ATTACHMENT 1

AB 32 California Global Warming Solutions Act of 2006 and the Scoping Plan

CAT Energy Subgroup Workshop

May 2, 2008

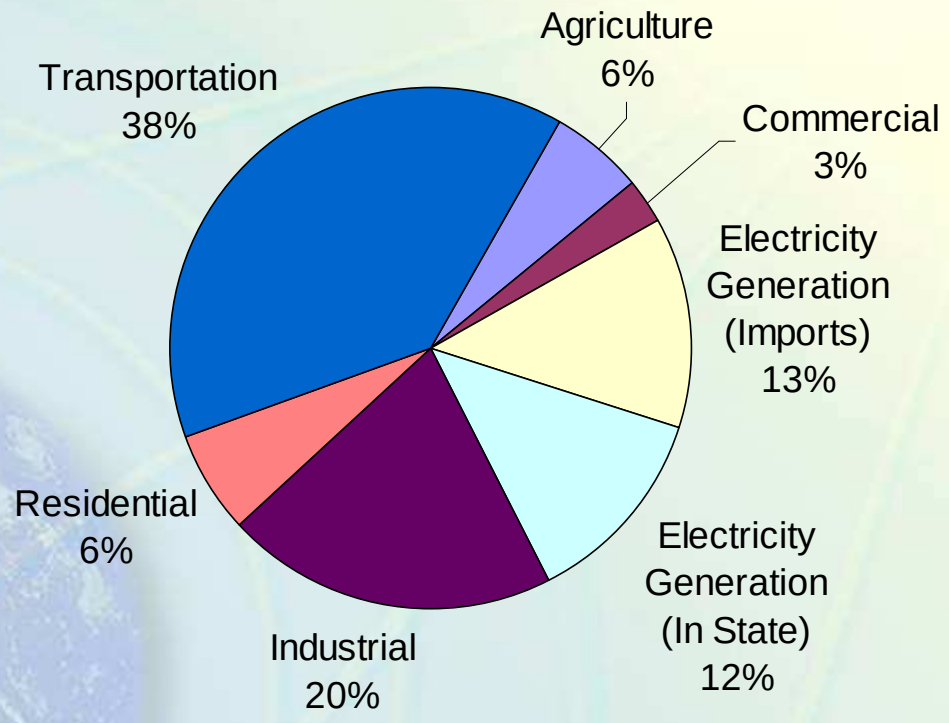
Jon Costantino
Office of Climate Change
California Air Resources Board

What Is AB 32?

- Sets in statute 2020 GHG emissions limit at 1990 level
  - Acknowledges that 2020 is not the endpoint
- Air Resources Board (ARB) to monitor/regulate GHG sources
- Extensive collaboration with other agencies
- Mandates that a Scoping Plan be adopted by January 1, 2009, with ARB as lead

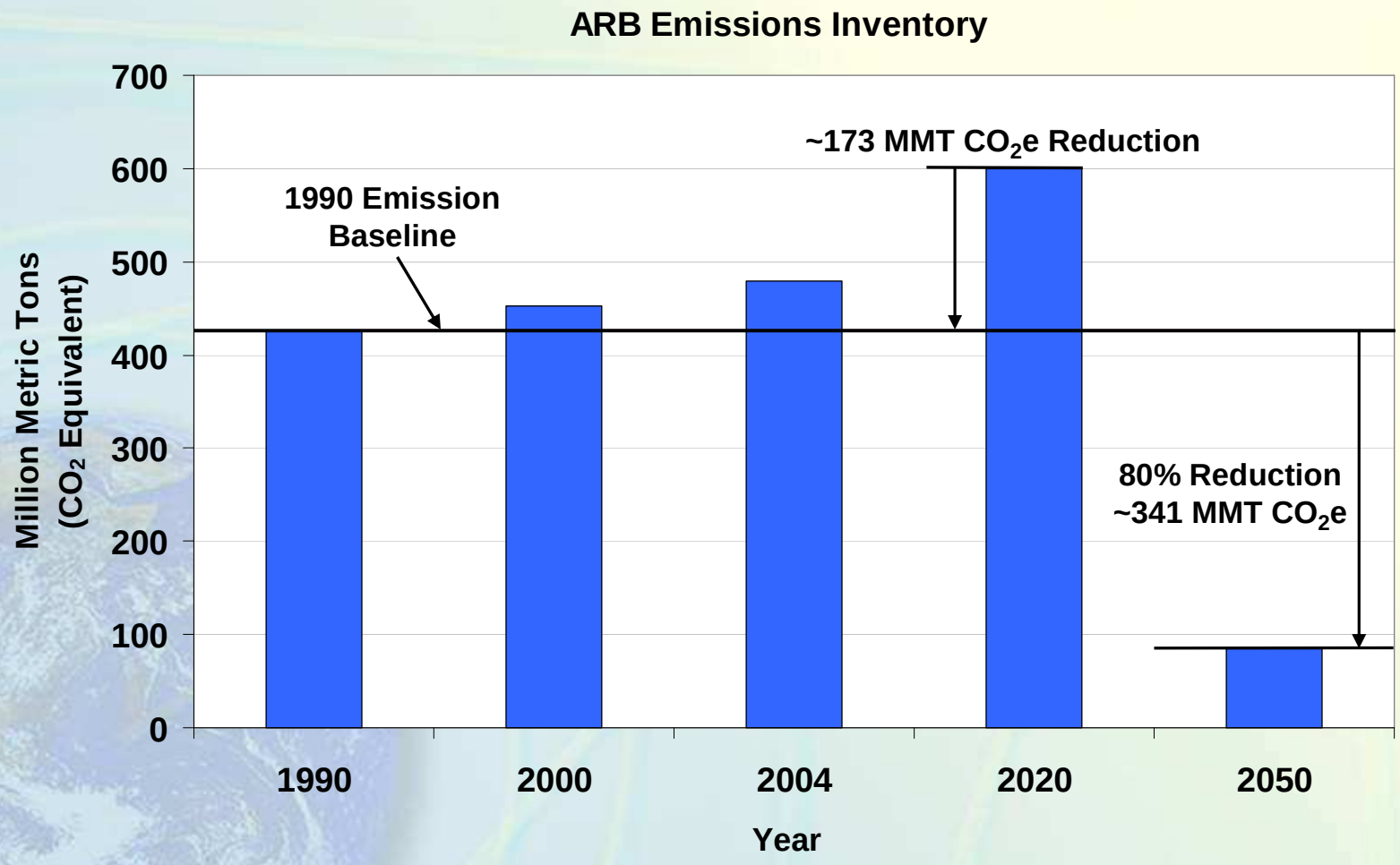
California GHG Emissions

2004 Emissions (480 MMT CO_2e)



ARB, "California 1990 Greenhouse Gas Emissions Level and 2020 Emissions Limit" (2007), www.arb.ca.gov/cc/ccei/inventory/1990_level.htm

Magnitude of the Challenge



What Is the Scoping Plan?

- California's plan, developed by ARB, to reduce the State's emissions to 1990 levels by 2020
- A model for other states, regions or nations
- A process to develop cost-effective GHG emission reductions
- A tool to identify economic benefits from improved efficiency and business creation
- An opportunity to provide co-benefits and additional reductions in criteria and toxic emissions
- A vision for a low carbon future beyond 2020

Who Is Developing the Scoping Plan?

- ARB is responsible for developing and approving the Scoping Plan
- ARB is working closely with Cal/EPA and the Climate Action Team subgroups
  - Energy CAT
  - Technical evaluations performed by multi-agency teams
  - Stakeholder outreach will be a joint effort with other State agencies
- Advisory groups (EJAC, ETAAC & MAC) providing recommendations

Who Else Is Involved?

- Climate Action Team subgroups
- Local air districts & other local government
- Industrial sources
- Transportation sources
- Environmental groups
- Community groups
- Public
- Climate Action Registry
- Western Climate Initiative
- International organizations

Public Process

- Stakeholder outreach
  - Public workshops to discuss plan development
    - November: scoping plan kick-off workshop (L.A.)
    - December: sector summary workshop (Sac.)
    - January: mechanisms workshop (Oakland)
    - May: scoping plan scenarios workshop (Sac.)
- Cat subgroup stakeholder meetings – ongoing
- Economic analysis technical workgroup – ongoing
- Program design technical workgroup – ongoing
- Community meetings – planned

What Will Be in the Scoping Plan?

- AB 32 requires maximum technologically feasible and cost-effective GHG emission reductions to achieve target of 427 $MMTCO_2e$
- Possible components include:
  - Direct regulations
  - Alternative compliance mechanisms
  - Market-based compliance mechanisms
  - Monetary and non-monetary incentives

Statutory Framework

- In adopting regulations to implement Scoping Plan, the Board shall:
  - Be equitable, minimize costs and maximize total benefits, encourage early action
  - Avoid disproportionate impacts
  - Ensure voluntary reductions get appropriate credit
  - Consider cost-effectiveness, overall societal benefits
  - Minimize administrative burden
  - Minimize leakage
  - Consider significance of sources

Core Measures in the Scoping Plan

- Core emission reduction measures expected to be included in Scoping Plan:
  - AB 1493 (Pavley) Emission Standards
  - Low-Carbon Fuel Standard
  - Reduction of Vehicle Miles Traveled
  - Other ARB Discrete Early Actions
  - Energy Efficiency
  - Renewable Portfolio Standard
  - High Global Warming Potential Gases
  - Other Core Measures Identified By CAT Subgroups

Importance of Local Action

- Cities and residents impacted by climate change
- Local governments have authority
- Can achieve substantial co-benefits
- Serves as a model for residents and other cities

2008 ARB GHG Activities

- Hold Scoping Plan scenarios workshop (May 19)
- Release draft Scoping Plan release (June 26)
- July workshops on draft Plan
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- Release final plan proposal (October 3)
- Hold board hearing on scoping plan (Nov. 20–21)

Ultimate GHG Goals

- Create model that is copied by other states and nations
- Develop least cost approach
- Generate economic benefits due to improved efficiency and business creation
- Achieve other societal benefits, such as associated reductions in criteria and toxic emissions
- Reduce emissions to 1990 levels by 2020
- Provide a vision for a low carbon future - 2050

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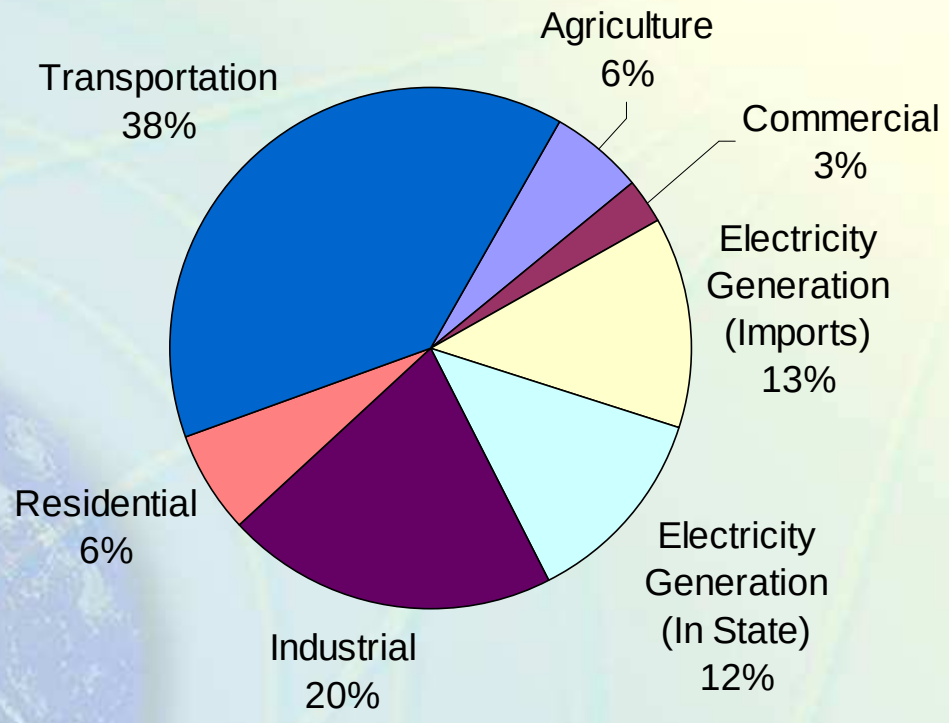

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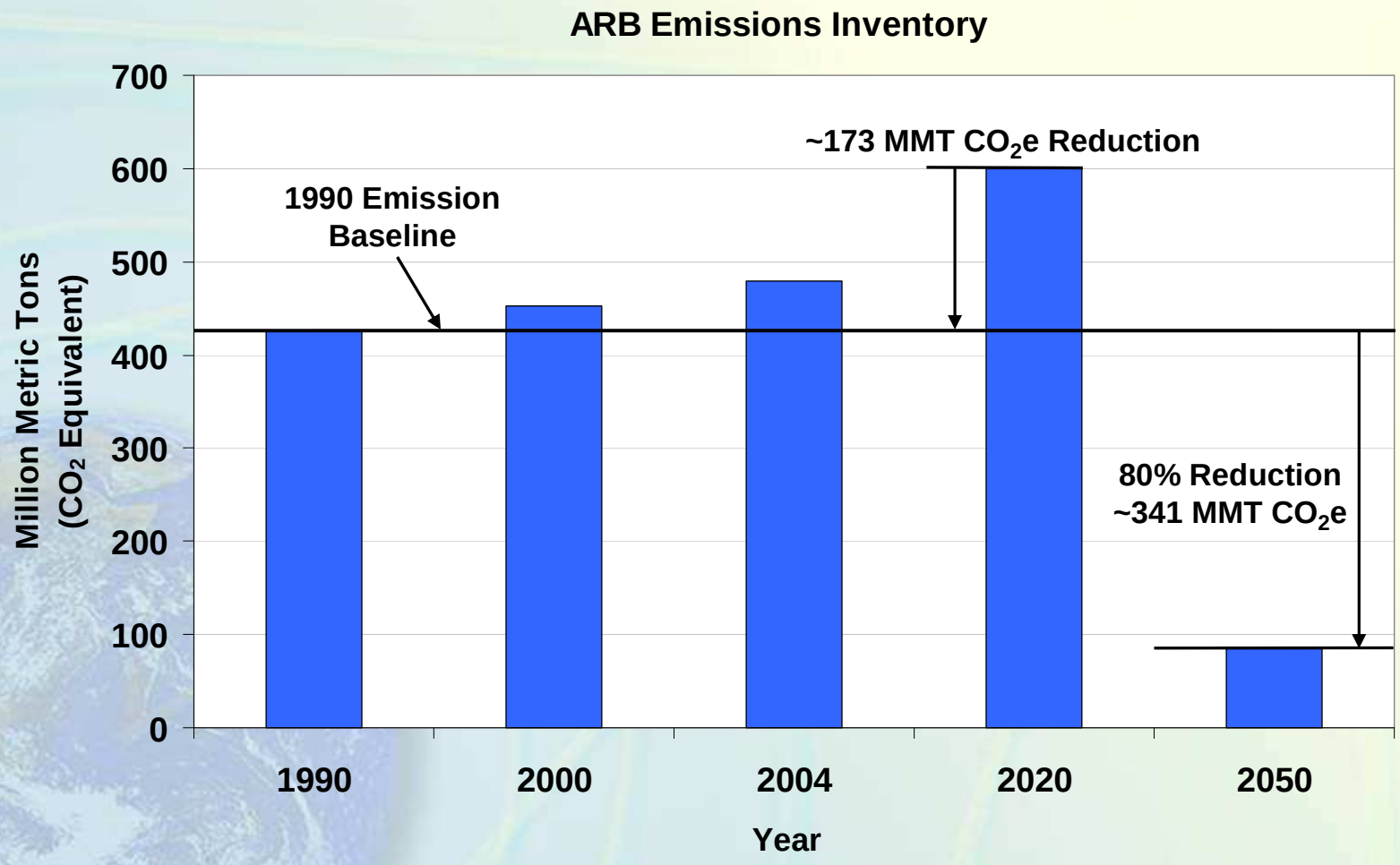

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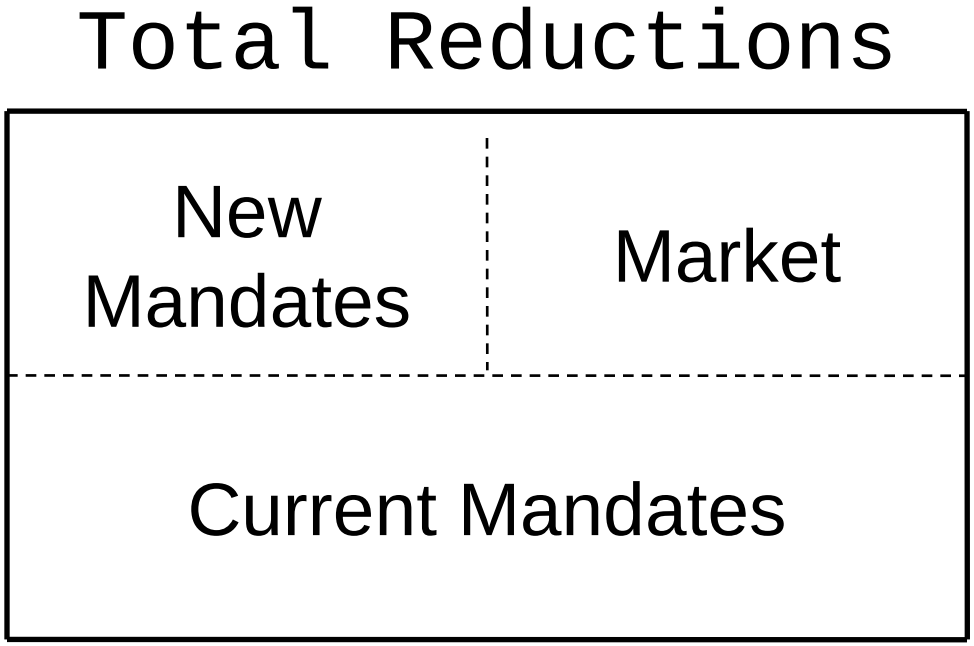
ATTACHMENT 2

Regulatory Approaches to GHG Reduction in the Energy Sectors

Julie Fitch
Director of Policy and Planning
California Public Utilities Commission

May 2, 2008

Generic Representation of Sector Emission Reduction Measures



Energy and Environmental Economics (E3) Modeling

- A combination of production cost dispatch model and a spreadsheet scenario planning tool
- Identifies the *physical cost* of achieving high penetrations of renewables, energy efficiency and other preferred resources
- Analysis based on *current technology and cost* assumptions
- Numbers presented today do not include any assumed cap-and-trade program
- Source of all data presented: E3 draft analysis for CPUC

Assumptions for two primary cases

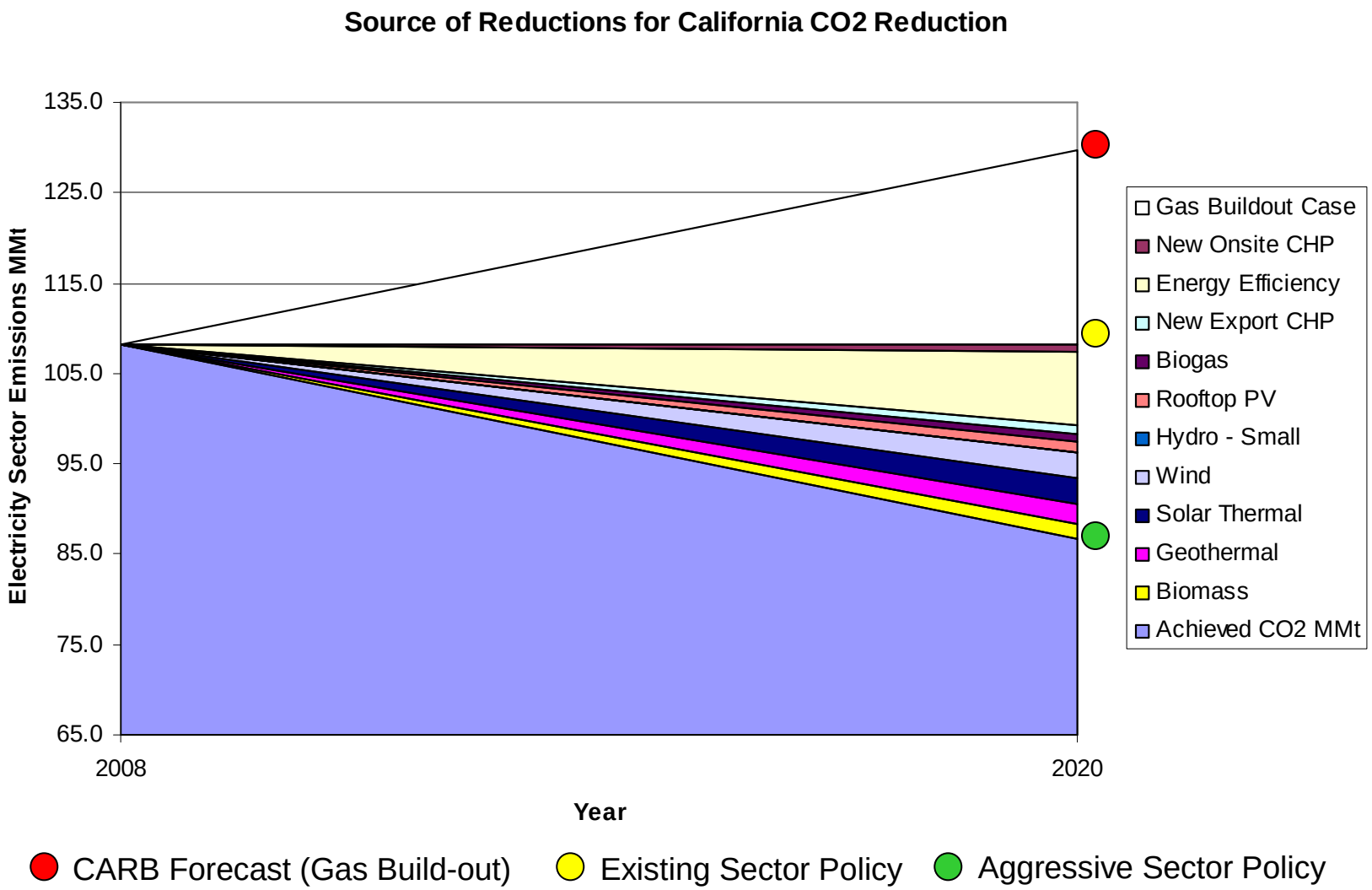
Measure Category	Existing Policy (also called BAU Reference Case)	Aggressive Policy
Energy Efficiency	Current EE forecast levels (16,450 GWh)	Itron “High-goals” EE scenario (59,126 GWh)
Renewables	20% RPS for all utilities	33% RPS for all utilities
California Solar Initiative (CSI)	847 MW new solar	3,000 MW new solar
Combined Heat and Power (CHP)	No new CHP	1,574 MW small (<5 MW) 2,804 large (>5 MW)

Projected Emissions Reductions
(in million metric tons of CO2e)

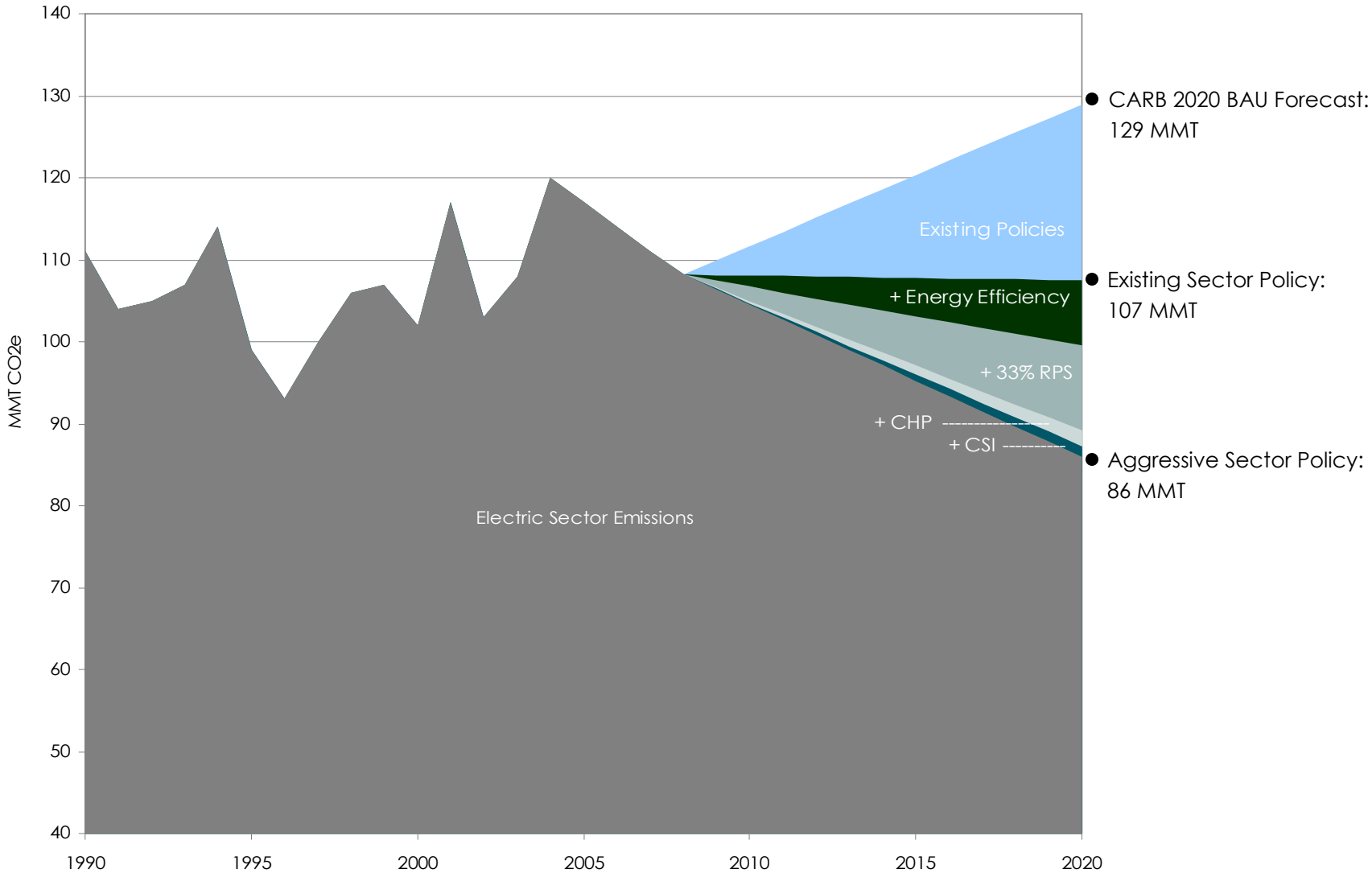
Measure Category	Existing Policy	% of Total	Aggressive Policy	% of Total
EE	6.7	40%	8.0	37%
Renewables	9.9	58%	10.3	44%
CSI	0.4	2%	1.3	6%
CHP	0	0%	1.9	9%
Total	17.0	100%	21.5	100%

Notes: Analysis is preliminary; cases are additive and compared to a conventional resource build-out scenario.

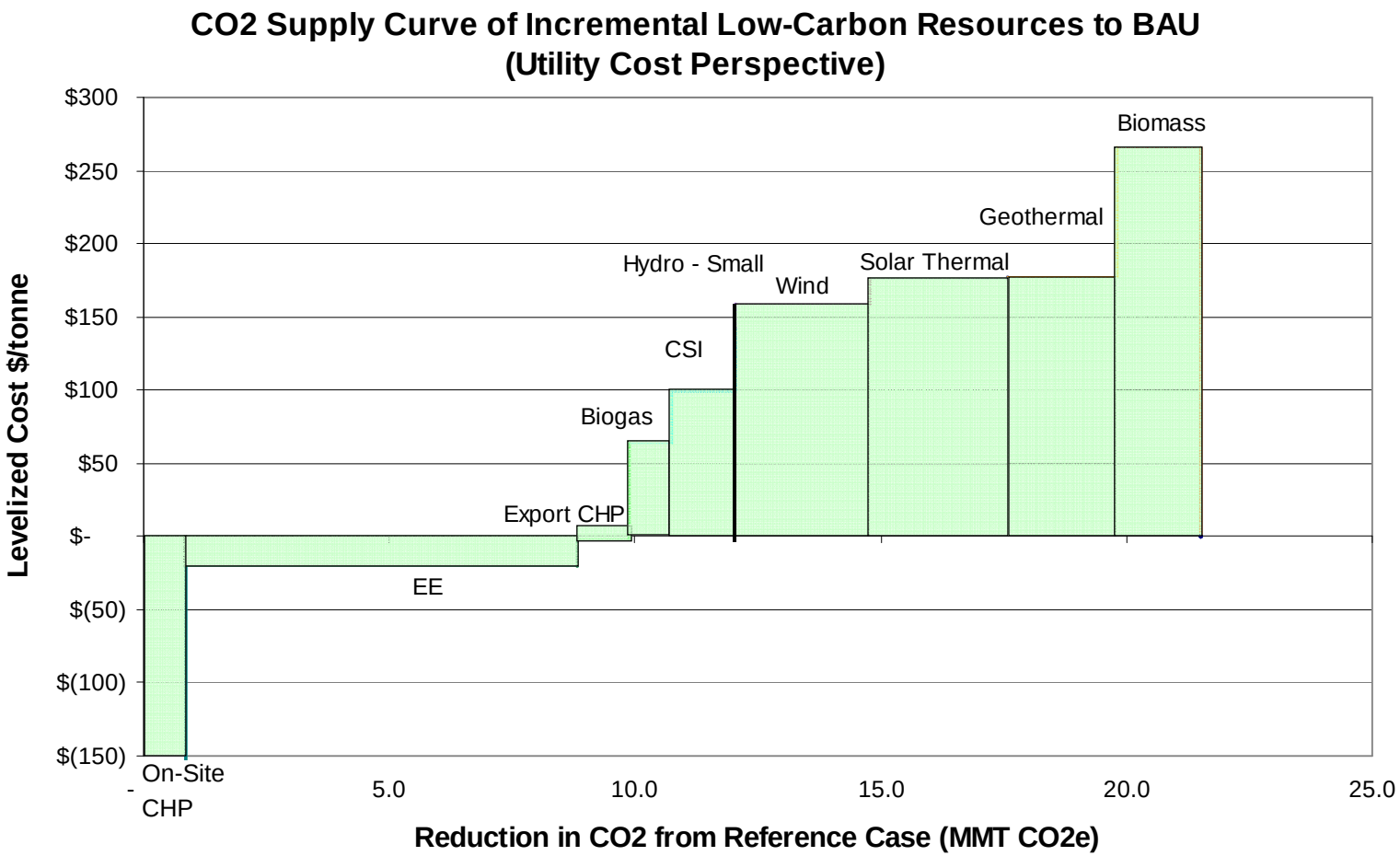
CO2 Savings, Aggressive Policy



Electric Sector "Wedges" Graph



"Aggressive" Emission Reduction Supply Curve



Average Cost $48/tonne

Cost Estimates

(average per ton of CO2 reduced – not marginal)

Measure Category	Existing Policy			Aggressive Policy		
	Utility	Consumer	Total	Utility	Consumer	Total
EE	-$162	$52	**-$110**	-$20	$56	**$36**
Renew.	$27	0	**$27**	$95	$0	**$95**
CSI	$125	$1011	**$1136**	$99	$1,211	**$1,310**
CHP	$0	$0	**$0**	-$472	$993	**$521**
Weighted Average	-$7	$46	**$39**	$48	$218	**$266**

- Huge uncertainty in these estimates, particularly aggressive energy efficiency

Fundamental Questions

- What means should CA employ to achieve the upper end of aggressiveness? Mandates or market?
  - Theory and conventional wisdom suggest market is a more cost-effective means
  - But CA-only market-based program subject to significant leakage vulnerabilities
  - Mandates are immune to leakage threats
  - In the longer term (with broader regional coverage) a market based system may operate more effectively

- Should target for the sector be set based on current assumptions regarding costs and technological potential, or set as a stretch goal?
  - Remember: whole point of market is drive innovation and cost-savings. -- i.e. to prove the conservative assumptions underlying this model wrong

Questions?
Comments?
Contact:

Julie Fitch

Director, Policy and Planning Division

California Public Utilities Commission

Phone (415) 355-5552

Email: jf2@cpuc.ca.gov

Web site: www.cpuc.ca.gov

(END OF ATTACHMENT 2)

ATTACHMENT 3

CPUC and Energy Efficiency: Utility Programs & Strategic Planning Process (2009-2020)

Cathy Fogel, Senior Analyst & Staff Coordinator
2009-2020 Energy Efficiency Strategic Planning Process
California Public Utilities Commission

CAT-CARB-CPUC-CEC Workshop on Non-market Based GHG Reduction Measures

Today:

- Incorporating CPUC Programs into ARB Scoping Process
- Energy efficiency programs at CPUC
- Recent developments –
  - “Big Bold” Programmatic Initiatives & Targets
  - Statewide Energy Efficiency Strategic Planning Process (2009-2020)
  - 2009-2011 Utility EE Applications
  - New energy efficiency goals out to 2020

Incorporating CPUC Energy Efficiency Efforts into AB 32 and ARB Scoping Process

- **CPUC EE programs for 2009-2011 and beyond should be included in ARB Scoping Plan**
  - Provide key measures for GHG savings needed under AB 32

- **CPUC EE programs also support CEC activities that are key to AB 32**
  - building standards development and enforcement
  - local government activities
  - the State's Green Building Executive Order
  - private sector energy efficiency activities that result in emission reduction efforts

- **Upcoming EE Strategic Plan, including Big, Bold EE Strategies, will provide basis for EE efforts in CA through 2020 and beyond**
  - CPUC staff will seek ARB staff comments on draft so final Plan is integrated with and supports AB 32 efforts;
  - In turn, ARB Scoping Plan should include final Strategic Plan (and Big, Bold EE Strategies) as key AB 32 reduction measures

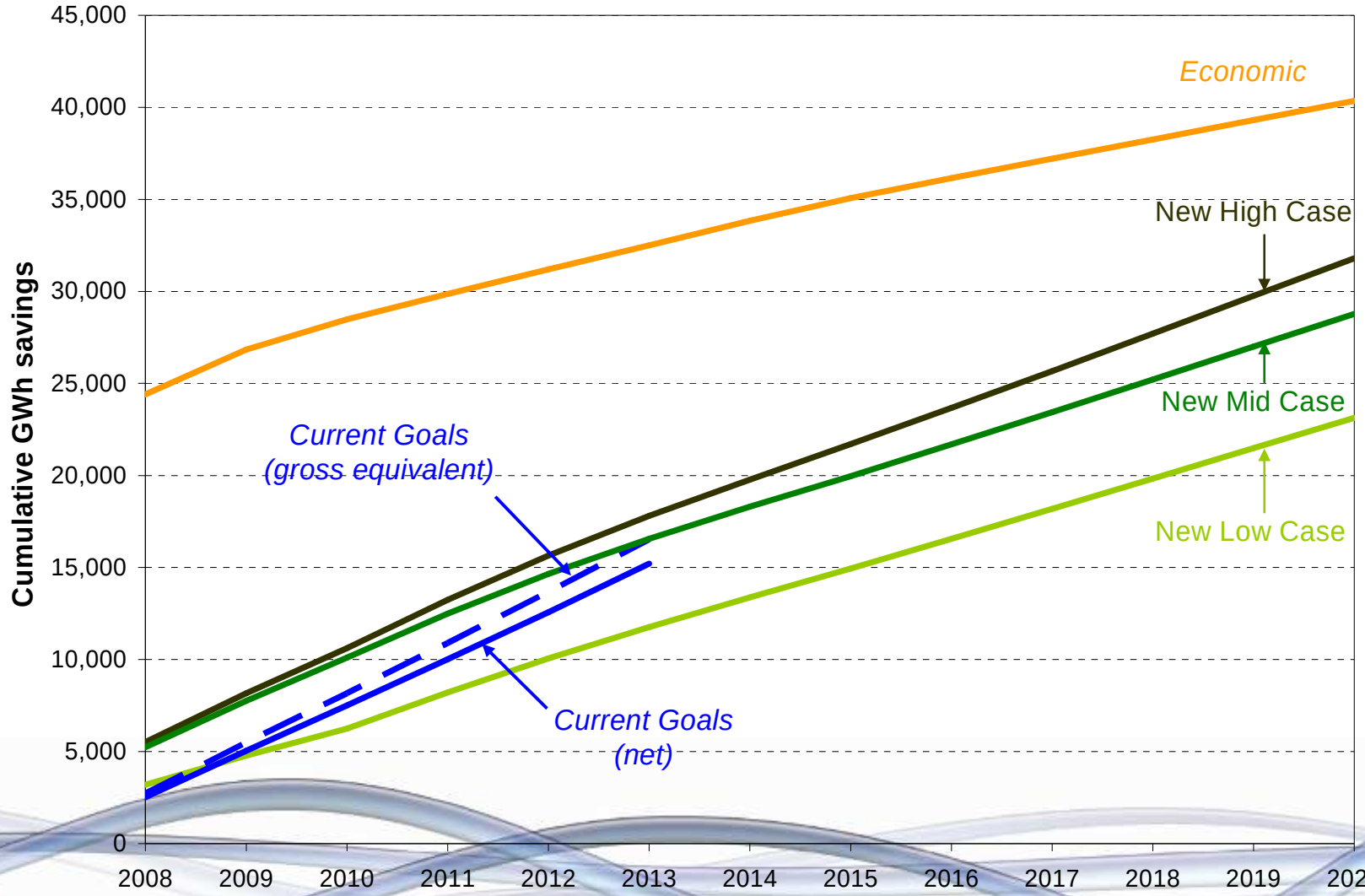
Current Energy Efficiency Programs

- 3 year cycles
- Utility administered programs
  - Design requirements, oversight and evaluation, measurement and verification (EM&V) by CPUC
- Approved Utility EE program funds
  - Ranged from $500- $845 million/year (2004- 2007), including LIEE programs
  - Approx $1 billion/year expected (2009- 2011)
- Mandated efficiency goals through 2013
  - Cumulative goals (through 2013): 23,183 GWH/year; 4,885 MW/year; 444 MMTh/yr)

Types of Utility Energy Efficiency Programs ('06-'08)

- Statewide Programs
  - Residential
  - Commercial/Industrial/Agricultural
  - New Construction
  - Codes & Standards
  - Emerging Technologies
- Statewide Marketing and Outreach
- Third Party (EE Contractors) Programs
- Local Government Partnerships
- Government Agencies Partnership Programs
- *Types of programs: Rebate, audit, direct install, appliance turn in, education, performance contracting, energy management services*

CPUC to adopt EE goals for Utilities through 2020



Big Bold Energy Efficiency Strategies

Commercial New Construction

- All new commercial construction in California will be zero net energy by 2030.

Residential New Construction

- All new residential construction in California will be zero net energy by 2020.

Residential / Small Commercial HVAC

- Heating, Ventilation, and Air Conditioning (HVAC) industry will be reshaped

Low-Income Energy Efficiency

- All eligible homes energy-efficient by

Organization of Strategic Plan Process

Sectors			
Residential	**Commercial**	**Agriculture**	**Industrial**
☐Small HVAC BBEES			
☐New Residential Construction BBEES	**☐New Commercial Construction BBEES**		
Residential Low Income Strategies			
Local Government Roles			
Emerging Technologies, Market transformation, and/or Code & Standards			
Integrated DSM & EE program development & delivery			
Integrated Marketing, Education & Outreach			
Training & Work Force Development			

EE Strategic Plan process

- 40 CPUC convened workshops Nov-Dec, 2007; CEC convened HVAC group
- 500 individuals, 1100 participant –days
- 48 comments, publicly posted
- Range of participants
  - Agencies (state, federal, cities, SCAQMD), NGOs, vendors, research groups, individuals, developers, finance institutions
- Workshop convener reports → utility draft

Major New Action Areas from Strategic Planning Process-

Broad Actor Focus; Not Limited to Utility Programs

- Zero Net Energy targets for new construction (residential – 2020; commercial – 2030)
- ZNE pilot projects (starting in ’09-’11 period)
- Enhanced CEC – CPUC – IOU coordination
  - Codes & Standards towards ZNE (Title 24, 20)
  - Tiered, coordinated ‘stretch’ goals beyond standard code
  - Coordination of CEC research & performance modeling, with CPUC authorized IOU incentives programs
- Benchmarking, building labeling programs

Residential and Commercial Themes

- Integrating DSM (EE, DR, DG/CSI) offerings & programs— (all sectors)
  - On-line information, coordinated incentive programs, audits
- Expanded whole building approaches
  - Incentives for integrated building design
  - Comprehensive retrofit programs
  - ‘One stop shops’ for integrated information
- Slowing “plug load” growth
  - Residential and commercial sectors
  - IOU emerging technologies, manufacture outreach, CEC Codes & standards, PIER research

HVAC (res and commercial)

- Improved installation and maintenance
  - Quality installer certification program
  - Tracking system from unit sale to permitting
  - Quality branding program
- Research & Design of HVAC systems suited to West
- Focus on training installers, permitting agencies
- Expanded compliance programs

Industrial

- Coordination of IOU programs with AB32 requirements
  - Aligning incentives
- Targeted, bilateral efficiency agreements
- Multi-resource program pilots
  - Food processing
- Participation in national energy management certification program
- Centralized technical support system

Agriculture

- Market assessment and goal setting
- Enhanced education, training, marketing, outreach
- Acceleration of new technologies
- Integrated offerings
- Focus on process changes to reduce energy use
  - Pump testing

Local Governments

- Emphasis on comprehensiveness
- Capacity building to ‘lead by example’
- Integrated offerings (ee, solar, LIEE,water)
- Engagement in ‘Stretch’ T24 C&S, ‘Green’ Standards
- Expedited permitting, enhanced compliance programs
- Pilot ‘point of sale’ (POS) programs

Marketing & Outreach

- Statewide brand, linked to AB32
- Web portal

Financing & Education

- On-bill financing, expanded loan programs
- Workforce needs assessment

Emerging Technologies

- Strategic expansion, improved links to market intelligence, Big Bold strategies

www.californiaenergyefficiency.com

- May 15th Strategic Plan filed with CPUC
  - Extensive review & comment period
  - Concurrent filing and review of utility 09-11 Applications
    - (2012-2014 and 2015-2017)
  - CPUC authorization decision, late fall
- Continued Strategic Plan process (every 3 years)

Incorporating CPUC Energy Efficiency Efforts into AB 32 and ARB Scoping Process

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» Cathy Fogel, Ph.D. Senior Analyst, CPUC cf1@cpuc.ca.gov

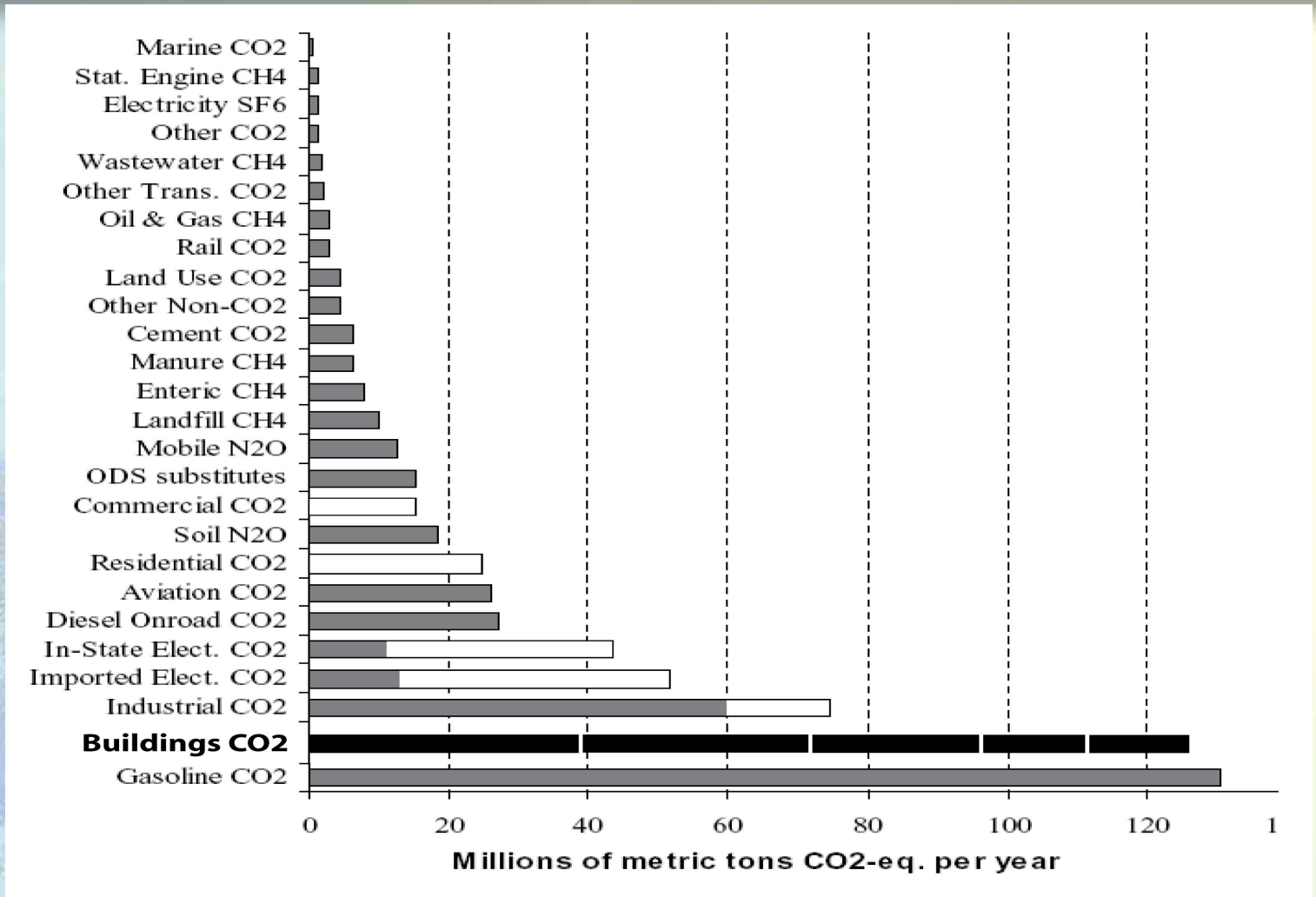
(END OF ATTACHMENT 3)

ATTACHMENT 4

Building and Appliance Standards

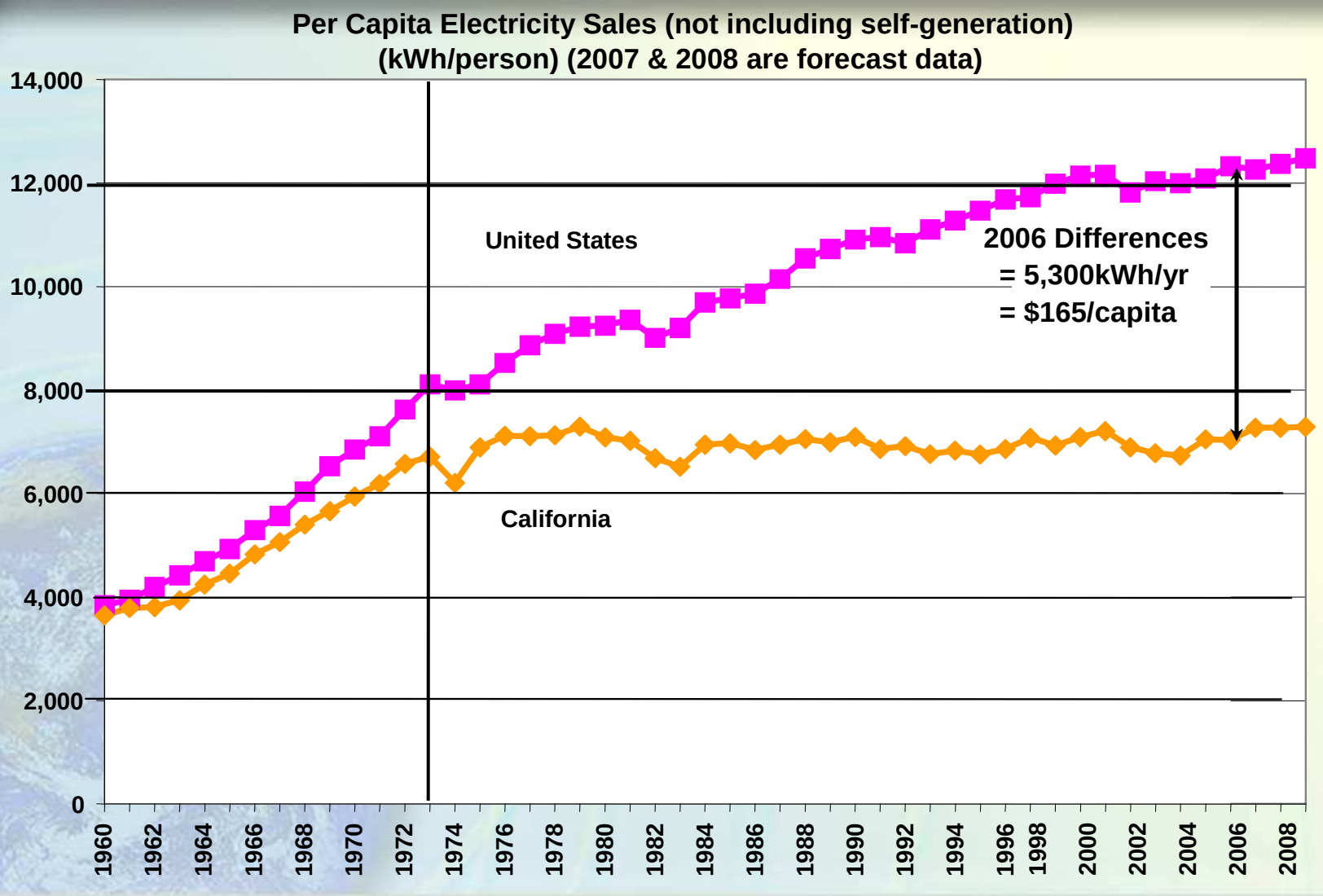
Martha Brook & Bill Knox
California Energy Commission

Climate Change: Why Focus on Buildings?

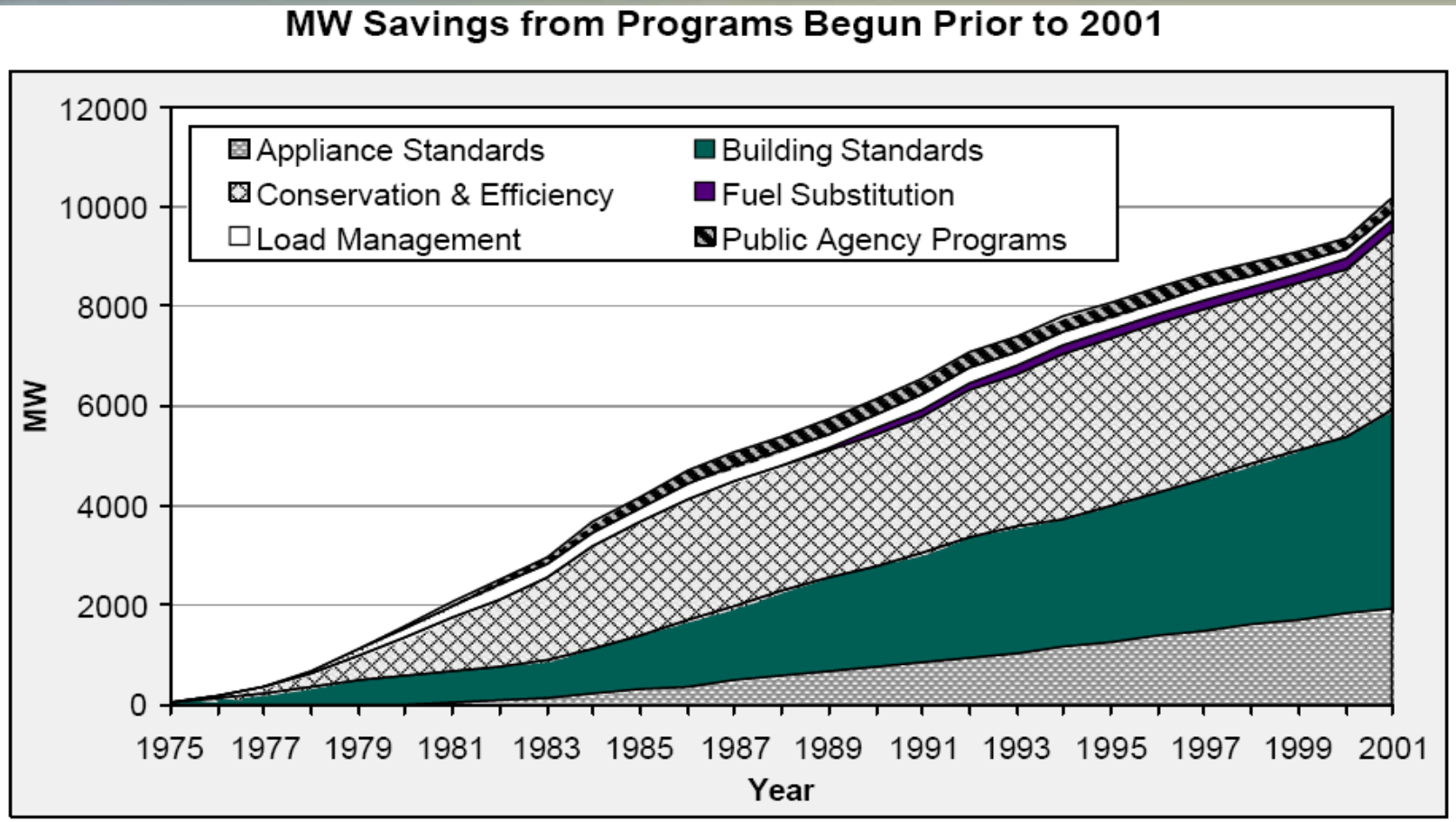


Source: EIA data as presented by Ed Mazria

California Per Capita Electricity Sales



Energy Efficiency Components



Efficiency programs and standards have contributed equally to achieving significant peak demand savings over the past 26 years.

Source: California Energy Commission

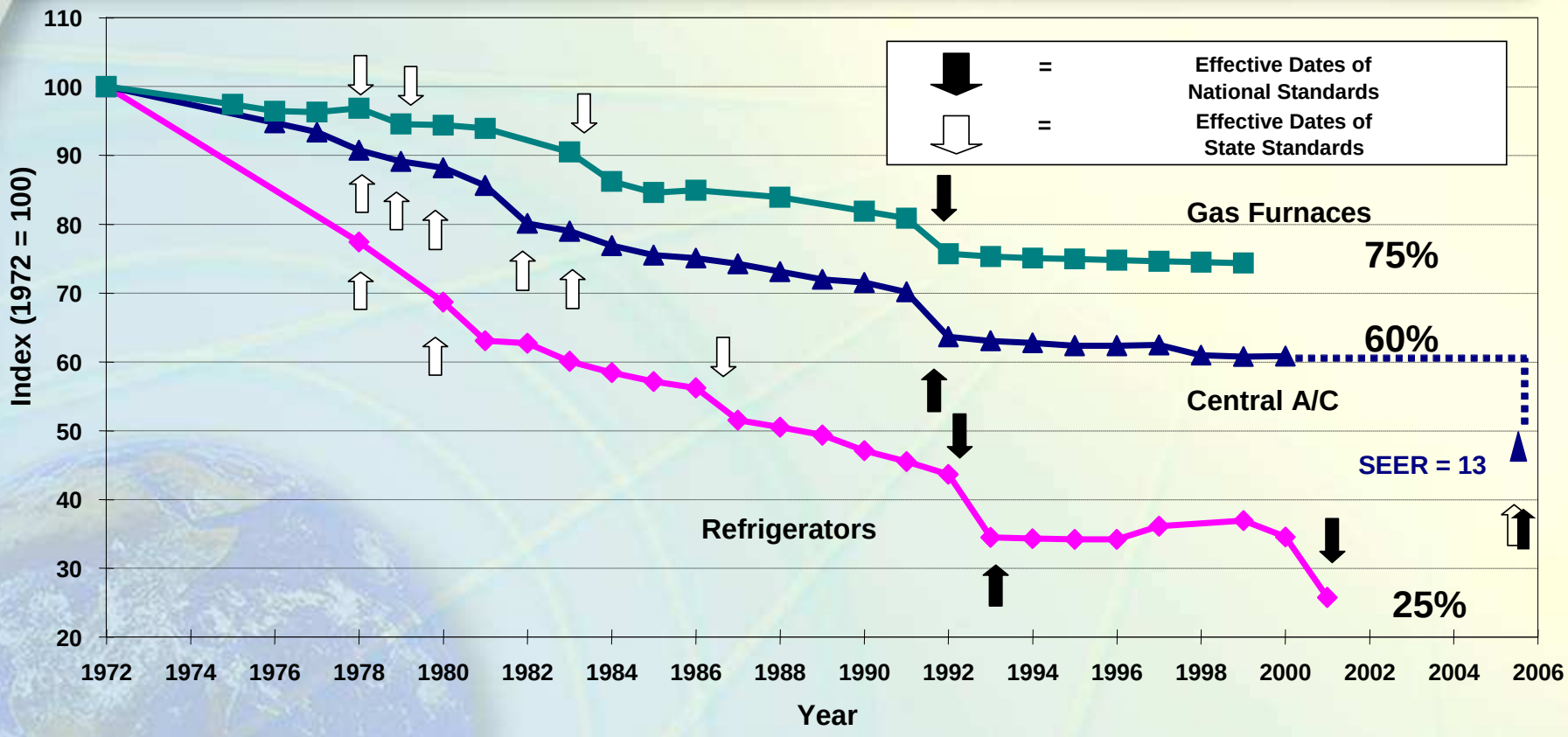
Legislative Mandates for Energy Efficiency Standards

- Building Design & Construction Standards
- New Construction & Alterations
- Prescriptive & Performance Standards
- Residential and Nonresidential
- Appliances Sold in California
- Cost Effective when Amortized Over Life of the Building
- Periodically Update
- Water Efficiency Standards

Building & Appliance Standards

- Early Actions
- Major Tool to Achieve Energy Savings
- One-Time Administrative Cost to Develop
- Recurring Annual Benefits – Construction, Alteration, Appliances Manufactured
- PIER → ET → Incentives → Standards
- Incentives "Exit Strategy"
- Utility Codes and Standards Program
- Driver for Both Energy Efficiency and PVs

Impact of Standards on 3 Appliances



Source: S. Nadel, ACEEE,

in ECEEE 2003 Summer Study, www.eceee.org

2008 Building Standards Changes

- Cool Roof requirements for steep-sloped roofs
- Lower Lighting Power Density for some NR
- Occupant Sensors Required for some NR
- Increased NR Insulation Requirements
- Requirements for Refrigerated Warehouses
- Lower Residential Window U-factors
- Updated Swimming Pool and Spa Requirements
- Residential HVAC – Furnace Fan, A/C Airflow
- Water Heating – MF recirculation controls, Pipe Insulation Under Slabs

Appliance Standards: What's Next

- Get Started in 2008
- Work Closely with Utility Codes and Standards
- High Efficacy General Service Lighting
- Battery Chargers
- Consumer Electronics
- Other Appliances to be Identified

(END OF ATTACHMENT 4)

ATTACHMENT 5

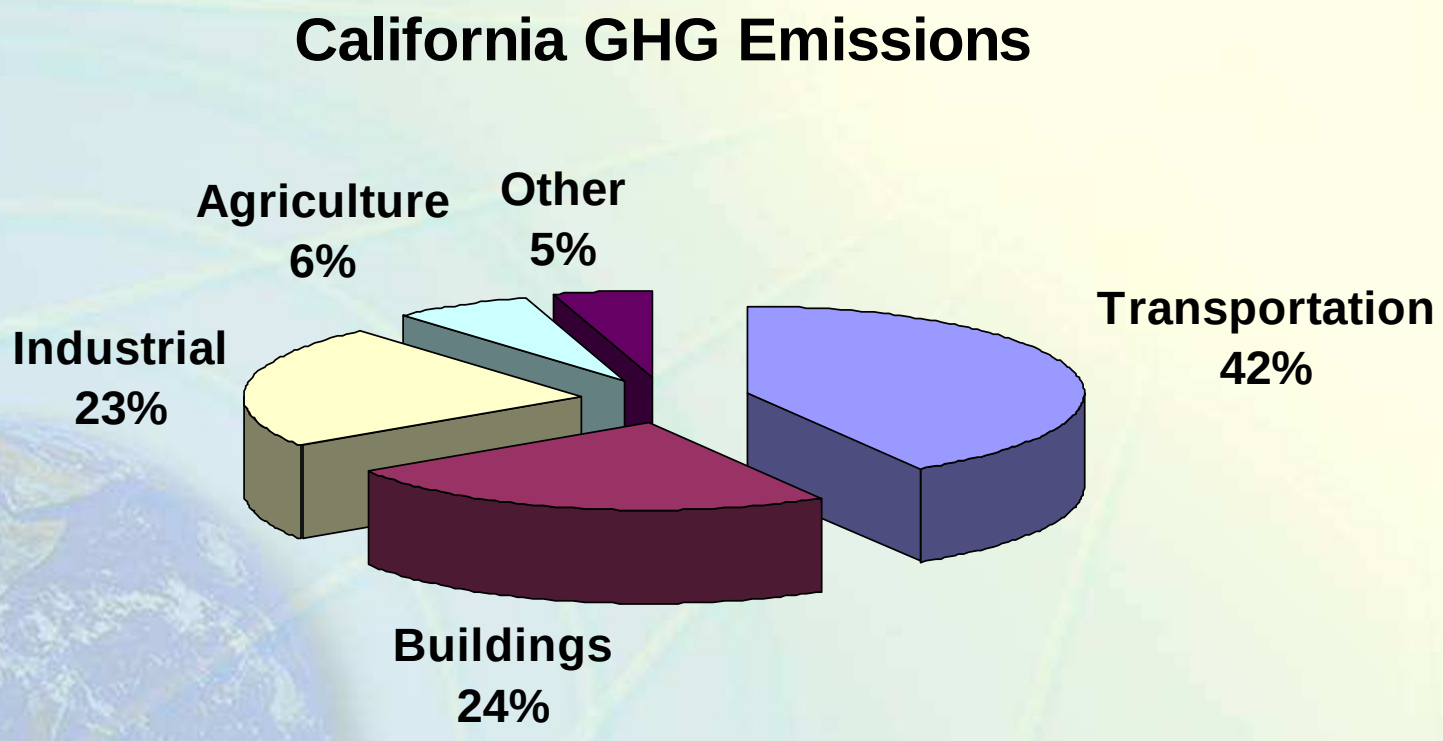
Policy Initiatives to Increase Energy Efficiency

Martha Brook & Bill Knox
California Energy Commission

IEPR Recommendations

- Adopt EE target of 100% of economic potential
- Enlist publicly owned utilities in collaborative relationship to ramp up EE
- Pursue legislation that would require cost-effective EE improvements at time of sale
- Increase efficiency levels of standards and combine with PV for zero energy buildings
- Investigate “white tags” for EE, analog to renewable energy credits

GHG Inventory for California



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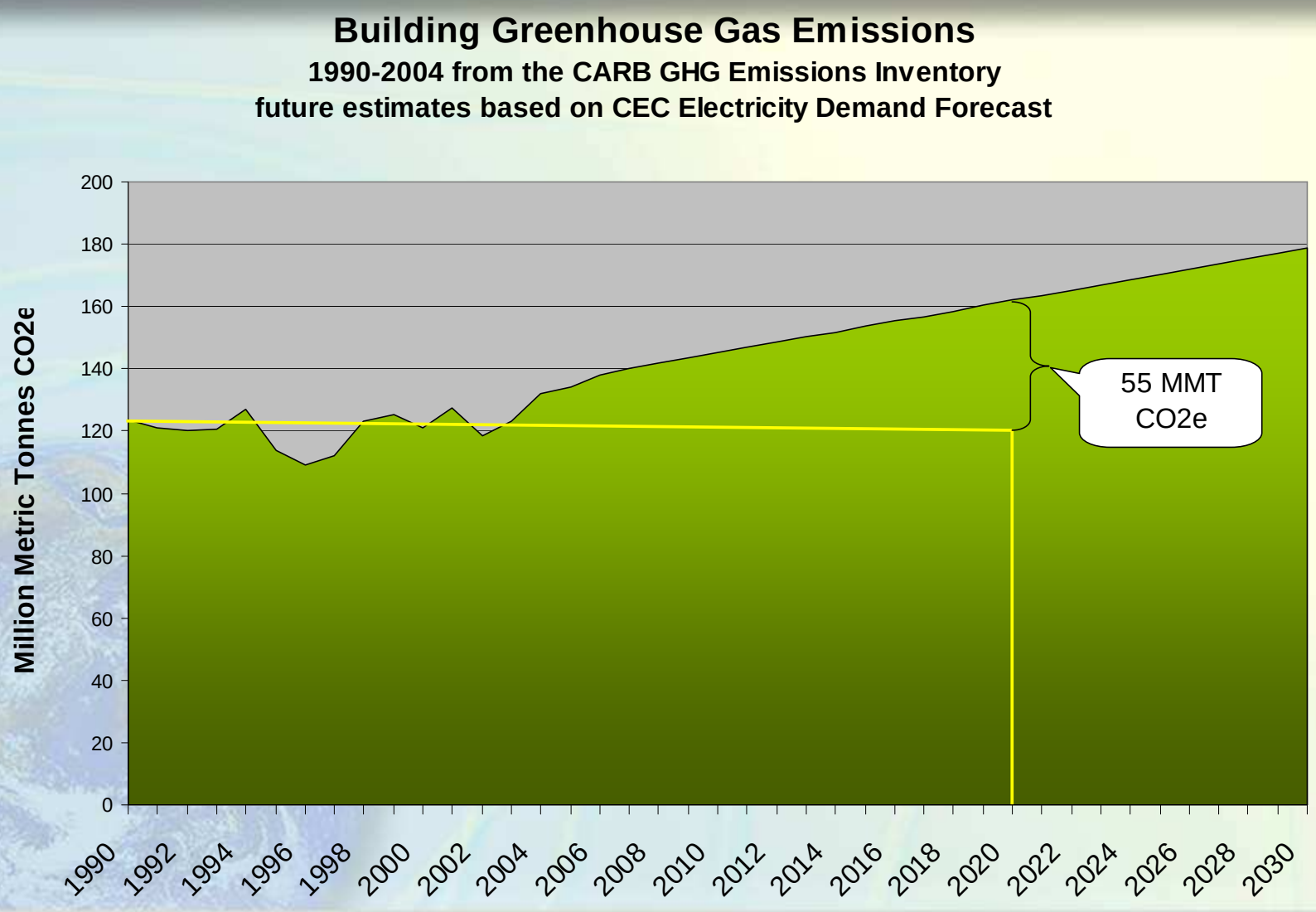
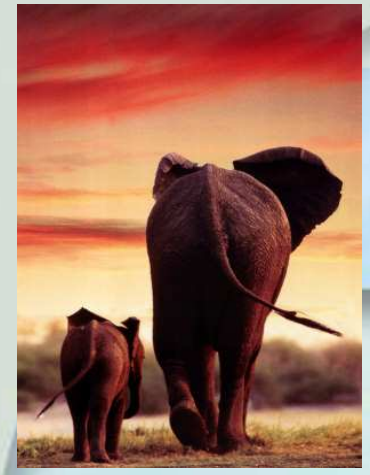


Building Energy Efficiency Standards

- Emissions forecast includes average level of future Standards improvements
- Need to accelerate Standards to change slope of forecast
- Progress to Zero Net Energy will require:
  - a new paradigm for Standards development & compliance
  - more & better collaboration with PIER, CPUC & CA utilities



Efficiency Standards:
Progress to Zero Net Energy

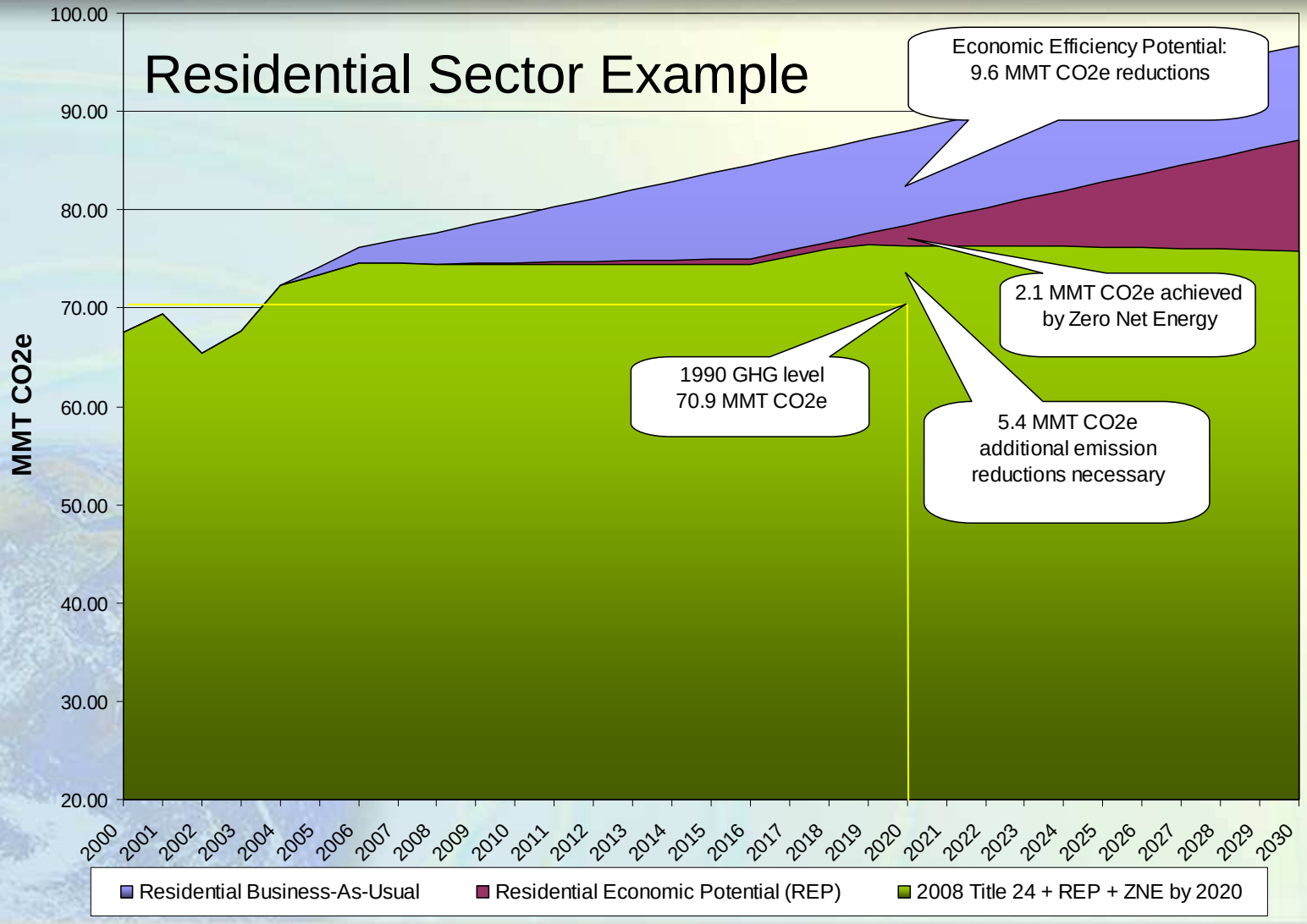
- Quicker migration from R&D and IOU emerging technology programs to Standards
- Redefining Standards' cost effectiveness criteria
- Use of scenario analyses to understand impacts & gauge uncertainty
  - e.g. fuel costs, technology costs, demographics, market acceptance, field performance, climate change
- Expansion of scope – for both Appliance & Building Efficiency Standards

"Reach" Standard for Title 24

Voluntary Standard for more energy efficiency & on-site renewable energy

- Similar approach as mandatory Standards
  - Public process w/ stakeholder workshops
  - Energy performance budgets
  - Written in code language
- Advanced Standard will become:
  - New Construction program targets
  - Future versions of Green Building Standard
  - Energy basis of regional green building codes
- Advanced Standard will provide:
  - List of measures for migration to mandatory Standards

Achieving AB32 goals…



What about Existing Homes?

- Efficiency at Point of Sale
  - Energy Use Disclosure
  - Mandatory Improvements
- Home Energy Ratings
  - HERS Proceeding
- Education & Training
- Local Pilot Projects

Existing Commercial Buildings

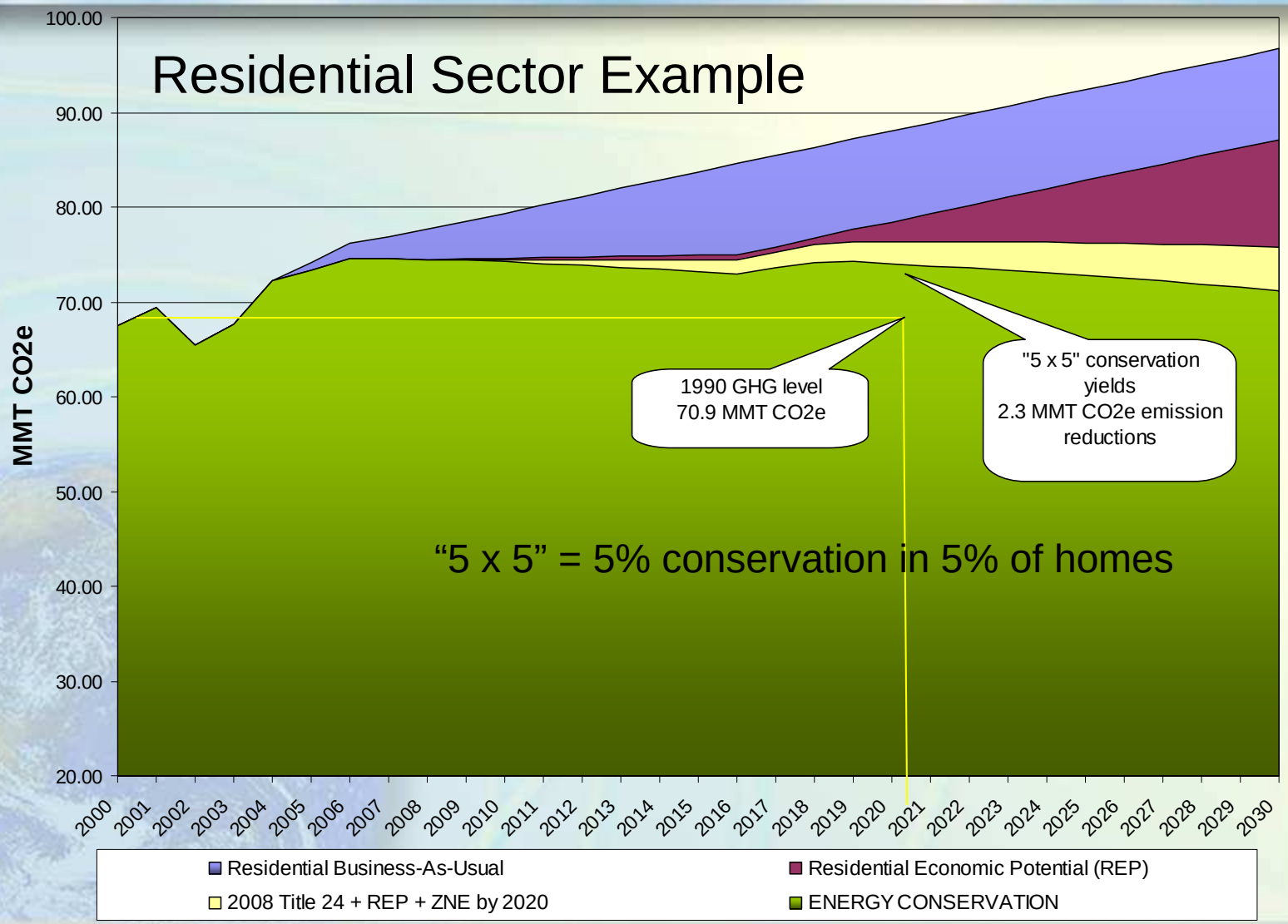
- AB 1103 – Energy Use Benchmarking at time of Lease, Lend or Sale
- Create Regional Markets for Efficient Commercial Property
- More Energy Audits & Retro-Commissioning
- More Trigger Points for Renovation Efficiency Standards
- Mandatory Efficiency at time of Commercial Transactions

Energy Conservation

"You can never get enough of what you don't really need"

- Conservation Ethic
- Social Marketing
- Education & Outreach
- Facilitate with technology innovation & behavioral research
  - Feedback devices
  - Carbon calculators & games
- Reward Conservation Heroes

Revisiting AB32 goals…



(END OF ATTACHMENT 5)

ATTACHMENT 6

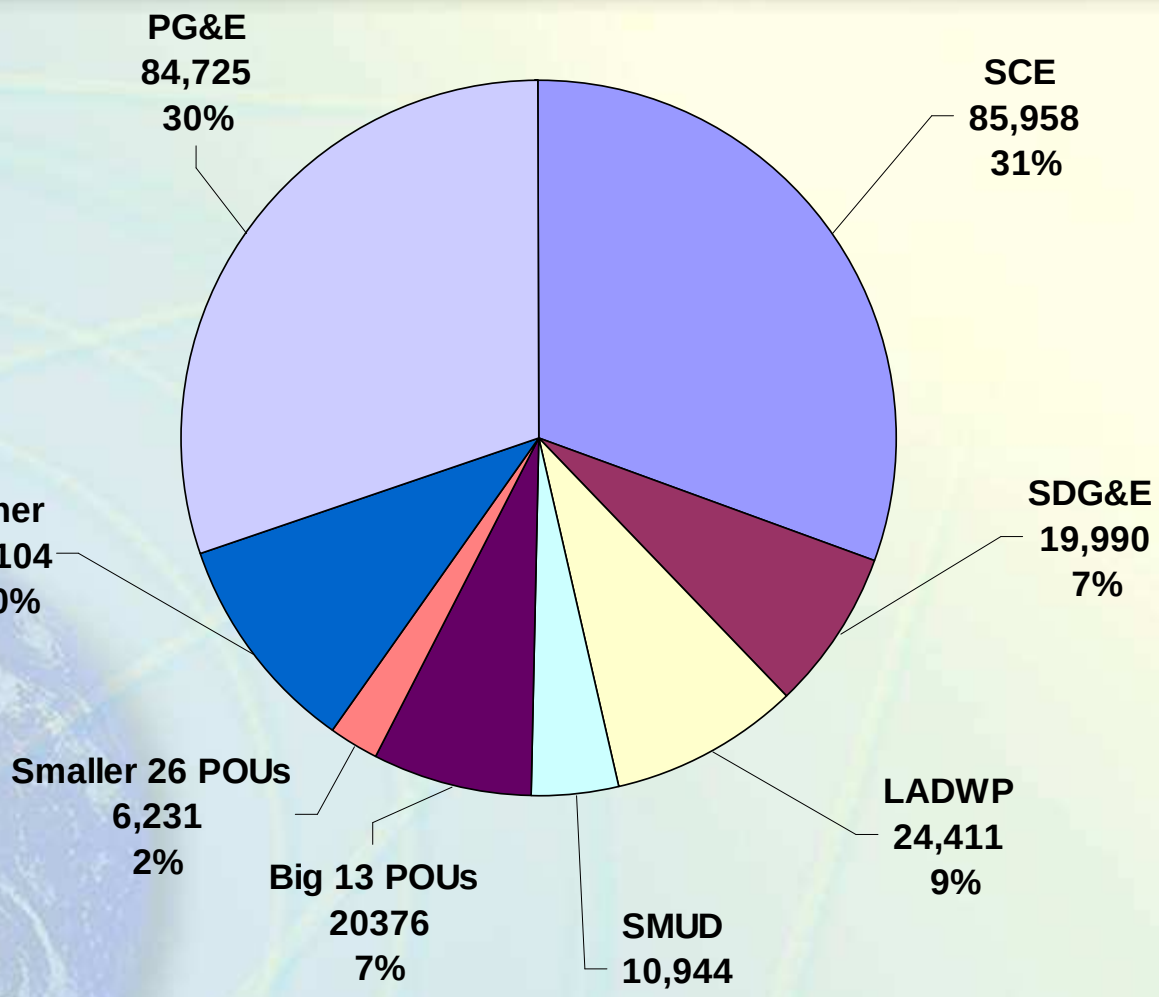
Energy Efficiency in California's Publicly Owned Utilities

Kae C. Lewis
California Energy Commission

IOU – POU Electricity Consumption

2006 Electricity Consumption in CA:

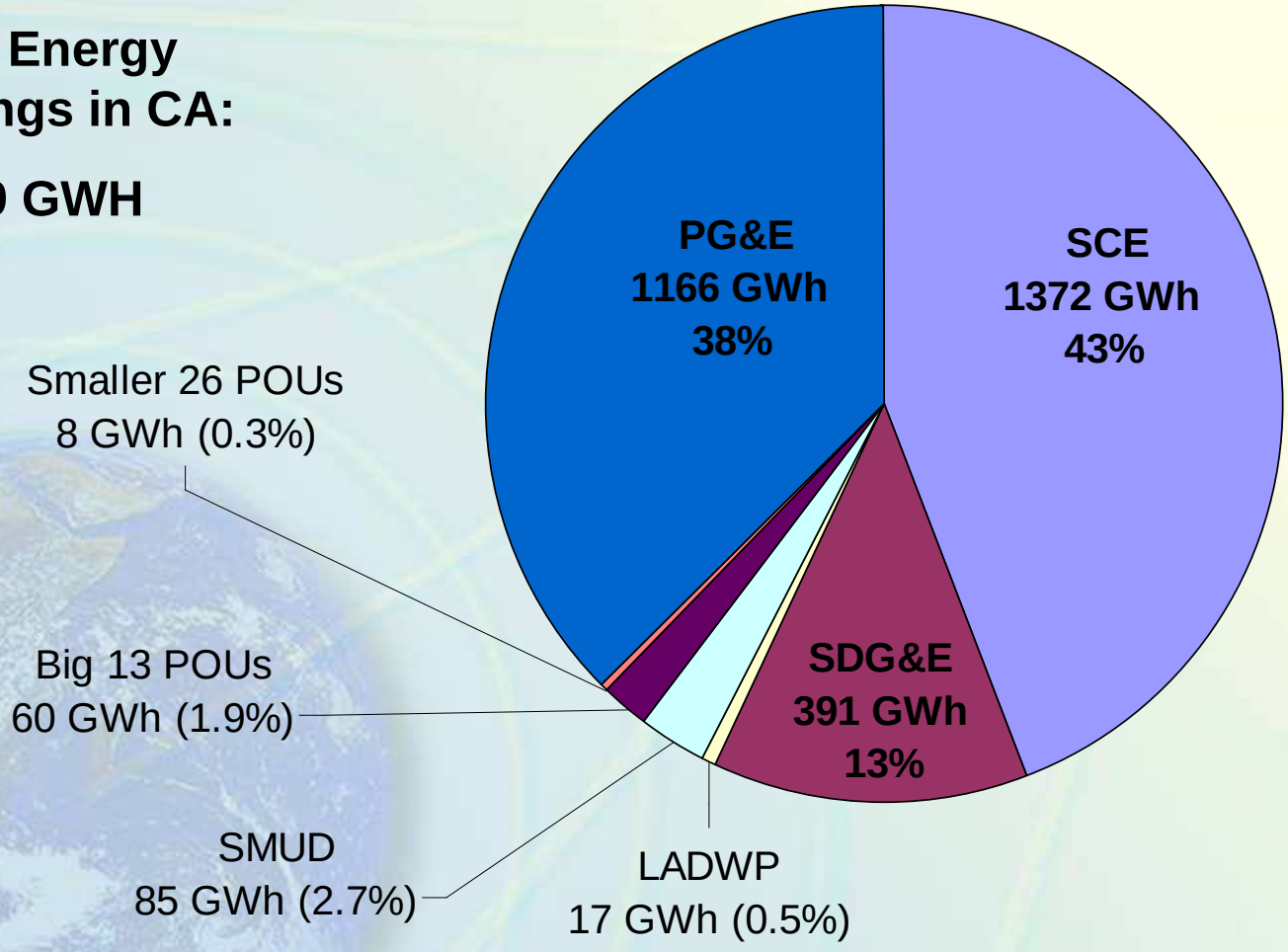
280,739 GWH



IOU – POU Electricity Savings

2005 Energy Savings in CA:

3,099 GWH



Utilities Contributing 93% of POU Efficiency Savings

- Anaheim
- Burbank
- Glendale
- Los Angeles DWP
- Imperial ID
- Modesto ID
- Pasadena
- Redding
- Riverside
- Roseville
- SMUD
- Silicon Valley Power
- Turlock ID

Purpose of POU Energy Efficiency Legislation 2005-06

- Procure all cost-effective energy efficiency measures so that the state can meet the goal of reducing total forecasted electricity consumption.
- First acquire all energy efficiency and demand reduction resources that are cost-effective, reliable, and feasible.
- POU energy savings help meet the Governor's greenhouse gas reduction targets established in Executive Order S-3-05 and AB 32.

Requirements of SB 1037 and AB 2021

- POUs identify achievable, cost-effective efficiency potential every 3 years and establish annual targets based on that potential for a 10-year period
- CEC combines POU targets with IOU targets established by the CPUC into a statewide estimate of all potentially achievable electricity and natural gas savings and establishes annual targets over a 10-year period
- POUs report annually on their sources of funding, cost-effectiveness, and verified energy efficiency measures
- CEC compares annual targets to actual energy savings in the IEPR and makes recommendations for improvements as needed

POU Economic Potential and Savings Targets by 2016

	Economic Potential	Proposed Savings	Proposed Savings as % of Economic Potential
Energy Savings (MWh)	10,657	6,424	61%
Peak Savings (MW)	1,991	1,353	68%
Natural Gas Savings (MMth)	4.5	0.9	21%

Publicly Owned Utility Annual Targets and Budget Reported and Estimated 2006-2016

Energy Efficiency Savings	2006 Reported	2007 Reported	2008 Estimated	2016 Estimated
MWh	169,000	254,000	541,000	701,400
MW	53	56	117	1,353
Expenditures	$54,000,000	$63,000,000	$145,000,000	N/A

Additions to the 2007 POU Program Report

- Calculates cost-effectiveness for each program portfolio – average benefit/cost measure exceeds 3.0

- Reports on GHG emissions reduction due to efficiency:
  - 1.5 million tons of CO_2 in 2007
  - 3.3 million tons of CO_2 expected in 2008

(END OF ATTACHMENT 6)

ATTACHMENT 7

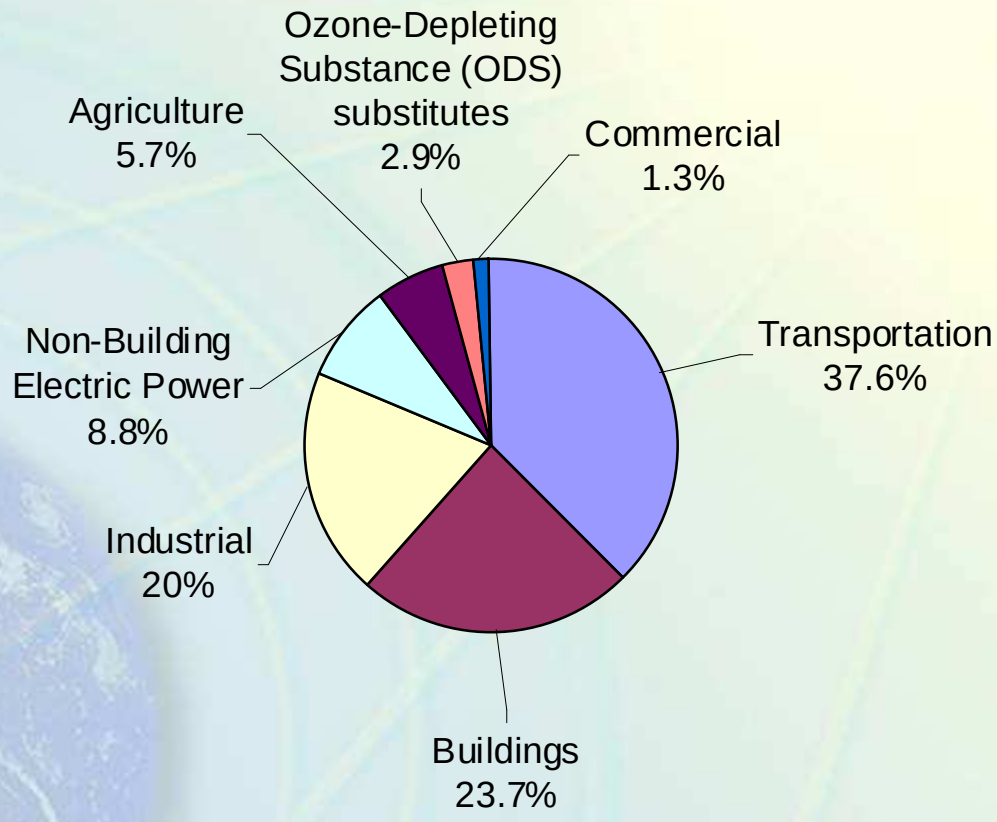
CLIMATE ACTION TEAM

GREEN BUILDING MEASURES

CAT Green Building Subgroup
Roy McBrayer
May 2, 2008

25% of GHG Emissions Attributable to Buildings

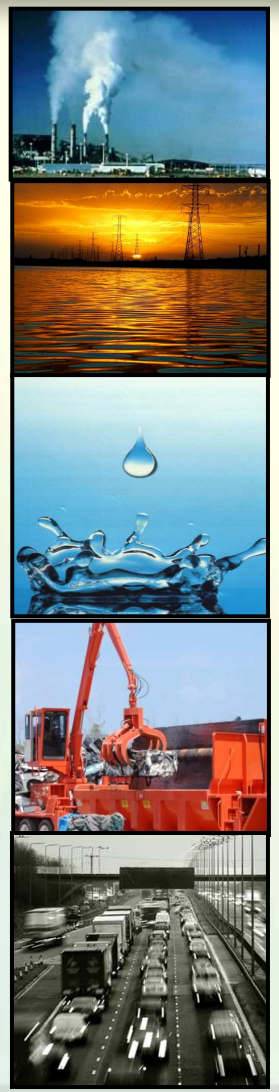
California GHG Emissions



2004 California GHG Inventory [480 MMT CO_2 e]

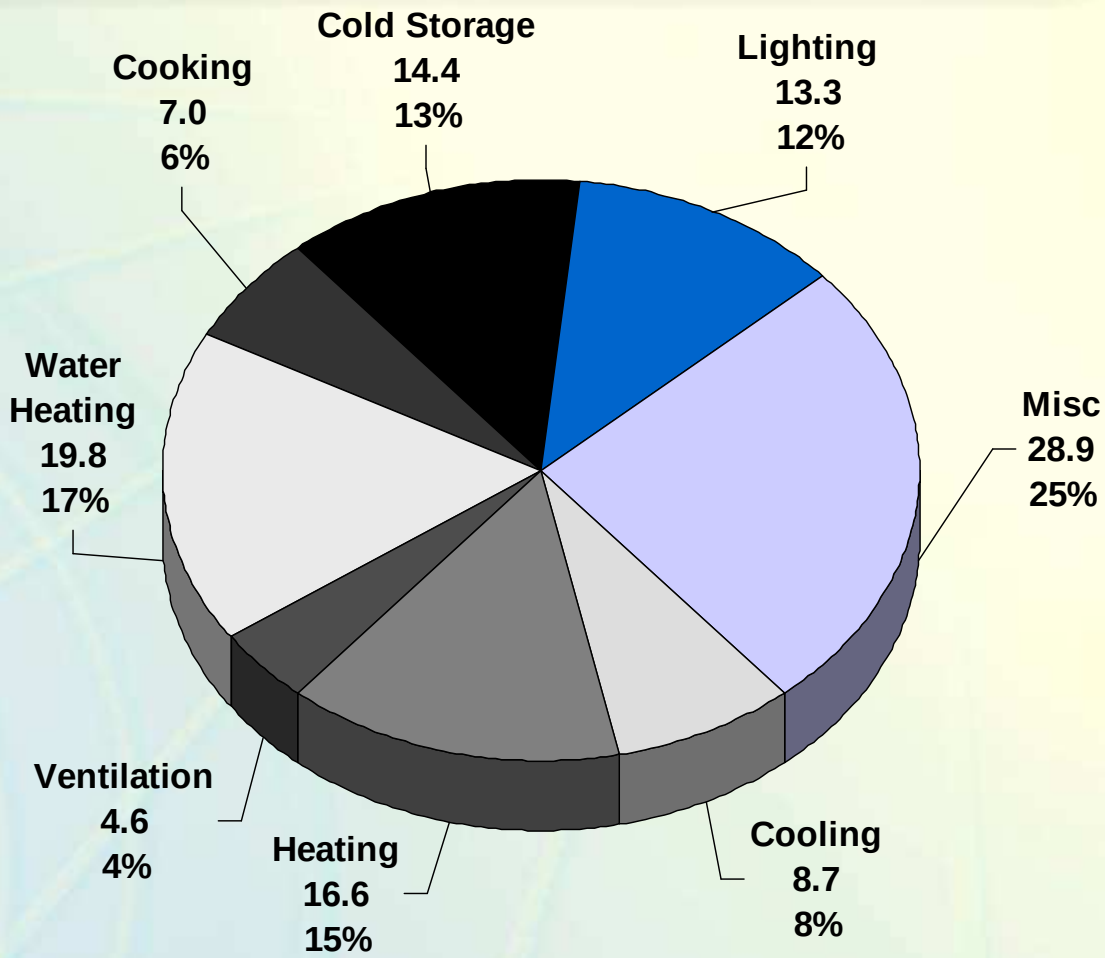
How Buildings Contribute to Greenhouse Gas Emissions

- Electricity Usage
- Fuel Combustion
- Water Consumption
- Solid Waste Disposal
- Construction & Demolition
- Building Material Manufacturing
- Transportation



California Building GHG Emissions Breakdown

- Electricity & gas use in buildings: 23.7% of GHG inventory
- Existing buildings: 90% of these emissions



Emissions in $MMTCO_2e$

The Challenge

- Existing buildings offer greatest potential for impact
- Retrofitting of existing buildings is needed to reach GHG targets
- Transportation impact (VMT) is also important
- Potential unfunded mandates are a concern

Potential Actions

- State to Lead by Example
- Regulatory Action
- GHG Reporting for Building Sector
- California Green Building Standards Code
- 3rd Party Rating Certification Systems to Exceed Minimum Code
- Financing/funding mechanisms
- Incentives (financial and non-monetary)

Potential Implementation Approaches - Education/Awareness

- Education and Training programs
  - Green collar jobs
  - Mandatory coursework
- Awareness programs
  - Flex Your Power
  - Media campaigns
- Green Building Appraisers
  - Place value on green features
- Utility technical assistance programs
- Targeted outreach programs

Potential Implementation Approaches - Incentives

- Financial
  - Grants
  - Rebates/buy downs
  - Pay as you save
  - Low cost loan programs and/or on-bill financing
  - Fee waivers
  - Tariffs
  - Tax incentives
  - Carbon trading
- Non-monetary
  - New building design assistance
  - Expedited permitting
  - Certifications (ie. “California Gold” building certification/placard)
  - Awards/Recognition

Potential Implementation Approaches - Mandates

- Exceed Green Building Executive Order policy for public buildings
- California Green Building Codes for all occupancies
- Energy audits and disclosure requirements for private buildings
- Upgrades/retrofits for existing buildings – voluntary/mandatory? Criterion?
- Other?

Additional Information

- ARB Climate Change Web Site – list serve
  - www.arb.ca.gov/cc/cc.htm
- California Climate Change Portal
  - www.climatechange.ca.gov
- ARB/agency contacts
  - www.arb.ca.gov/cc/contacts/contacts.htm
- **Green California Website**
  - www.green.ca.gov

(END OF ATTACHMENT 7)

ATTACHMENT 8

Distributed Generation and California Solar Initiative:
CPUC Policies and Programs

Molly Sterkel, Energy Division
California Public Utilities Commission
May 2, 2008

Presented to
Air Resources Board Workshop

Presentation Overview

- What is Distributed Generation?
- A Priority for California
- CPUC Distributed Generation Policy and Programs
  - Net energy metering and Interconnection rules
  - California Solar Initiative
    - General Market Incentive Program
      - PV and Non-PV solar
    - Low Income Programs
    - Research and Development Program
    - Solar Hot Water
  - Self Generation Incentive Program
  - Feed-in-Tariffs
    - Small Renewable Energy Generators
    - Combined Heat and Power
- Current CPUC Proceedings

What is Distributed Generation?

DG is:

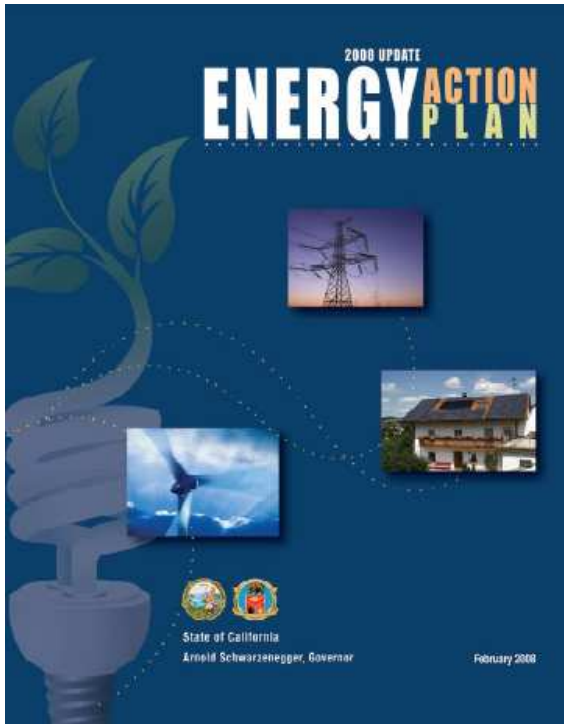
- Generation connected at *distribution* voltage
- 1 kW to 20 MW
- Customer generation
- Voltage support
- Local reliability
- Merchant plant
- Utility plant

Technologies:

- Renewable
  - Solar (PV & solar thermal)
  - Wind
  - Dairy/landfill/waste biogas
  - Biomass
- Combined Heat and Power (CHP)
  - Microturbines
  - IC Engines
  - Small gas turbines
  - Fuel Cells

Why DG Matters

- Peak demand reduction
- Can enhance grid reliability
- Best DG technologies and applications reduce GHG emissions via demand side reductions
- Empowers consumers



CPUC Policy & Programs

- Net energy metering (NEM) and Interconnection Rules
- California Solar Initiative
  - General Market Incentive Program
    - PV and Non-PV solar
  - Low Income Programs
  - Research and Development Program
  - Solar Hot Water
- Self Generation Incentive Program
- Feed-in-Tariffs
  - Small Renewable Energy Generators
  - Combined Heat and Power

Interconnection and Net energy metering (NEM)

- Interconnection (Rule 21) - CA one of the first states to adopt standard interconnection, operating, and metering requirements for DG
- Net Energy Metering:
  - Customers may offset utility charges with credits from onsite power production.
  - NEM customers are exempt from standby charges and interconnection fees.
- NEM Rates:
  - *Full retail NEM* - credit based on the full retail rate (PUC Section 2827)
    - Solar up to 1MW
    - Wind up to 50kW
  - *Generation only NEM* - credit based on generation portion of the rate
    - Wind between 50kW and 1MW (PUC Section 2827.8)
    - Biogas generation up to 1MW (PUC Section 2827.9)
    - Fuel Cells up to 1MW (PUC Section 2827.10)

NEM customers statewide as of 12/31/2007

	PG&E		SDG&E		SCE		**Total**	
	#	MW	#	MW	#	MW	**#**	**MW**
Solar	20,501	160.0	4,840	33.3	6,708	70.4	**32,049**	**263.7**
Wind (under 50kW)*	137	0.5	7	0.0	203	1.5	**347**	**2.1**
Wind (50kW-1MW)**	-	0.0	-	0.0	1	0.9	**1**	**0.9**
Biogas	4	1.1	1	0.1	5	2.7	**10**	**3.9**
Fuel Cells**	7	4.3	3	2.0	6	3.2	**16**	**9.5**

*Estimates only - based on ERP project data; **Estimates only - based on SGIP project data

Self Generation Incentive Program (SGIP)

- **SGIP is the largest DG incentive program in the country**
  - Represents over $1 billion in total project costs
  - As of March 31, 2008, approximately 1200 operating facilities (~300 MW of capacity)
- **Program was initiated by AB 970 (Ducheny, 2000)**
  - Started in response to California peak demand problems
  - Developed to pursue load control and distributed generation (DG)
  - DG facilities were to be located at the demand source (i.e., customer sites)
- **Program continues to evolve**
  - Solar PV moved to CSI in 2007
  - AB2778 extends SGIP through December 31, 2011, limits technologies to only wind, fuel cells
  - Recent ruling may extend incentives to advanced energy storage technologies, when used in conjunction with wind and fuel cells

SGIP Technologies & Incentives

- Eligible technologies have included both renewable and fossil fuel powered systems in the past
- Currently, only wind and fuel cells are eligible for SGIP, per statute
- Maximum system capacity = 5MW

Eligible Technology	Incentive Level $/watt	
	2007	2008**
Solar PV*		
Wind turbines	$1.50	$1.50
Biogas fuel cell	$4.50	$4.50
Natural gas fuel cell	$2.50	$2.50
Biogas microturbines (MT)	$1.30	
Biogas internal-combustion engines (ICE)	$1.00	
Large biogas turbines	$1.00	
Natural gas microturbines	$0.80	
Natural gas internal-combustion engines	$0.60	
Small natural gas turbines	$0.80	
Large natural gas turbines	$0.60	

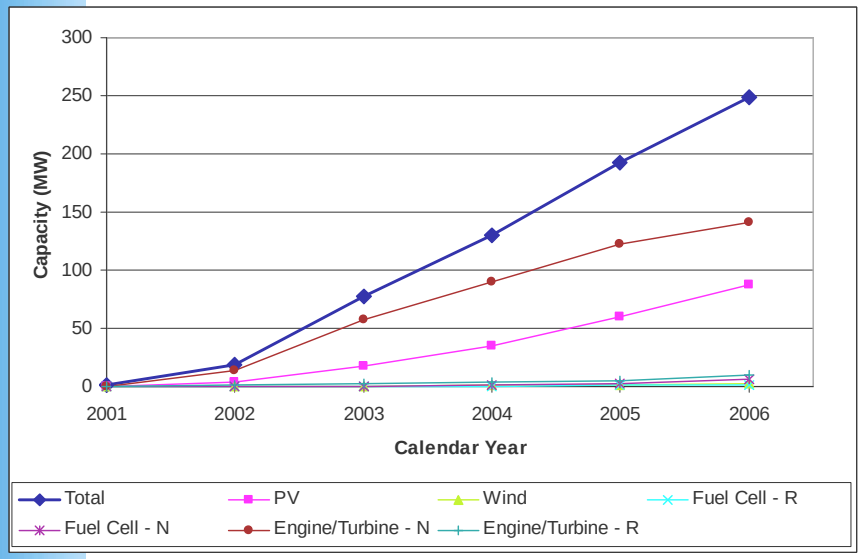
*Solar PV technologies were removed from SGIP effective 1/1/2007

**AB 2778 limits SGIP to wind and fuel cells effective 1/1/2008

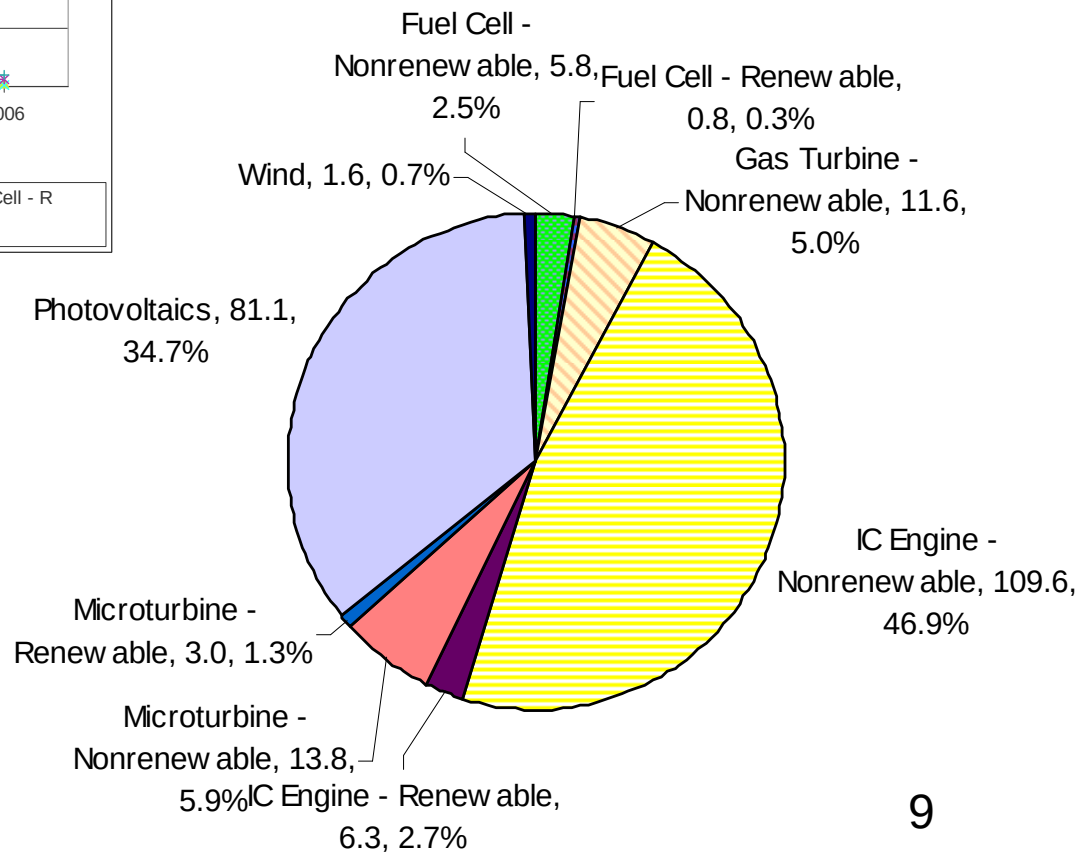
Renewable fuel

Nonrenewable fuel

SGIP Funded Projects



Total Installed Capacity through 12/31/2006 = 223.6 MW



SGIP Program Impacts

- SGIP facilities delivered ***610,000 MWh*** in 2006
  - Engines/Turbines provided 78%
  - PV provided 17%
  - Represents electricity that did not have to be generated by central station power plants or delivered by transmission and distribution systems
- Over 110,000 tons of CO2 equivalent reduced in 2006
  - PV systems account for over half of all GHG reductions
  - Biogas systems provided over 58,000 tons of CO2 equivalent reductions
- Three ways SGIP funded systems reduce GHG emissions:
  - *Displace grid electricity*
  - *Methane captured and used by biogas facilities*
  - *Waste heat recovery systems used at cogeneration facilities avoid need for emissions associated with generating heat other ways*

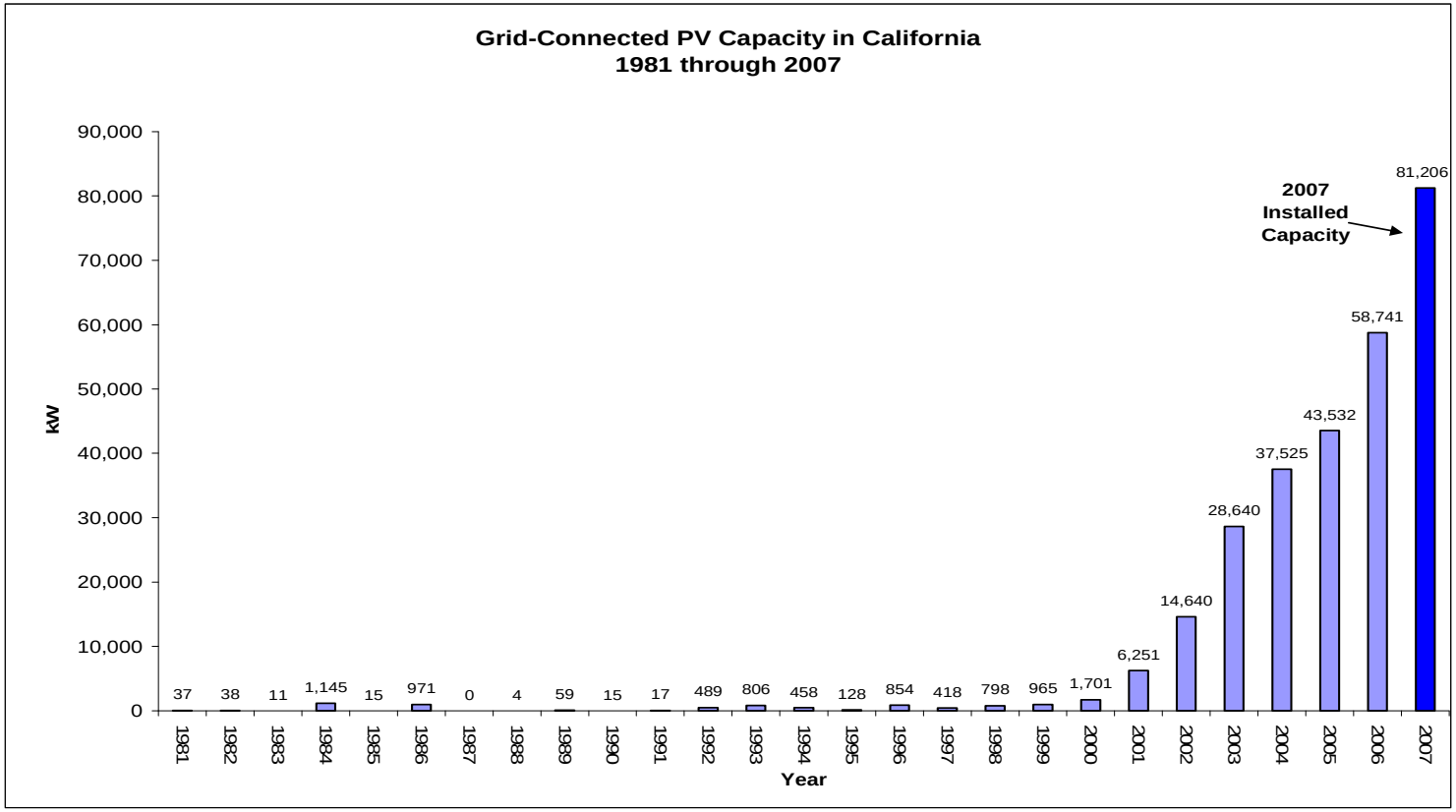
California Solar Initiative (CSI)

- Statewide goals
  - 3,000 MW of new distributed solar generation by 2016
  - Create a self-sustaining solar industry free from ratepayer subsidies after 2016
    - Provides rebates for solar based on performance
    - Rewards optimally-sited and maintained systems to ensure performance, maximize ratepayer return on investment
    - Incentives decline based on program demand

CSI Program Components, 2007-2016

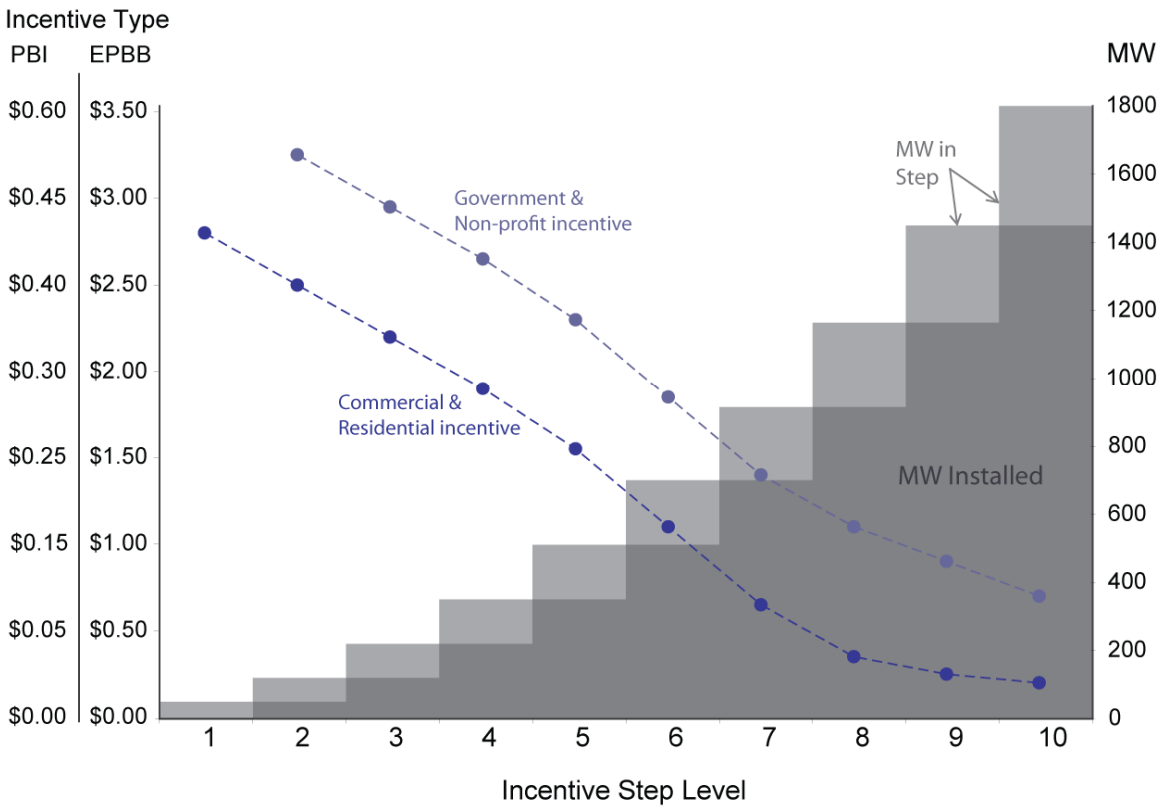
Program Authority	California Public Utilities Commission	California Energy Commission	Publicly Owned Utilities (POU)
Budget	$2,167 million	$400 million	$784 million
Solar Goals (MW)	1,940 MW	360 MW	700 MW
Scope	All systems in IOU areas <u>except</u> new homes	New homes in IOU territories	All systems in POU areas

CA has 280 MW of Grid-Tied PV at 32,000 solar installations statewide



Source: 1981-2007 data from California Energy Commission's *Grid Connected PV Capacity Installed in California*, April 1, 2008. Available at: http://energy.ca.gov/renewables/emerging_renewables/GRID_CONNECTED_PV_12-31-07.XLS.

CSI Incentives Decline as the Solar Market Continues to Grow



PBI: Performance Based Incentive, paid over 5 years, in $ / kWh
EPBB: Expected Performance Based Buydown, paid upfront, in $ / W

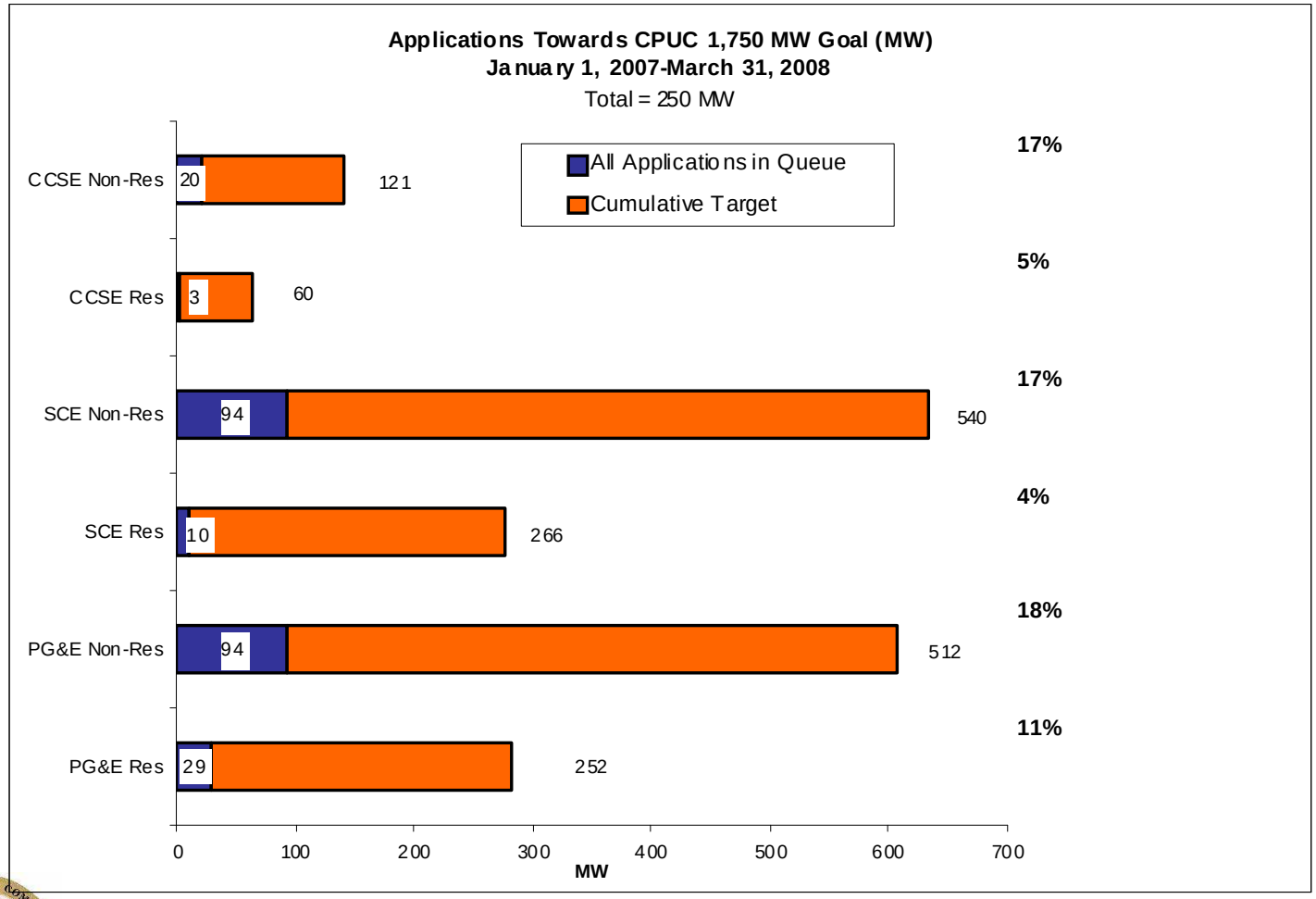
Demand for CPUC CSI program through 3/31/2008

Photo: Travis Richardson, Hansen Trout Farm; Fillmore, CA. 105 kW California Solar Initiative Funded System, June 2007, Installer: GW Richardson Heating & Air Conditioning, Inc. Engineer/Designer: Kris Sutton, Travis Richardson

- Capacity of CSI Applications
  - 41.7 MW Residential
  - 207.5 MW Non-Residential
  - **249.3 MW Total**
  - (33.4 MW Installed)

- Number of Applications
  - 8,786 Residential
  - 1,031 Non-Residential
  - **9,817 Total**
  - (2,719 Completed)

Making Progress Towards CPUC's 2016 Goal of 1750 MW



Other CSI Program Components

- Research Development, Deployment and Demonstration (RD&D)
  - CPUC Adopted in September 2007
  - Energy Division working to get a Program Manager selected
- Low-income incentive programs
  - Single Family Program Adopted in November 2007
  - Energy Division working to get a Program Manager selected for Single Family Program
  - Multifamily Low-Income Program Under Development
- Solar Hot Water Pilot Program
  - Program Launched in July 2007
  - Will inform future implementation of AB 1470 (Huffman, 2007)

Photo: Brian Peterson, Sierra Nevada Brewing Company, Chico, CA
California Solar Initiative Funded System, 1,258 kW, September 2007
Installer: Chico Electric

Feed-in-Tariffs (FiT)

- What is a feed-in-tariff?
  - Standard offer contract for the sale of energy from a qualifying DG facility to the utility grid
  - CA experience with FiT - Qualifying Facilities (QFs)
    - Public Utilities Regulatory Policy Act (PURPA) of 1978 established QFs and outlined their payment according to the avoided cost of power
    - QF is defined as non-utility generator with less than 80 MW capacity that utilizes cogeneration and/or renewable fuels (for bioenergy, ≥ 50% biomass)
    - CA IOUs have more than 6,000 MW under QF contracts
    - In D. 07-09-040, CPUC adopted QF policy, pricing terms and conditions for existing and new QF facilities
- New CA feed-in-tariffs
    - AB 1969 (Yee, 2006) – Renewable FiT, under 1.5 MW
    - AB 1613 (Blakeslee, 2007) – CHP FiT, under 20MW

AB 1969 (Yee, 2006) Renewable Feed-in-Tariff

- Feed-In tariff for Public Water/Wastewater facilities
  - CPUC voluntary expansion required SCE and PG&E to offer the FiT to all facilities
  - CPUC considering expansion to SDG&E and other IOUs
- Eligibility:
  - All *renewable* DG up to 1.5MW
- Statewide cap of 478.4 MW
  - 250 MW statewide cap for public water/wastewater facilities
  - 228.4 MW cap for all other facilities in PG&E and SCE territories
- Fixed price is determined by Market-Price Referent (MPR), adjusted for time of delivery and season
- Contract periods of 10, 15 and 20 years
- Tariffs transfer Renewable Energy Certificates (RECs) from generator to utility and count as utility procurement towards Renewable Portfolio Standard (RPS)
- Two options under tariff (depending on customer's choice):
  - Full sale of production
  - Excess sales (after onsite usage)
- *Available now to customers*
- Implementation of AB 1969 takes place in R. 06-05-027

AB 1613 (Blakeslee, 2007) CHP Feed-in-Tariff

- Requires CPUC to adopt terms and conditions for utility procurement of Combined Heat and Power DG via a Feed-in-Tariff
- Fixed or variable price to be determined by the CPUC
- Eligibility:
  - CHP up to 20MW
  - CHP systems must be sized to meet customer's thermal load. There is no requirement that CHP systems be sized to the customer's electric load. Thus, oversized systems (from an electric perspective) are permitted.
  - Only new CHP systems (installed after January 1, 2008) are eligible.
- CPUC expects to open new rulemaking to establish pricing, terms and conditions

Order Instituting Rulemaking (OIR) and Rulemaking (R) 08-03-008

- On March 17, 2008, the Commission released an OIR (R. 08-03-008) to continue the work on DG
- Scoping memo lists major policy issue areas to be considered in 2008 and beyond;
  - California Solar Initiative
  - Self-Generation Incentive Program
  - Non-utility procurement DG programs
  - Other DG issues
    - Rule 21
    - DG cost-benefit methodology
- R. 08-03-008 will not consider AB 1613 FiT or new incentives for CHP not currently included in SGIP
- Future big policy issues
  - Dozens of bills in legislature on Distributed Generation
  - Implementation of new Solar Hot Water program, new CHP feed-in tariff, inclusion of storage and other new technologies

Back up slides

CSI Low Income Programs

Single-Family Low Income Program ($108 million budget):

•Established by Commission decision November 2007

•Provides fully subsidized 1kW systems to applicants who qualify

•Provides higher incentives to other low income households, according to tax liability:

Federal Income Tax Liability	Qualifying Low-Income CARE-Eligible Homeowners	Qualifying Low-Income Homeowners not eligible for CARE
$0	$7.00	$5.75
$1 to $1000	$6.50	$5.25
$1001 to $2000	$6.00	$4.75

•CPUC is in the process of selecting a statewide Program Manager: Request For Proposals issued 4/08

•Incentives will not be available until after the Program Manager is selected

Multi-Family Affordable Housing Program ($108 million budget):

•Multifamily Affordable Housing Program is currently under development
•February 2008: Energy Division staff issued a proposal on the program
    •A workshop was held in March 2008
    •Comments filed in early April
•The CPUC is currently considering comments: next step is a proposed decision

(END OF ATTACHMENT 8)

ATTACHMENT 9

New Solar Homes Partnership

Payam Narvand
California Energy Commission

California Solar Initiative

Goal = 3,000 MW

CPUC's CSI

$2,167 mil.

CEC's

NSHP

$400 mil

POU Solar Programs

$784 mil

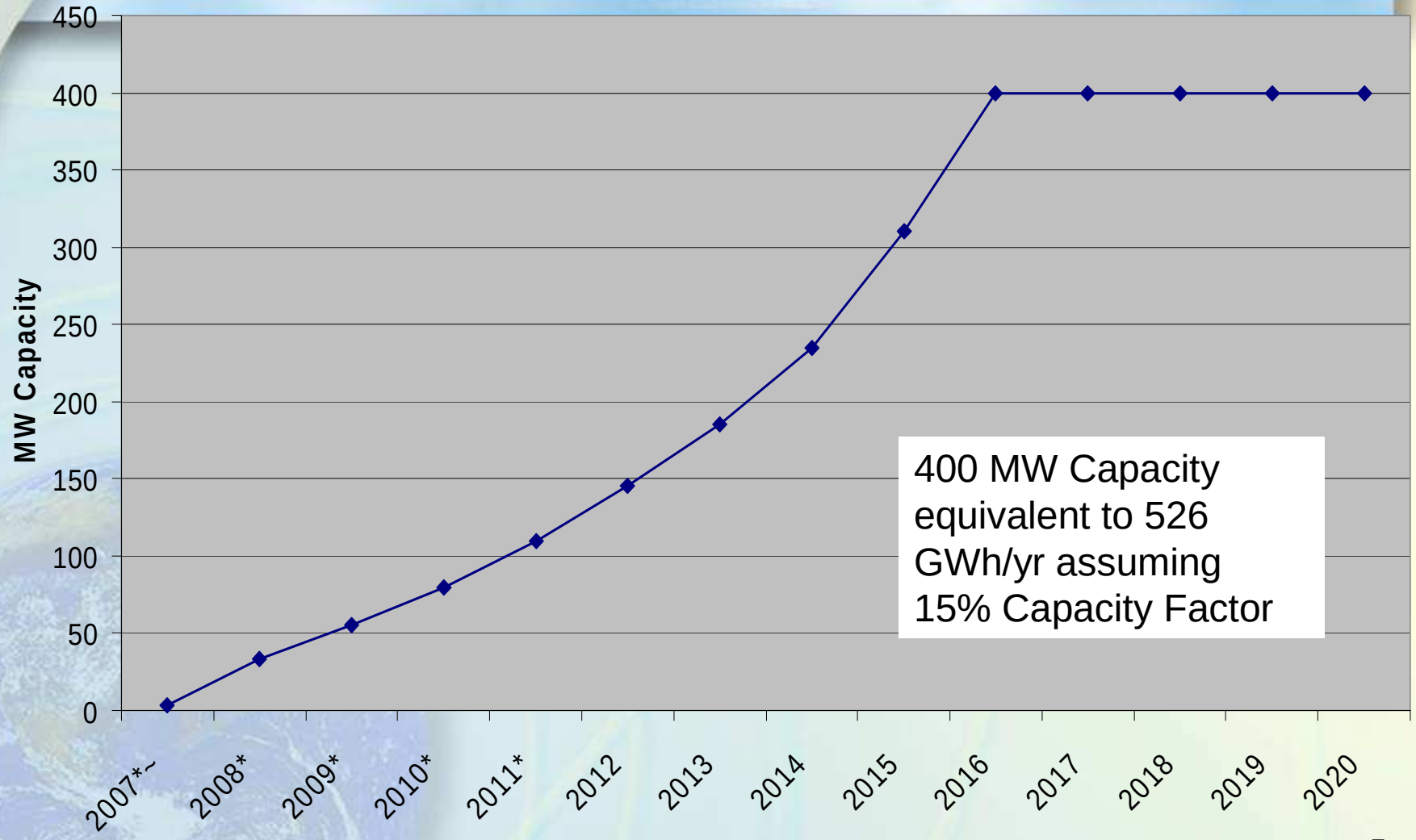
NSHP Partnership - Overview

- Program started January 2007
- 400 MW goal by 2016
- New residential only:
  - Custom homes
  - Developments
  - Affordable housing
- Mixed use is eligible, but only for residential portion. However, entire project is eligible if non-residential portion is 10% or less of the total project (space).
- Must surpass 2005 Building Energy Efficiency Standards by 15% (Tier 1) or 35% (Tier 2)

NSHP – Incentives Overview

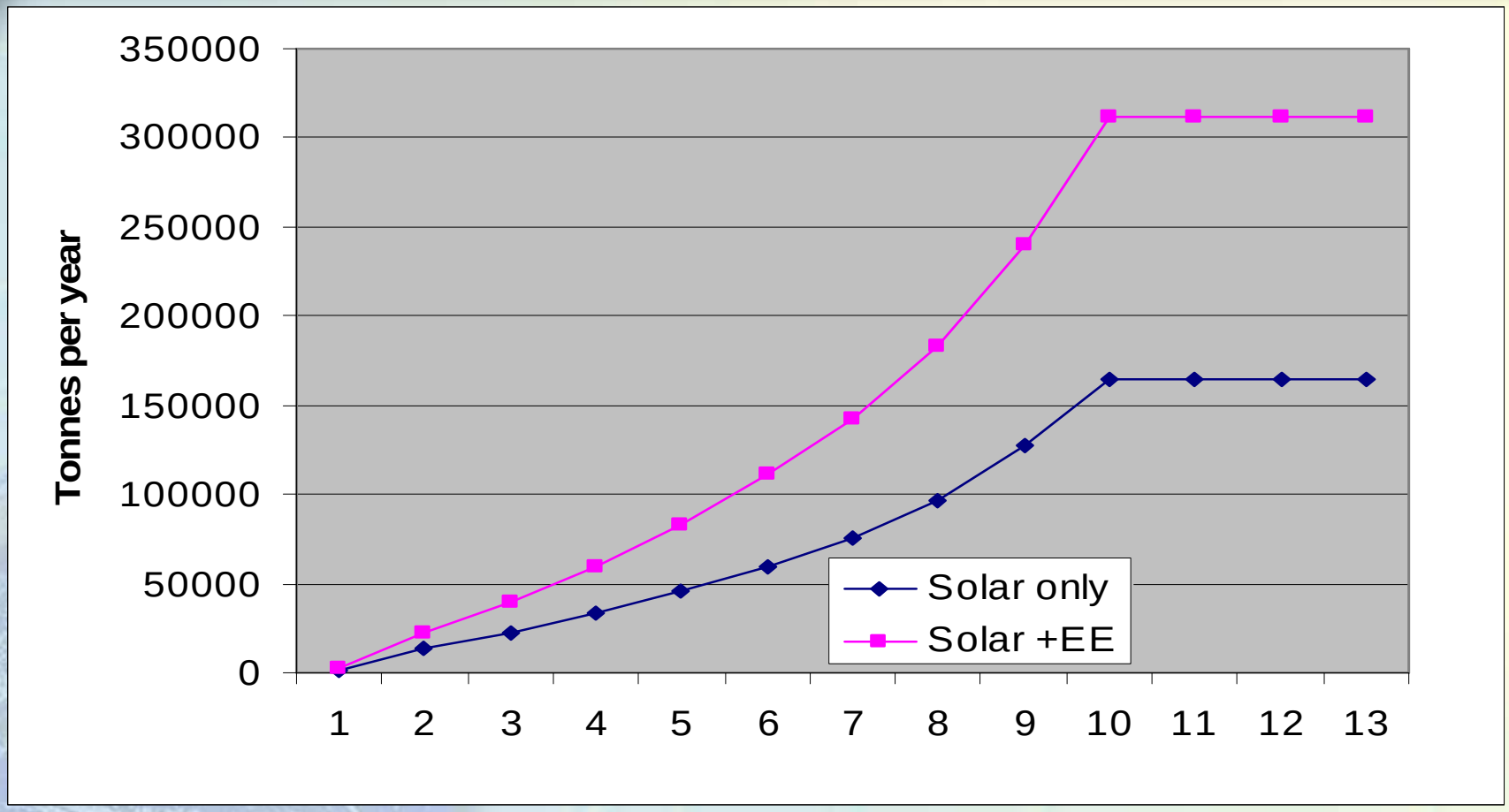
- One time, up-front incentive
- Incentives decline as megawatt targets are achieved
- Incentives decline to zero over 10 year period
- Incentives for “standard feature” is $2.60/W
  - $2.50/W for base or “solar as option”
- Higher for affordable housing developments
  - $3.50/W ($3.30/W for common areas)

NSHP Program Goal – MW Capacity



400 MW Capacity equivalent to 526 GWh/yr assuming 15% Capacity Factor

NSHP Program Goal
CO2 Reduction *



*Based on 15% CF, 313 kg CO2/MWh (tentative), 53.06 kg CO2/MMBtu

www.gosolarcalifornia.ca.gov

(END OF ATTACHMENT 9)

ATTACHMENT 10

GHG Regulation for Combined Heat and Power

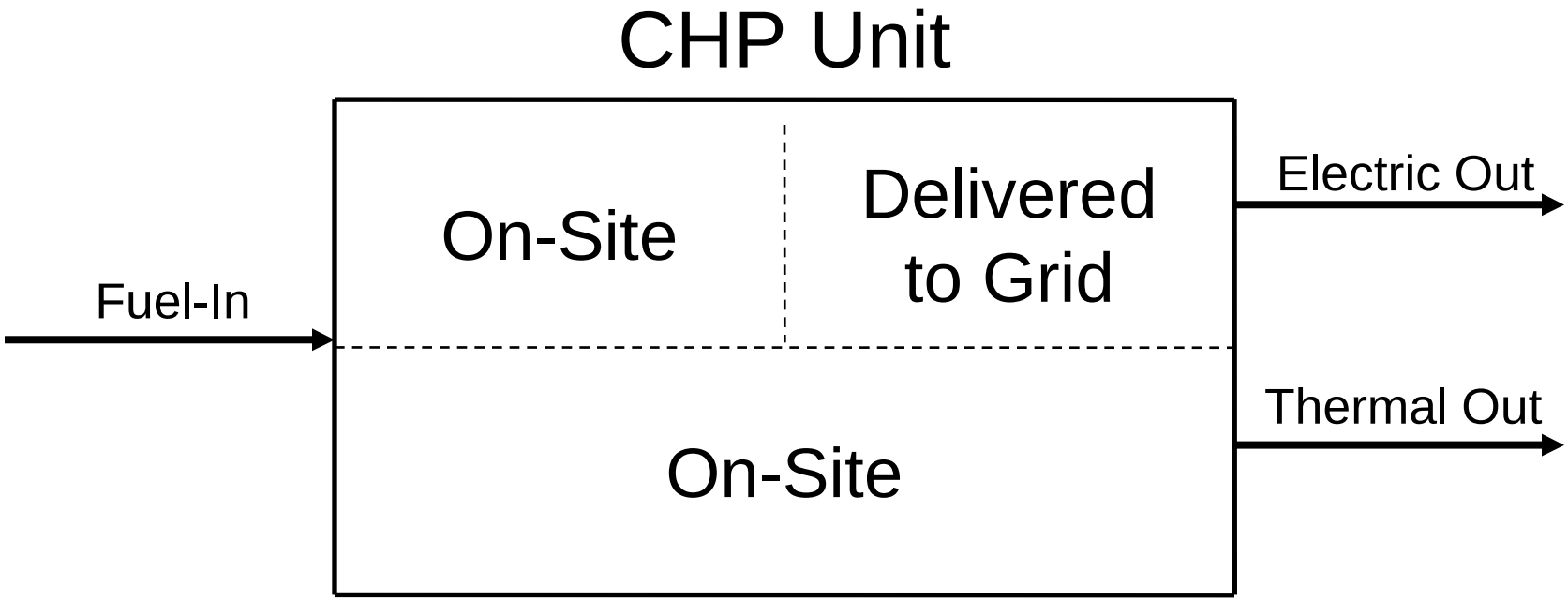
Michael Colvin
Policy and Planning Division
California Public Utilities Commission

May 2, 2008

What is Combined Heat and Power

- A technological process where both electricity and heat are created from a single fuel source.
- Heat and Power are “co-generated”
- Efficiency gains possible when compared to generating heat and power separately
- Potential emissions reduction strategy as a result

Generic Representation



Even though there are multiple different iterations of this basic process, we can still think about this as one piece of technology for the purposes of GHG regulation

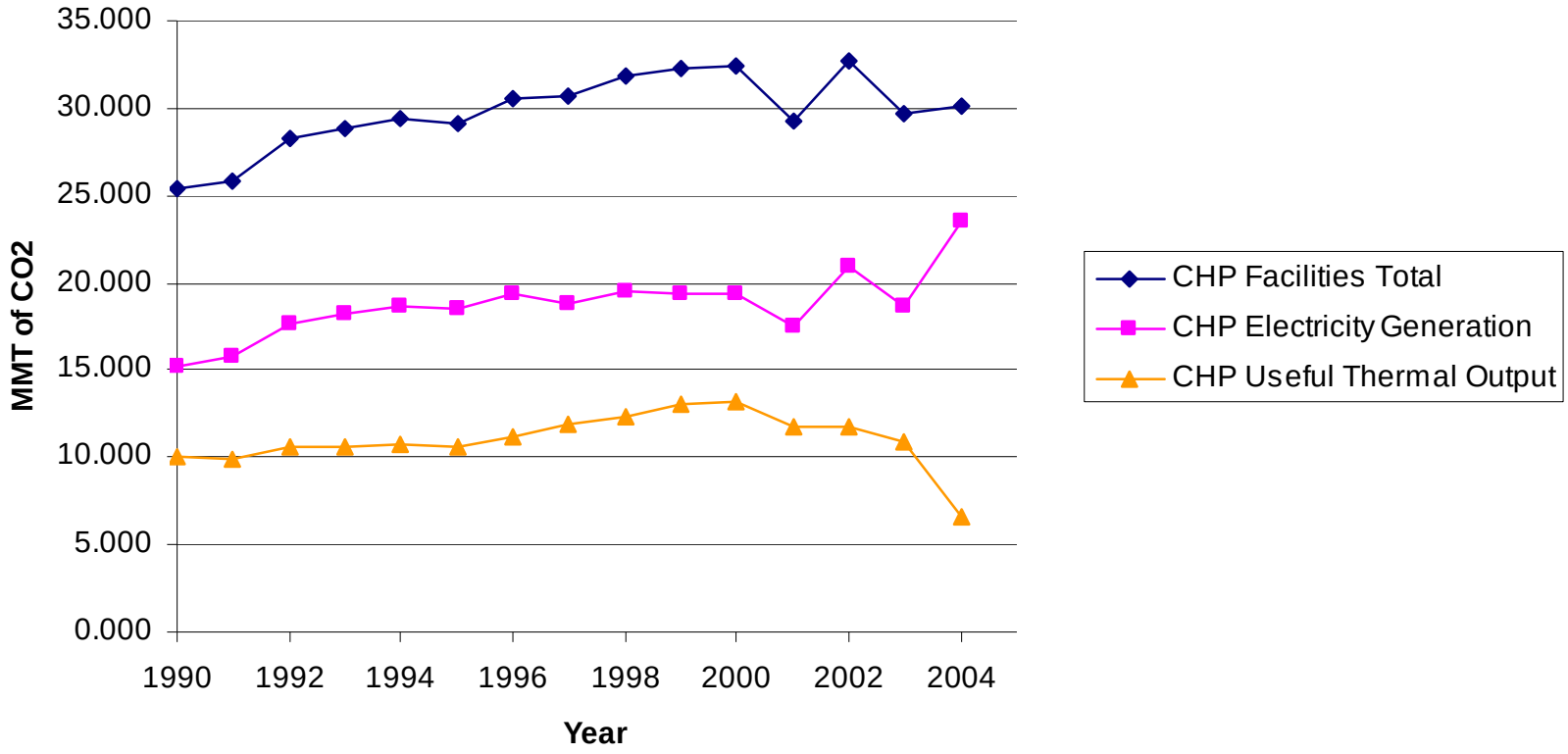
Basic CHP Info in California

- Approximately 940 CHP units in operation
- Capacity of +9,000 MW

Size Threshold	MW Capacity	% of Total MW	Number of Plants	% of Total Plants
< 5 MW	380	4%	727	77%
≥ 5 MW	8,848	96%	213	23%
Total	9,228	-	940	-

Source: Energy and Environmental Analysis Database, 2006 Data

GHG from CHP in CA



- Approximately 6-7% of CA's total GHG emissions during the 1990-2004 time period
  - Source: ARB 2007 Inventory

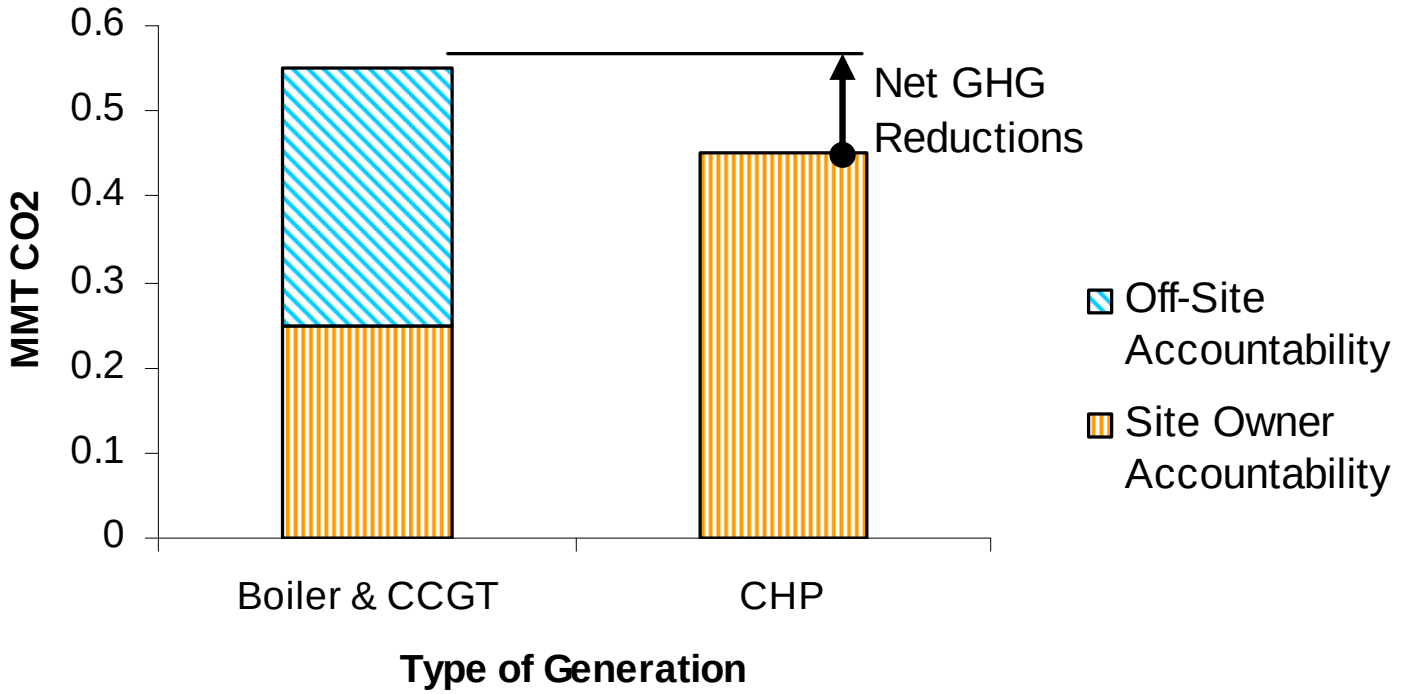
Existing CHP policies in CA

- Self Generation Incentive Program (SGIP)/ AB 2778 (up to 1 MW)
  - Recent legislation removes incentives for technologies combusting natural gas
- AB 1613
  - Incentives for CHP up to 20 MW
  - Commission in process of drafting OIR
- Qualifying Facility Program
  - New decision released in September 2007
  - New standard contracts being drafted

CPUC/CEC Joint Proceeding

- R 06-04-009
- CHP staff paper issued informally. Presents basic information and asks questions to develop record
  - Comments May 27; Reply Comments on June 10
- Proposed Decision in mid-July
- Commissions issue decision with recommendations to ARB in August

Emissions Responsibility



Potential for NET decrease but an on-site increase –
does this inherently create a disincentive for CHP installation?

Fundamental Questions

- Should GHG emissions from CHP be captured under a cap-and-trade program or not?
- Should GHG emissions from CHP be considered separately or as apart of the electricity, natural or industrial sectors?
- Should CHP be considered an emissions reduction strategy for AB 32 purposes?
  - If so, may need separate forum for policymaking purposes designed to encourage new CHP investment

Further Important Questions

- Is there a rationale for differential treatment of a *topping cycle* vs. a *bottoming cycle* CHP unit?
- Should we differentiate based on capacity size of the CHP unit?

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(END OF ATTACHMENT 10)