Comments on US Energy Policy: A Biased Primer

Terry Surles, Executive VP for R&D
Desert Research Institute
and
Board Director
Pacific International Center for High Technology Research

March 19, 2012

Paradigm: Consider Inter-Relationships

Presentation Will Cover

- General comments on energy and security
- Commentary on US political situation
- Current status of national energy activities
- State initiatives in energy and environment

Problem Confluence Hasn't Changed: Climate Change and Energy Security

- Availability and price pressure on oil prices - disruption of international supply (political unrest) and domestic availability (hurricanes)
- Coal - domestic supplies lessen security issues, BUT exacerbate climate issues, geologic carbon sequestration is not yet proven on a large scale, limits and issues with water supplies
- Natural gas – US shale gas as a new paradigm?
- Nuclear – Benefits to climate, BUT increased concerns for public safety and on-going security issues due to concerns over proliferation risks, similar water issues as coal
- Bio-fuels - increased food/fuel/land/water competition, coupled with uncertainties related to future agricultural productivity
- Other renewable energy resources – indigenous resources benefit security, low carbon footprint benefits the climate, but at what cost and impact to the grid, logistics issues
- Efficiency and demand response (use of energy storage) – how much can we "squeeze out" over the next century

What Is the US Doing About Energy and Security Problems: Reality Check

Stimulus Funding (~$40B for energy) was a good idea but had predictable issues with implementation

Despite Administration pronouncements, policy driven by regional and Congressional initiatives with no carbon price signal!

- Coal is king, but electricity utilities want development of gas
- Nuclear utilities (Exelon, Duke) want price signal
- Coal utilities (Southern, AEP) do not want signal

Congress strongly influenced by lobbyists and local interests

- Mish-mash of subsidies to all energy forms and resources

Risk aversion, coupled with desire for cheap gasoline, drives decisions

- Drilling for more off-shore oil to increase, including the Arctic
- Uncertainties with nuclear power, but construction underway
- New issues with gas pipeline risks are being addressed

Effectively, US energy policy is to not have an energy policy - at least a coherent one!

Recent Legislation Illustrates Changing Political Interests

- **EPAct 2005 - Focus on coal and nuclear - Bush and a Republican Congress**
- **EPACT 2007 - Focus on renewables and coal - Bush and a Democratic Congress**
- **2009 Economic Stimulus Bill - Broad funding for renewables, energy efficiency, Smart Grid, and carbon capture and storage**
  - **– Obama and a Democratic Congress**
- **Despite current (2012) rhetoric on both sides, current energy bills do not substantively change overall funding**
- **Side note: Prior to 2005, the last substantive, integrated energy policy act was passed under Bush (the elder) in 1992 with a bi-partisan Congress that laid out the approach for cap-and-trade legislation**

Since Start of Obama Administration and Since January with a Republican House

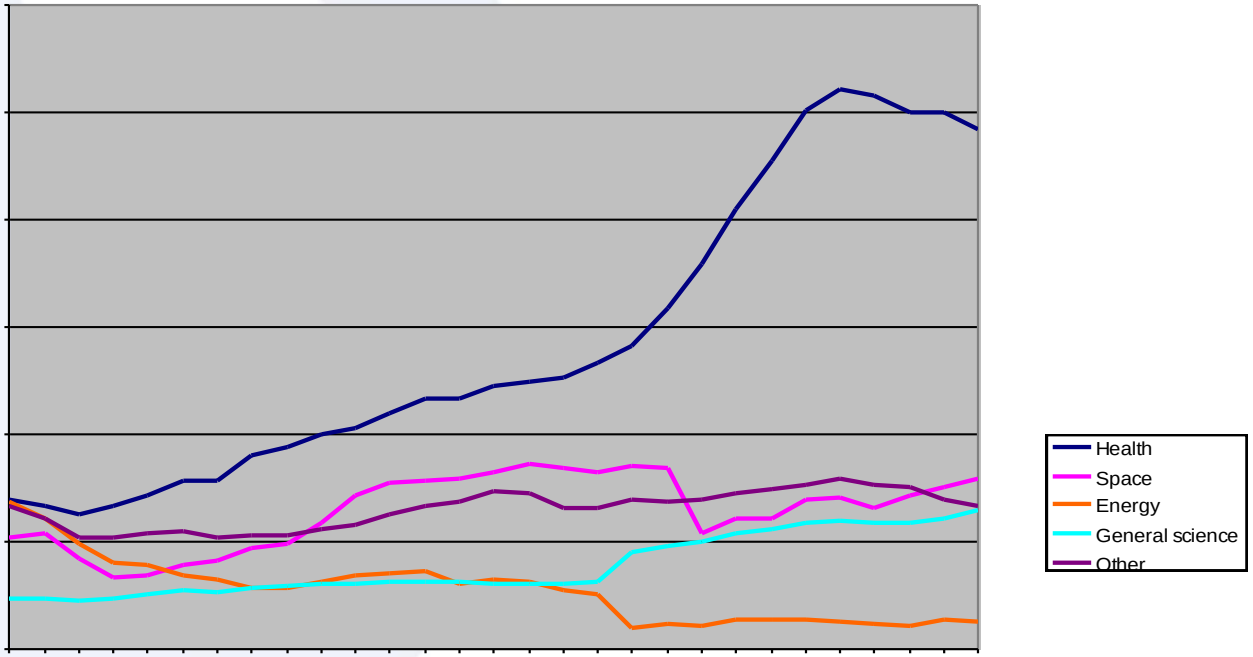
ARRA poured about $40B into energy technology development broadly focused on CCS, Smart Grid, efficiency, renewables
FY10 budget significantly increased funding

- Energy efficiency and renewable energy
- FutureGen (IGCC) re-start - politically driven by Illinois Senator

Current budget battles - some observations

- Energy efficiency and renewable energy: significantly reduced from what the Administration wanted in FY11
- Fossil: severe cuts for coal research, but new interest in fracking
- Nuclear: battles over the closure (or not) of Yucca Mountain
- Electricity delivery: On life support funding
- Office of Science (climate change-related): limited cuts
- ARPA-E: started by Bush, battles over funding of high-risk R&D

US Funds Energy Substantially, But Other Sectors Get More R&D Funds



New Environmental Regulations Could Close 30 GW of Coal-Fired Plants

	Affected Units	Regulatory	Quantity, MW
Air Toxics	Principally coal and oil units	MACT	410,000+ coal, oil
CSAPR/ NAAQS	All fossil units	CAA	Complex-Need unit data, operating conditions, etc.
CCP	Coal Only	RCRA	330,000 (utility) Thousands? Industrial
Water OTC/316B	Most thermal plants, including nuclear	CWA	247,000
Regional Haze	All units, but largest burden falls on coal fleet	CAA	15% of coal?
GHG	1st source with a GHG "BACT" is an NGCC	CAA	800,000+

Wind and Solar Incentives

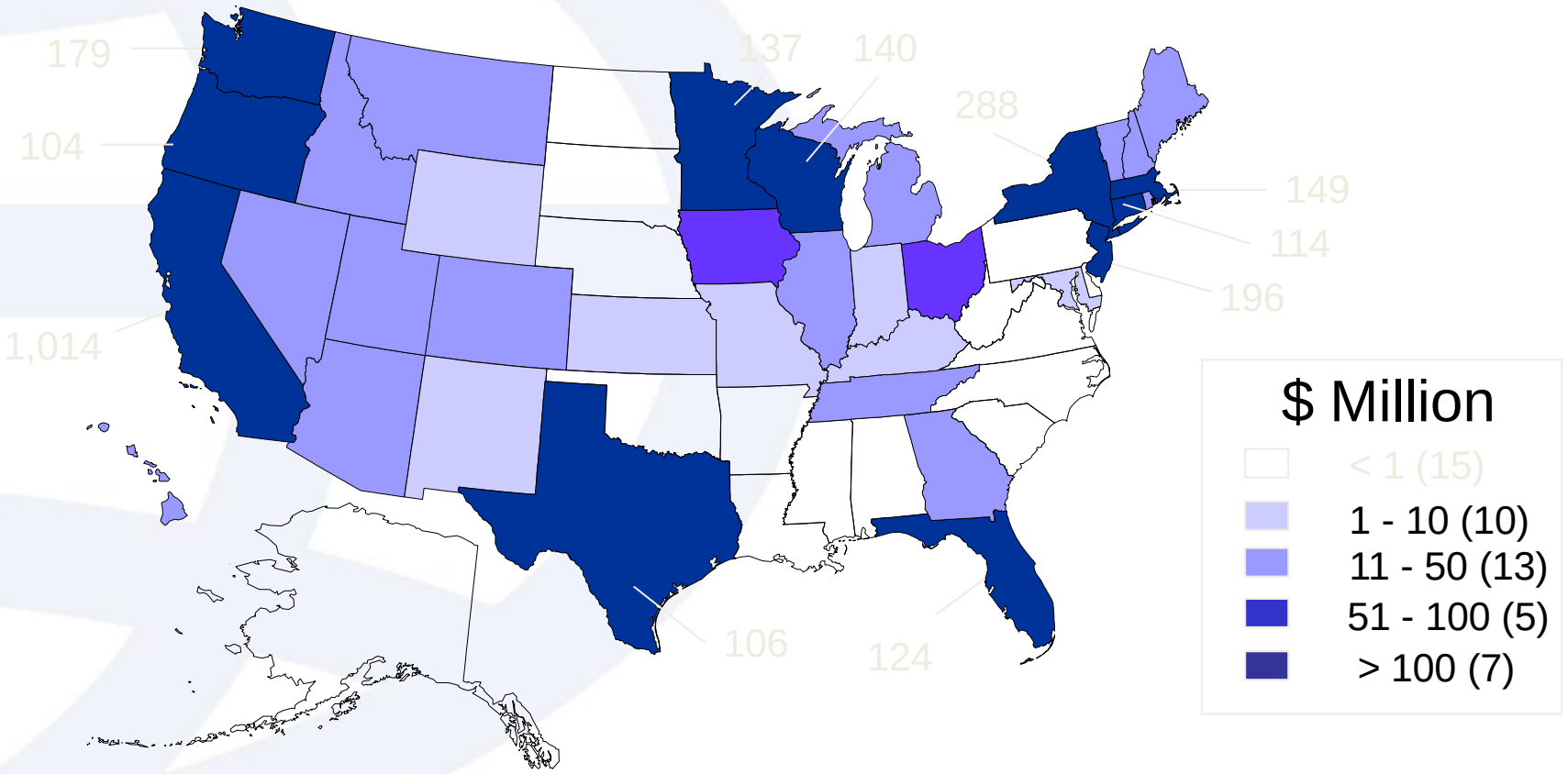
- Federal Incentives – Solar
  - Investment Tax Credit (ITC) – Secure through 2016, value equal to 30% of the installed cost of the facility.
  - MACRS – Depreciation over 5 years including bonus depreciation of 50% if placed in service during 2012. Basis of the property reduced by 50% of the credit amount.
- Federal Incentives – Wind
  - Production Tax Credit (PTC) – Equal to 2.2¢ per kWh for projects placed in service before December 31, 2012.

States (PUCs) Aggressive in Developing Policy and Regulatory Instruments

- Renewable Portfolio Standards (RPS) now in over half of the 50 states -
  - Federal standard unlikely due to Commerce Clause in Constitution, related “Low-Carbon Fuel Standard” in CA
- Energy efficiency and demand-side management requirements, codes, and standards
- Feed-in Tariffs
- Net metering laws and regulations
- Power Purchase Agreements - national law, but specifics driven by PUCs
  - New PPAs must take into account ancillary services - grid stability, reliability, Var support
- Transmission investments and access - use of Public Utility Commission process

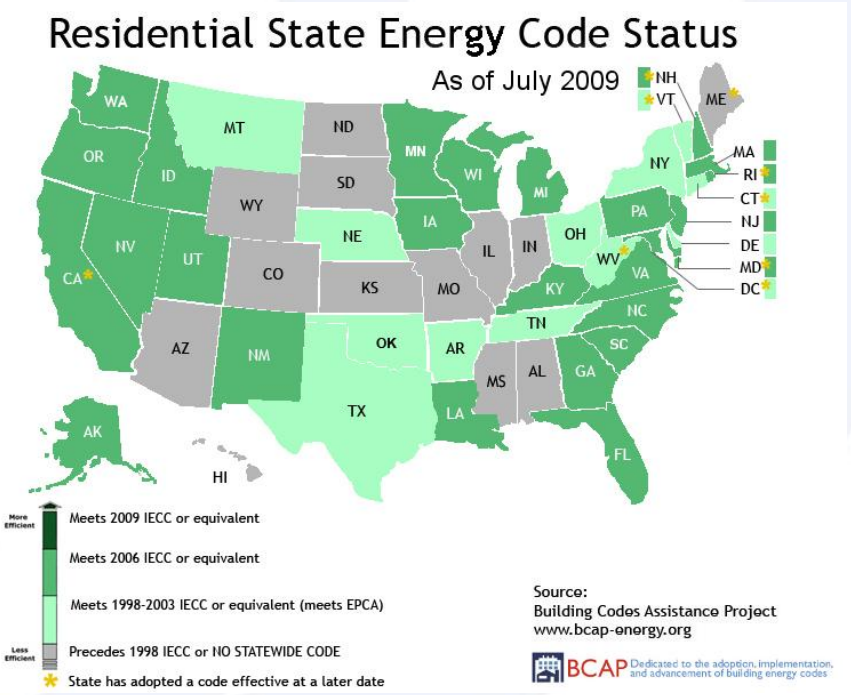
Utility Ratepayer-Funding for EE Varies Considerably Across U.S. States

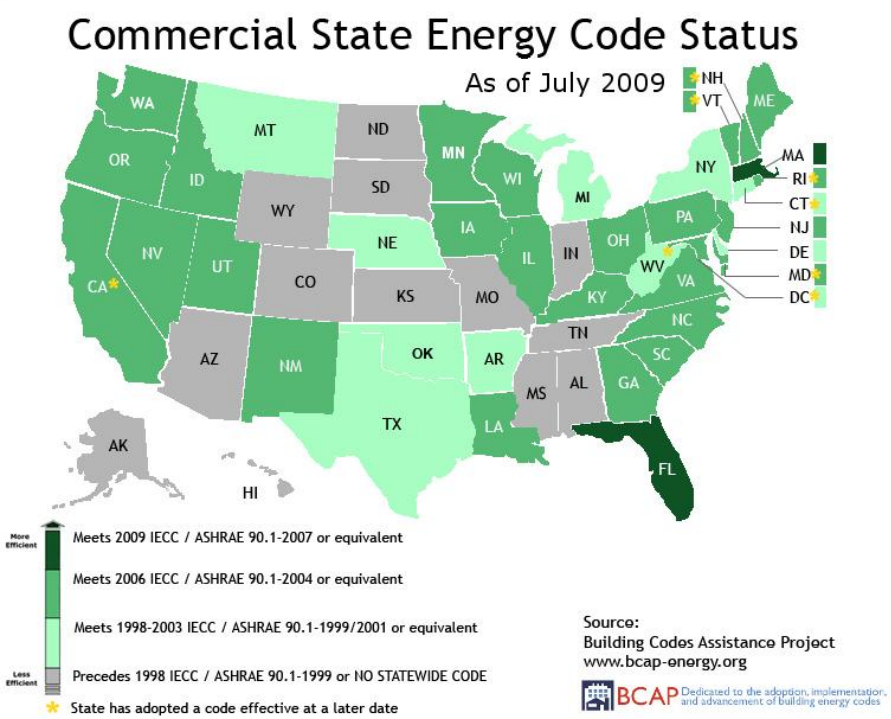
2008 Utility Ratepayer-Funded Energy Efficiency Budgets (Electric & Gas)



Building Energy Codes Vary Widely and Are Driven by State Agency Policies

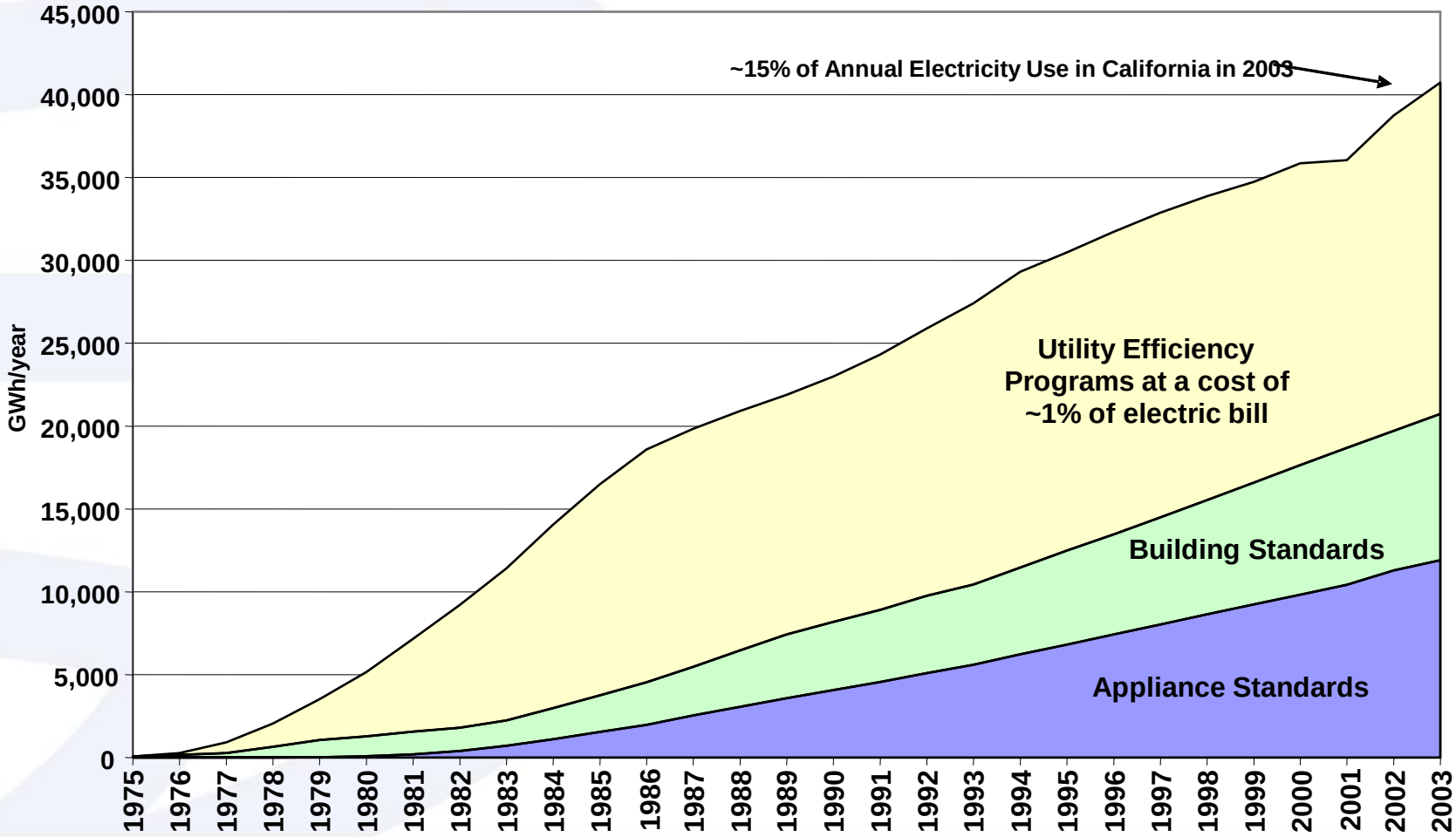
- Residential and commercial model building energy codes developed by IECC and ASHRAE, respectively; updated continuously
  - After each update, DOE required adopt as national code if efficiency gains would be made
- States must adopt current national code for commercial buildings, and must provide justification if residential code not adopted
  - But no consequences if these requirements are not fulfilled





California: Annual Energy Savings from Efficiency Programs and Standards

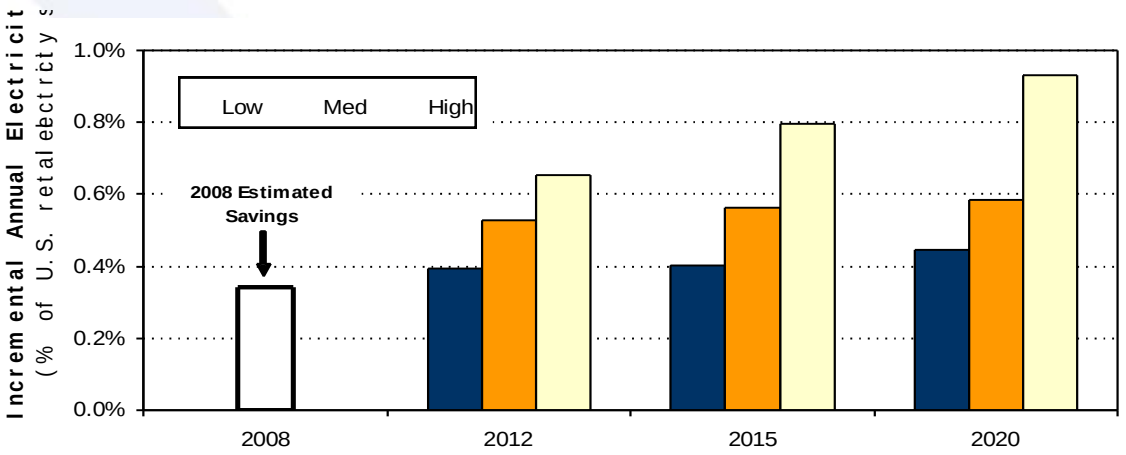
Source: A.H. Rosenfeld/California Energy Commission estimates



Electricity Savings from Ratepayer-Funded Programs Projected to Grow Substantially

- 2008 U.S. annual electricity savings = 0.34% of retail sales
  - **Represents 1st-yr. savings from measures in 2008**
  - **Some leading states achieved savings >1% (VT at 2.5%)**

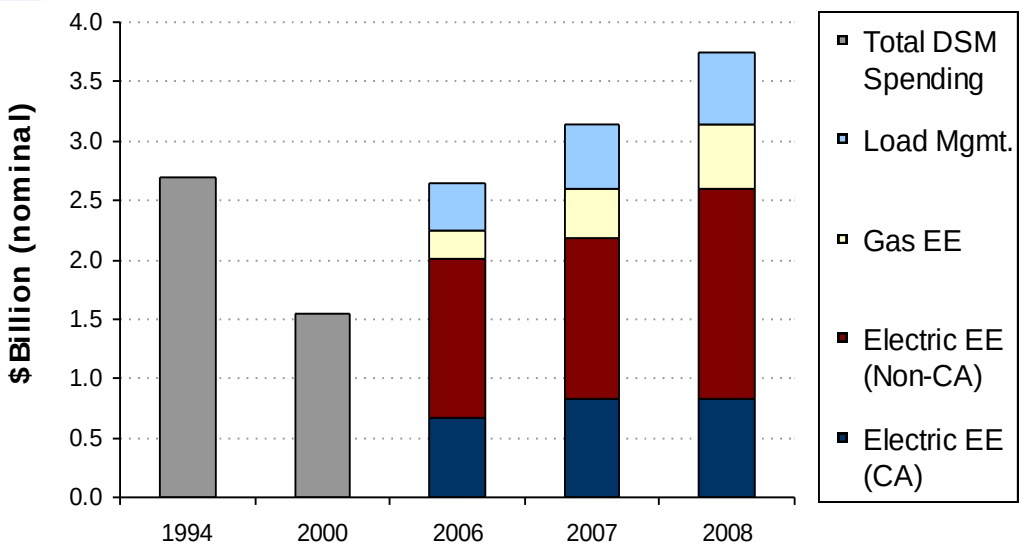
Project Incremental Annual Electric Energy Efficiency Savings from Ratepayer-funded Programs



- Annual electricity savings are projected to rise to 0.45%-0.93% of retail sales by 2020, with a Medium Case projection of *0.58%*
  - **In comparison, EIA's AEO2009 reference case projects that U.S. retail electricity sales will grow by 1.1%/yr from 2010-2020 (though some ratepayer-funded EE savings may be implicitly included in that projection)**
- Cumulative savings by 2020 equal 4.7%-8.6% of EIA's reference case forecast of 2020 retail electricity sales (6.1% in Medium Case)

DSM Budgets Rising and Can Be Used to Address Aspects of Renewable Variability

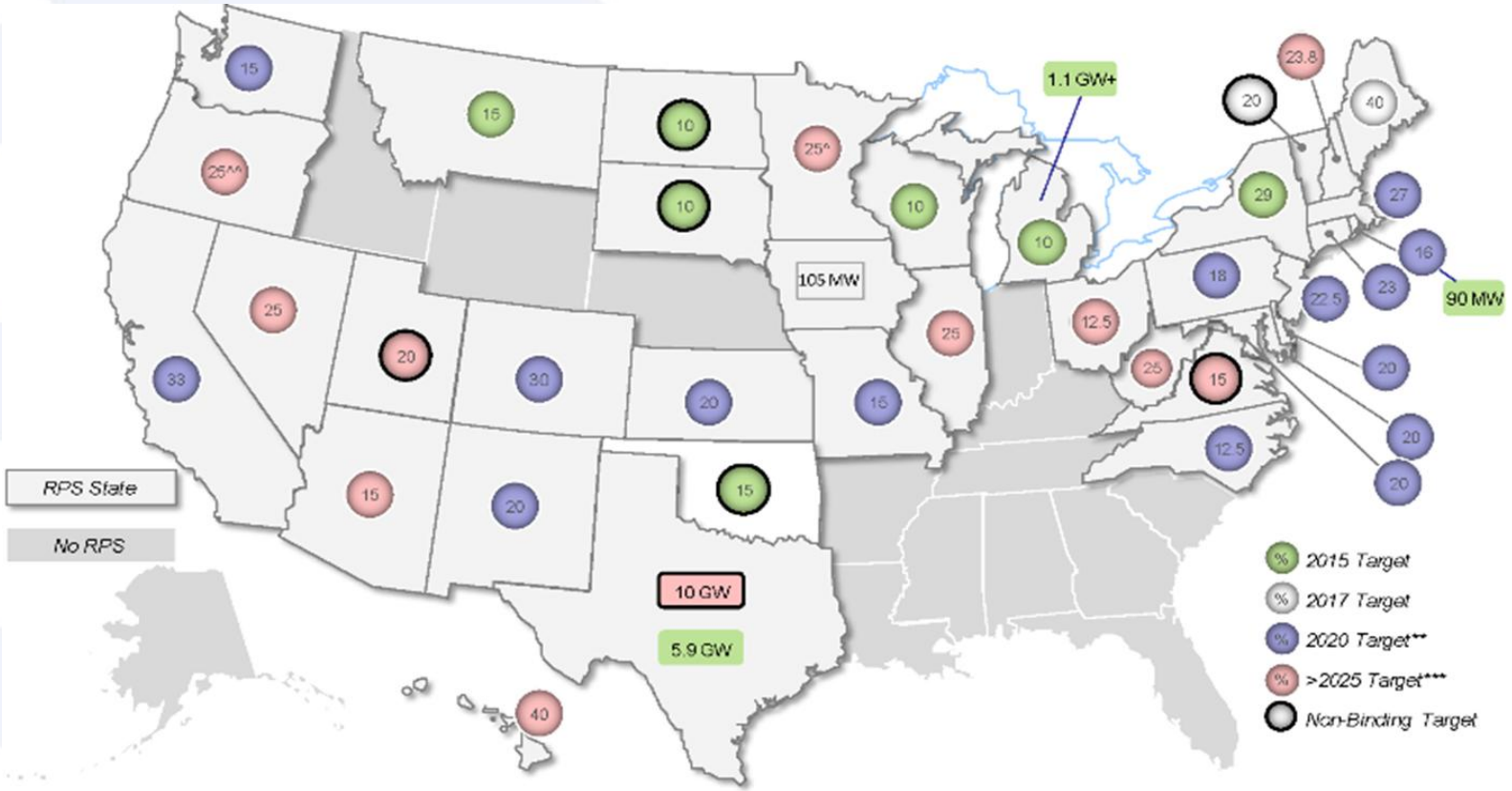
- DSM programs began in 1980s
  - Funded through utility rates
  - Established/overseen by state public utility commissions
- Utility EE budgets in 2008: $3.1B (electric + gas) plus $0.5B for load mgmt.



- A proliferation of new state-level policies to support ratepayer-funded EE have been adopted in recent years
- LBNL projects state-level programs will yield cumulative savings in 2020 equal to 5-8% of total U.S. electricity consumption (excluding impact of stimulus bill funding)

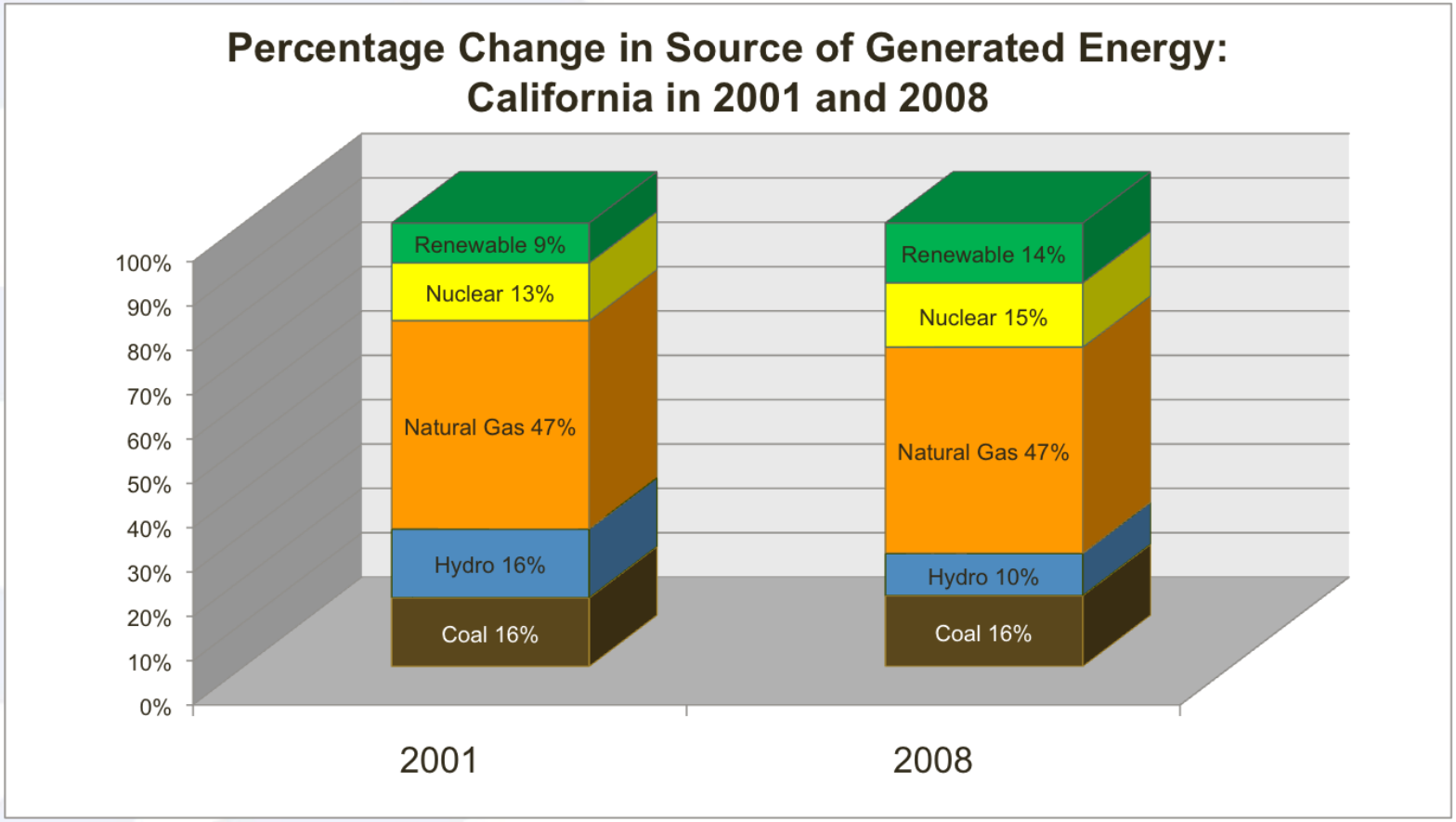
State Renewable Energy Portfolios

RPS – Renewable Portfolio Standard



Note: *Includes states with installed capacity >1 MW. **Includes targets for 2019 (RI), 2021(MO, NC), and 2022 (MD). ***Includes Hawaii, with target date of 2030. ^Separate target for Xcel Energy at 30% by 2020. ^^By 2025: 25% (large utilities), 10% (small); 5% (smallest)
Source: IHS Emerging Energy Research

California: Electricity Generation from All Renewable Resources Is Increasing



DRI – Science. Environment. Solutions.

Transmission Planning Critical to Reach RPS Goals With As-Available Renewable Resources

- Transmission permitting based in state Public Utility Commissions
  - Renewable resources are often remote from load centers
    - **Major problem** for siting cross-state transmission lines causes delays of up to ten years
    - Even within a state - CPUC, CalISO, and CEC, plus IOUs and publicly-owned utilities - are involved!
- Renewable Energy Transmission Initiative are underway in a number of states - CA, NV
  - Purpose is to identify competitive renewable energy zones (CREZs) for transmission development
  - These are economic incentives as significant amounts of renewable-generated energy from Nevada will be sold to California IOUs - transmission solved by connecting to Hoover Dam hydroelectric lines
  - Solve “chicken and egg” problem of what comes first: transmission or generation (similar issue in Hawaii linking load on one island with renewable resource on another island)

Proven Technology: Trans Bay 400MW HVDC Project, Western Interconnect, Hawaii Big Wind, Mid-West Renewables Next?

Project Name	**Trans Bay Cable Project**
Location	**Pittsburg, CA San Francisco, CA**
Type of Plant	**53-mile HVDC PLUS Submarine Cable**
Delivery	**400Mw's in Downtown San Francisco**

Marsh Landing

A Number of Climate-Based Policy Activities Are Underway in the States

- RGGI – Northeastern US states
  - Good news: nine states and institutions coming together in a bi-partisan fashion, offsets in place (SF6, landfill gas, end use efficiency, methane from animal waste, etc.)
  - Bad news: very real concerns about “leakage,” only one sector (electricity) is planned for regulation and New Jersey will probably leave RGGI
- AB 32 (California)
  - Good news: bi-partisan approach to address the problem, rejected an initiative that would have gutted legislation
  - Bad news: little prior knowledge of how to link aggressive public policies to technological realities, significant dithering to come up with effective policies and regulations

Linking R&D and Public Policy to Commercialization Process