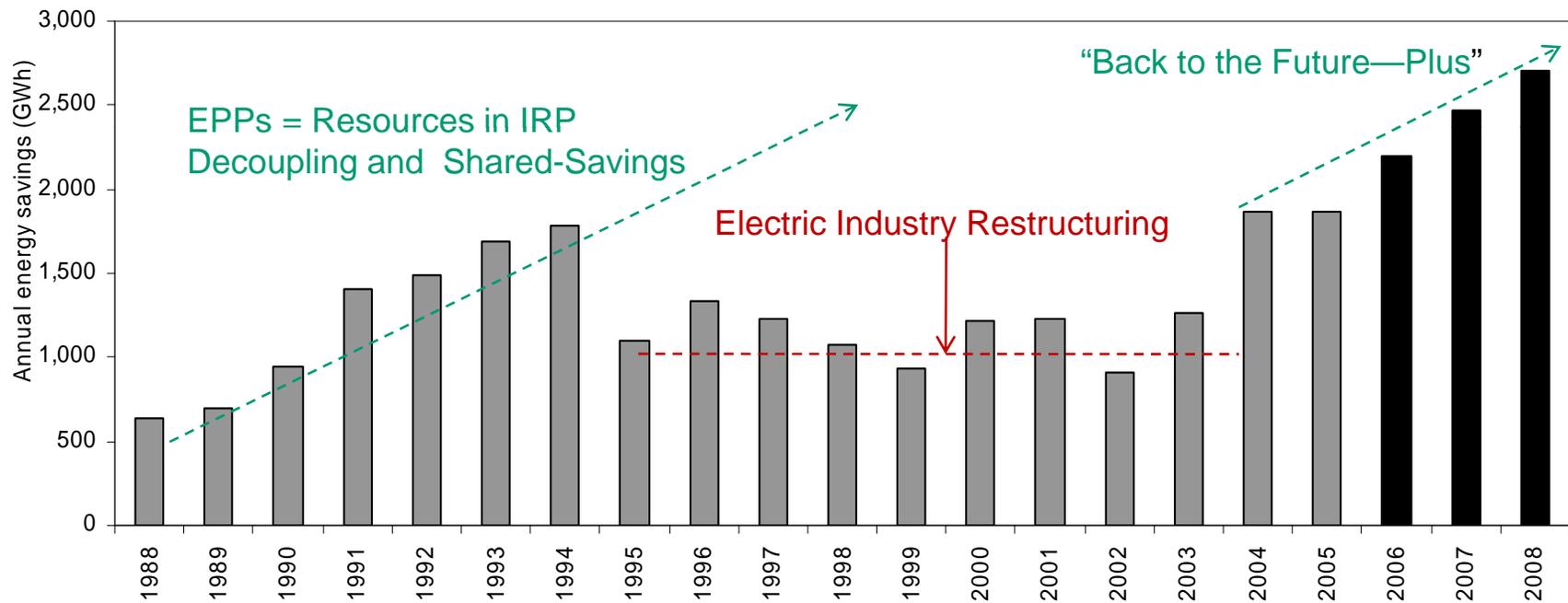
# What the Federal Stimulus Bill Says About Utility Financial Incentives

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- \$3.1 billion in stimulus funds will be allocated by the US Department of Energy (in the form of grants):
  - To States that “seek to implement...a general policy that ensures that **utility financial incentives are aligned with helping their customers use energy more efficiently** and that provide timely cost recovery and a **timely earnings opportunity for utilities associated with cost-effective measurable and verifiable efficiency savings**, in a way that sustains or enhances utility customers’ incentives to use energy more efficiently.”
- To receive these funds, states are also required to have building codes that meet or exceed standards [IECC (res) or ASHRAE 90.1 2007 (nonres)]
- Grants will be prioritized for expansion of existing state and ratepayer funded programs (as opposed to inventing anything new).

# How is California Doing With “Back to the Future--Plus”?

Historical and Projected Electric Efficiency Savings for California Investor-Owned Utilities



Sources: California Energy Commission; IOU Annual Reports; California Public Utilities Commission



## How is California Doing? For EPPs Built 2006-2008

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- \$1.8 billion dollars in ratepayer funding over 3 years
- Replacing the equivalent of 1500 MW conventional power plants
- Projected to producing \$5.4 billion in savings over the life of the EPPs
- Total costs to install the EPPs (including contributions by participating customers) of \$2.7 billion
- **Projected net savings to all consumers from this investment = \$2.7 billion** (or 100% return on investment)
- EM&V results are coming in--are controversial--but no one contends that the EPPs are not highly cost-effective



## How Is California Doing? (continued)

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### Longer Term Projection for EPPs in California:

- New EPPs are projected to (statewide) provide cumulative additional savings of 23,000 GWh/year by 2013, avoiding the need to build twelve (12) 300 MW power plants.
- And the average cost of savings is projected at 3 cents to 4 cents per kWh



# Key Components for Successful Implementation of EPPs

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- **Recognize Energy Efficiency as a Cost-Effective Power Plant**
- Make a Strong Commitment to Plan, Finance and Build EPPs:
  - Evaluate the Resource—Technical and Economic Potential and Set Achievable but Aggressive Savings Targets
  - Establish a Stable Source of Funding
  - **Evaluate Current Regulatory Incentives and Consider Creating a New Business Model for the Power Sector that will Deliver Least-Cost Energy Services to Customers**
- Improve Price Signals to Customers
- Keep “Raising the Bar” with Efficiency Codes and Standards
- Continue to Measure and Verify “Negawatts” and “Negawatt-hours”



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“You can’t solve a problem with  
the same thinking that created it”

~Albert Einstein



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“You can’t solve a problem with the same regulations that created it”

~ Meg Gottstein



# About The Regulatory Assistance Project (“RAP”)

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**RAP** is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP is funded by US Department of Energy, several foundations, and international agencies. We have worked in 40+ states and 16 nations.

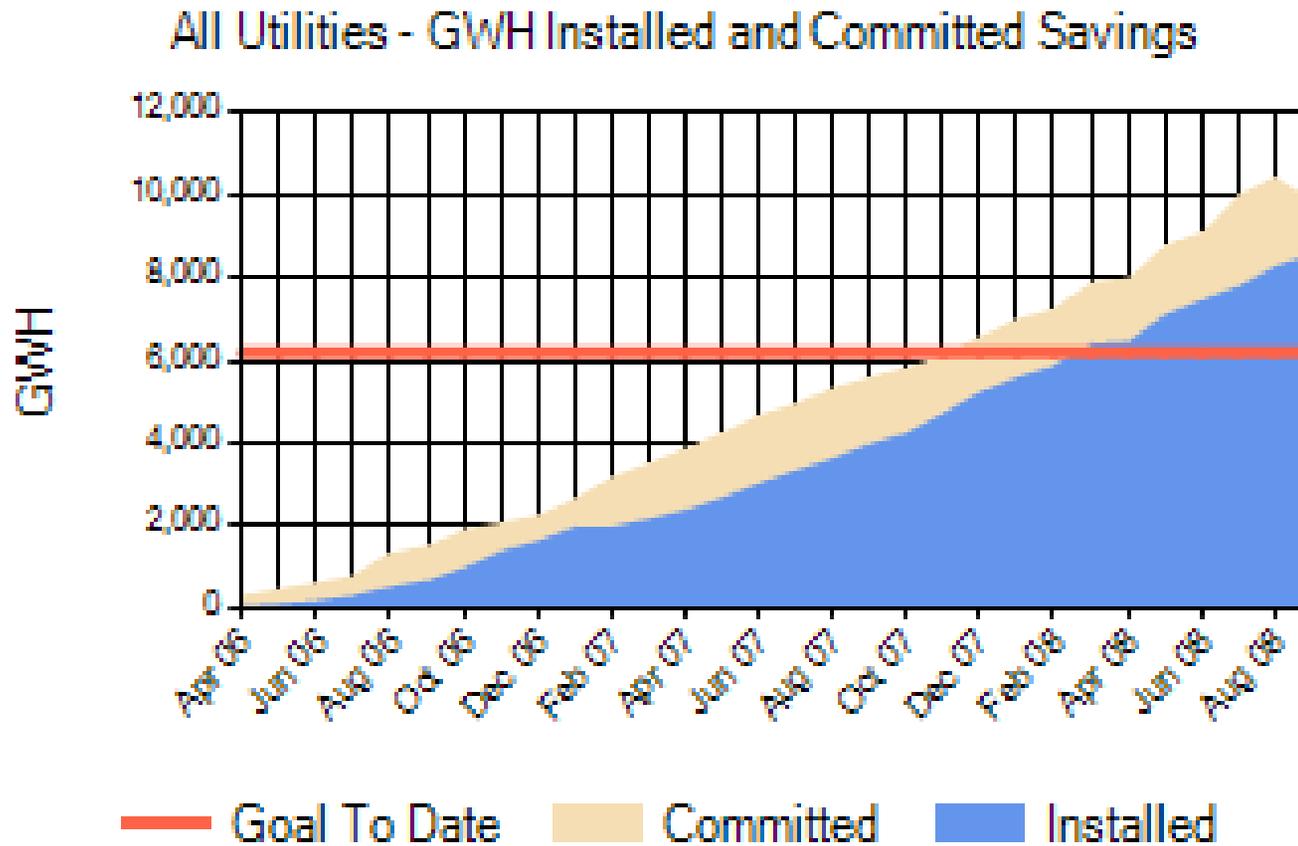
**Meg Gottstein** served as Administrative Law Judge at the California Public Utilities Commission for over 20 years, and was a key architect of California’s energy efficiency and climate change policies for the power sector. Before joining the Commission, Meg consulted for the US National Governor’s Association and other clients on renewable energy, energy efficiency and other energy topics. In addition, she served from 1979 to 1981 in the Carter administration as the Department of Energy’s Regional IX Director for the Appropriate Technology Grants program. Meg Gottstein received a Bachelor of Arts in German and Economics from Tufts University and a Masters of Public Policy from the Kennedy School of Government at Harvard.

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# Achievements in California (2006-2008)

# Savings Goals and Accomplishments Through August 2008





## Reported EE Savings and Net Benefits

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### California Energy Efficiency Portfolio Savings and Net Benefits (2006-2008 Efficiency Installations)

Company	Total Cost*	Total Savings	Net Benefits
PG&E	\$826,713,538	\$1,851,409,215	\$1,024,695,677
SCE	\$764,770,484	\$1,619,402,088	\$854,631,604
SoCalGas	\$173,589,689	\$334,684,980	\$161,095,291
SDG&E	\$209,659,142	\$507,785,116	\$298,125,974
<b>Total</b>	<b>\$1,974,732,853</b>	<b>\$4,313,281,399</b>	<b>\$2,338,548,546</b>

For Pacific Gas & Electric Company, Southern California Edison Company, San Diego Gas & Electric Company and Southern California Gas Company combined; As Reported through June, 2008  
Source: <http://eega2006.cpuc.ca.gov/DataQueriesDisplay.aspx?QueryName+QuarterlyPortfolioMetrics>

\*Includes customer out-of-pocket costs, i.e., "total resource costs".



## How are “Energy Efficiency Utilities” in Vermont/Oregon Doing?

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### ➤ Vermont:

- Since 2000, funding for EPPs equals \$17.5 million/year.
- The EEU has built EPPs totaling 80 MWs
- EPPs produce “negawatt-hours” at a cost of \$0.026/kWh, compared with average retail prices of \$0.106/kWh

### ➤ Oregon:

- Funding for EPPs in 2007 equals \$50 million/year
- In 2007 alone, the EEU built 35 MW of EPPs at a levelized cost per kWh of \$0.014/kWh
- Total construction of EPPs to date: 178 MW



## How is New York Doing?

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- New York is financing EPPs at approximately \$175 million each year.
- EPPs have achieved energy savings at a cost of \$0.02/kWh while the price of electricity is at \$0.16/kWh
- In just its Commercial/Industrial performance program, New York has been able to construct EPPs that save more than 790 GWh per year.



## How Is Texas Doing?

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- In 2007, \$72.6 million was spent on building EPPs through standard performance contracting
- EPPs build in 2007 = 122 MW saving 371 GWh annually
- Net benefits (resource savings minus costs) = \$155.4 million over the life of the EPPs
- EPPs through standard performance contracting are required to meet 20% of electric demand by 2010.



# Miscellaneous Additional Presentation Slides



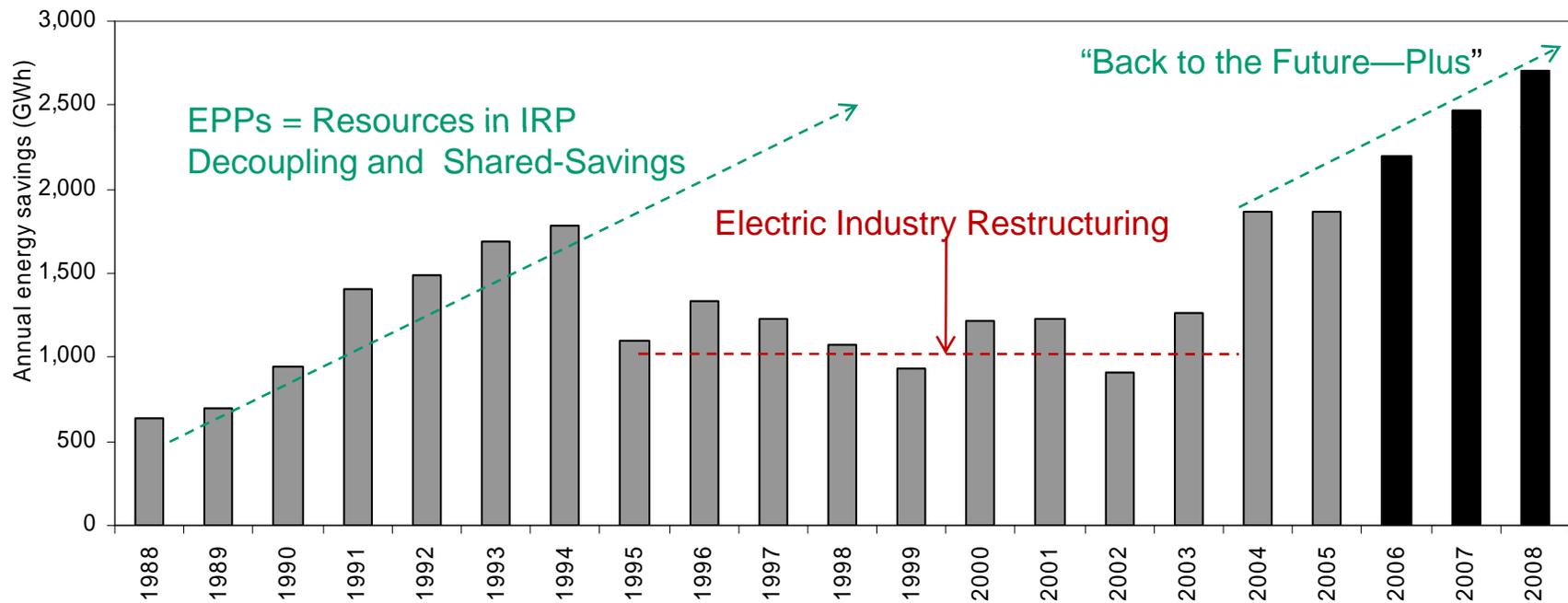
## Lessons Learned (cont.)

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- Getting **Market Prices** for Energy “Right” (including Carbon Costs) **Will Not Produce Optimal Level of EPPs.**
  - **EE “Complementary Policies” Are Needed** to Supplement and Strengthen Cap-and-Trade and other Approaches (e.g., Carbon Taxes) to Reflect the Full Cost of Energy in the Marketplace.
- ....And EE Complementary Policies Will Also Keep the Cost of Cap-and-Trade Reasonable (**another story for another day**)....

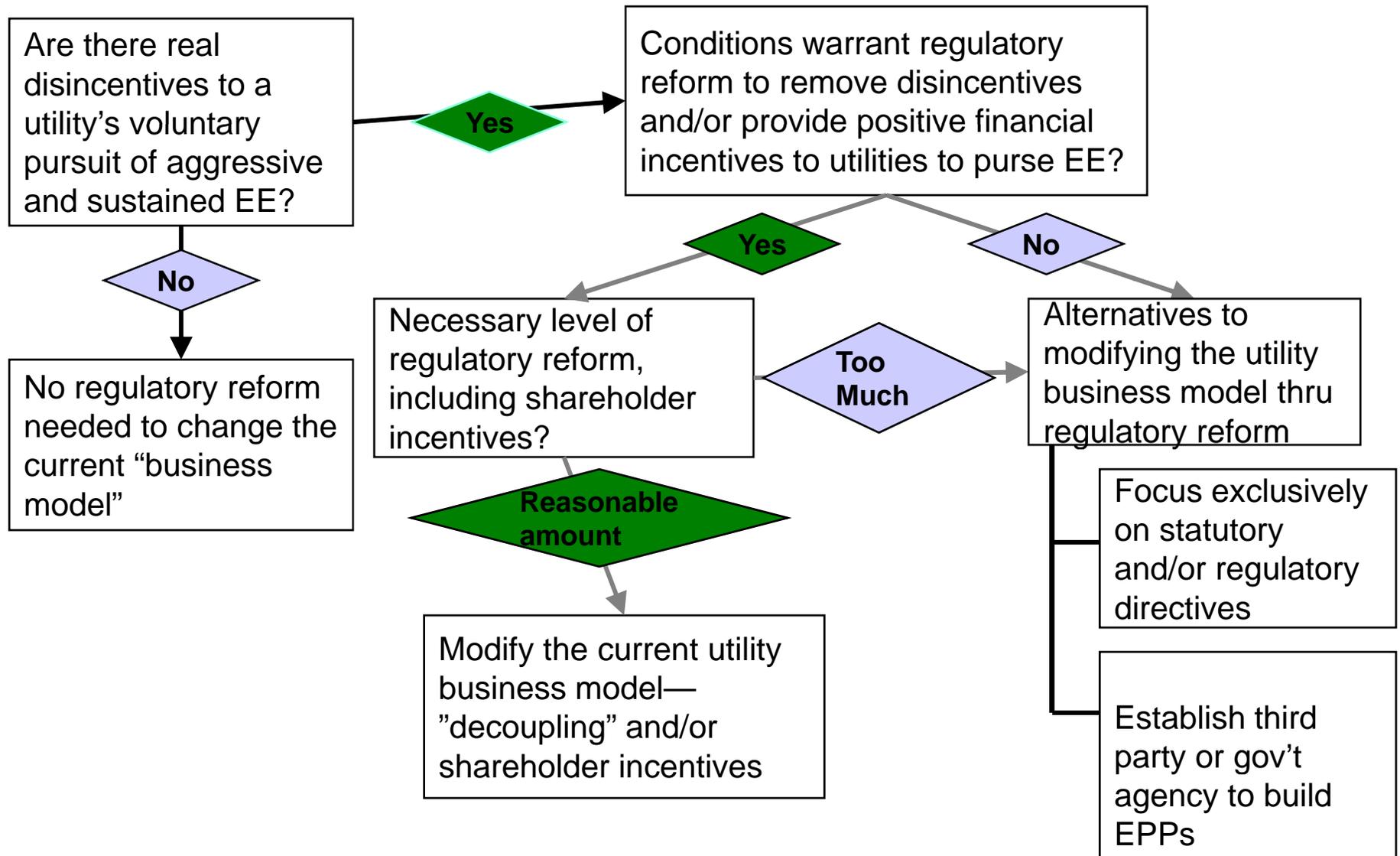
# So California Went “Back to the Future...Plus” After its Second Energy Crisis (2000-2002)

Historical and Projected Electric Efficiency Savings for California Investor-Owned Utilities



Sources: California Energy Commission; IOU Annual Reports; California Public Utilities Commission

## Answer Will Depend on the Following Considerations:

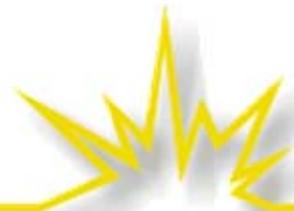




# There is Not a Single “Right” Answer

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- There are successful administrative models for planning, financing and building EPPs through non-utility entities (or hybrid approaches)
  - Vermont, New York, Oregon (see extra slides)
  - These states have also adopted or are considering regulatory reforms in the context of these models (Vermont/Oregon-decoupling; New York-incentives for some utility-run programs)
- More and more States are considering a range of regulatory reforms to create a new business model for (primarily) investor-owned utility delivery of EE, by considering ways to:
  - Remove financial disincentives to EE
  - Provide positive financial incentives for EE



# The “Throughput Disincentive”

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- For most utility regulation, *rates are set based on authorized utility costs divided by projected sales*
  - If projected sales equal actual sales, the utility will exactly recover its authorized non-fuel costs, which include an authorized rate of return on investments.
- Actual utility actual revenues will therefore depend on actual unit sales (kWs, kWhs)
- Increases in sales will increase revenues and profits
- Reductions in sales will lower utility revenues and profits
- *In the US, the effect is very powerful....*
  - For every 1% change in sales, profits can vary by more than 10%



# How Decoupling Works

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- Utilities submit their revenue requirements and estimated sales to regulators
- The regulators sets the rates by regularly applying adjustments to ensure that utilities collect **no more and no less** than is necessary to run the business and provide a fair return to investors (i.e., enough to collect the “authorized revenue requirements”)
- Any excess revenue gets credited back to customers
- Any shortfall gets recovered later from customers
- **Decoupling removes a strong disincentive--makes the companies indifferent to changes in sales--but does not provide a positive financial incentive to pursue EPPs relative to “steel-in-the ground” investments**