



## California Energy Commission

# 2009 IEPR Workshop California Energy Demand 2010-2020 Staff Revised Forecast

## Efficiency/Conservation, Self-Generation

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Chris Kavalec  
Demand Analysis Office  
Electricity Supply Analysis Division

[Chris.Kavalec@energy.state.ca.us](mailto:Chris.Kavalec@energy.state.ca.us)

916-654-5184



# Energy Savings Categories

- Utility and Public Agency Efficiency Programs (committed)
- Building and Appliance Standards
- Naturally Occurring Savings



# Summary

- Savings from these three sources reduce consumption and peak demand by 18-21% over the forecast period
- Largest source of savings is combination of building and appliance standards
- Additional lighting savings beyond programs and standards
- Analysis has limitations



# Utility and Public Agency Efficiency Programs

- Support from Itron, Demand Forecasting Energy Efficiency Quantification (DFEEQP) Working Group
- Incorporated publicly owned utility efficiency programs for revised forecast
- Adjusted IOU program impacts



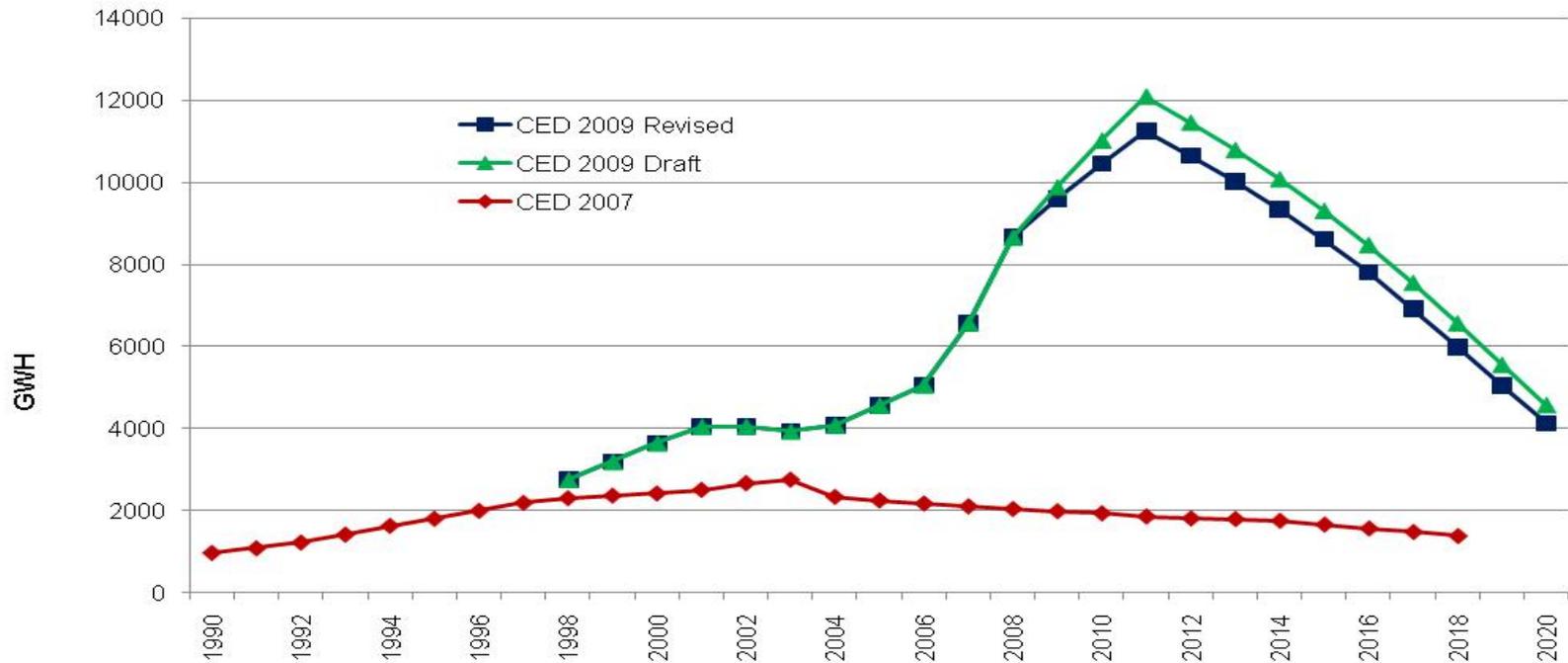
# IOU Efficiency Program Impacts

- Updated history back to 1998
- Some impacts incorporated in models, others through “post-processing”
- Adjusted IOU program impacts (realization rates) for 2009-2011 in revised forecast—0.85 to 0.7
- May shift to 2010-2012 program cycle



# Cumulative Efficiency Program Savings for IOUs: Three Forecasts

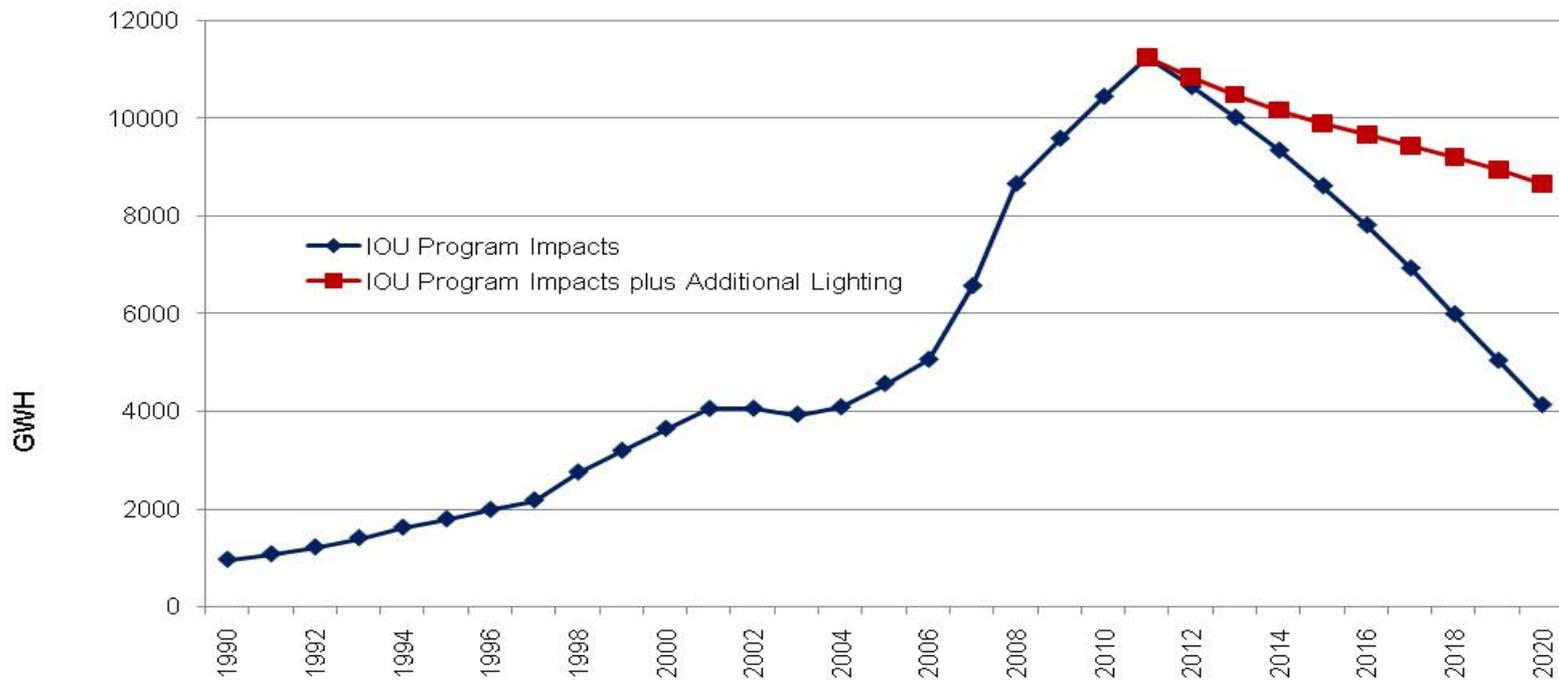
## Realization rate adjustment reduces consumption impacts by 800 GWH in 2011 vs. draft forecast



Source: California Energy Commission, 2009



## “Actual” Decay of IOU Program Impacts Including Additional Lighting ~4,500 GWH of additional lighting savings by 2020



Source: California Energy Commission, 2009

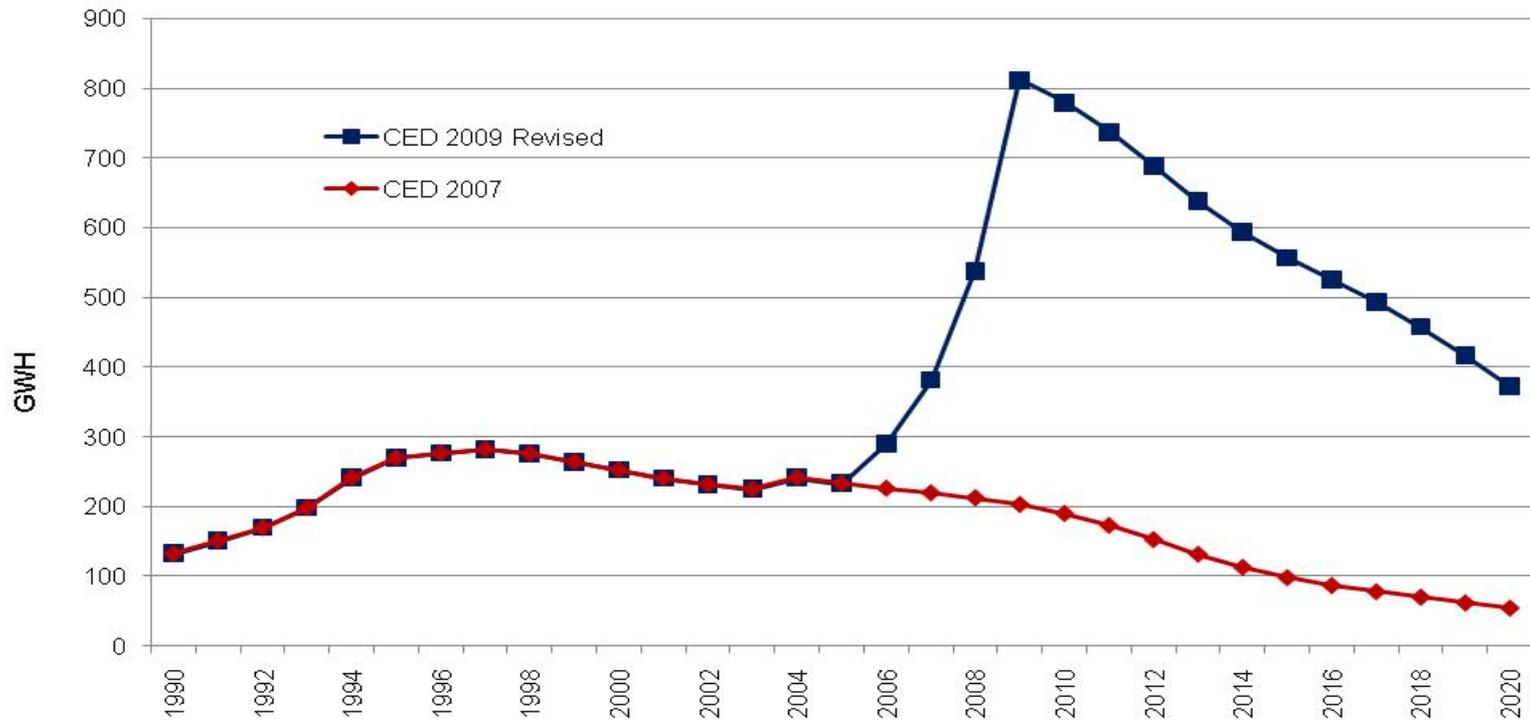


# Publicly Owned Utility Program Impacts

- Updated 2006-2009 program savings estimates by end use using SB 1037 POU filings
- Used same methodology as in the IOU case (EULs, realization rates)
- Some impacts incorporated in models, others through “post-processing”
- Beyond 2009 not considered committed



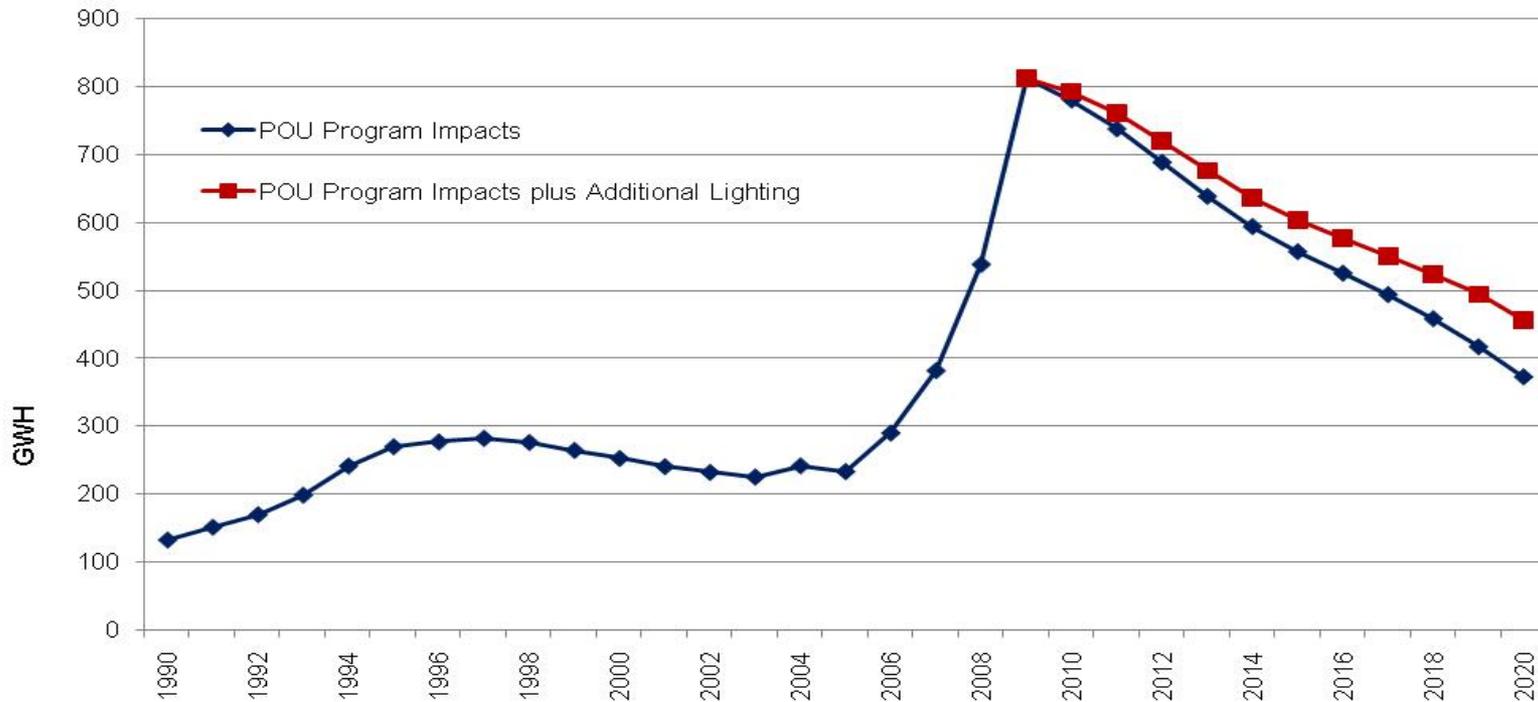
## POU Cumulative Program Impacts Around 4 times more impacts in 2009 vs. 2007 forecast



Source: California Energy Commission, 2009



# “Actual” Decay of POU Program Impacts Including Additional Lighting ~80 GWH of additional lighting savings by 2020



Source: California Energy Commission, 2009



# Building and Appliance Standards

- Energy Commission forecasting models incorporate building and appliance standards through changes in inputs
- End-use consumption per household in the residential sector and end-use consumption per square foot in the commercial sector
- To measure the impact of each individual set of standards, staff removed the input effects from standards one set at a time



# Standards Incorporated in Forecast

Residential Model	
1975 HCD Building Standards	1976-82 Title 20 Appliance Standards
1978 Title 24 Residential Building Standards	1988 Federal Appliance Standards
1983 Title 24 Residential Building Standards	1990 Federal Appliance Standards
1991 Title 24 Residential Building Standards	1992 Federal Appliance Standards
2005 Title 24 Residential Building Standards	2002 Refrigerator Standards
Commercial Model	
1978 Title 24 Nonresidential Building Standards	1992 Title 24 Nonresidential Building Standards
1978 Title 20 Equipment Standards	1998 Title 24 Nonresidential Building Standards
1984 Title 24 Nonresidential Building Standards	2001 Title 24 Nonresidential Building Standards
1984 Title 20 Nonres. Equipment Standards	2004 Title 20 Equipment Standards
1985-88 Title 24 Nonresidential Building Standards	2005 Title 24 Nonresidential Building Standards

Source: California Energy Commission, 2009



# Naturally Occurring Savings

- Meant to capture load impacts of changes in energy use not directly associated with standards or efficiency programs
- Focus on impacts that could overlap with programs and standards
- Includes impacts of rate changes (price effects) and lighting savings
- Terminology: taxonomy work

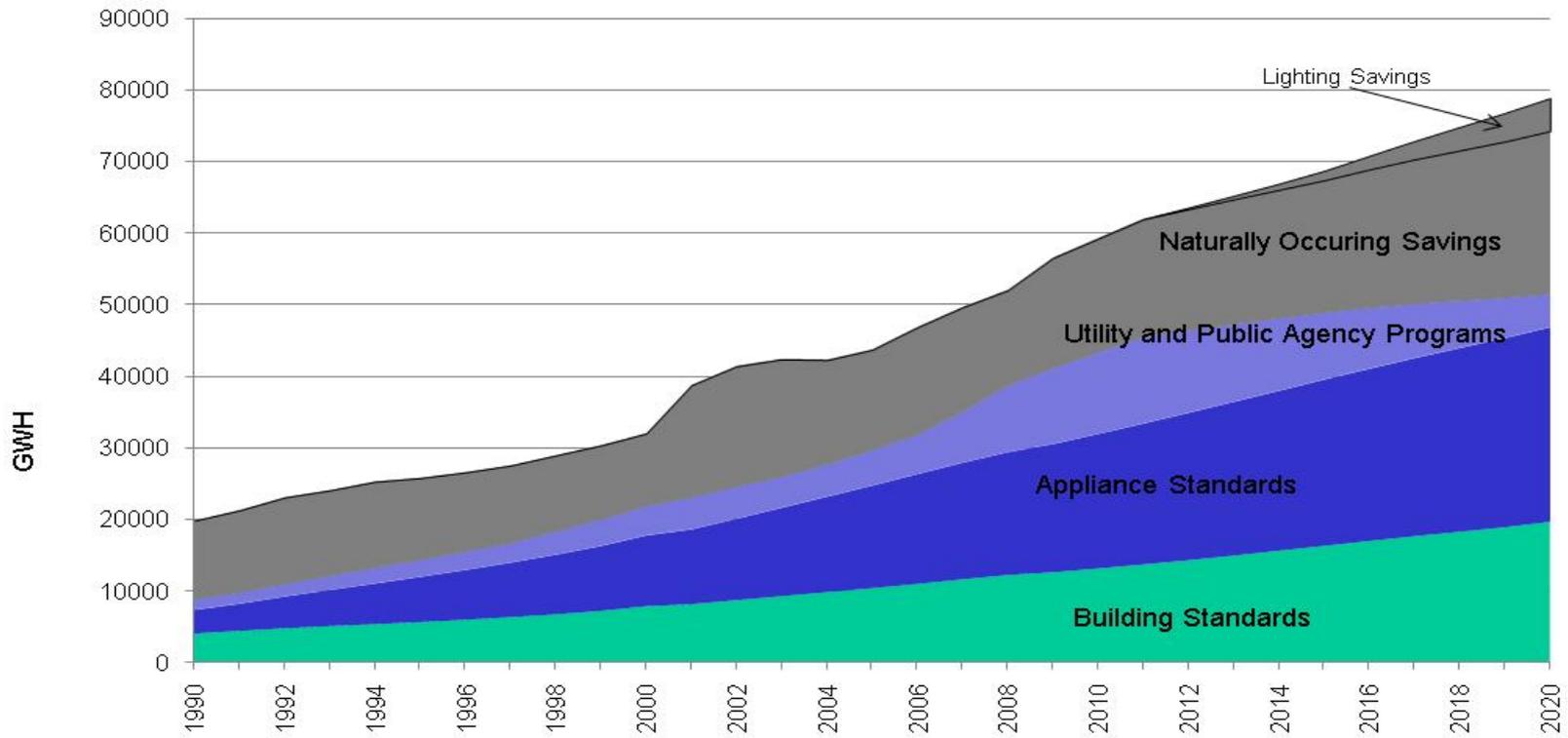


# Lighting Savings Included in Naturally Occurring

- Focus of utility programs and State and Federal Legislation
- Committed utility program impacts decay after 2011
- Unrealistic to assume average lighting per household returns to current levels
- Forecast assumes average residential lighting continues at 2011 levels for IOUs and 2009 for POUs

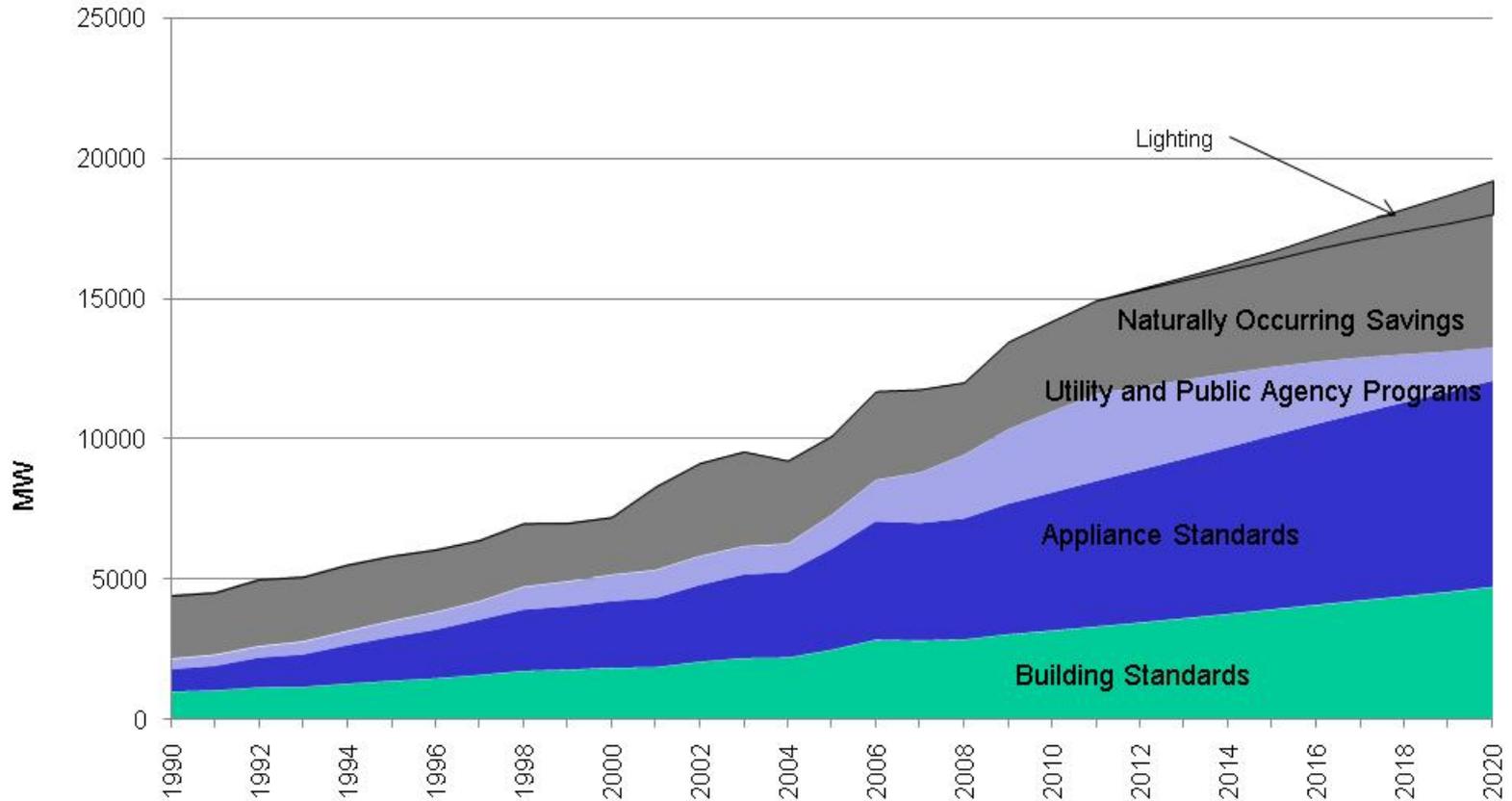


# Electricity Consumption Savings by Category





# Electricity Peak Savings by Category



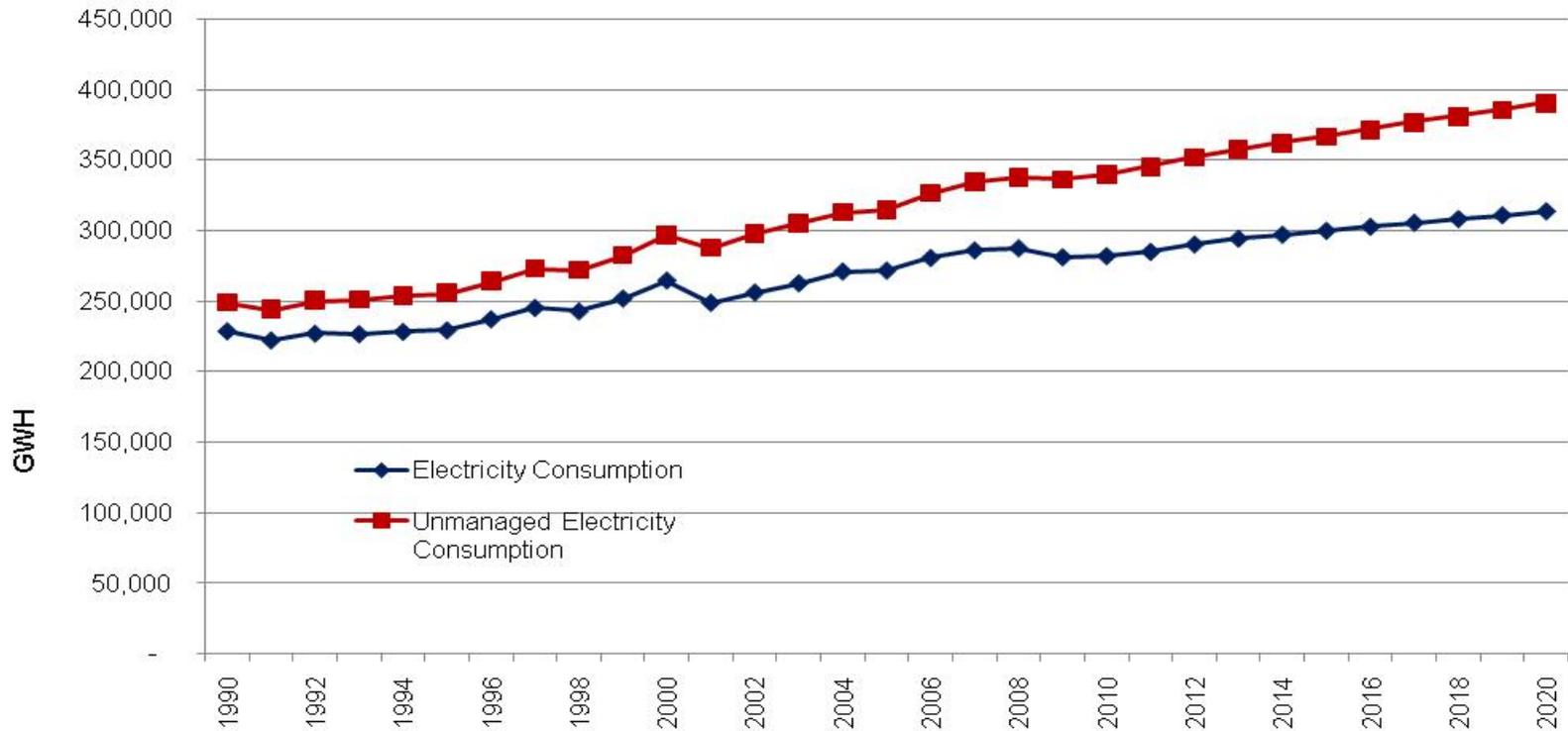


# Savings Impacts

- Total consumption reduced 17.5% in 2010 vs. “unmanaged”; 20% by 2020
- Corresponding peak reductions are 19% and 21%
- In 2010, standards impacts make up 54% of total consumption savings, 59% in 2020
- Corresponding peak impacts 57% and 63%
- Utility programs reach a share of 20% of consumption savings in 2011 (peak: 21%)



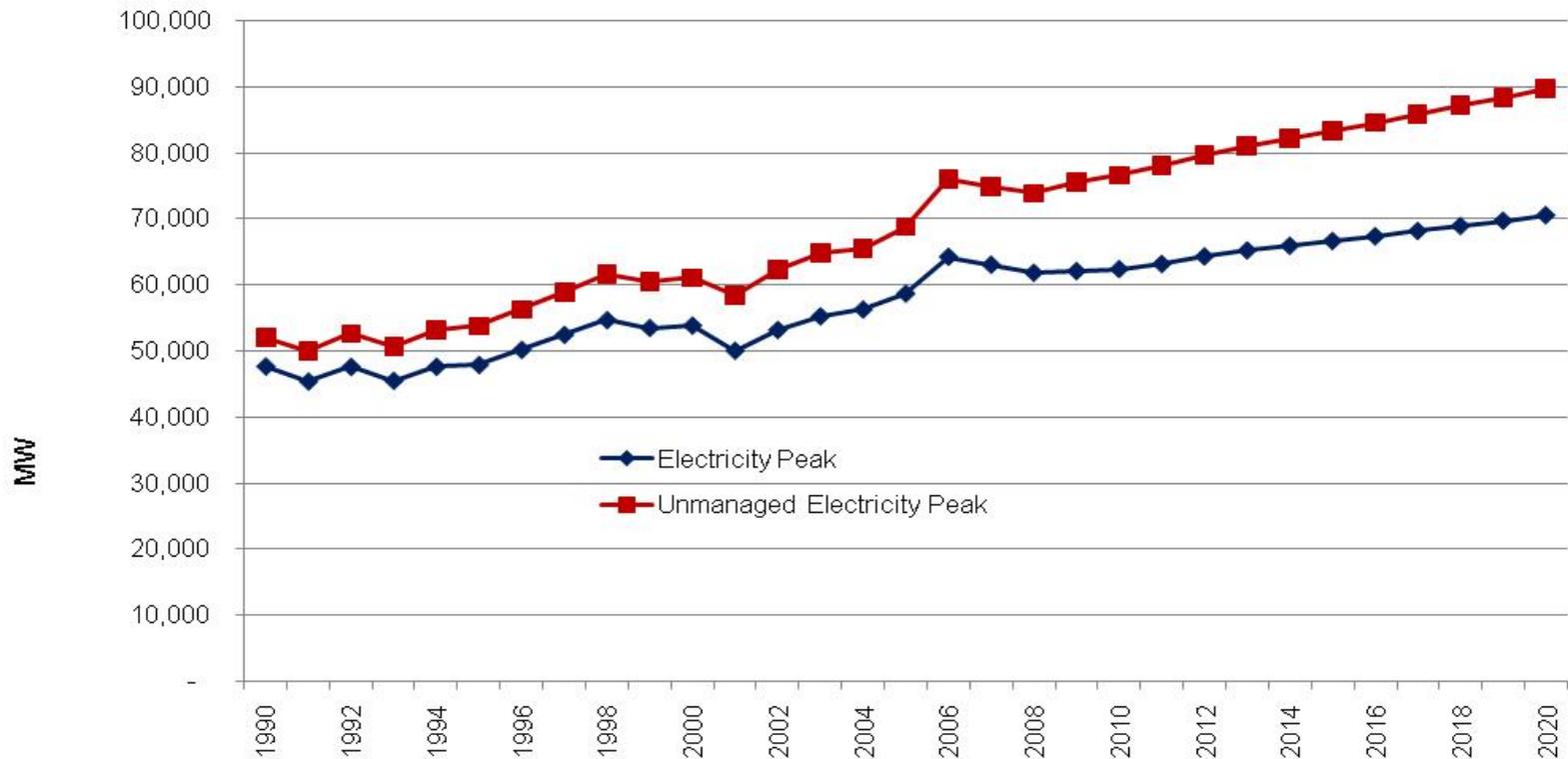
## “Unmanaged” Consumption 57,000 GWH savings in 2009, 79,000 in 2020



Source: California Energy Commission, 2009



## “Unmanaged” Peak 13,000 MW savings in 2009, 19,000 in 2020



Source: California Energy Commission, 2009



# Limitations of Analysis

- Relies on assumption of “counterfactual”
- Attribution is inexact
- “Take back” and related factors
- Impact of economy on utility programs



## Takeback or Rebound Effect

- Increased electricity usage with more efficient appliances
- Propensity to purchase larger appliances
- Income effect: more electronic “gadgets.”
- Production effects: energy intensity increase
- Cumulative takeback effect more than 50 percent?
- Consumption approach

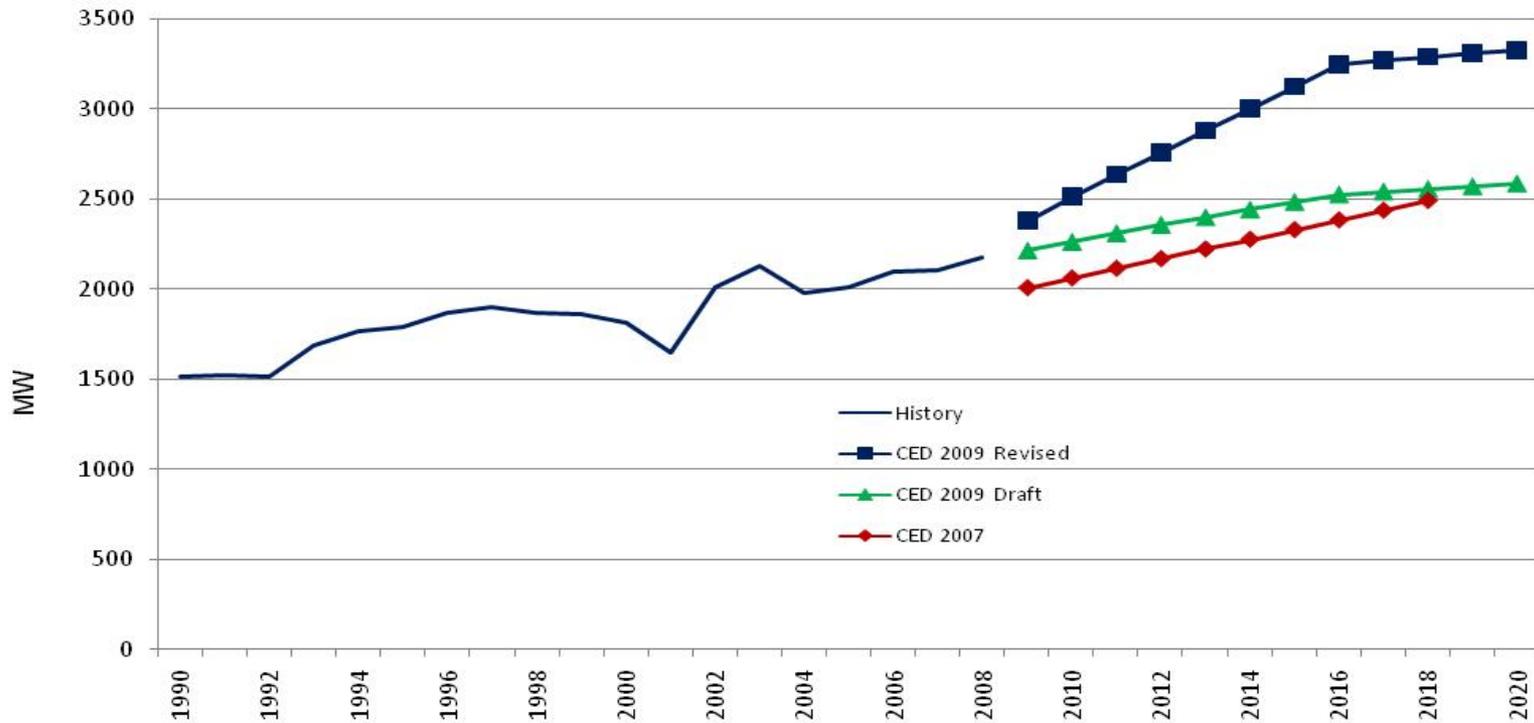


# Self-generation

- ERP, CSI, SGIP, NSHP, POU Programs
- Big industrial and commercial users
- For CSI and NSHP, average rate of photovoltaic system install and pending install for 2008-2009 used for future adoptions
- CSI and NSHP grow at average rate of energy after 2016
- Photovoltaic peak factor of 0.5



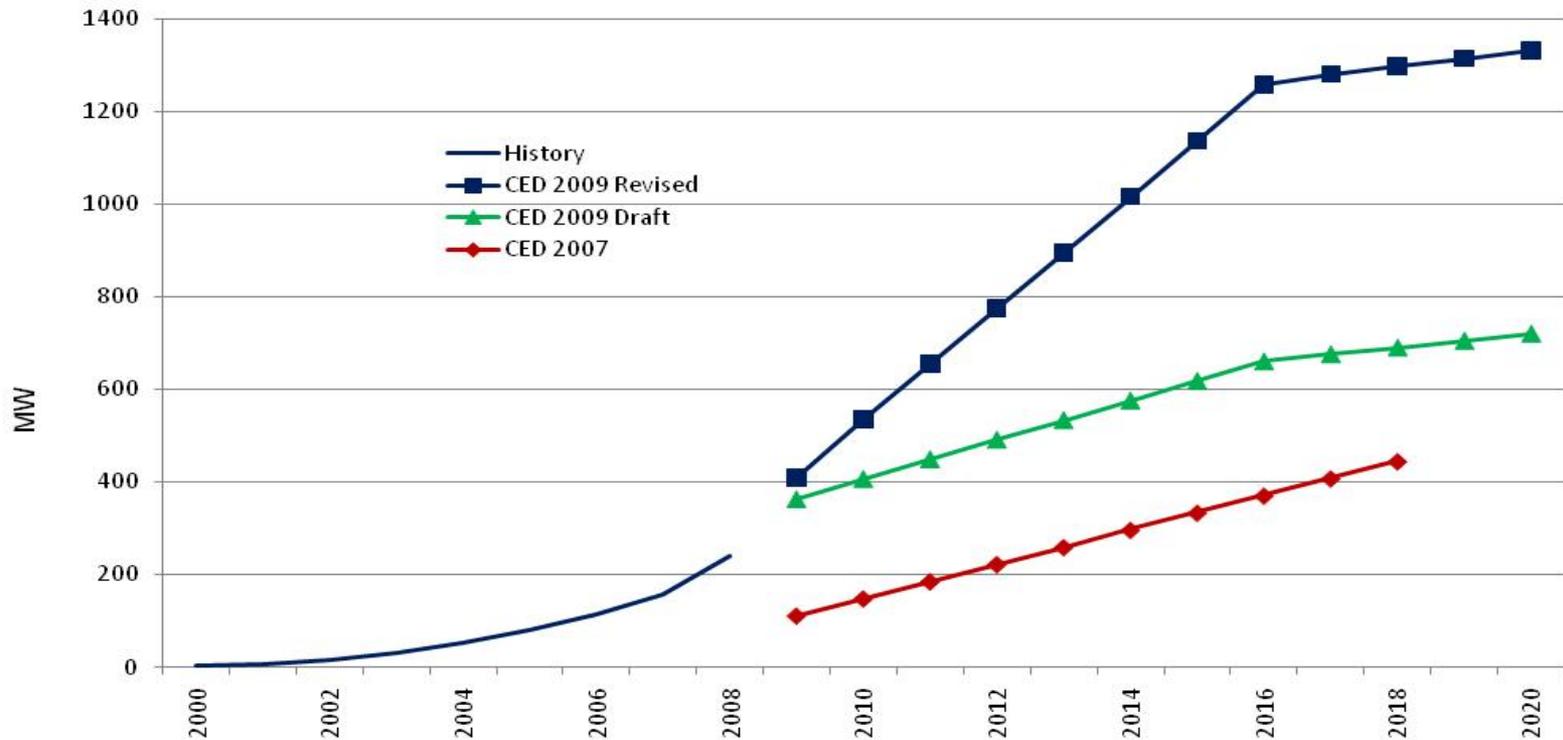
## Self-generation Peak Impact ~800 MW than CED 2007 in 2018



Source: California Energy Commission, 2009



## Self-generation PV Peak Impact Almost 2800 MW installed by 2020

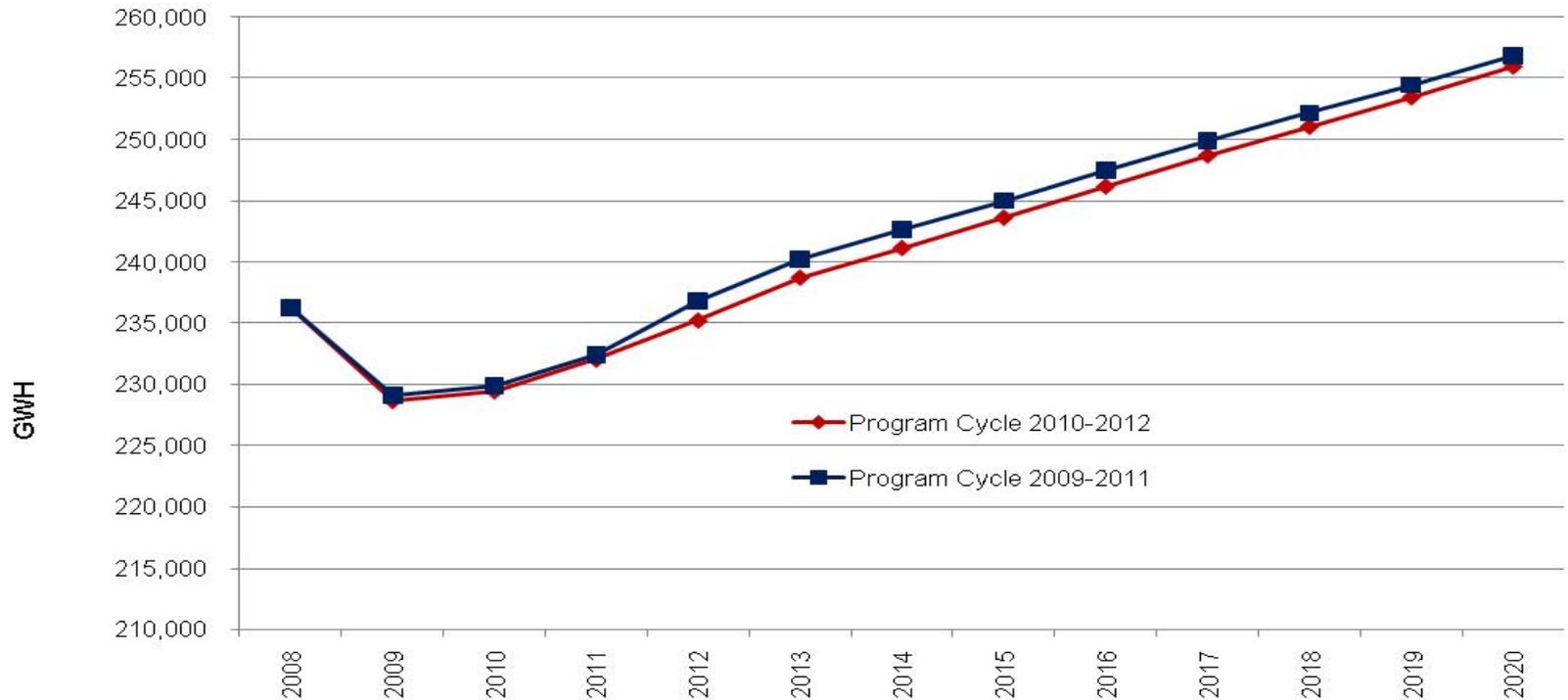


Source: California Energy Commission, 2009



# Impact of Program Cycle Shift on IOU Projected Electricity Consumption

## 0.7% difference in 2012





# Impact of Program Cycle Shift on IOU Non-coincident Peak 0.5% Difference in 2012

