Planning for a Low-Carbon Future at San Diego Gas & Electric

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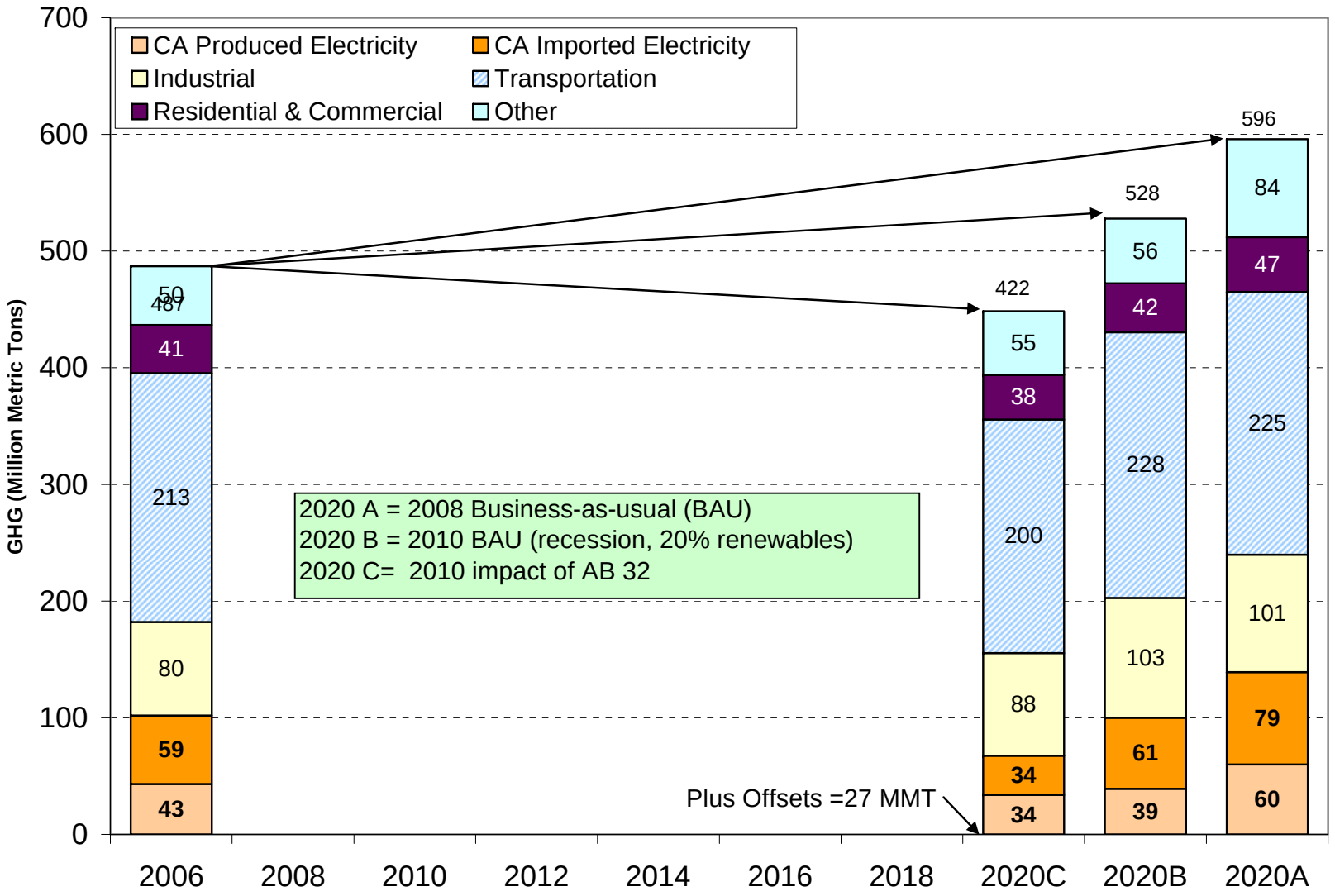
Greenhouse Gas Regulations That Impact SDG&E Resource Planning: 2002 – 2006

- **Legislated 20% Renewable Mandate by 2017 (2002)**
  - SDG&E portfolio had less than 1% renewables in 2002
- **CPUC/CEC Energy Action Plan (2003)**
  - Developed the Loading Order Approach to Resource Planning and the acquisition of resources in part to reduce GHG
    1. Cost-effective energy efficiency
    2. Cost-effective demand response
    3. Renewable generation
    4. Distributed generation
    5. Conventional generation
- **Legislation moves 20% Renewable Mandate to 2010 (2004)**
- **CPUC adopts GHG Emission Performance Standard Adopted (2006)**
  - No contracts of more than 5 years length with generation having emissions more than 0.5 MT/MWh (1100 lbs/MWh) of CO2e

Greenhouse Gas Regulations That Impact SDG&E Resource Planning: 2007 - Present

- **Legislation (AB 32) sets state wide GHG reduction goal with Air Resources Board in charge of implementing (2007)**
  - Bill requires state wide 2020 GHG at 1990 levels, does not set sector limits
  - Electric Sector has both Complimentary Measures and participation in a Cap and Trade Program
- **Complementary Measures**
  - Energy Efficiency beyond levels of 2002-2008
  - Distributed Rooftop Photovoltaics
  - Expansion from 20% renewables to 33% renewables
  - Expanded Combined Heat and Power – still not well defined
- **AB 32 Cap and Trade (C&T) Program for 2012**
  - First jurisdictional deliverer approach puts compliance at generator level
    - Market purchased power will incorporate carbon price
  - Major Issues:
    - Link to Western Climate Initiative Cap and Trade Program, replacement by Federal program, allocation of allowances, cost containment, and use of offsets

California GHG Reductions from AB 32



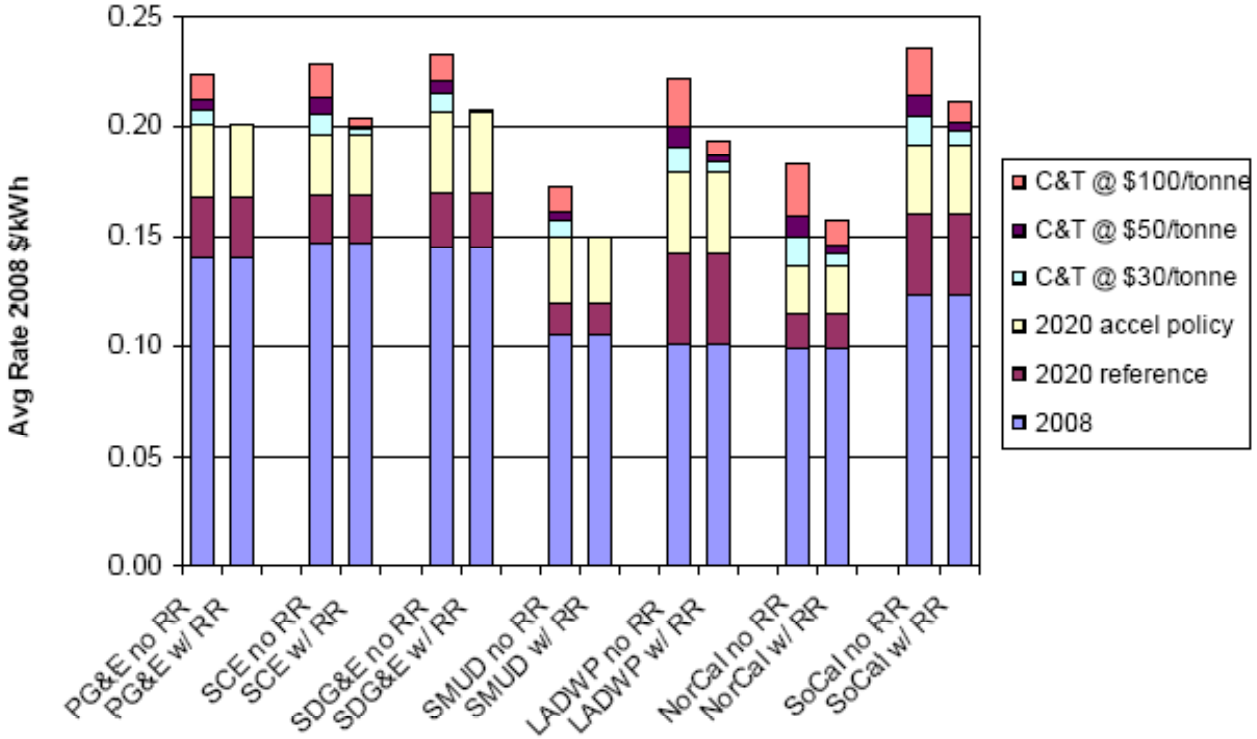
Price Consequences of GHG Regulation

California electricity consumers will pay for GHG reductions in rates both from complementary policies (yellow) and cap-and-trade allowance costs (blue, purple, or salmon).

How much? Depends on

- Actual cost of complementary policies
- Carbon price
- Allowance revenue recycling or allocation of free allowances
- Method of allocation or recycling

Average Retail Rates in 2008 and Projected Reference Case Rates in 2020 with Incremental Rate Impacts from Accelerated Policy Case, and Cap and Trade with and without Revenue Recycling



Source: E3, *Greenhouse Gas Modeling of California's Electricity Sector to 2020,* **October 2009**

Incorporating Carbon into Planning

- Incorporate Demand Side GHG Reduction Policies Through Impact on Forecasts of Need
  - Energy Efficiency
    - Based on Cost Effectiveness with $30/MT carbon price
  - Smart Grid
    - Customer response to price signals uncertain
    - Roll out of smart appliances uncertain
  - Distributed PV
    - 75 MW by end of 2010
  - Electric Plug-in Vehicles
    - Currently small forecast
- Incorporate Supply Side GHG Reduction Policies on Resource Acquisitions
  - Intermittent renewables
  - Other renewables
  - Potential new CHP
- Incorporate GHG Adder in long-term resource acquisition evaluation process
  - $30/MT levelized
- Incorporate GHG in market price of short-term purchases and dispatch post-2012

The Challenges - Uncertainty

- Uncertainty created by intermittent renewables
  - Flexible resources – will the need for resources be driven by integration needs (ramping, etc) and not by a planning reserve margin?
  - More accurate forecasting of peak production of intermittent renewables
- Uncertainty of Demand GHG reductions
  - Impact of technology over time (Smart Meters, Smart Grid, EVs, PV) on customer demand
- Uncertainty of Supply GHG reductions
  - Flexibility for uncertain timing of when renewables will show up given delays in contracting, permitting, and getting transmission built
  - Flexibility to take advantage of "surprise technologies"
    - Need for load following resources that are "cleaner" than natural gas fired combined cycle plants