Planning, Financing and Building Efficiency Power Plants:

Regulatory Practices in California and other States

Meg Gottstein
Director, The Regulatory Assistance Project

Santiago
November 26, 2008

The Regulatory Assistance Project

www.raponline.org Offices in California, New Mexico, Maine, Vermont and Bejing

What This Presentation Covers:

- What is an Efficiency Power Plant (EPP) and what is its advantage?
- What is California's experience with investments in EPPs?
- How does California plan, finance and build EPPs?
- What approaches do other states take?
- What are key components for the successful implementation of EPPs?

Please Note:

- All values are in US dollars
- 1 US$ = 630 Pesos (Chilean)
- 0.01 US$/kWh (or 1 ¢/kWh) = 6.3 Pesos
- US numbers are represented as 1,000.00
  (1.000,00 in Chile.)
- Although this presentation describes energy efficiency in terms of kWh and kW savings, energy efficiency can substantially reduce natural gas usage as well.

What is an Efficiency Power Plant (EPP)?

- An EPP is a bundled set of energy efficiency 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 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.

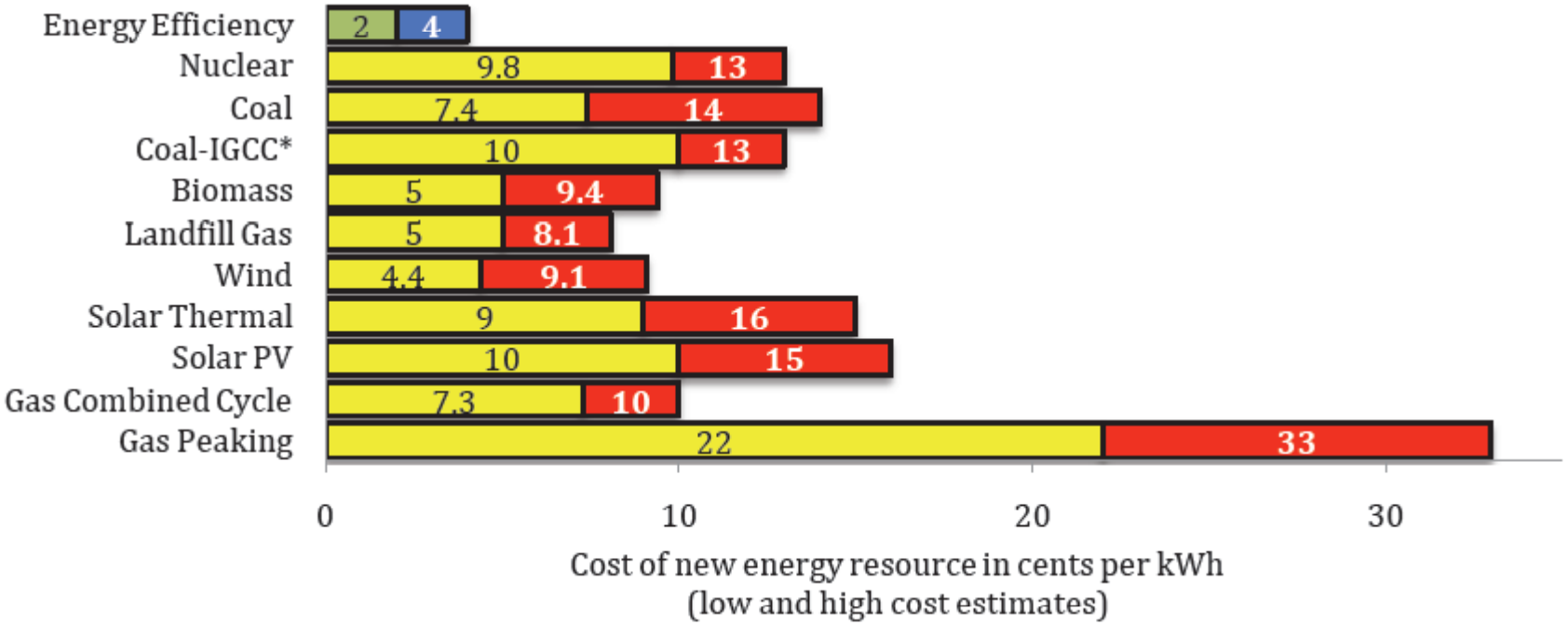
How is an EPP different from a conventional power plant?

- 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.

Why EPPs are the primary "power source" for robust and sustained economic growth in California:

- EPPs are cheap (~ US$ 0.03/kWh)
- EPPs can be implemented relatively quickly
- EPPs do not create "stranded investment"
- EPPs do not require expensive and intrusive transmission lines to bring "negawatts" to load centers
- EPPs are unaffected by world oil prices or fuel supply disruptions
- EPPs are cleaner than conventional power plants
- EPPs can "buy time" for the deployment of renewable supply-side technologies (e.g., solar, wind, biomass).

Levelized Cost Comparison: Energy Efficiency and Supply-Side Alternatives

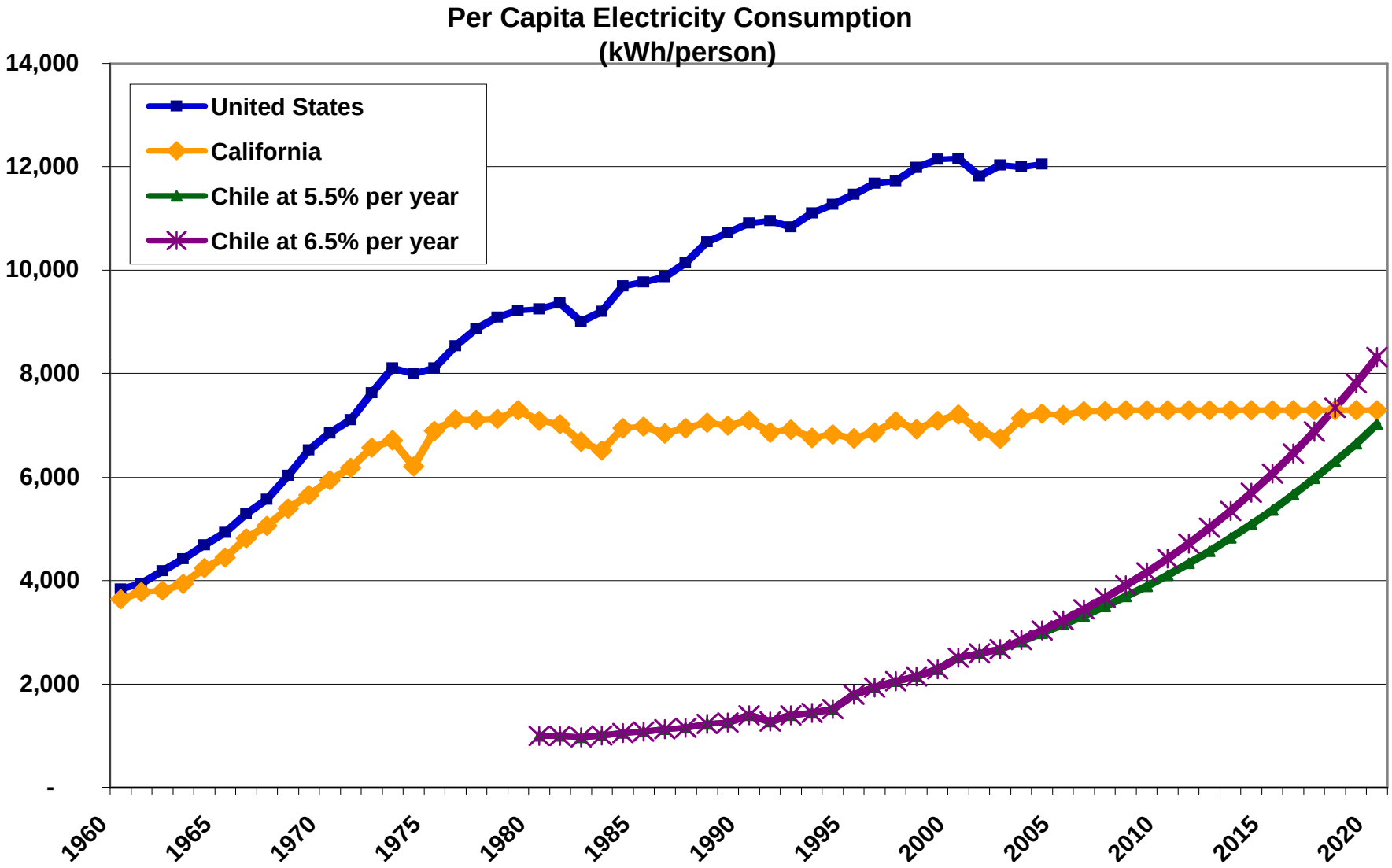


Sources: *Levelized Cost of Energy Analysis – Version 2.0*, Lazard Management, June 2008 and *National Action Plan for Energy Efficiency*, July 2006.
*Cost estimates for Coal-IGCC do not include the cost of carbon capture and storage.

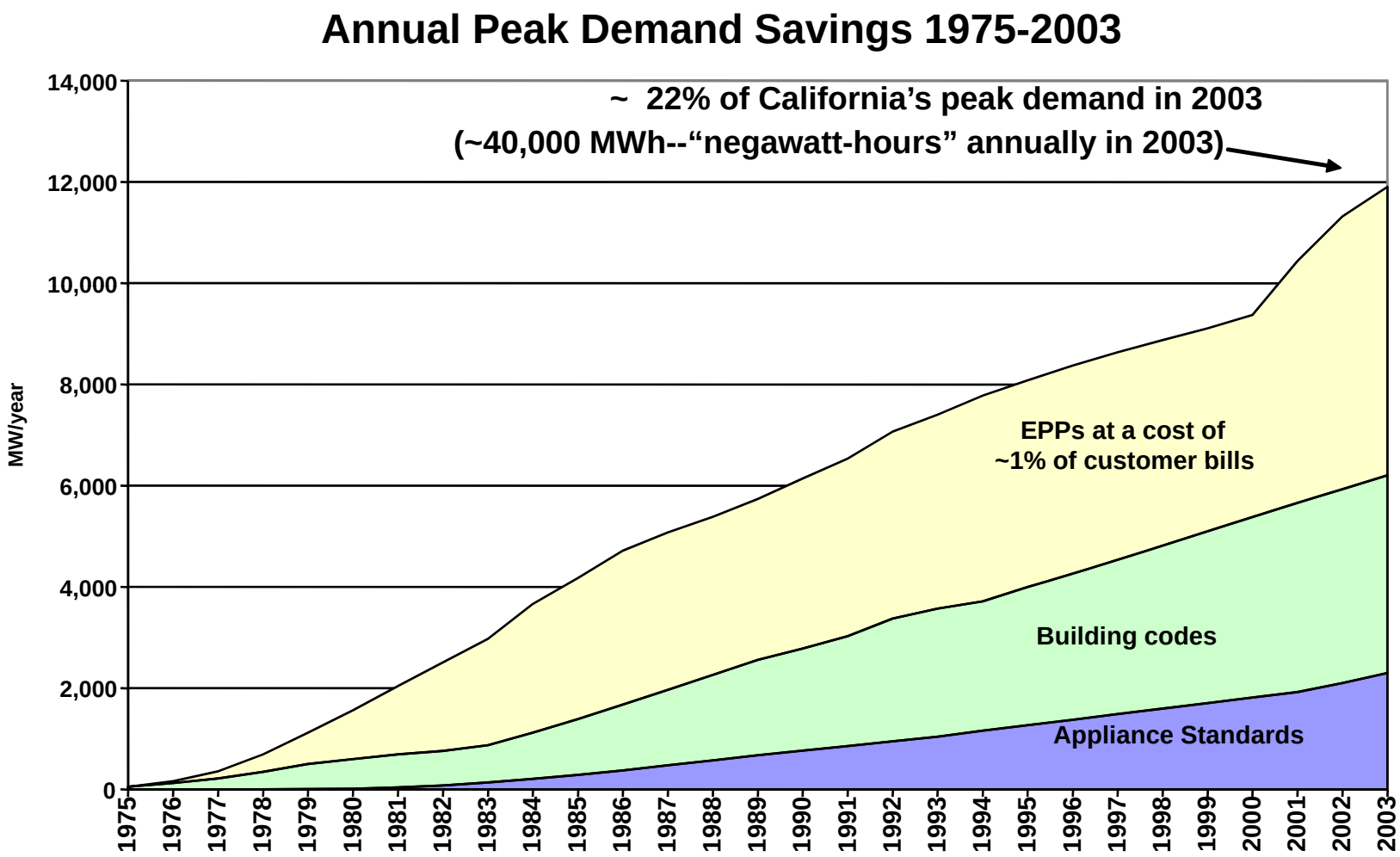
Assumes fuel price of $8/MMBtu for gas-fired plants

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


Per Capita Electricity Consumption
(kWh/person)
United States
California
Chile at 5.5% per year
Chile at 6.5% per year
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020

Impact of Efficiency Power Plants ("EPPs") and Standards



Source: Art Rosenfeld, California Energy Commission

California's Experience with EPPs:

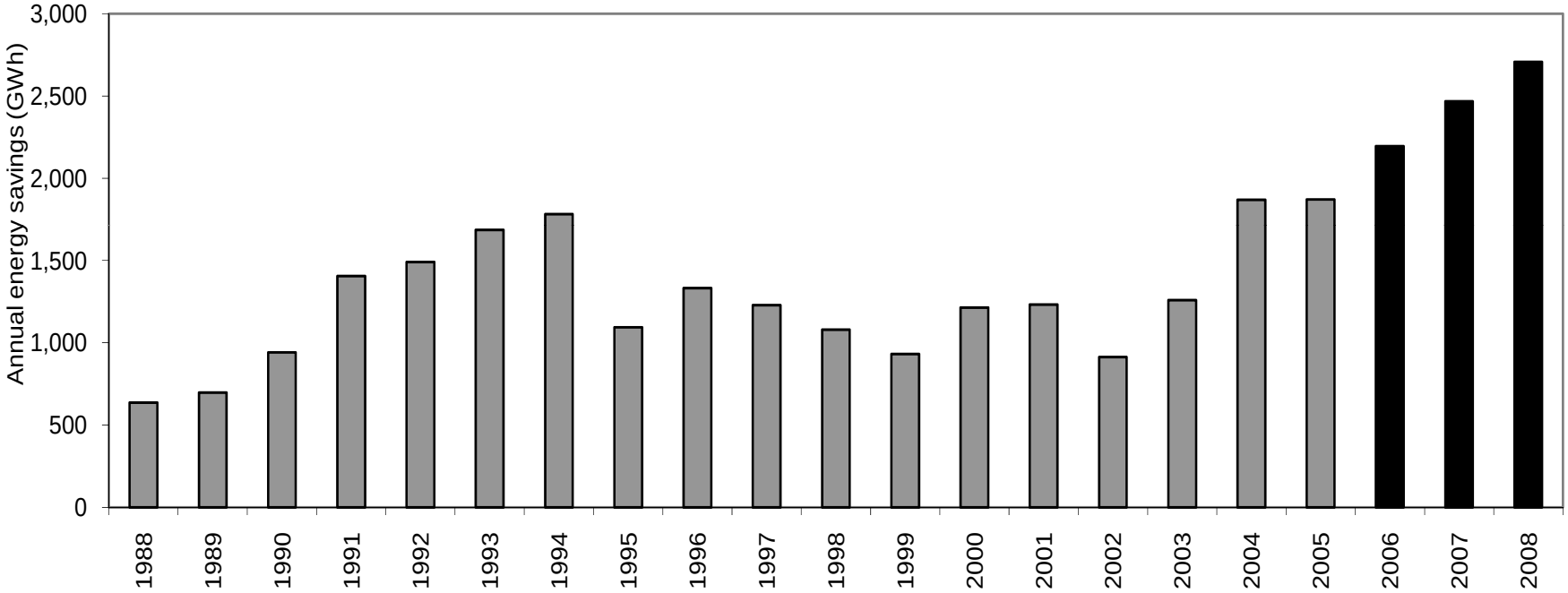
- Since the mid-1970s, California's economy quadrupled while per capita electricity remained flat.
- From the mid-1970s through 2003, EPPs in conjunction with efficiency standards displaced 12 GW in power plant construction (or 40 plants of 300 MW each)
- **California has calculated that the EPPs installed during the 1990s before electric restructuring produced $670 million in total net benefits to all California ratepayers (i.e., resource savings minus costs).**
- **The EPPs installed in 2006-2008 alone are expected to produce over $2.5 billion in total net benefits (resource savings minus costs).**

But California could have done better:

We "took our eye off the ball" between mid-1990s and the 2000-2001 energy crisis:

- We thought a restructured electric industry and competitive electric market would invest in EPPs at an increasing rate;
- **We were wrong!**
- In 2000-2001 California was facing power shortages, soaring natural gas prices with major distribution companies in bankruptcy and increasing environmental constraints.
- We needed to take steps to re-invigorate the energy efficiency industry and re-evaluate the role of distribution utilities in delivering "negawatts" and "negawatt-hours".

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



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

How Did California Address These Challenges?

- Drawing from successful experience in the 1980s, the "California Collaborative" was reborn.

- Distribution and generation companies, environmental groups, customer organizations, research institutes and government agency staff came together to address key questions on how best to promote energy efficiency in the power sector.

Key Questions:

- What is the technical and economic (cost-effective) potential for energy efficiency in California?
- What are still the major barriers to investing in all cost-effective energy efficiency in California?
- What role should government and regulation play in removing those barriers?
- What “business model” is best suited for the construction of EPPs in California, and as quickly as possible?

Here's What California Concluded:

- Technical and Economic Potential for Energy Efficiency: Enormous cost-effective potential still untapped. **Pricing policies and market forces alone are not sufficient to tap that potential.**

- What the Public Sector Should Do:

  - Establish policies, statutes and regulations that consistently **place EPPs "first in the loading order"** for meeting California's energy needs.
  - **Adopt concrete short- and long-term savings targets** for the construction of EPPs (GWh and MW savings goals) to guide decisions in the power industry.

California's Conclusions (continued)

- **Establish a stable long-term source of financing** for meeting the EPP targets (i.e., through non-bypassable distribution charges).
- **Keep improving price signals** to customers through "smart meters" and other approaches.
- Keep raising the bar for EPPs through **efficiency codes and standards (e.g., appliances and new construction).**
- Continue **independent measurement and verification** (M&V) of "negawatts" and "negawatt-hours" that builds upon 20 years of experience in California.

California's Conclusions (continued)

Key Finding: California needs a **new business model** in the power sector that is **consistent with the goal of delivering least-cost energy services to customers, not just "electrons".**

- California's distribution companies are well positioned to "build" EPPs, but they have insufficient motivation to do so.
- Meeting the goals for EPPs requires a revised "compact" between the distribution companies and the public they are given the license to serve.

The Regulatory Challenge:

Can We Align the Interests
of Private Distribution Companies
with the Public Interest?

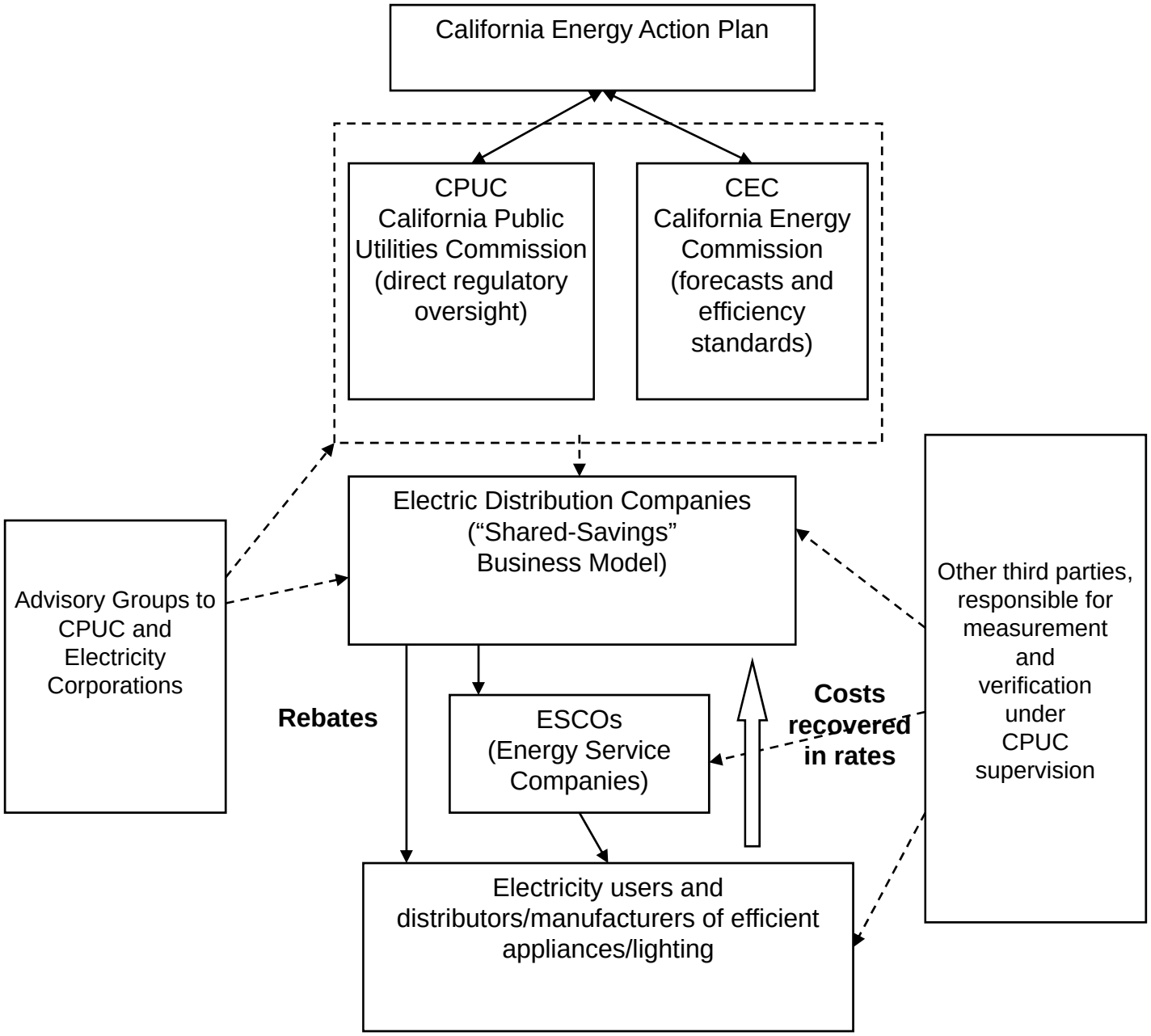
Change Needed in the Compact and Business Model

- From the **Traditional Compact** (**"Cost of Service Regulation"**), where the distribution company is encouraged to:
  - Make large and increasing "steel in the ground" capital investments (especially when the distribution company also owns generation facilities), and
  - Promote the sale of "electrons."

Changes in the Compact and Business Model….(continued)

To a **Revised Compact** (**"Share the Savings" Regulation**), where the distribution company is service-oriented and motivated to build EPPs instead of brokering electrons. Under this approach:

- Potential profits on steel-in-the-ground investments continue to be effectively capped through cost-of-service regulation, but now
- Distribution companies can earn significantly above that cap by building cost-effective EPPs (i.e., by sharing that cost savings with ratepayers)
- Distribution companies do not benefit (or lose) financially with fluctuations in sales levels ("decoupling" of sales from profits).


California Energy Action Plan
CPUC
California Public Utilities Commission (direct regulatory oversight)
CEC
California Energy Commission (forecasts and efficiency standards)
Electric Distribution Companies ("Shared-Savings" Business Model)
Advisory Groups to CPUC and Electricity Corporations
Other third parties, responsible for measurement and verification under CPUC supervision
Rebates
ESCOs (Energy Service Companies)
Costs recovered in rates
Electricity users and distributors/manufacturers of efficient appliances/lighting

How is California Doing?

For EPPs built in 2006-2008:

- $1.8 billion dollars in ratepayer funding over 3 years
- Replacing the equivalent of 1500 MW conventional power plants
- 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
- **Net savings to all consumers from this investment = $2.7 billion** (or 100% return on investment!)

Longer Term:

- 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 to remain ~ $0.03/kWh.

What Approaches Have Other States Taken?

- States with a strong commitment to building EPPs have adopted **stable long-term financing sources** through electric (and natural gas) rates. (e.g., Connecticut, Massachusetts, New York, Texas, Oregon, Rhode Island, Vermont, Wisconsin)

- A growing number have also adopted **firm energy efficiency savings targets** either via legislation or regulation.

- Depending on the power market structure, regulatory framework and other factors, **the adopted "business model" for building EPPs varies across the various states.**

The "Energy Efficiency Utility" Model (Vermont, Oregon)

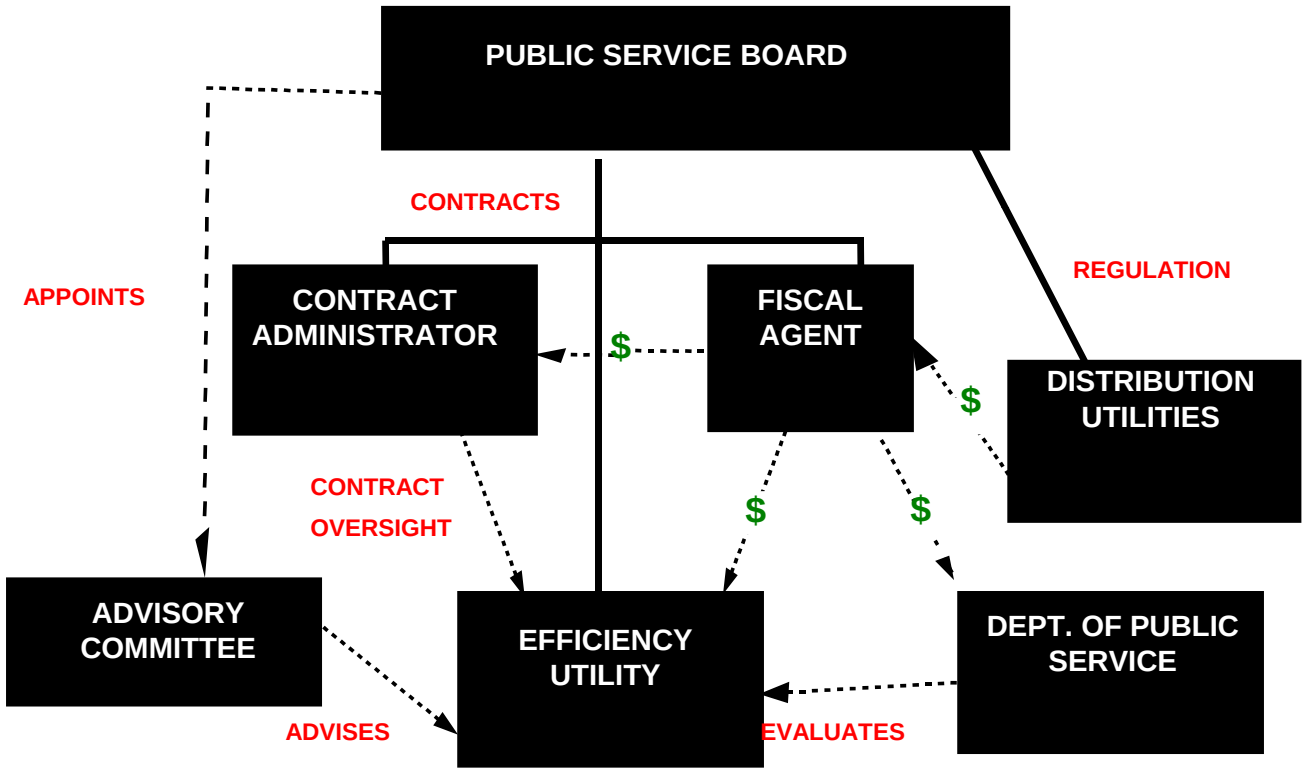
A separate **Energy Efficiency Utility (EEU)** was established by law to pursue all cost-effective EPPs with ratepayer funding (per-kWh charge):

- A non-profit organization became the EEU via competitive bid.
- EEU can install measures with its own staff but mainly contracts with other organizations (e.g., energy service companies or non-profit service groups);

Energy Efficiency Utility Model (Continued)

- EEU's financial rewards tied directly to its success in acquiring cost-effective energy efficiency;
- Distribution companies continue to be regulated under the "Traditional Compact" with some modifications (e.g., decoupling).
- Regulators involve EEU in a planning process with the distribution companies and generators to make sure that EPPs are integrated into any plans for new power plant construction.

Energy Efficiency Utility Model (Vermont)



The "Public Agency Administrator" Model (New York):

- An existing or new state public agency is designated as the administrator of EPPs
  - The agency selects the most cost-effective programs for EPP.
  - Programs are implemented by contractors (distribution companies, private sector companies) through competitive bidding.
  - Agency staff and technical evaluation panels evaluate bids.

- Regulators oversee the agency administrator as they would the Energy Efficiency Utility

Key Components for Successful Implementation of EPPs

- 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
  - Set Goals—Achievable but Aggressive
  - Establish a Stable Source of Funding
  - Create a Business Model for the Power Sector that will Deliver Least-Cost Energy Services to Customers
- Increase Capability to Measure and Verify "Negawatts" and "Negawatt-hours"
- Improve Price Signals to Customers
- Keep "Raising the Bar" with Efficiency Codes and Standards

"You can't solve a problem with the same thinking that created it"

"Usted no puede resolver un problema con el mismo pensamiento que lo creó"

– ***Albert Einstein***

About The Regulatory Assistance Project ("RAP")

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.

Contact Information: mgottstein@raponline.org; www.raponline.org

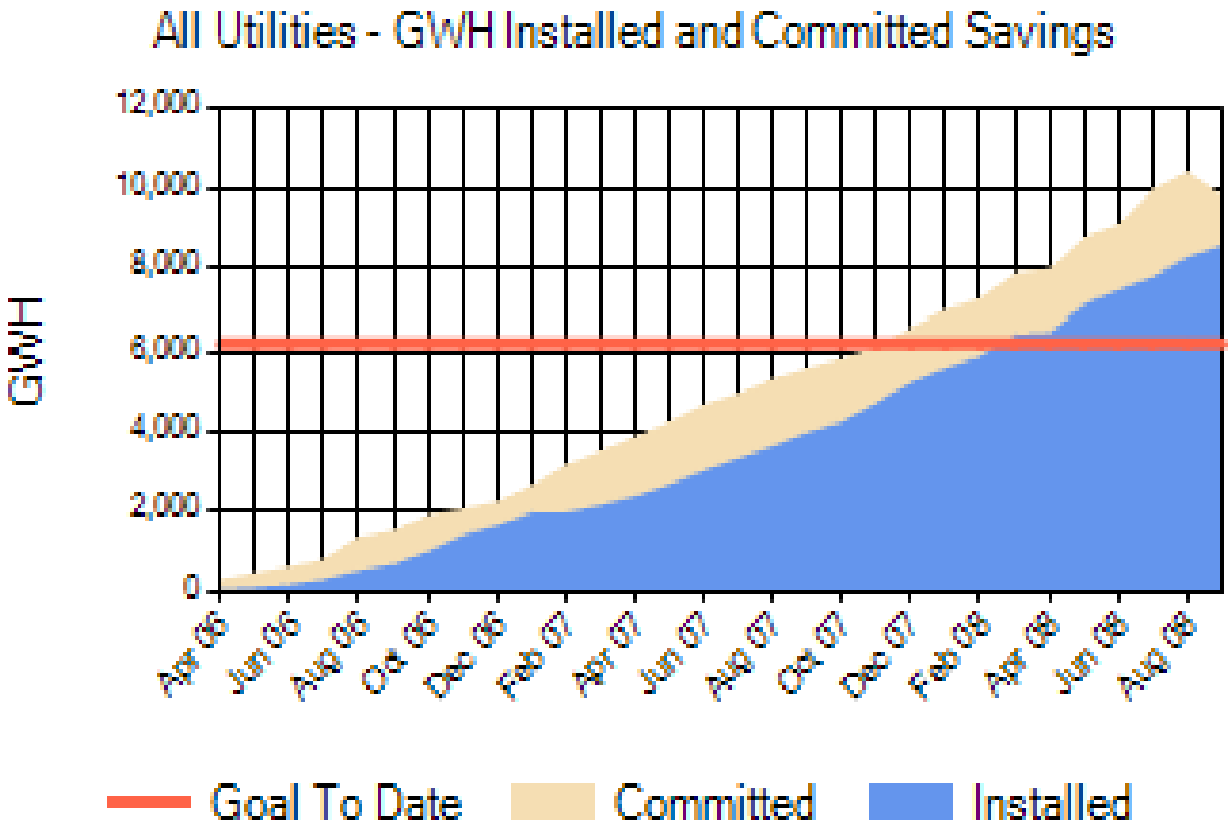
ADDITIONAL INFORMATION

- PG&E's Perspective on EPPs
- Achievements in California (2006-2008)
- How are Vermont and Oregon Doing?
- How is New York Doing?
- Standard Performance Contacting (Texas)

Perspectives on EPPs of Pacific Gas & Electric Company (PG&E),

California's Largest Private Power Company

Achievements in California (2006-2008)


All Utilities - GWH Installed and Committed Savings
GWH
12,000
10,000
8,000
6,000
4,000
2,000
0
Apr 06
Jun 06
Aug 06
Oct 06
Dec 06
Feb 07
Apr 07
Jun 07
Aug 07
Oct 07
Dec 07
Feb 08
Apr 08
Jun 08
Aug 08
Goal To Date
Committed
Installed

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
Total	$1,974,732,853	$4,313,281,399	**$2,338,548,546**

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?

- 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?

- 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.

"Standard Performance Contracting" for EPPs (Texas)

- Standard Performance Contracting can be incorporated into the California "shared-savings" model (and has been), the Vermont/Oregon "Energy Efficiency Utility" model or the New York "Public Agency" model.
- Under this approach, the regulating agency establishes the level of incentive payments to "project sponsors" for installing eligible energy efficiency measures in residences, businesses or industrial facilities.
- The incentive is based on engineering estimates of the savings ("avoided costs") for many measures.
- For more complicated installations, the contract with the project sponsor may require on-site metering, billing analysis or computer simulation to verify savings and calculate payments.

Standard Performance Contracting for EPPs (Texas) Continued

Numerical example:

A commercial HVAC project saves 25 kW of summer peak demand and 50,000 annual kWh.

25 kW x $175/kW + 50,000 kWh x $0.06/kWh= $7,375 payment

Standard Performance Contracting (continued)

- Projects sponsors earn the difference between the incentive payment and the actual cost of the EPP measures, and may negotiate co-payments by commercial and industrial customers.

- In Texas, the distribution company administers the incentives payments and enters into contracts with project sponsors. It cannot be a project sponsor, and is subject to very strict "conflict of interest" rules with potential sponsors.

- If a non-profit or government agency assumed the administrative and contracting role, the distribution company could be a project sponsor, as could equipment distributors or manufacturers, non-profit organizations, or even large commercial or industrial energy consumers.

How Is Texas Doing?

- 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.