

# EE and GHG in California

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# AB 32

- California Global Warming Solutions Act of 2006
- Establishes first-in-the-world comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases (GHG).
- Makes the Air Resources Board (ARB) responsible for monitoring and reducing GHG emissions.
- Continues the existing Climate Action Team to coordinate statewide efforts.
- Authorizes the Governor to invoke a safety valve in the event of extraordinary circumstances, catastrophic events or the threat of significant economic harm, for up to 12 months at a time.
- Requires ARB to:
  - Establish a statewide GHG emissions cap for 2020, based on 1990 emissions by January 1, 2008.
  - Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2008.
  - Adopt a plan by January 1, 2009 indicating how emission reductions will be achieved from significant GHG sources via regulations, market mechanisms and other actions.

# AB 32 continued

- Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in GHGs, including provisions for using both market mechanisms and alternative compliance mechanisms.
- Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise ARB.
- Ensure public notice and opportunity for comment for all ARB actions.
- Prior to imposing any mandates or authorizing market mechanisms, requires ARB to evaluate several factors, including but not limited to: impacts on California's economy, the environment, and public health; equity between regulated entities; electricity reliability, conformance with other environmental laws, and to ensure that the rules do not disproportionately impact low-income communities.
- Adopt a list of discrete, early action measures by July 1, 2007 that can be implemented before January 1, 2010 and adopt such measures.

# AB 32 Implementation Timeline

- **By July 1, 2007** The State Air Resources Board (ARB) forms Environmental Justice and Economic & Technology Advancement advisory committees.
- **By July 1, 2007** ARB adopts list of discrete early action measures that can be adopted and implemented before January 1, 2010.
- **By Jan 1, 2008** ARB adopts regulations for mandatory greenhouse gas (GHG) emissions reporting. ARB defines 1990 emissions baseline for California (including emissions from imported power) and adopts that as the 2020 statewide cap.
- **By Jan 1, 2009** ARB adopts plan indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanisms and other actions
- **During 2009** ARB staff drafts rule language to implement its plan and holds a series of public workshop on each measure (including market mechanisms).
- **By Jan 1, 2010** Early action measures take effect.
- **During 2010** ARB conducts series of rulemakings, after workshops and public hearings, to adopt GHG regulations including rules governing market mechanisms.
- **By Jan 1, 2011** ARB completes major rulemakings for reducing GHGs including market mechanisms. ARB may revise the rules and adopt new ones after 1/1/2011 in furtherance of the 2020 cap.
- **By Jan 1, 2012** GHG rules and market mechanisms adopted by ARB take effect and are legally enforceable.
- **Dec 31, 2020** Deadline for achieving 2020 GHG emissions cap.

# California's 2006-2008 EE Commitment

- Utility budgets for EE
  - PG&E: \$282 million 2006, \$339 million 2007, \$323 million 2008
  - SCE: \$230 million 2006, \$242 million 2007, \$255 million 2008
  - SDG&E: \$85 million 2006, \$86 million 2007, \$99 million 2008
- Utilities will file for 2009-2011 in June 2008

# Risk/Reward Mechanism

- “To be eligible for earnings, SDG&E, PG&E and SCE shall meet the following minimum performance standard (MPS) for the energy efficiency portfolio as a whole, on an *ex ante* basis for load impacts, with verified installations and costs:
  - Achieve a minimum of 85% of the Commission-adopted savings goals, based on a simple average of the percentage of each individual gigawatt-hour (GWh), megawatt (MW) and, as applicable, million therm (MTherm) goal they achieve, *and also*
  - Meet a minimum of 80% of the goal for each individual savings metric.
- b) “SoCalGas shall meet the MPS and be eligible for earnings if it achieves a minimum of 80% of the MTherm savings goal on an *ex ante* basis for load impacts, with verified installations and costs.”

# Risk/Reward Mechanism

- If the portfolio meets the MPS, the utility shares a percentage of the net benefits produced by the portfolio, where “net benefits” represents the dollar value of the portfolio resource savings minus costs. The dollar value of these net benefits is referred to as the performance earnings basis (PEB).
- If the MPS is achieved, the utilities share 9% of the portfolio PEB. If portfolio performance achieves 100% of the Commission’s savings goal(s) or higher, the shared-savings rate increases from 9% to 12%.
- If performance falls to 65% or below of the savings goals for any individual metric (kWh, kW or therms), financial penalties are imposed. No earnings or penalties accrue in the "deadband range," i.e., above 65% and below 85% of the Commission's savings goals.
- Total earnings and penalties are capped at \$450 million over each three-year program cycle, for the four utilities combined.

# Risk/Reward Mechanism

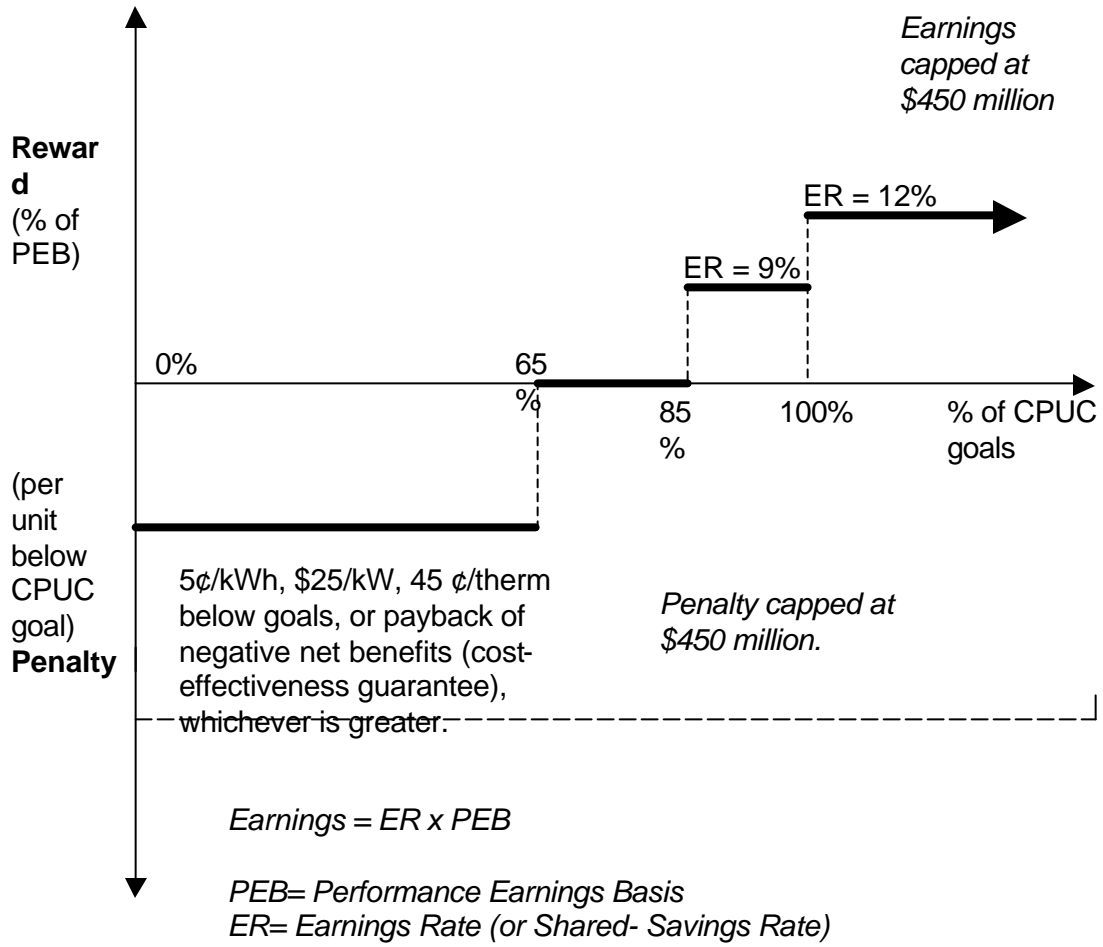
- Earnings (or penalties) to be paid as follows:
- There shall be two “progress payment” interim earnings claims and one final true-up claim for each three-year program cycle. They shall be linked to Energy Division’s Verification and Performance Basis Reports as described in this decision and in Attachment 6.
- Interim claims shall be evaluated on a “Cumulative-to-Date” basis, which counts the verified achievements from program year(s) in determining whether the MPS is met in each subsequent interim claim.
- Thirty-five (35) percent of the earnings calculated for each interim claim shall be held back until the final true-up claim, in order to minimize the risk of overpaying earnings before the *ex post* true-up of load impacts in the final claim.

# Risk/Reward Mechanism

- If the MPS is met utilizing *ex ante* assumptions for load impacts, with verified installations and costs, but the *ex post* EM&V results take an individual metric below the 80% threshold or take the overall portfolio results to between 65% and 85% of the Commission-adopted savings goals, the utility shall continue to earn at the first tier sharing rate of 9%, applied to the *ex post* PEB, and shall not return any interim claims payments.
- If, however, *ex post* results take a utility below 65% of Commission goals for any individual metric, the utility shall pay back any interim payments, in addition to any applicable penalty

# Risk/Reward Mechanism

- Penalties begin to accrue if portfolio performance for any single savings metric (GWh, MW or MTherm) falls to or below 65% of the savings goal for that metric. If this occurs, the larger of the following penalty provisions apply up to the penalty cap adopted for each utility:
  - (1) 5¢/kWh, 45¢/therm and \$25/kW per unit penalties applied to each unit below the savings goal, or (if larger):
  - (2) Dollar-for-dollar payback of negative net benefits (“cost-effectiveness guarantee”), where negative net benefits are calculated based on the PEB formula adopted in D.04-10-059.
- g) Total earnings and penalties are capped for the four utilities combined at \$450 million over each three-year program cycle, beginning with the 2006-2008 program cycle. The \$450 million combined cap is allocated to each utility as follows: PG&E--\$180 million; SCE--\$200 million; SDG&E-\$50 million and SoCalGas--\$20 million.



# Reasons for RRM

- “What is fair to ratepayers? We believe that it is to make sure that this large return on their investment, the kW, kWh and therm savings goals and the large reductions in GHG emissions, are actually realized with the funds authorized. By aligning shareholder and ratepayer interests, today’s adopted incentive mechanism serves to ensure this result. In doing so, this mechanism *produces a return in excess of 100% on ratepayers’ investment in energy efficiency as the utilities achieve and surpass our 2006-2008 savings goals.*[\[1\]](#)” (D. 0709043, pp. 10-11)
- “Utility investors are attracted by opportunities to earn returns, and absent energy efficiency incentives, utilities only earn on supply-side investments.” (Ibid. p. 63)
- [\[1\]](#) If 100% of the goals are achieved, the ratepayer share of net benefits is \$2.366 billion, which is 107.5% of the \$2.2 billion in ratepayer investment. At higher levels of performance, the return (net benefits) associated with the same level of portfolio investment will increase.

# Reasons for RRM

- “More specifically, the Energy Policy Act of 1992 requires state commissions to consider the following standard:
- “The rates allowed to be charged by a State regulated electric utility shall be such that the utility’s investment in and expenditures for energy conservation, energy efficiency, and other demand side management measures *are at least as profitable*, giving appropriate consideration to income lost from reduced sales due to investments in and expenditures for conservation and efficiency, as its investments in and expenditures for construction of new generation, transmission and distribution equipment.”[\[2\]](#)
- [\[2\]](#) 16 U.S.C. Sec. 2621(d)(8)[emphasis added]; see also 15 U.S.C. Sec 3203(b)(4) (corresponding to Section 115(b)(4) for natural gas).
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# Reasons for RRM

- “in considering what is fair to ratepayers, we observe that ratepayers “invest” in both supply-side and energy efficiency resources, irrespective of who puts up the initial capital. The only difference is that for steel-in-the-ground investments (generation, transmission, distribution) ratepayers have to pay not only the cost of the facilities, but also the financing costs (debt service and return-on-equity, and associated taxes) to compensate those that put up the initial capital. In contrast, since energy efficiency expenditures are “expensed” and reflected in rates immediately, energy efficiency saves ratepayers substantial financing costs. Those cost savings are magnified because a dollar of energy efficiency can displace far more than a dollar of supply-side investment to meet the same GWh, MW and MTherm energy needs. Hence, the critical question is not “who puts up the capital” for energy efficiency, but rather, “how can we ensure that the potential return on ratepayers’ investment in energy efficiency is actually realized.”” (D. 07-09-043, p. 68)
- “decoupling merely eliminates a financial *penalty* for pursuing energy efficiency—it does not make it the preferred resource from a shareholder, investment community or utility management perspective.” (Ibid, p. 69)

# PG&E 2006-07 by the numbers

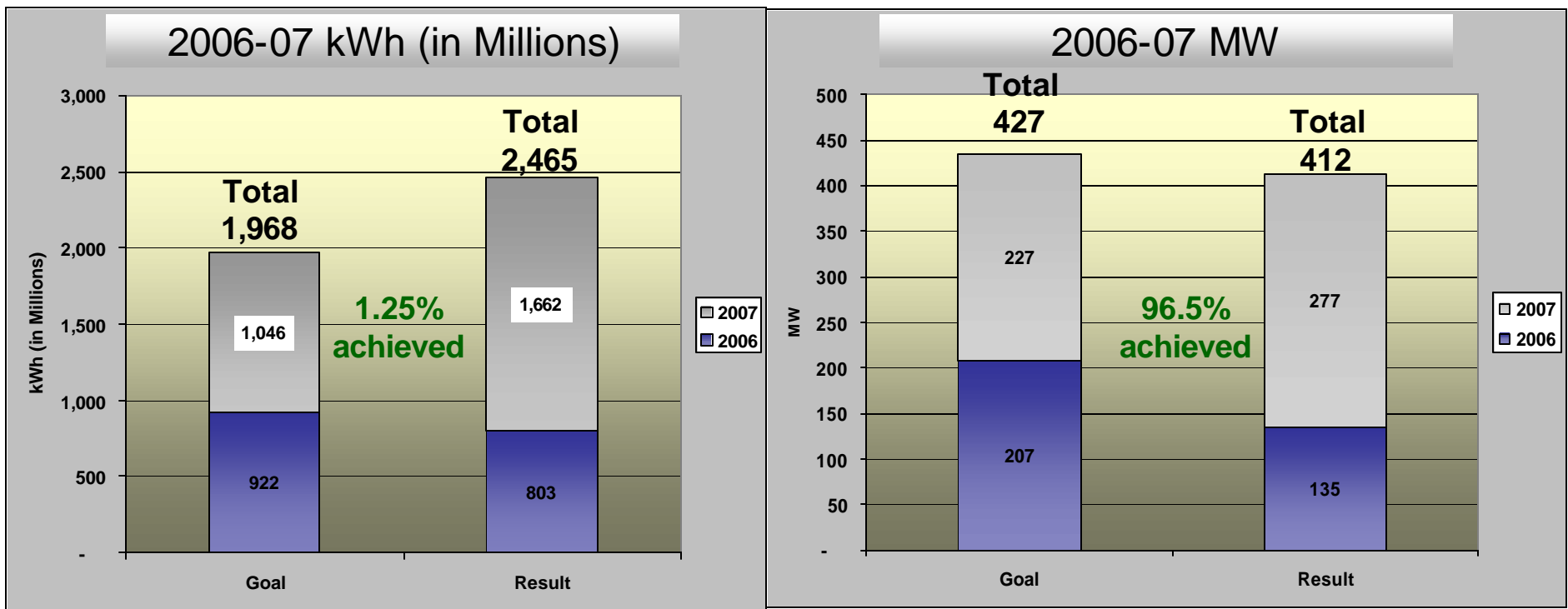
	Goal	Achieved	Percent of Goal Achieved
MW	385	429	111%
GWH	1,773	2,379	134%
MM Therms	27.5	33.3	121%

Avoided emission of more than  
1.5 million tons of CO<sub>2</sub>

*Note: Savings data is consistent with 2007 4th Quarter Report. Energy Division's DEER updates and Verification Report likely will adjust PG&E's overall recorded savings downward.*

# A Look Back: How Did We Do In 2006 - 2007?

## SCE Energy Savings vs. CPUC Goals



# 2009-11 PG&E Savings Goals

	<u>2009</u>	<u>2010</u>	<u>2011</u>
<u>MW</u>	232	220	236
<u>GWH</u>	1,067	1,015	1,086
<u>MM Therms</u>	20.3	21.1	22.0

# A Look Ahead At 2009 – 2011

## 2009-11 Goals By Year

CPUC Goal	2009	2010	2011	Totals '09-'11
Energy Savings (GWh)	1,189	1,176	1,164	3,529
Demand Reduction (MW)	249	247	245	741

# Big Bold EE Goals

- New Commercial Buildings:** The target is 50% savings and 100% participation. The goal is zero net energy by 2030. The remainder of zero net energy will be supplied by renewables.

- New Residential Construction:** All new residential construction in California will be zero net energy by 2020.

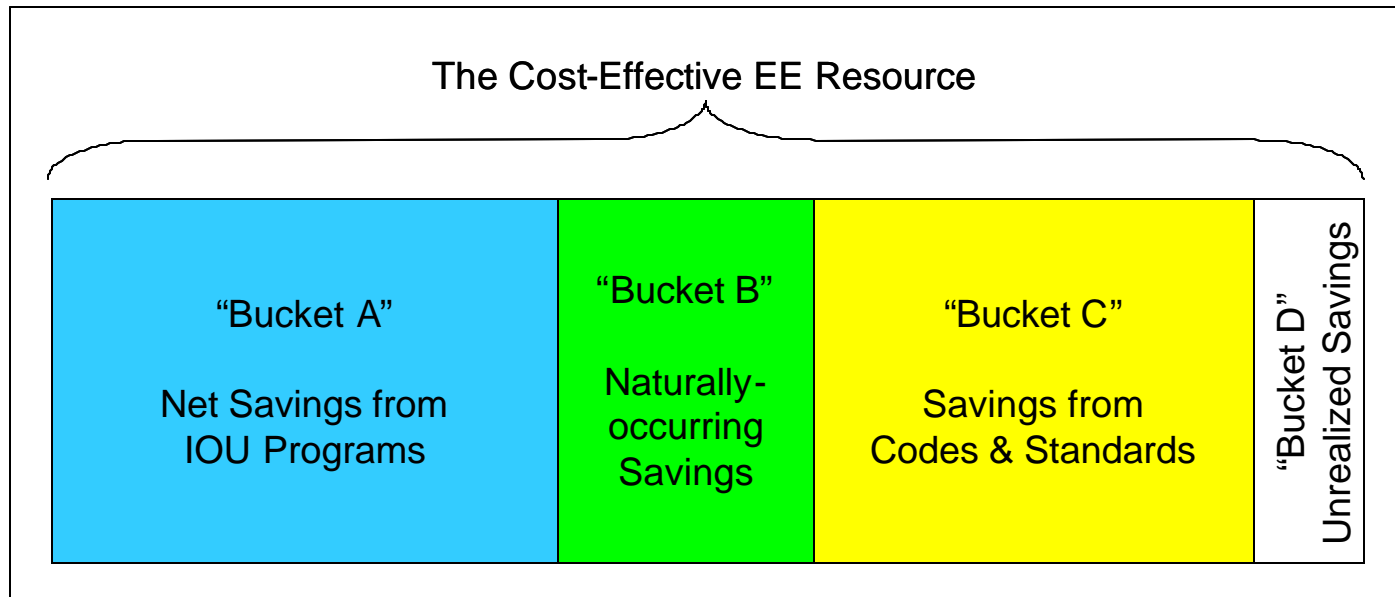
**Zero Net Energy** is defined as the implementation of a combination of building energy efficiency design features and on-site clean distributed generation that result in no net purchases from the electricity or gas grid, at the level of a single “project” seeking development entitlements and building code permits. Definition of zero net energy at this scale enables a wider range of technologies to be considered and deployed, including district heating and cooling systems and/or small-scale renewable energy projects that serve more than one home or business.

# Big, Bold EE Strategy

- **HVAC Residential and Small Commercial:** The HVAC industry will be reshaped to assure optimal performance of HVAC equipment.
  - Because small HVAC constitutes over 20% of California's peak demand, the potential energy savings are substantial: as high as 1,400 MW, 2,000 GWh, and 300 million therms.
  - Includes residential air conditioning and space heating and one third of commercial air conditioning, space heating and ventilation. The savings potential is based on a 10% increase in efficiency based on improvements made at turnover taken out to 2016 at the rate of 1/15th of the existing base per year. In addition, for the entire stock, an additional 10-15% was assumed.
- Industrial Strategy dropped in final decision on BBES.



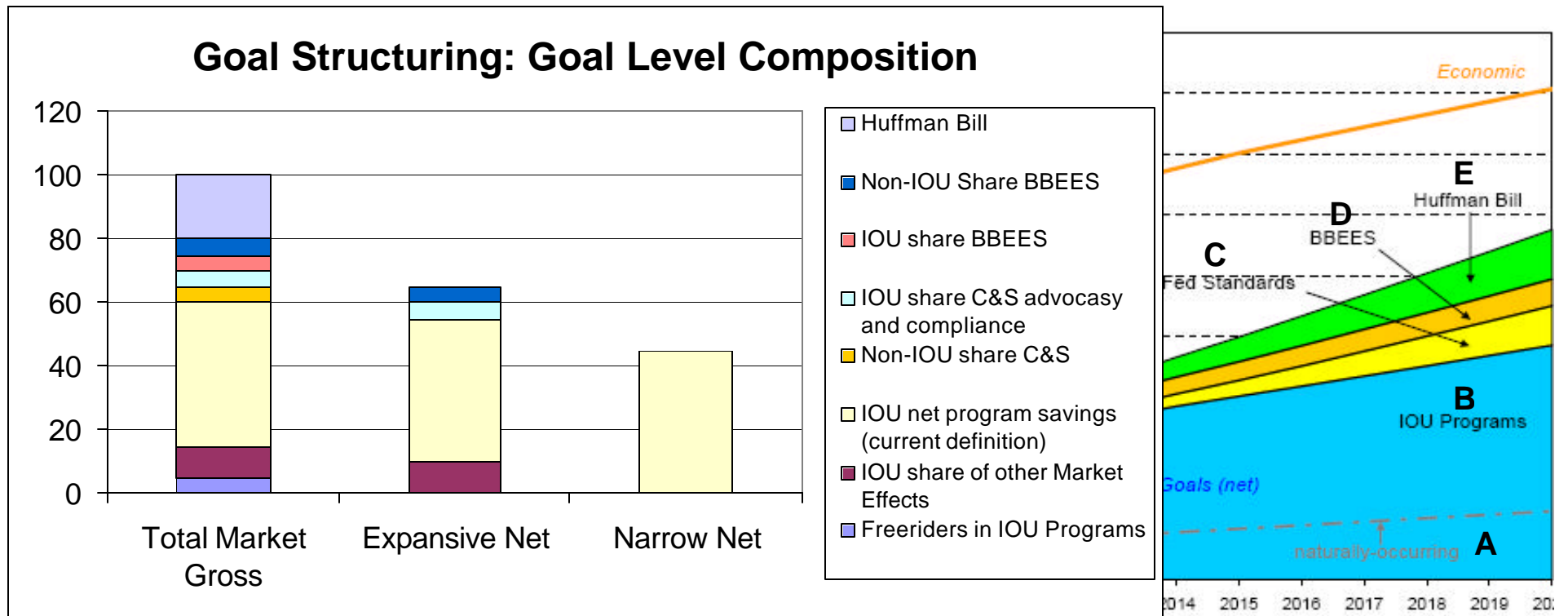
# Goal of the Goals: A Conceptual Framework



- Attempts to capture CPUC & CEC rhetoric
  - “EE as a way of life”, “Innovation, Integration, Collaboration”
- Effort to value awareness of total market savings
- Optimize “A” through appropriate amplification of “B” and “C” such that “D” is as small as possible

# Visualization of Expansive Net

- Expansive Net diagram wedges = Portion of Wedge A + Wedge B + Portion of Wedge C + Portion of Wedge D

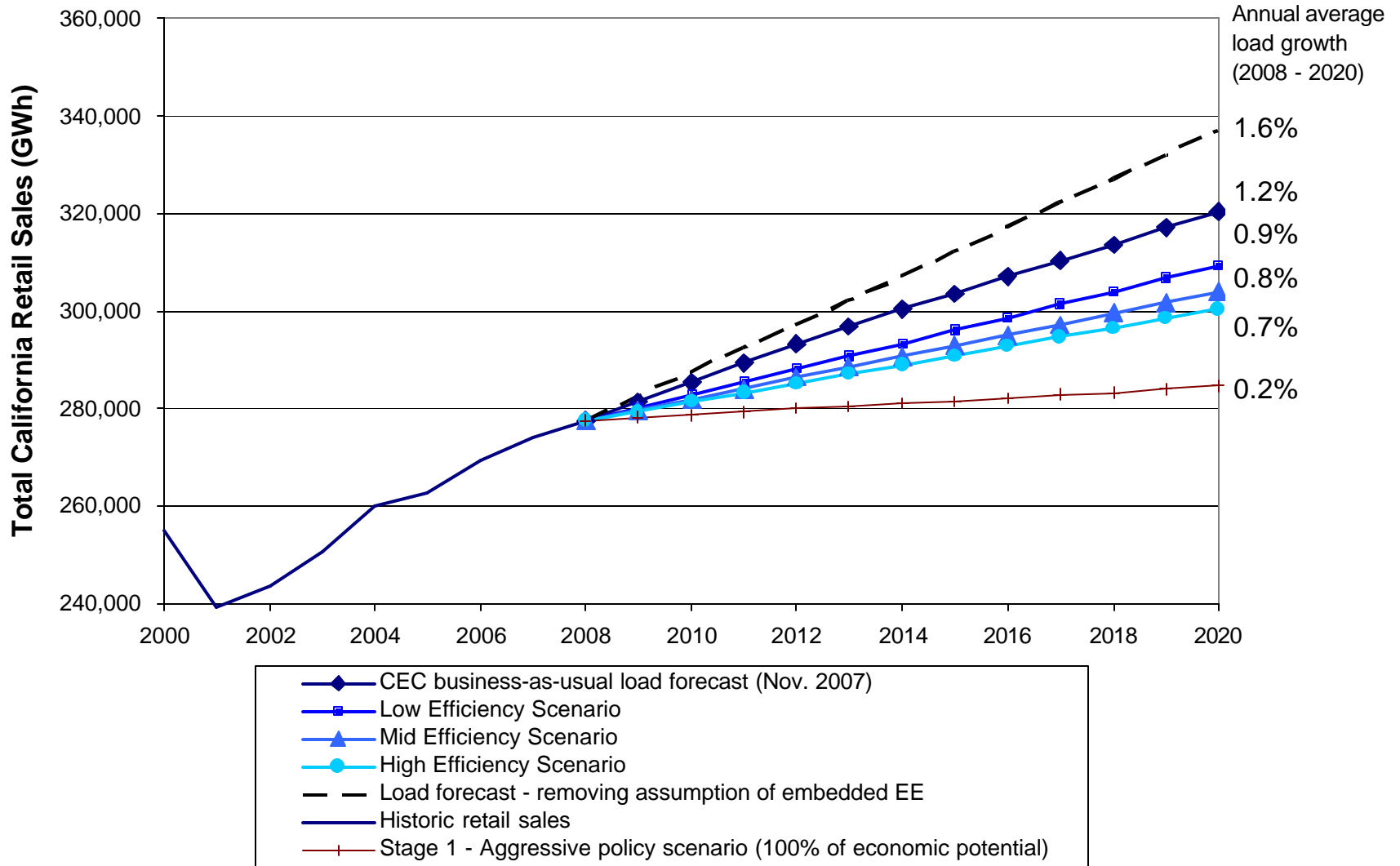


# Energy Efficiency Cost and Potential for GHG

Note: Costs are currently under review

Revised Statewide Scenarios	BAU reference case	'Low' EE scenario	'Mid' EE scenario	'High' EE scenario
Total utility program costs including admin.	\$605 M/yr	\$887 M/yr	\$1.5 billion/yr	\$2.1 billion/yr
Utility program costs and BBEES (\$/kWh)	\$0.032/kWh	\$0.041/kWh	\$0.051/kWh	\$0.065/kWh
T24 & fed. stndrds, Huffman Bill (AB 1109)	N/A	\$0.010/kWh	\$0.010/kWh	\$0.015/kWh
Utility program energy savings (2008 – 2020)	16,450 GWh	14,056 GWh	21,638 GWh	21,738 GWh
T24 & fed. stndrds, BBEES, Huffman Bill (AB 1109) (2008 – 2020)	...	13,801 GWh	11,733 GWh	15,240 GWh
<b>Incremental energy savings (2008 – 2020)</b>	<b>16,450 GWh</b>	<b>27,857 GWh</b>	<b>33,371 GWh</b>	<b>36,978 GWh</b>
Stage 1 Statewide Scenarios	BAU reference case	N/A	75% of econ. potential	100% of econ. potential
Utility program costs including admin.	\$775 M/yr	...	\$2 billion/yr	\$3 billion/yr
<b>Incremental energy savings (2008 – 2020)</b>	<b>22,977 GWh</b>	...	<b>44,345 GWh</b>	<b>59,126 GWh</b>

## Energy Efficiency Scenario Impacts on California Load Growth



Note: 1990 – 2000 average annual CA retail sales growth rate: ~1.5%

# 2020 BAU Reference Comparison

<b>Policies</b>	<b>Stage 1 BAU</b>	<b>Revised BAU</b>
<b>Energy Efficiency (EE)</b>	Assume 23,000 GWh EE embedded in CEC load forecast	Assume 16,450 GWh EE embedded in CEC load forecast
<b>Rooftop solar PV</b>	1,091 MW nameplate of rooftop PV installed	847 MW nameplate of rooftop PV installed
<b>Demand Response</b>	5% demand response	5% demand response
<b>Combined heat and power (CHP)</b>	No explicit assumption	292 MW nameplate behind-the-meter CHP No new large (>5MW) CHP
<b>Renewable Energy</b>	20% RPS (7,404 MW)	20% RPS (6,733 MW)
<b>2008 Emissions</b>	109.4 M MMTCO <sub>2e</sub>	109.6 MMT CO <sub>2e</sub>
<b>2020 Emissions</b>	112.5 MMTCO <sub>2e</sub>	107.1 MMTCO <sub>2e</sub>

# 2020 E3 Aggressive vs. BAU Comparison

<b>Policies</b>	<b>Business As Usual</b>	<b>Aggressive Policy</b>
<b>Energy Efficiency</b>	Assume 16,450 GWh EE embedded in CEC load forecast	'High goals' EE scenario based on CPUC Goals Update Study, March 08
<b>Rooftop solar PV</b>	847 MW nameplate of rooftop PV installed	3,000 MW of rooftop PV
<b>Demand Response</b>	5% demand response	5% of demand response
<b>Combined heat and power (CHP)</b>	292 MW nameplate behind-the-meter CHP No new large (>5MW) CHP	1,574 MW nameplate small CHP (< 5 MW) 2,804 MW nameplate larger CHP (>5 MW)
<b>Renewable Energy</b>	20% RPS (6,733 MW)	33% RPS (12,847 MW)
<b>2008 Emissions</b>	109.6 MMT CO <sub>2</sub> e	
<b>2020 Emissions</b>	107.1 MMT CO <sub>2</sub> e	85.6 MMT CO <sub>2</sub> e

# CPUC GHG Recommendations to ARB

- For the electricity sector, the compliance obligation in a GHG emissions cap-and-trade system should be placed on the entities that deliver power to the electricity grid in California, which we call “deliverers”
- The “deliverer” is the entity that owns electricity as it is delivered to the grid in California.
- A deliverer point of regulation would treat all electricity delivered to the California grid the same, whether that electricity is generated in California or elsewhere. In either case, the deliverer would later have to surrender GHG allowances (or secure adequate offsets to the extent they are allowed) based on the amount of GHG emissions associated with that electricity.

# CPUC GHG Recommendations to ARB

- **that the California Air Resources Board (ARB) set energy efficiency requirements in its scoping plan at the level of all cost-effective energy efficiency in the State. This would be achieved through a combination of utility and non-utility programs coordinated at the State level, with consistent requirements across all types of retail providers.**
- **that the ARB adopt mandatory minimum levels of cost-effective energy efficiency savings for publicly owned utilities (POUs), at levels recommended by the California Energy Commission.**
- **that ARB adopt mandatory minimum levels of cost-effective energy efficiency for investor owned utilities, Community Choice Aggregators, and Electric Service Providers consistent with the programs and goals adopted by the California Public Utilities Commission.**
- **that ARB require POUs to deliver at least 20 percent renewable electricity to their customers by 2017.**
- **that ARB work with the Public Utilities Commission and the Energy Commission to seek legislation that requires retail providers of electricity to deliver more than 20 percent of their power from renewable sources in the future, at levels and dates to be determined.**

# CPUC GHG Recommendations to ARB

- that ARB design a multi-sector cap-and-trade system for greenhouse gas (GHG) emissions in California, to be implemented in 2012, provided that ARB finds that the tests outlined in Part 4 and Part 5 of AB 32 are met. This GHG emissions cap-and-trade system should include the electricity sector.
- that, for the electricity sector, ARB establish the compliance obligation in the GHG emissions cap-and-trade system on the entities that own electricity as it is delivered to the California electricity grid, as described in this decision.
- that some portion of the GHG emission allowances available to the electricity sector be auctioned, with the majority of the proceeds from the auctioning of allowances for the electricity sector being used in ways that benefit electricity consumers in California.
- that, for the natural gas sector, ARB rely on programmatic measures to achieve emission reductions and not include the natural gas sector in a multi-sector GHG emissions cap-and-trade system at this time. We recommend consideration of the inclusion of the natural gas sector in a cap-and-trade program at a later date.