California Energy Commission

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

Statewide Forecast Results for Electricity and Natural Gas

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Chris Kavalec
Demand Analysis Office
Electricity Supply Analysis Division

Chris.Kavalec@energy.state.ca.us
916-654-5184

Staff Revised CED Forecast

- http://www.energy.ca.gov/2009_energypolicy/documents/index.html#092109
- Agenda
  - Statewide results for electricity and natural gas
  - Conservation/Efficiency, self-generation
  - Results and forecast comparisons for 5 major planning areas
  - Uncommitted forecast

Summary of Results

- Reduced electricity consumption vs. previous forecast (for 2007 IEPR)
  - Economy
  - Increased efficiency impacts
  - Higher electricity rates
- Drop in peak electricity demand not as dramatic
- Forecast up relative to *CED 2009 Draft*

Demand Forecast Methodology

8 Planning Areas for Electricity

- Burbank/Glendale
- Imperial Irrigation District
- LA Department of Water and Power (LADWP)
- Pacific Gas and Electric (PG&E)
- Pasadena
- Southern California Edison (SCE)
- San Diego Gas and Electric (SDG&E)
- Sacramento Municipal Utility District (SMUD)

Demand Forecast Methodology

Individual sector models for:

- Residential
- Commercial
- Industrial
- Agricultural
- Transportation, communications, and utilities (TCU) and street lighting

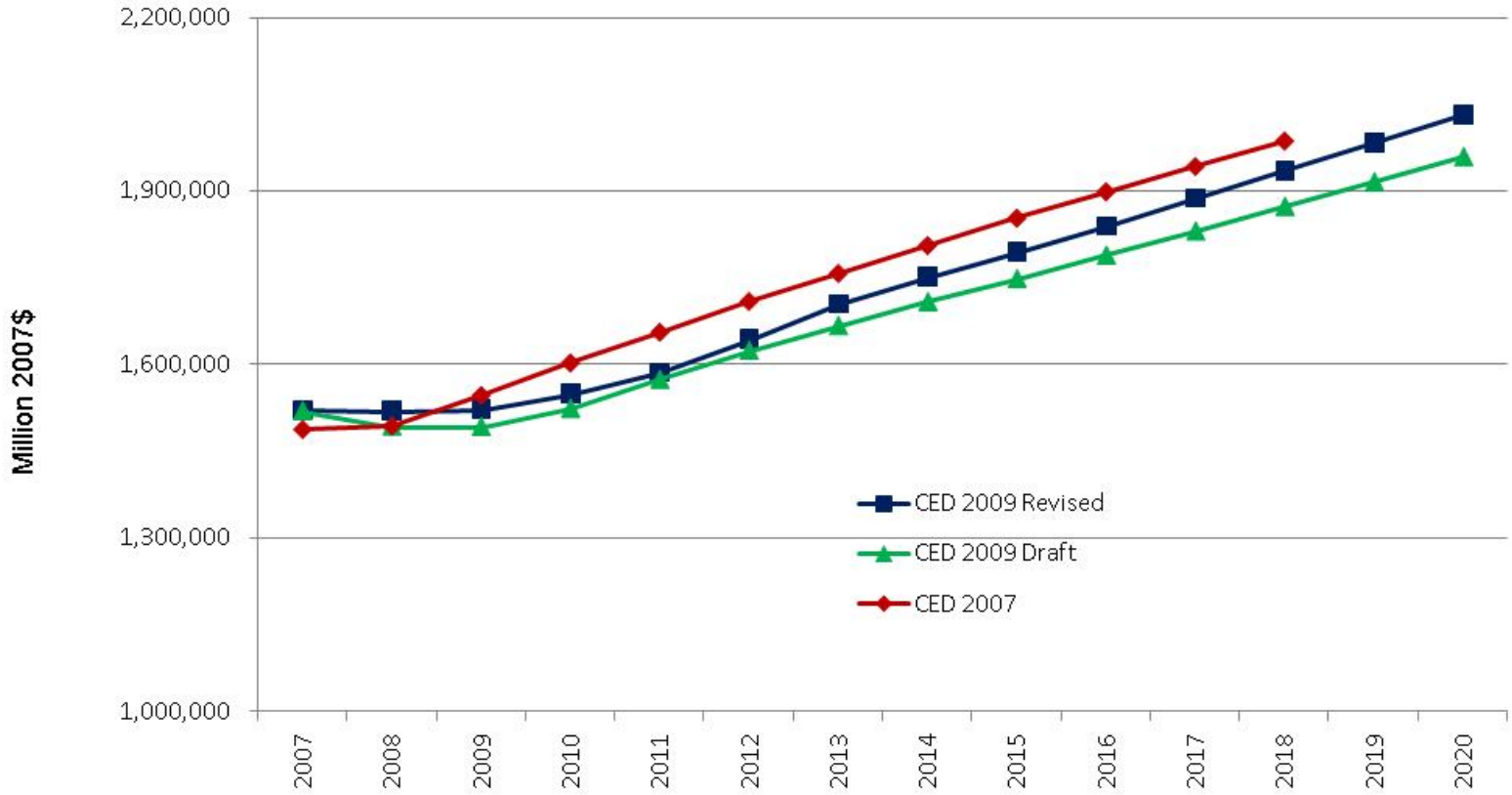
Changes in Demand Forecast

- Residential lighting broken out as separate end use
- Increased effort to capture the impacts of utility efficiency programs, including POUs
- Economic/demographic scenarios
- Slightly increasing electricity rates (15% by 2020); flat rates in 2007 forecast

Reduced Economic Growth

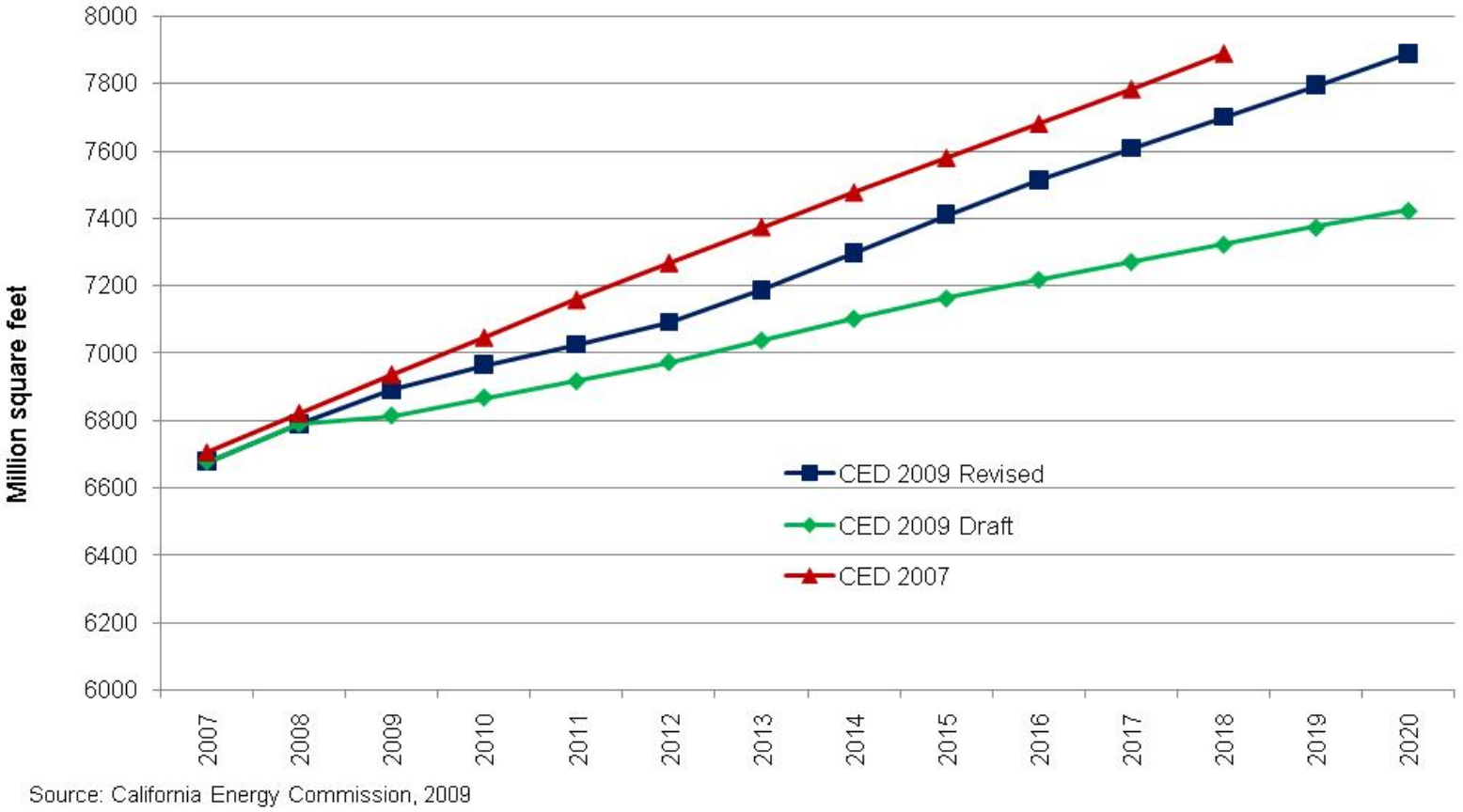
- Projected real personal income down 2.6% statewide relative to 2007 forecast by 2018
- Projected total commercial floor space down 2.4% statewide relative to 2007 forecast by 2018
- However, key economic indicators up relative to *CED 2009 Draft* forecast

Statewide Personal Income Grows at CED 2007 Levels after 2013



Source: California Energy Commission, 2009

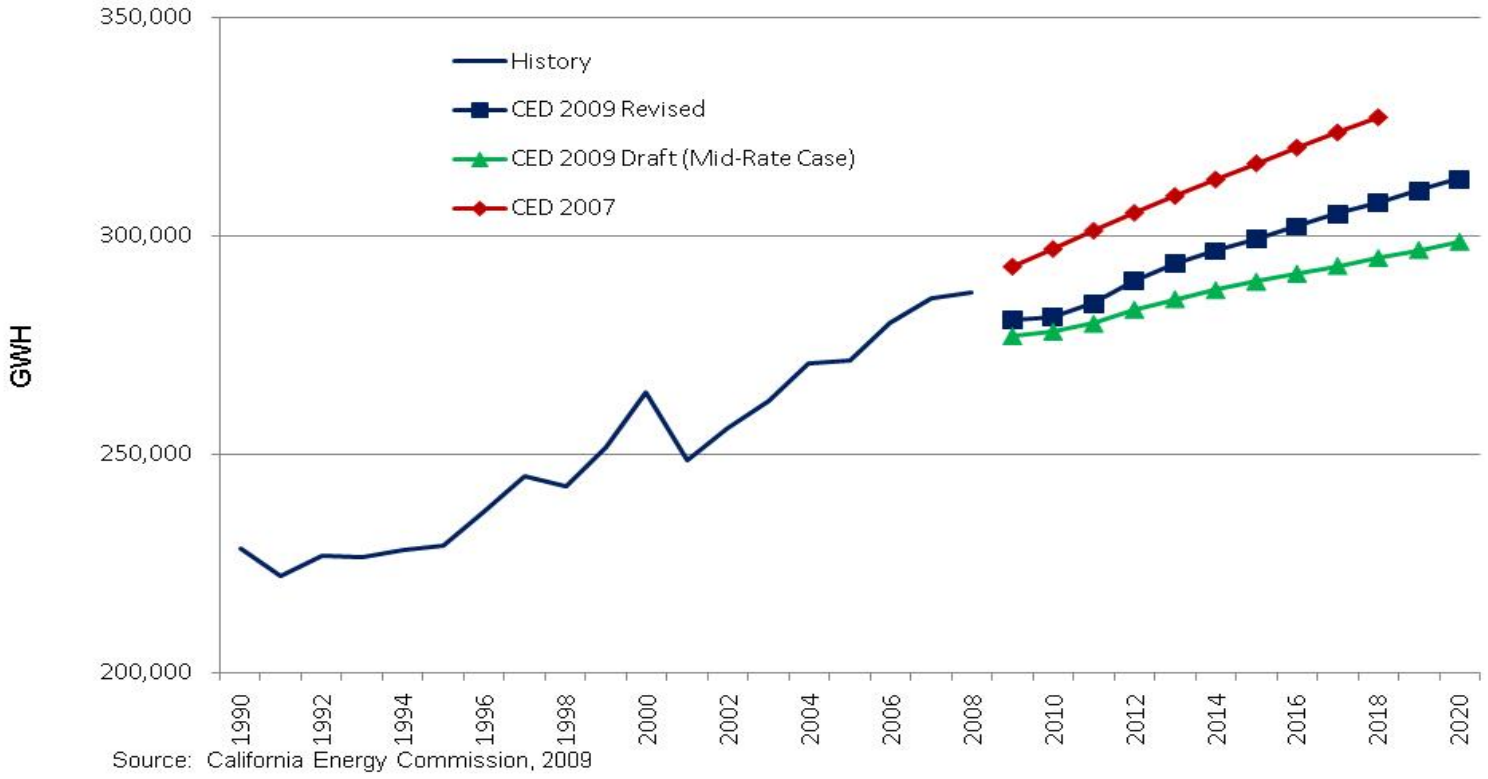
Statewide Commercial Floor Space up to CED 2007 Levels by 2020



Source: California Energy Commission, 2009

Statewide Electricity Consumption

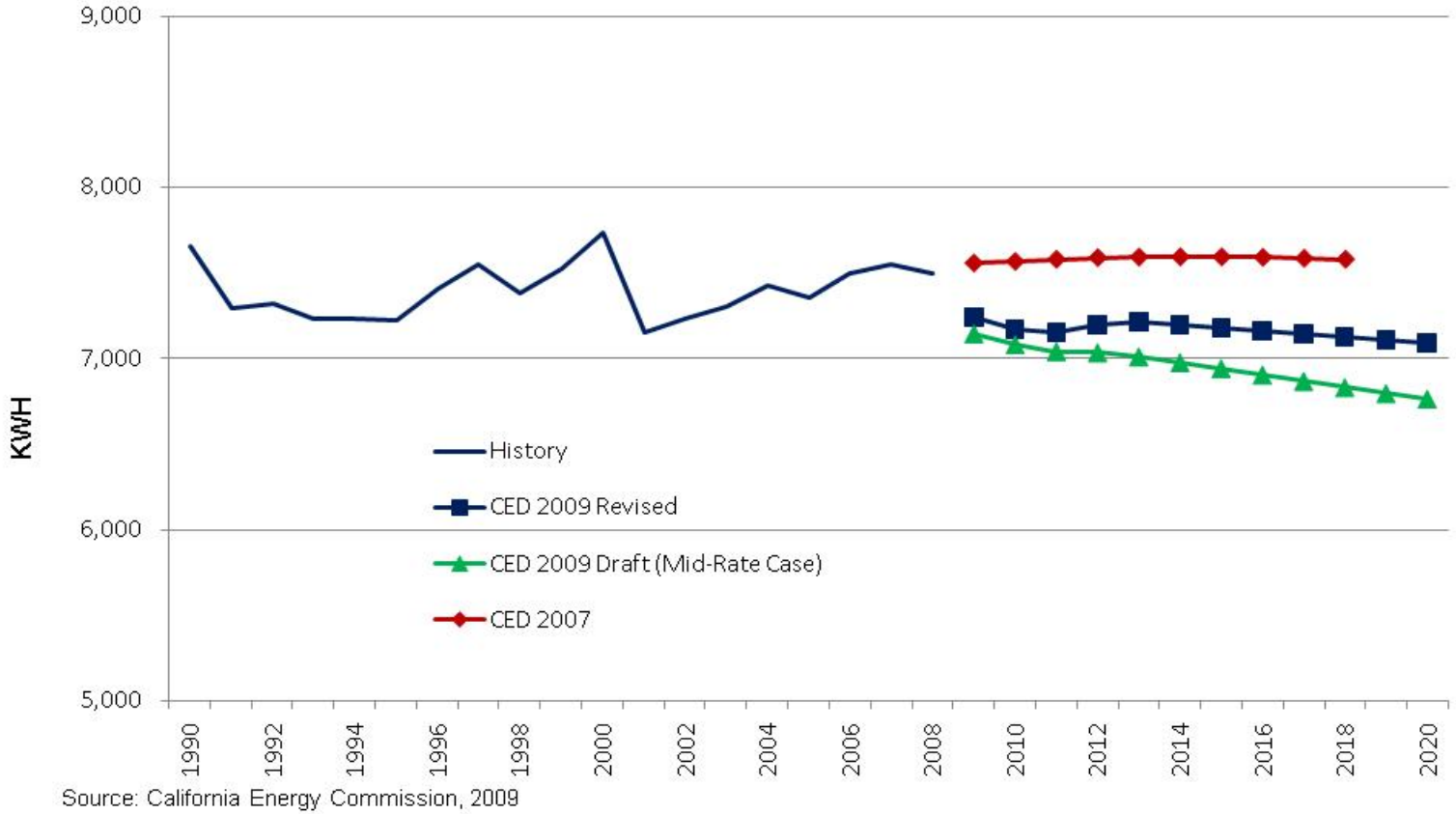
Short-term Drop, Slightly Lower Long-term Growth vs. CED 2007



Source: California Energy Commission, 2009

Electricity Consumption per Capita

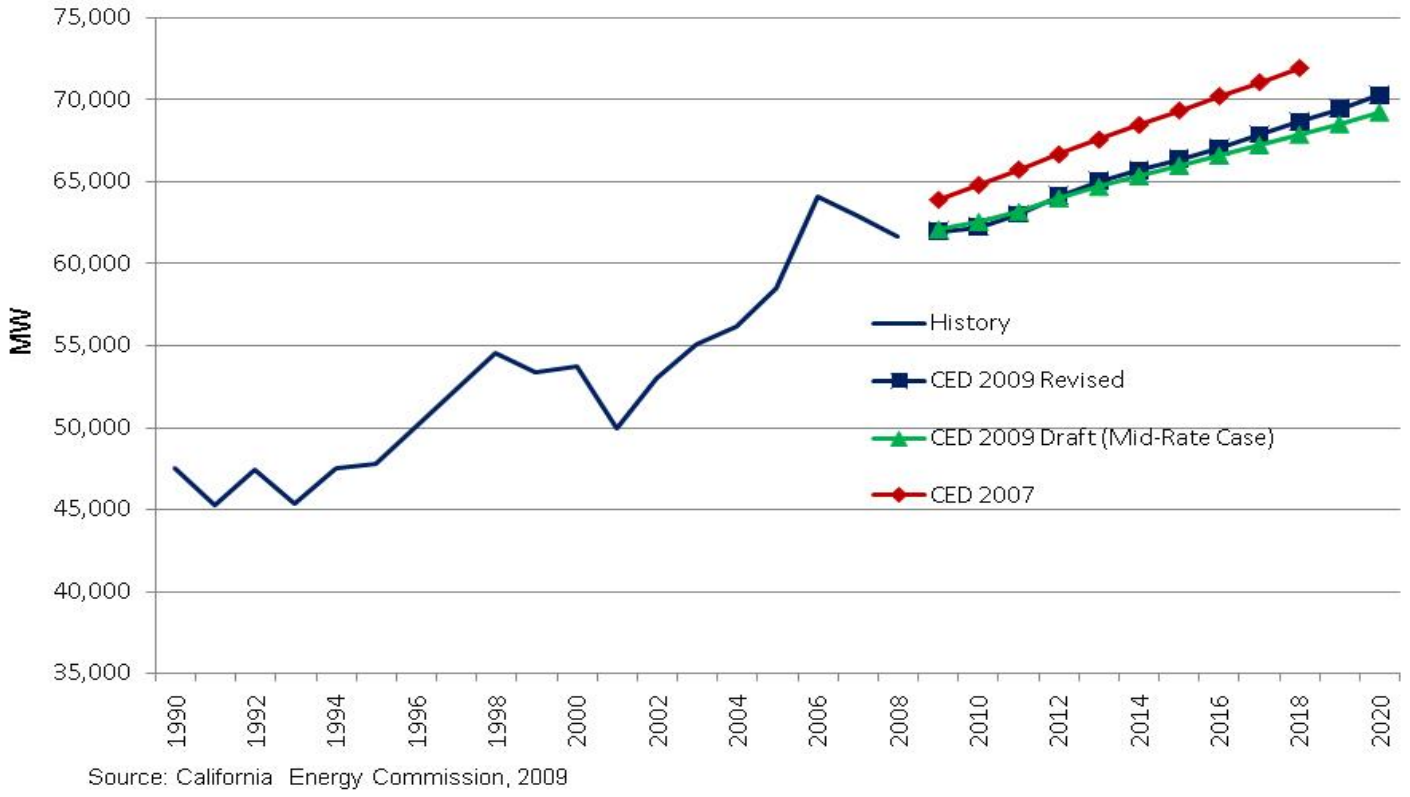
Less Decline than in 2009 Draft Forecast



Source: California Energy Commission, 2009

Statewide Electricity Peak

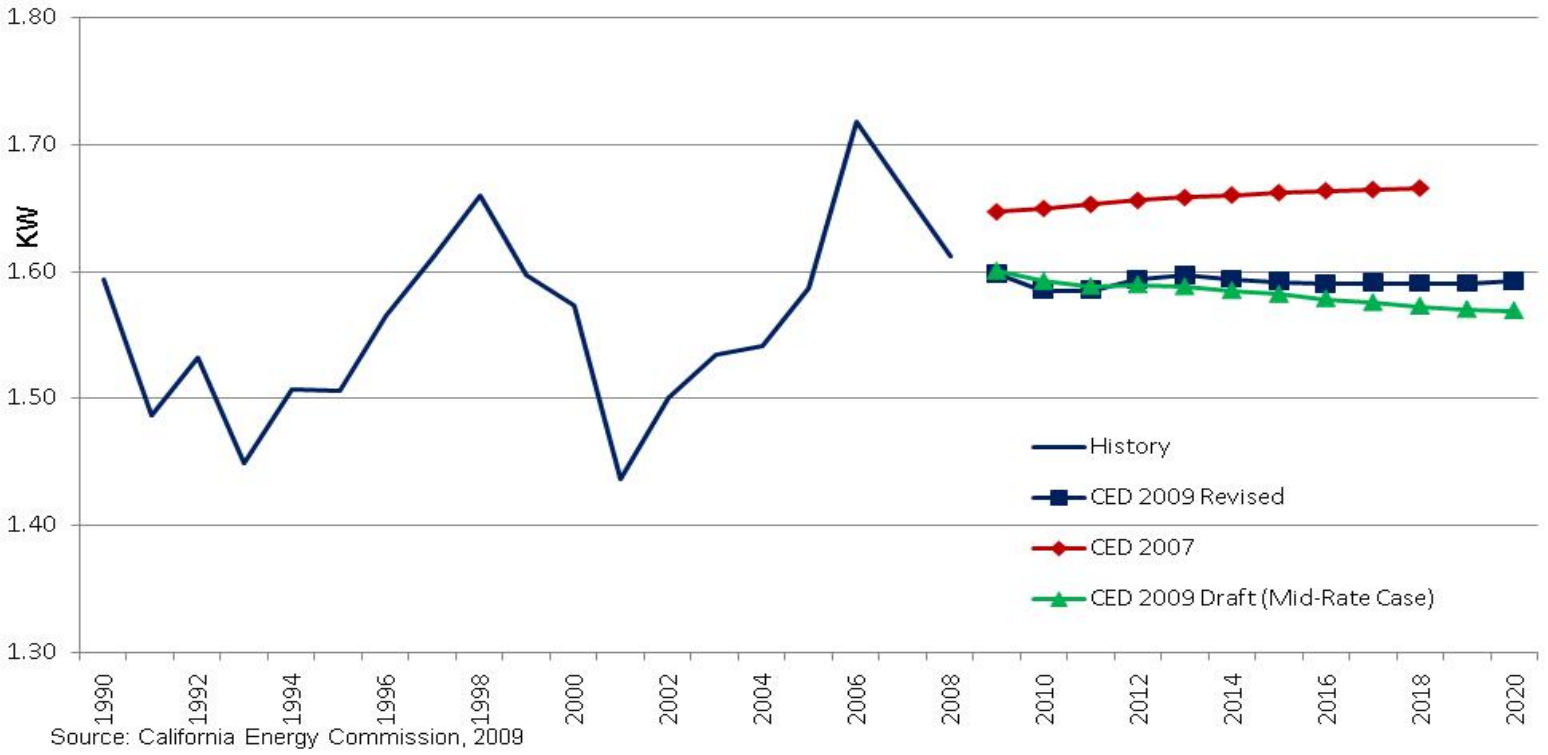
Grows at higher rate than consumption



Source: California Energy Commission, 2009

Peak Electricity per Capita

Begins to rise at end of forecast period

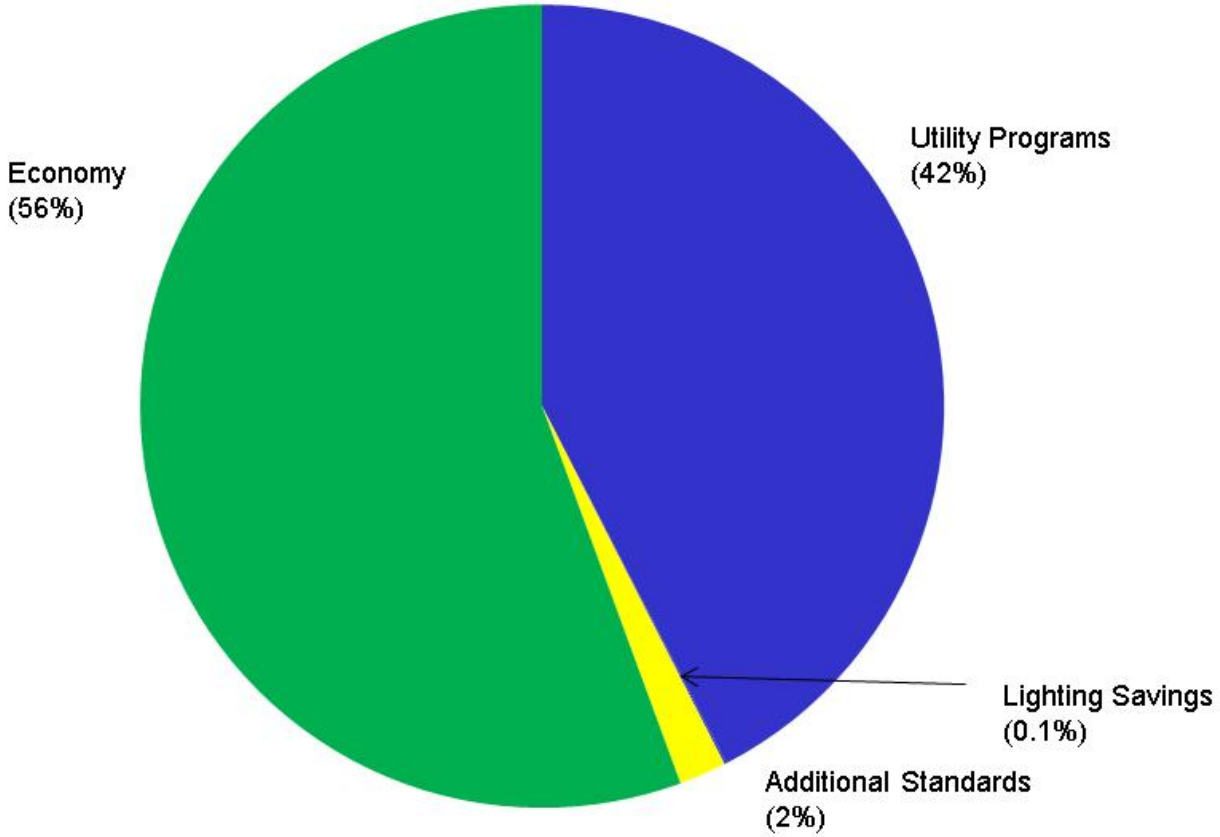


Source: California Energy Commission, 2009

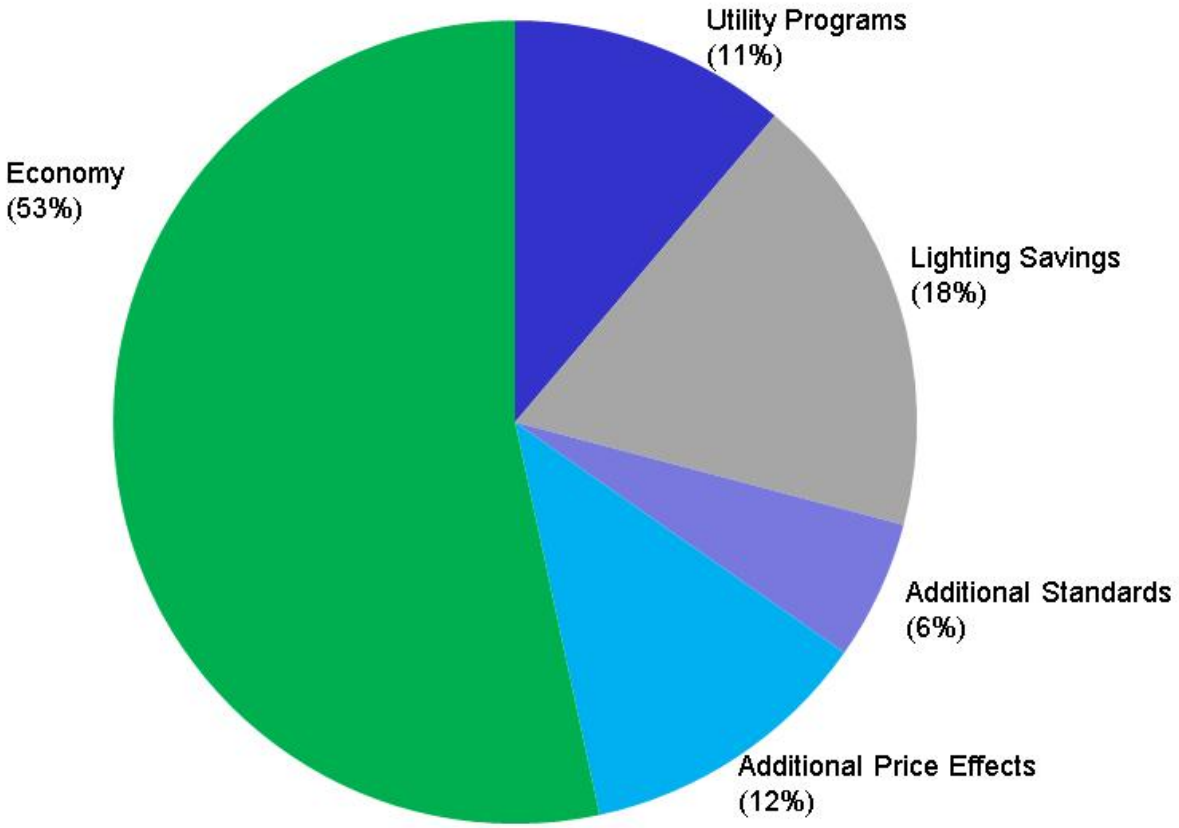
Statewide Electricity Forecast

- Consumption down by 6% by 2018 vs. CED 2007
- Peak down by 4.5% in 2018
- Growth rates 2010-2018: consumption 1.1% vs. 1.2% for CED 2007; peak 1.25 vs. 1.3% for CED 2007
- Economy responsible for most of the difference

Causes of Reduced Consumption in 2010: *CED 2009 Revised* vs. *CED 2007*

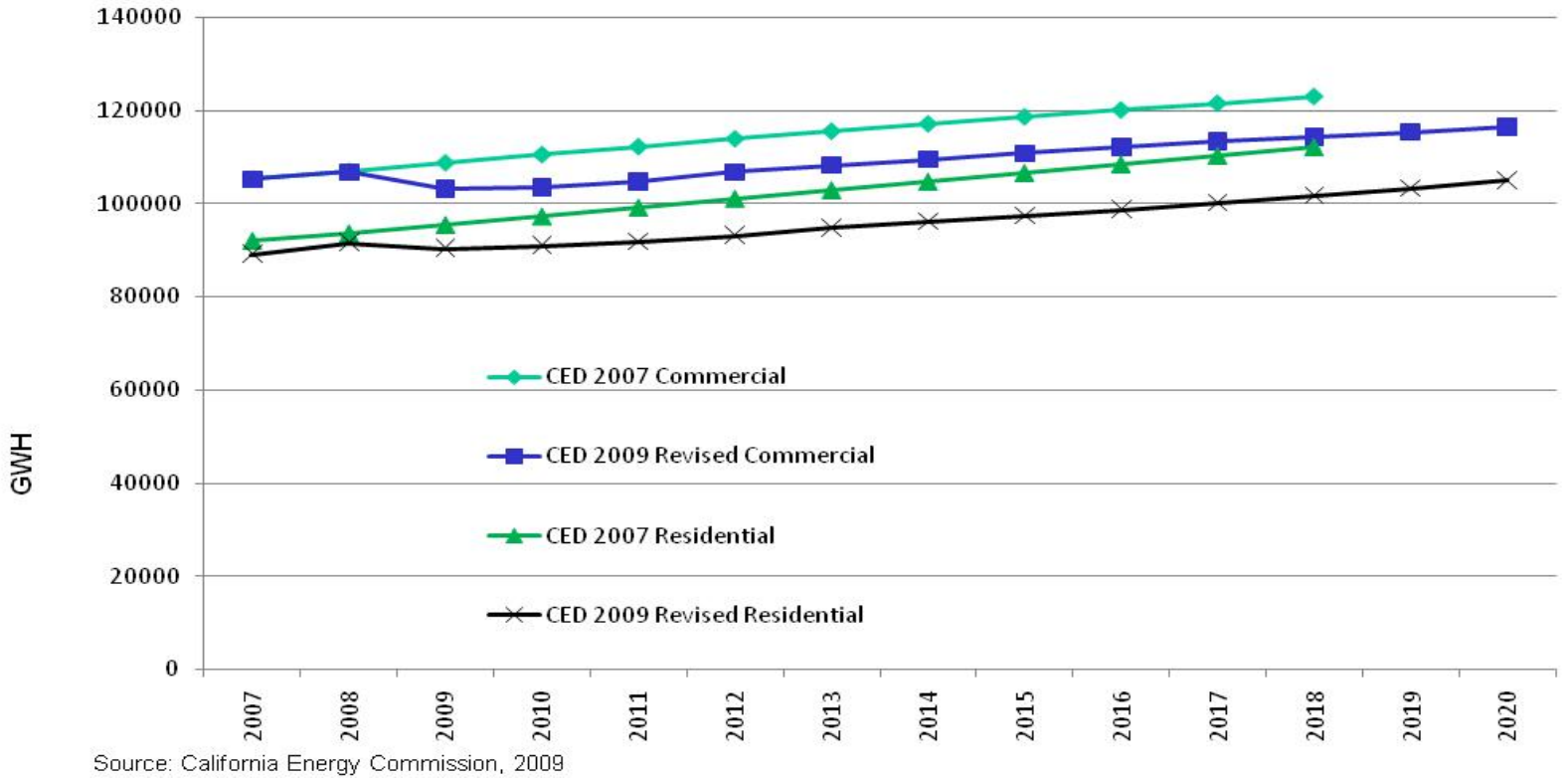


Causes of Reduced Consumption in 2018: *CED 2009 Revised* vs. *CED 2007*



Statewide Electricity Consumption by Sector

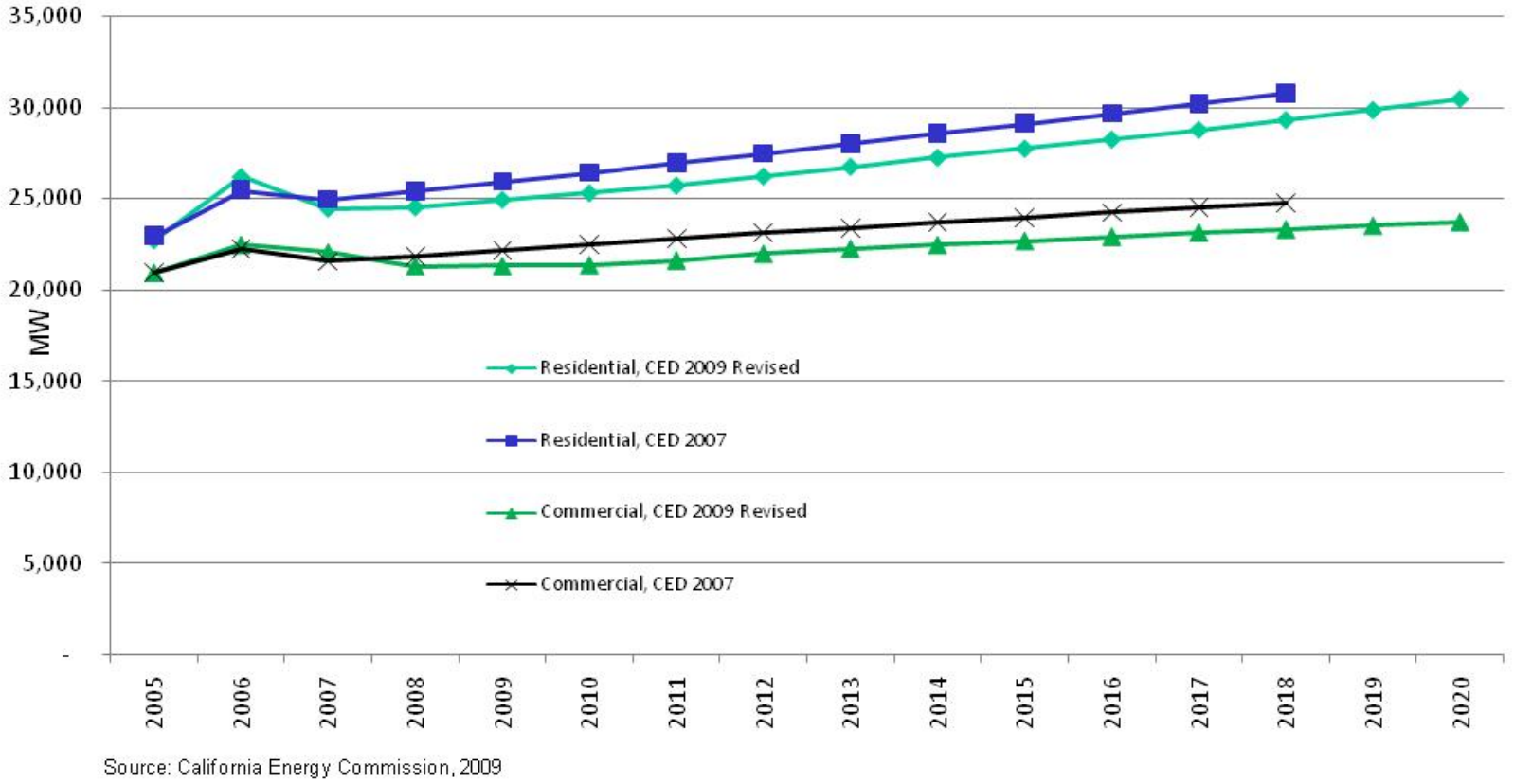
Most of the reduction in residential and commercial



Source: California Energy Commission, 2009

Statewide Electricity Peak by Sector

Most of the reduction in residential and commercial



Source: California Energy Commission, 2009

Statewide Electricity by Sector

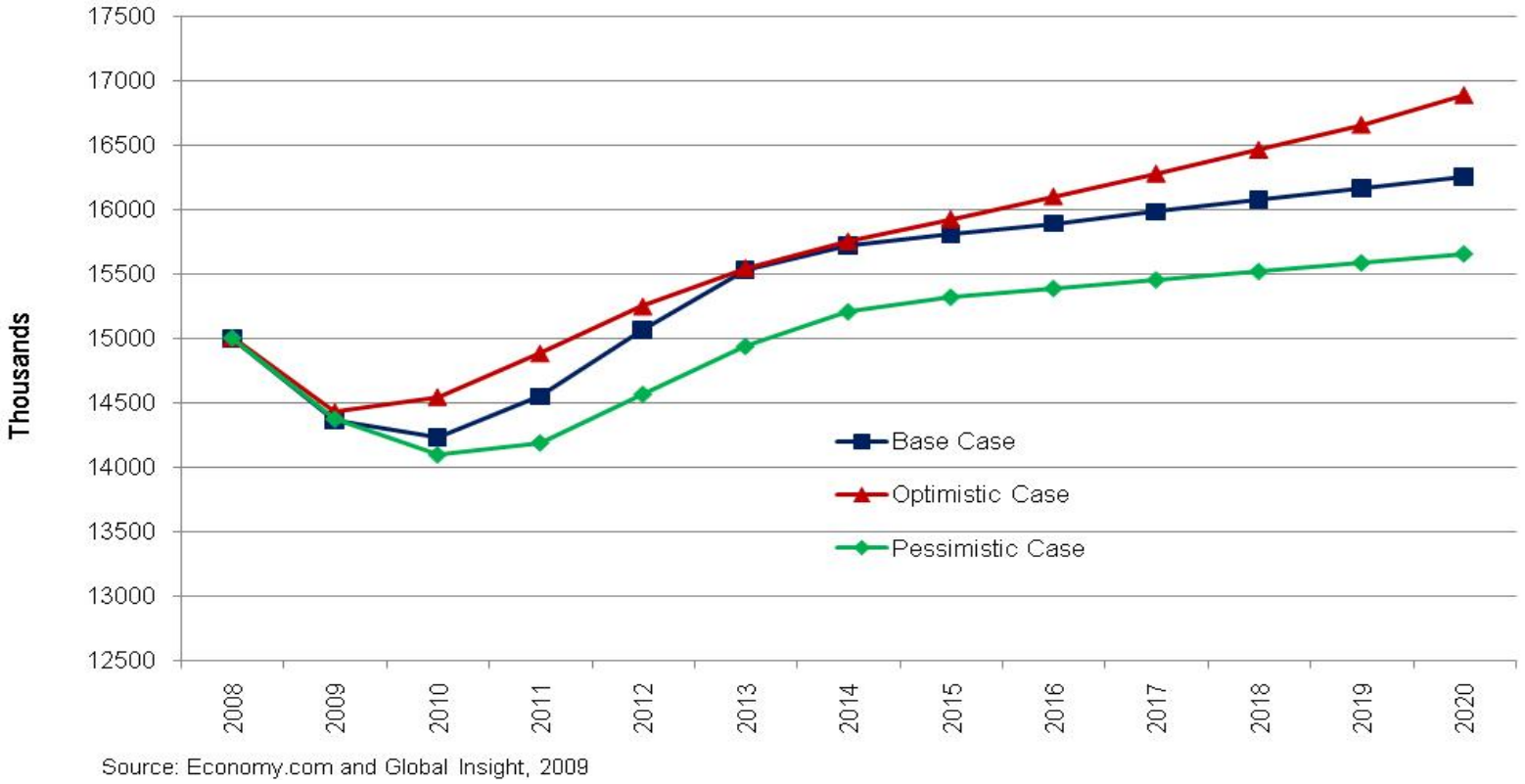
- Residential consumption down by 9.3% in 2018 vs. CED 2007
- Residential peak down 4.8% in 2018
- Commercial consumption down by 7.1% in 2018
- Commercial peak down by 5.7% in 2018

Economic Scenario Analysis

- Staff examined the impacts of two alternative economic scenarios
  - Global Insight optimistic case
  - Economy.com “aborted recovery” pessimistic case
- Scenarios differ based on assumed impact of stimulus package, projected business investment, projected consumer demand, etc.
- Scenarios provide California-specific projections

CA Total Employment by Scenario

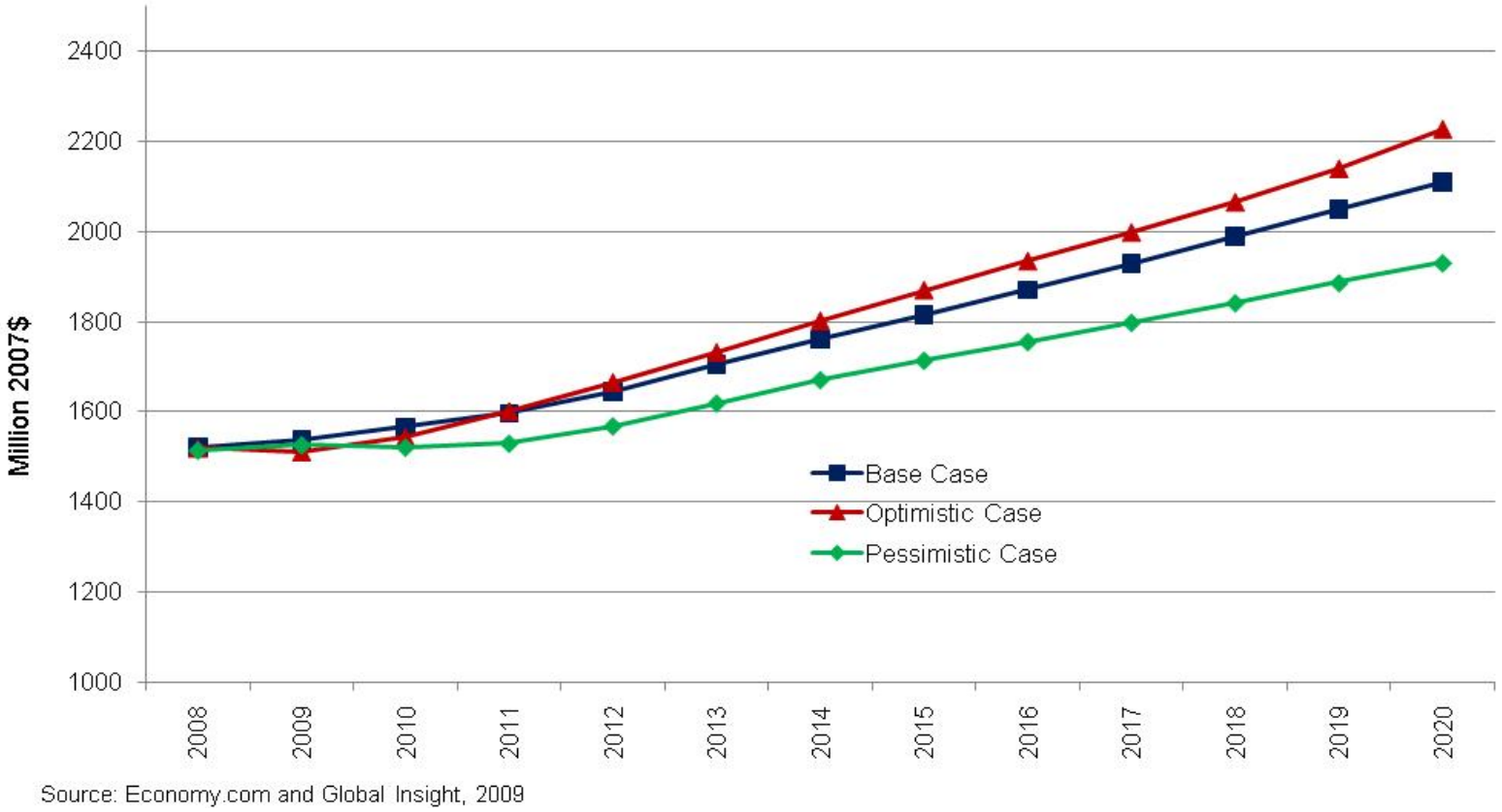
4% Higher/Lower vs. Base in 2020



Source: Economy.com and Global Insight, 2009

CA Personal Income by Scenario

5% higher/8% lower vs. base in 2020



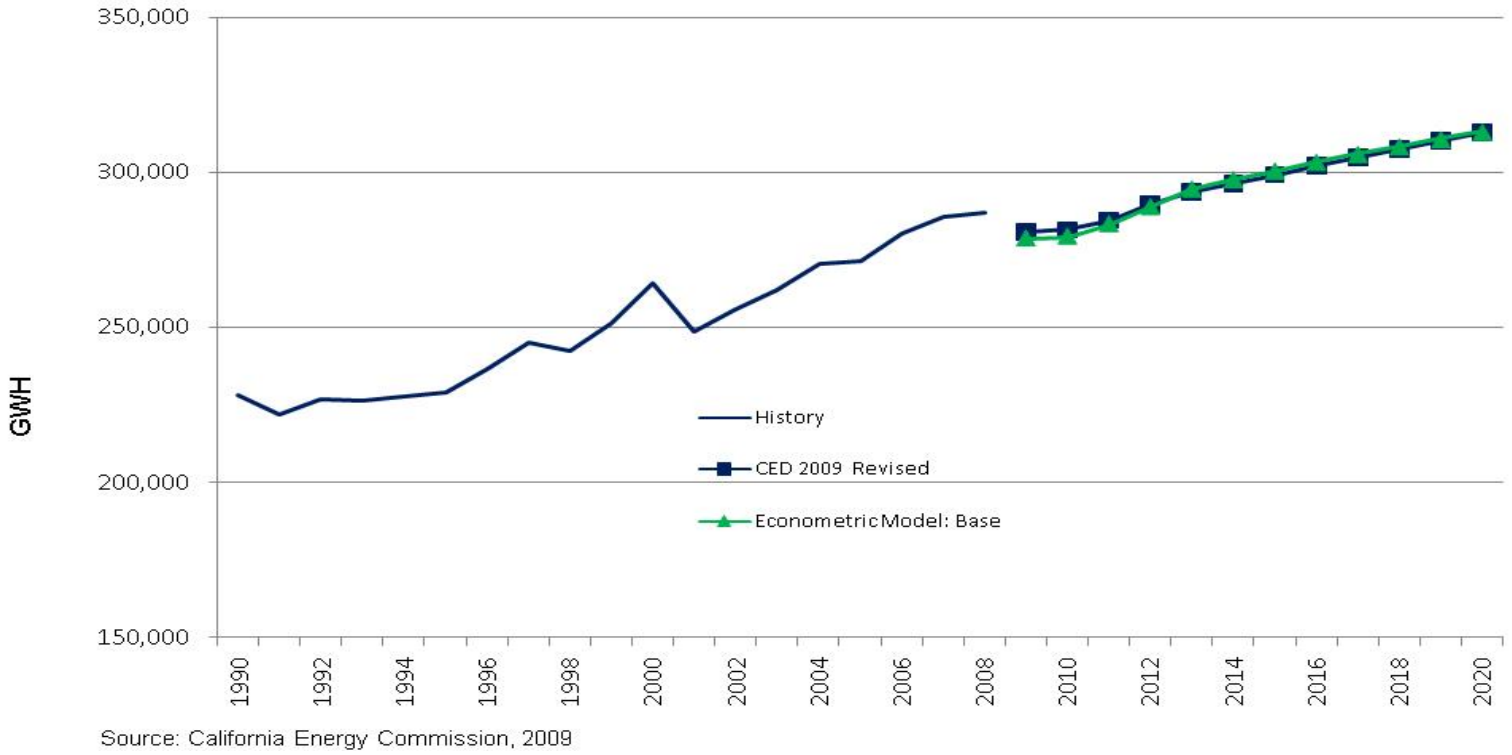
Source: Economy.com and Global Insight, 2009

Economic Scenario Methodology

- Econometric models estimated for electricity consumption by planning area for the three major sectors
  - Residential
  - Commercial
  - Industrial
- Forecast results match closely with *CED 2009 Revised*

CED 2009 Revised Elec. Consumption vs. Econometric Base Forecast

Less than 0.1% difference in 2020



Source: California Energy Commission, 2009

Economic Scenarios

- Econometric models run for the “base case” and two alternative scenarios
- Base case means same econ/demo inputs as *CED 2009 Revised*
- Percentage difference in alternative scenarios vs. base case applied to *CED 2009 Revised*
- Peak demand estimated by applying *CED 2009 Revised* load factors by planning area and sector to consumption results

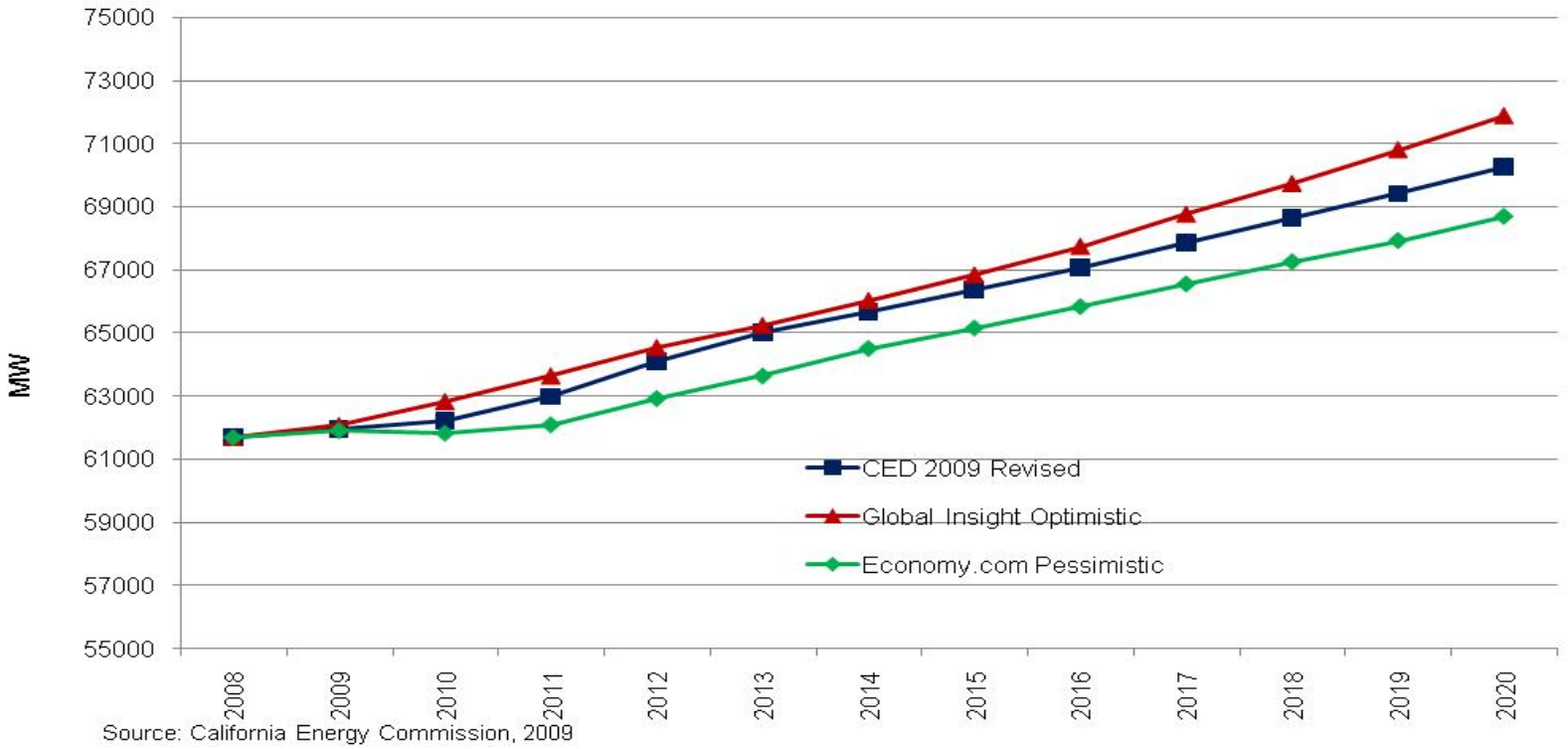
Statewide Electricity Consumption by Economic Scenario

~ 2 percent higher or lower by 2020

Source: California Energy Commission, 2009

Statewide Peak Demand by Economic Scenario

Slightly more change than in consumption



Source: California Energy Commission, 2009

Economic Scenario Results

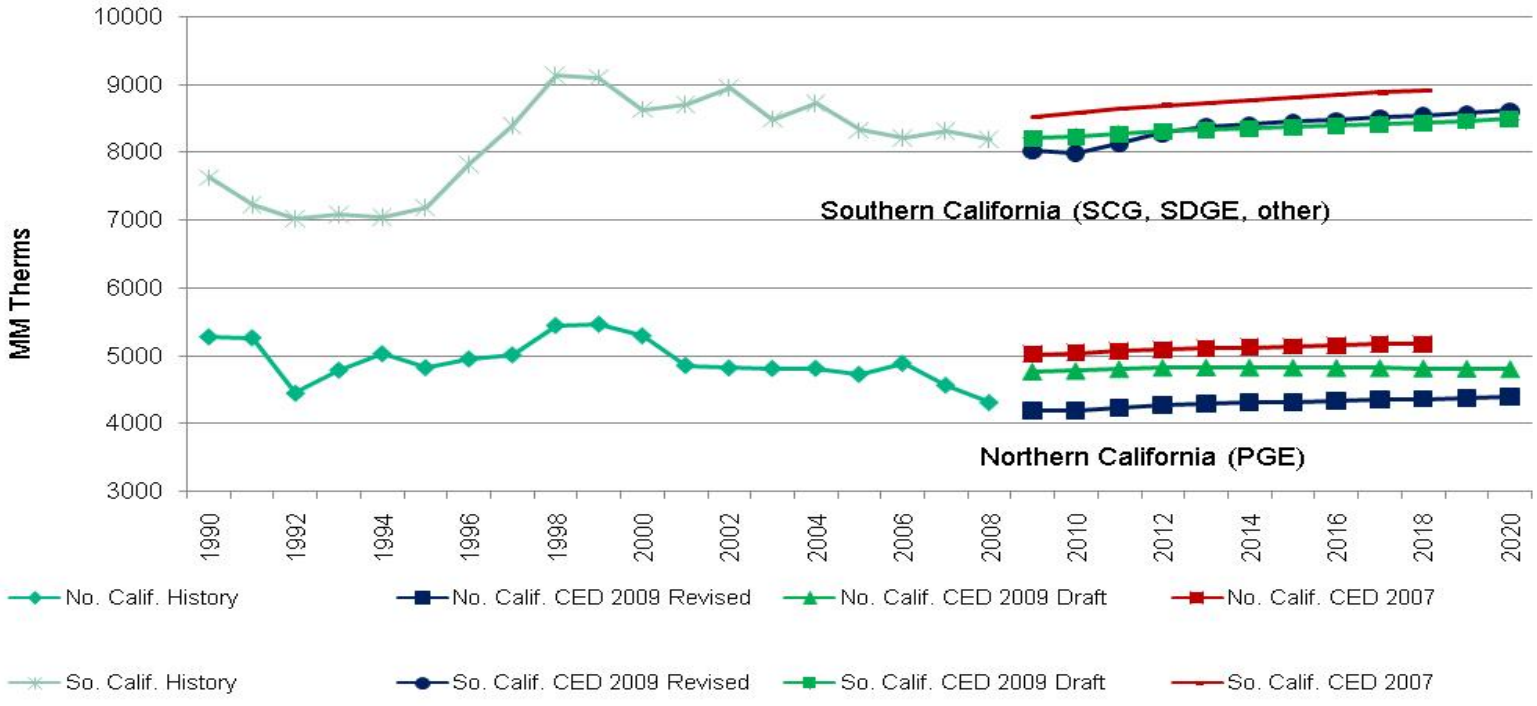
- Annual electricity consumption growth 2010-2020 increases to 1.2% in optimistic case, decreases to 0.9% in pessimistic
- Peak growth 2010-2020 increases to 1.4% in optimistic case, decreases to 1.1% in pessimistic
- Largest change by sector: industrial for optimistic, residential for pessimistic
- Narrow spread of scenarios

End-User Natural Gas Forecast

- By planning area: PG&E, SCG, SDG&E, and other
- Does not include natural gas used by utilities or others for electric generation
- Assumes mid-rate natural gas prices from draft forecast

End-User Natural Gas Forecast

Lower starting point, higher growth



Source: California Energy Commission, 2009

Additional Analysis

- Model Performance
  - Backcasts vs. Actual History
  - Forecasts vs. Subsequent Consumption
- Climate Change Impact on Peak Demand
  - High and Low Temperature Change Scenarios
  - 1.5%-2.2% Increase in Peak by 2020 in High Scenario
  - -0.4%-1% Increase in Peak by 2020 in Low Scenario

Preliminary Electric Vehicle Forecast

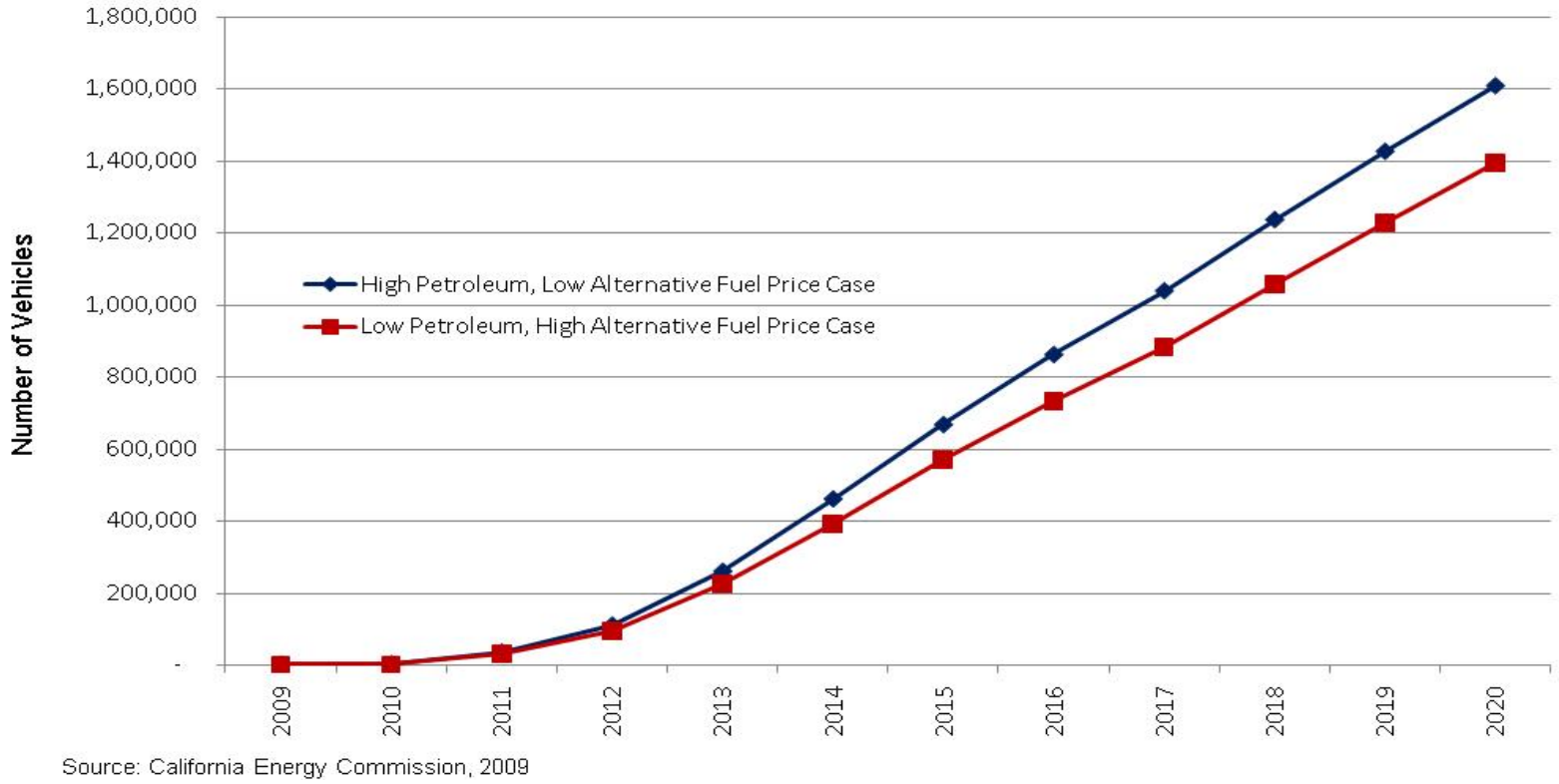
- Calcars Model
  - Vehicle choice/quantity model
  - Choices among conventional gasoline, hybrid, diesel, natural gas, ethanol, dedicated electric, plug-in hybrid
  - Choice based on vehicle and HH characteristics
  - Estimates VMT and fuel use by vehicle type
- Critical input: projected vehicle characteristics
- Two scenarios: high gasoline price, low alternative fuel price, and vice versa

Preliminary Electric Vehicle Forecast

- By 2020, 12 classes of plug-in hybrids (PHEVs), 11 classes of dedicated EVs
- Electricity costs: 13 cents/kWh, 6 cents/kWh
- Average EV purchase price ~ $6,000 higher than gasoline
- Average range for dedicated EVs = 85 miles; average efficiency ~ 2 miles/kWh
- PHEVs on average 60% more fuel efficient than gasoline (44 mpg)

Projected Number of Electric Vehicles on the Road

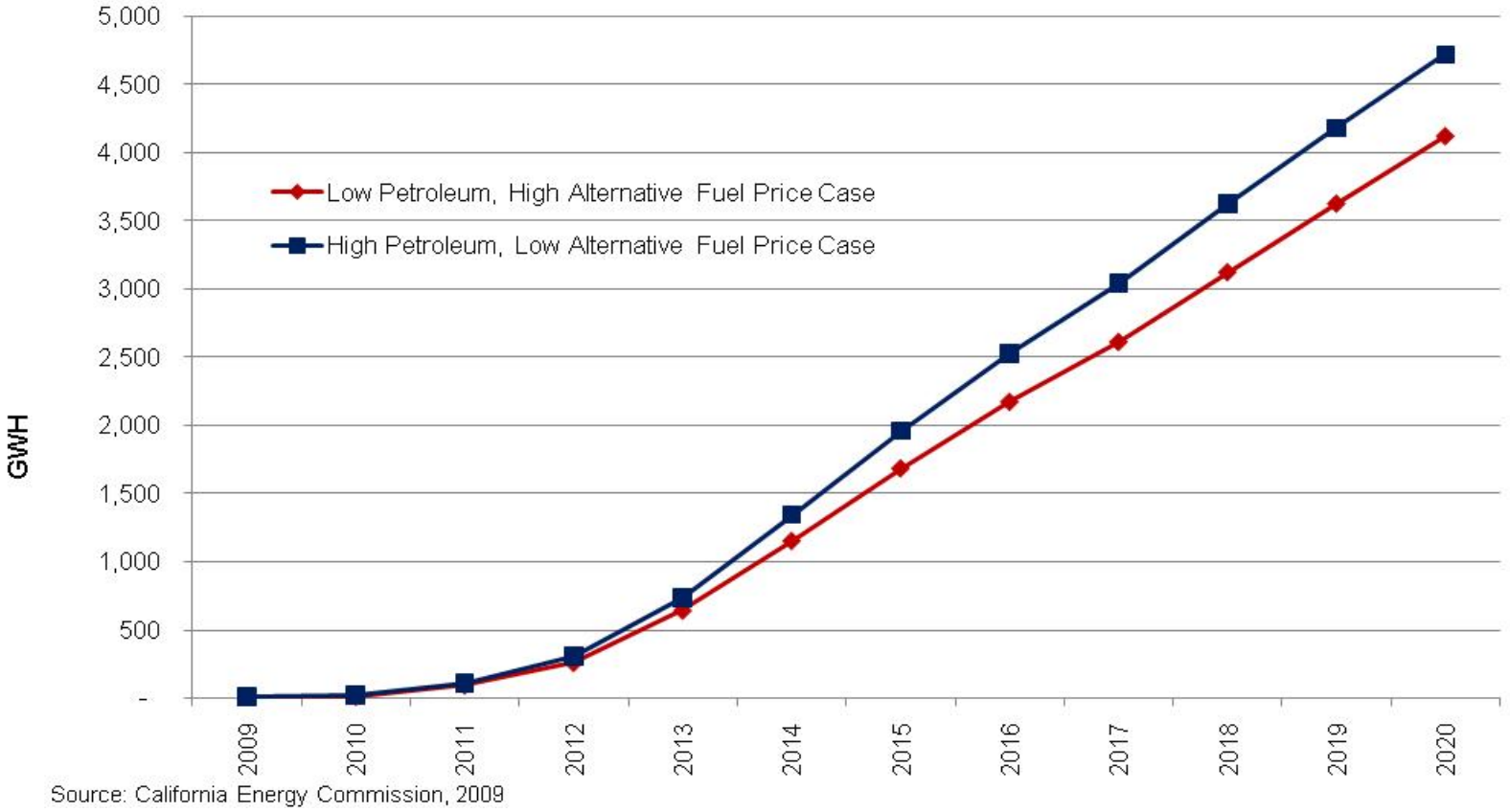
Majority are plug-in hybrid



Source: California Energy Commission, 2009

Projected EV Electricity Consumption

PHEVs assumed to operate 50% on electric



Source: California Energy Commission, 2009