



University of
California,
Berkeley

Green to Gold: Creating the Next Industrial Revolution

Daniel M. Kammen

Energy and Resources Group & Goldman School of Public Policy
Director, Renewable and Appropriate Energy Laboratory
Director, transportation Sustainability Research Center
University of California, Berkeley

National Association of State Treasurers Annual Conference
Dana Point, California, August 31, 2009

Renewable and Appropriate Energy Laboratory - rael.berkeley.edu

Summary: Positive Tipping points needed

- Example: The US pays a TARP bailout every year (>\$500 billion) every year for imported carbon energy
 - These funds need to be re-directed
- Global: Energy efficiency must become a global priority
 - True for all nations ... and all communities: urban *and* rural
 - Energy efficiency facilitates low carbon supply



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REPORT OF THE
RENEWABLE AND APPROPRIATE ENERGY
LABORATORY

Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?

by

Daniel M. Kammen
Kamal Kapadia
Matthias Fripp

of the
Energy and Resources Group &
the Goldman School of Public Policy

APRIL 13, 2004



Green Jobs and the Clean Energy Economy



Co-authors
Ditlev Engel,
Chief Executive Officer
Vestas Wind Systems A/S

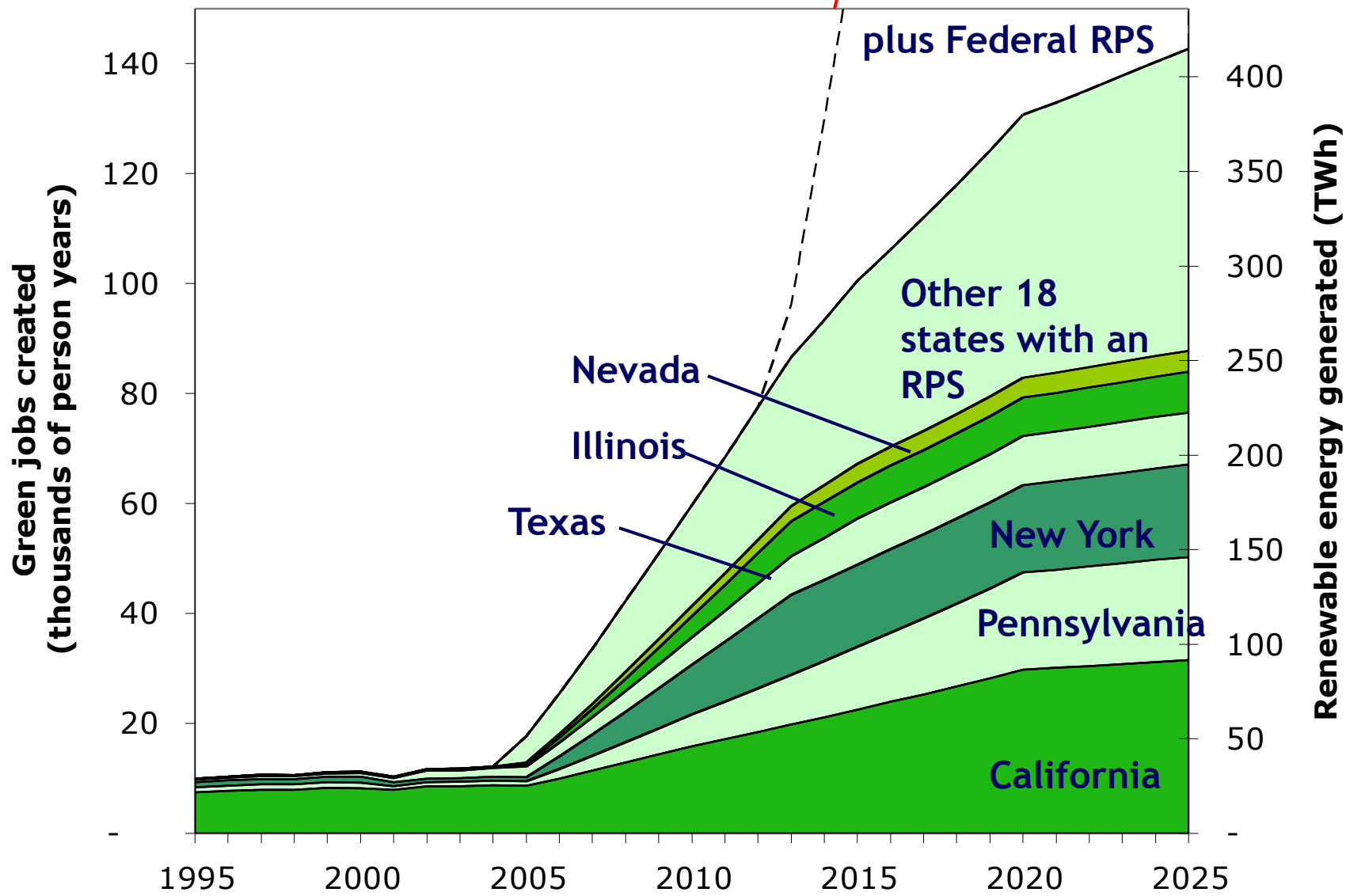
Daniel M. Kammen,
Professor and Co-Director,
Berkeley Institute of the Environment

04
THOUGHT LEADERSHIP SERIES

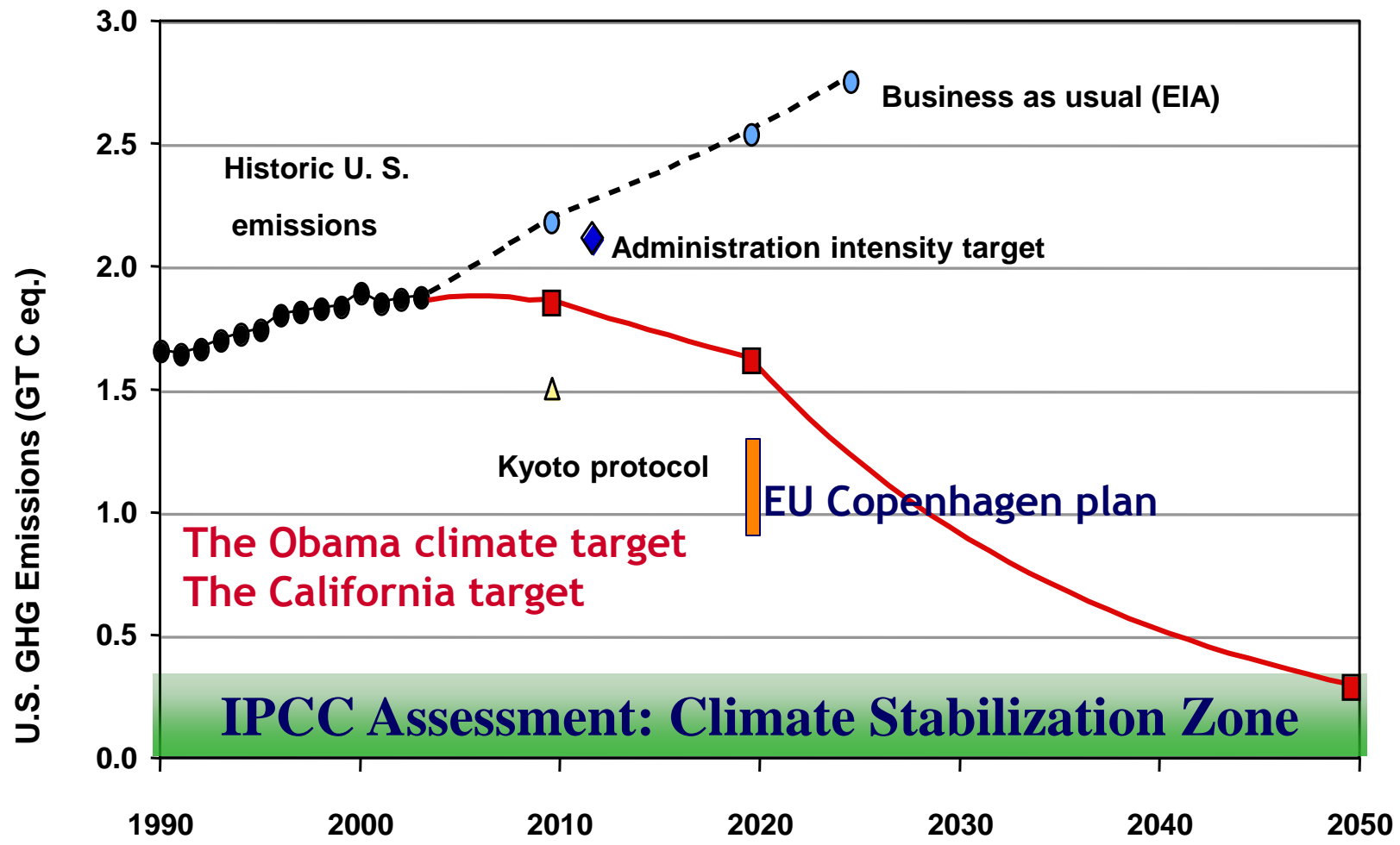


Green job creation: Obama 25% by 2025 Plan

Federal + state RPS yields
+348,000 jobs in 2025

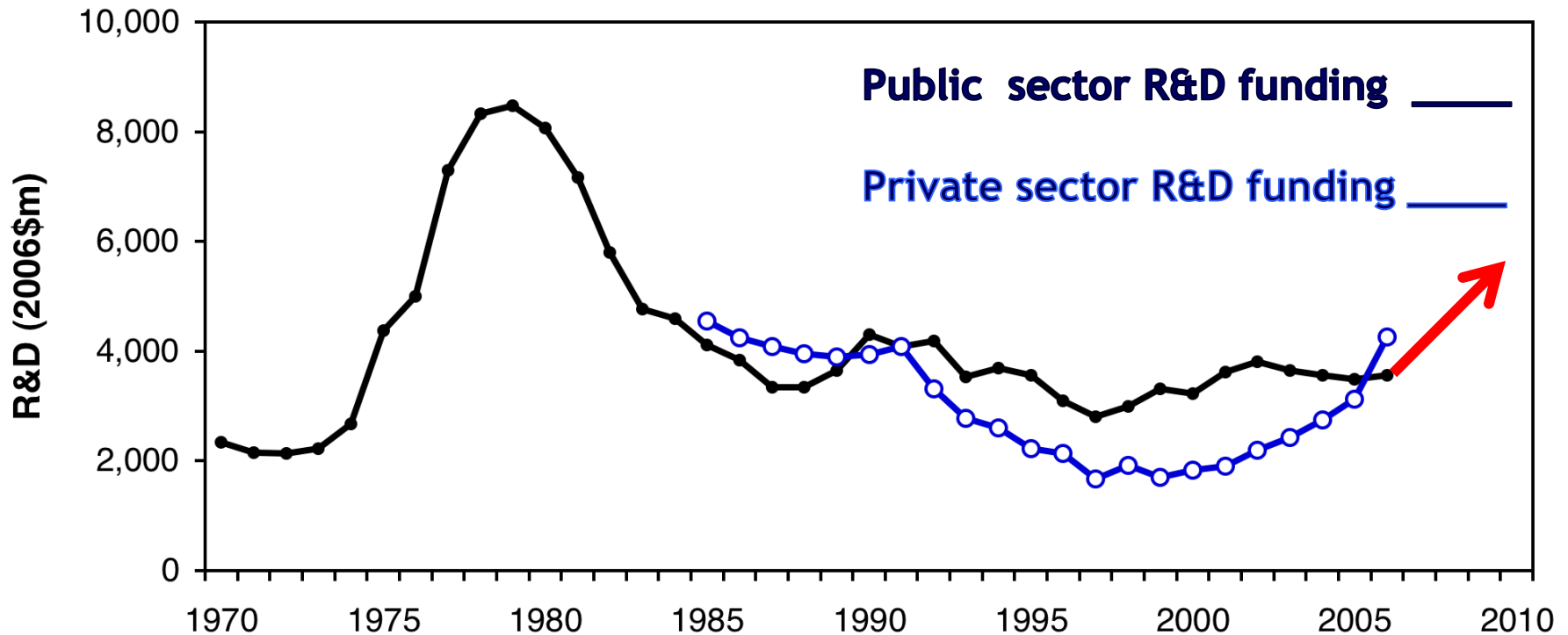


The Cascade of Commitment: IPCC Science, CA and US targets



Kammen, "September 27, 2006 – A day to remember", *San Francisco Chronicle*, September 27,

United States' Public and Private Sector Energy Research and Development Spending

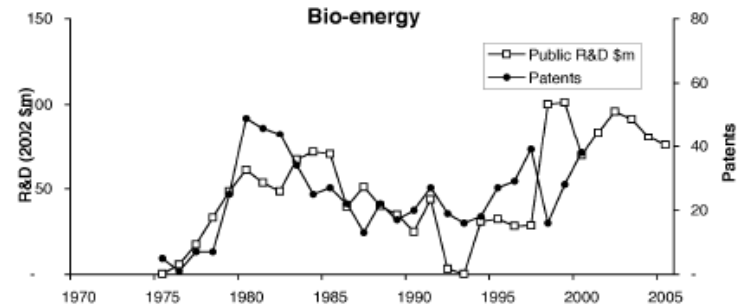
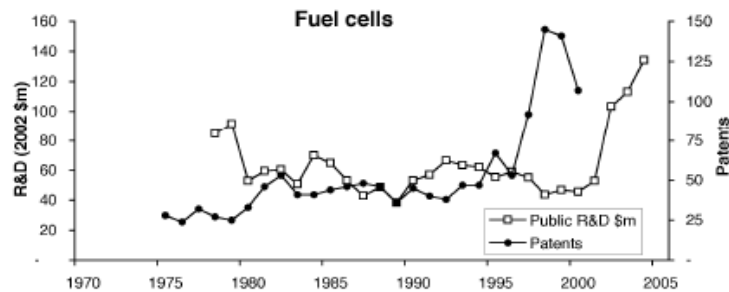
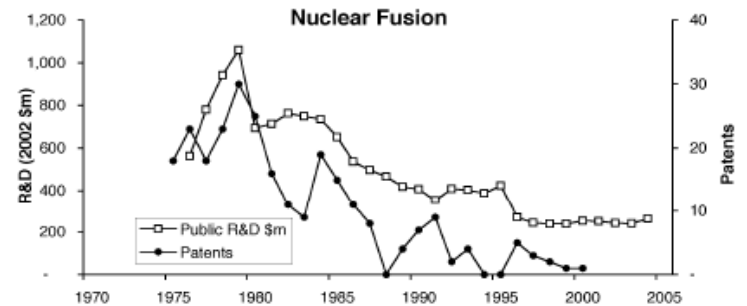
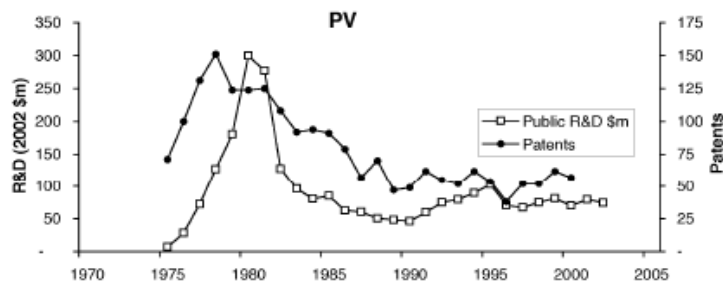
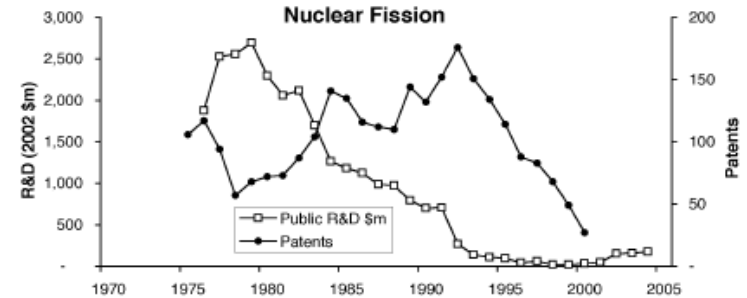
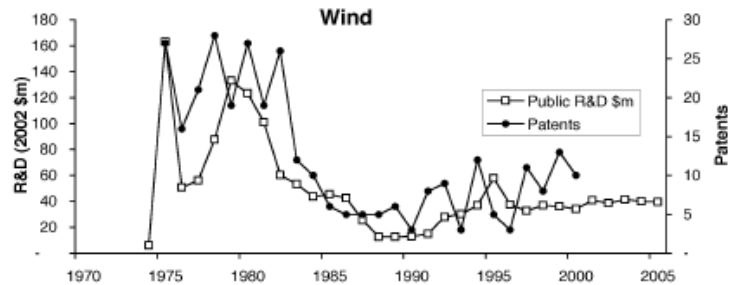


**The Obama
commitment to
innovation and
our future**

Kammen and Nemet (2007), *Energy Policy*

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Patents and R&D Funding Strongly Correlated

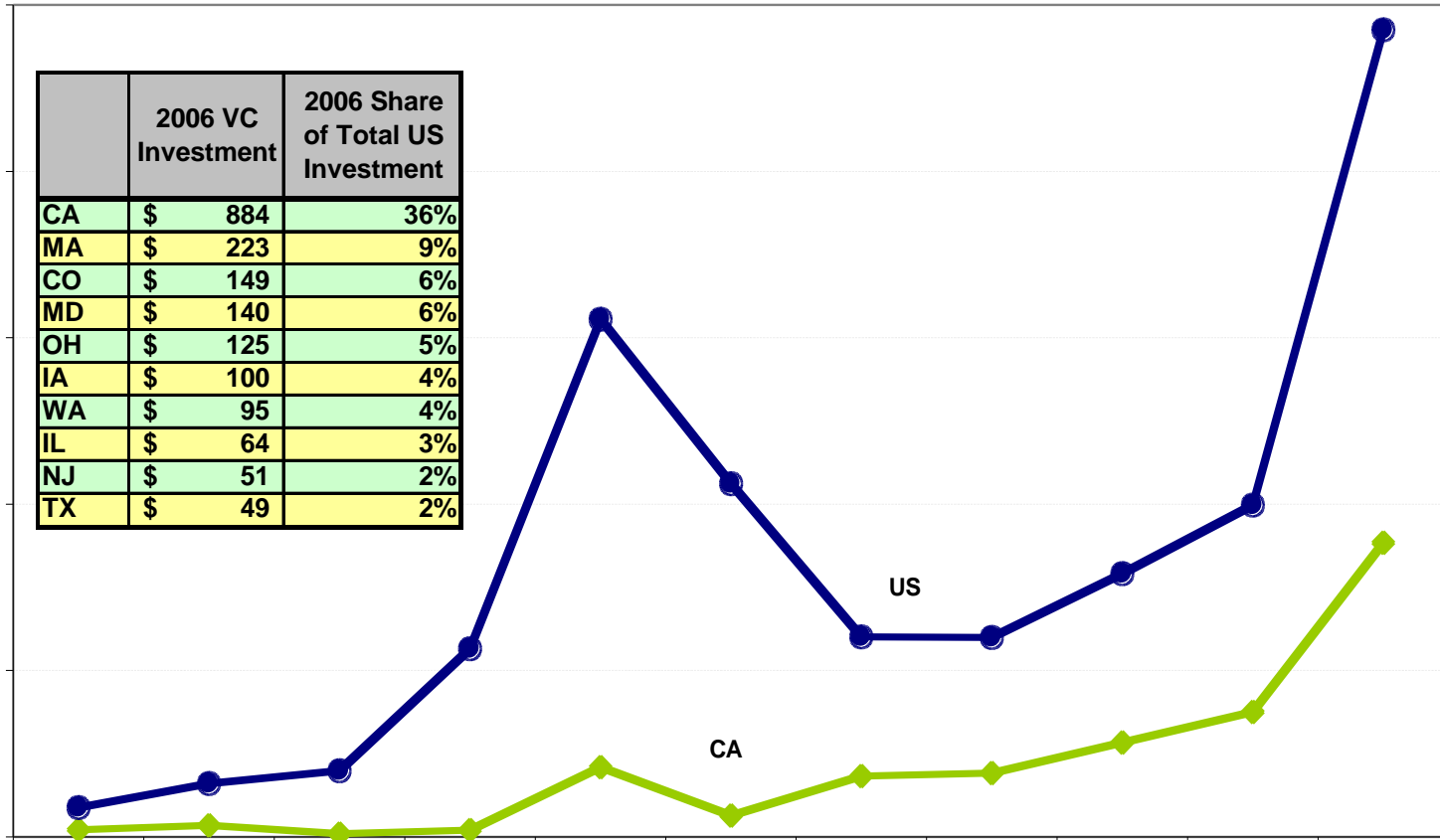


Kammen and Nemet (2005)

“Reversing the incredible shrinking energy R&D budget,” *Issues in Science & Technology*, Fall, 84 - 88.

And Nemet, dissertation, 2007

VENTURE CAPITAL INVESTMENT IN ENERGY TECHNOLOGY



Energy Efficiency Strategies

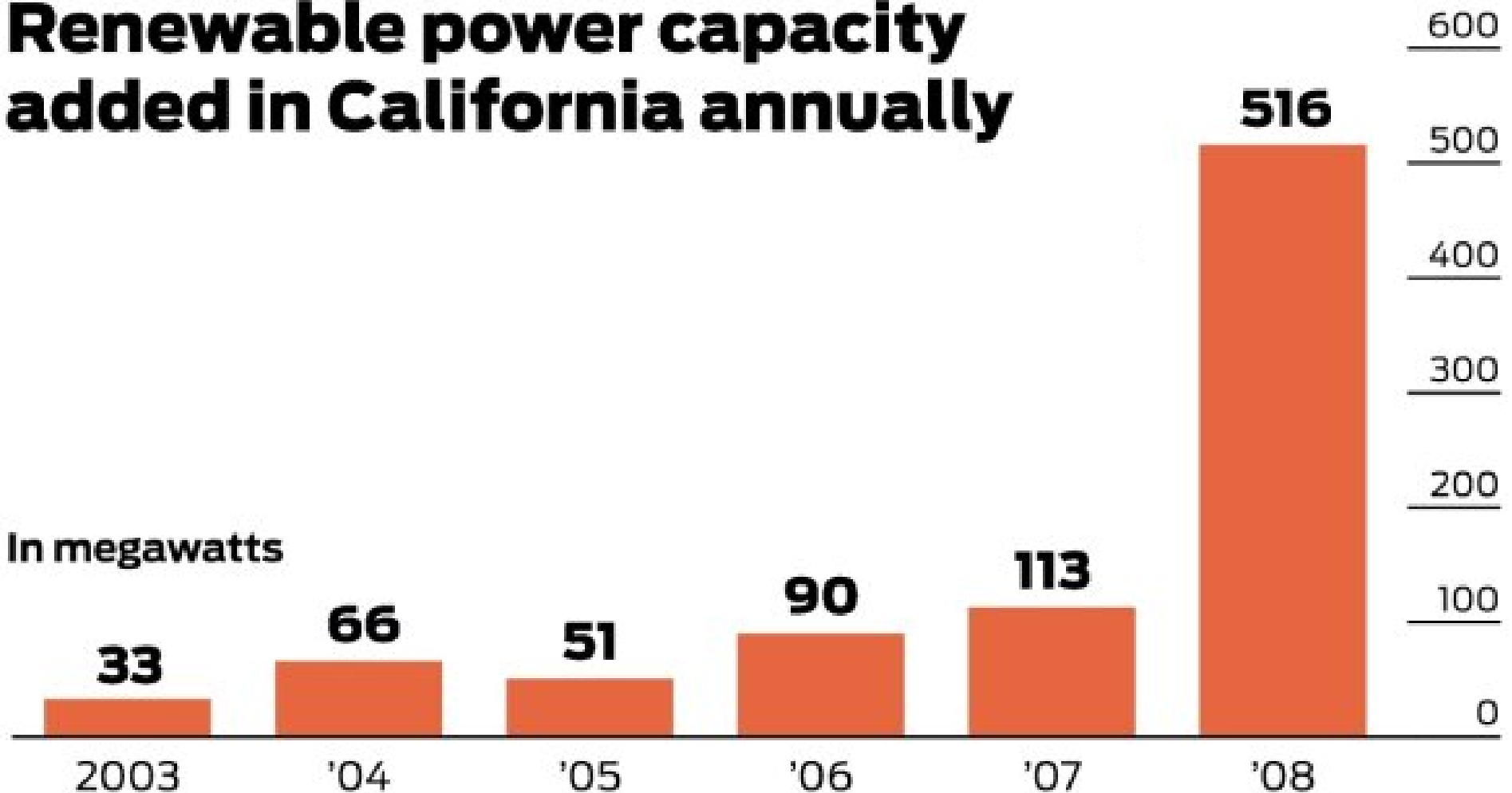


Residential New Construction

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



Renewable power capacity added in California annually



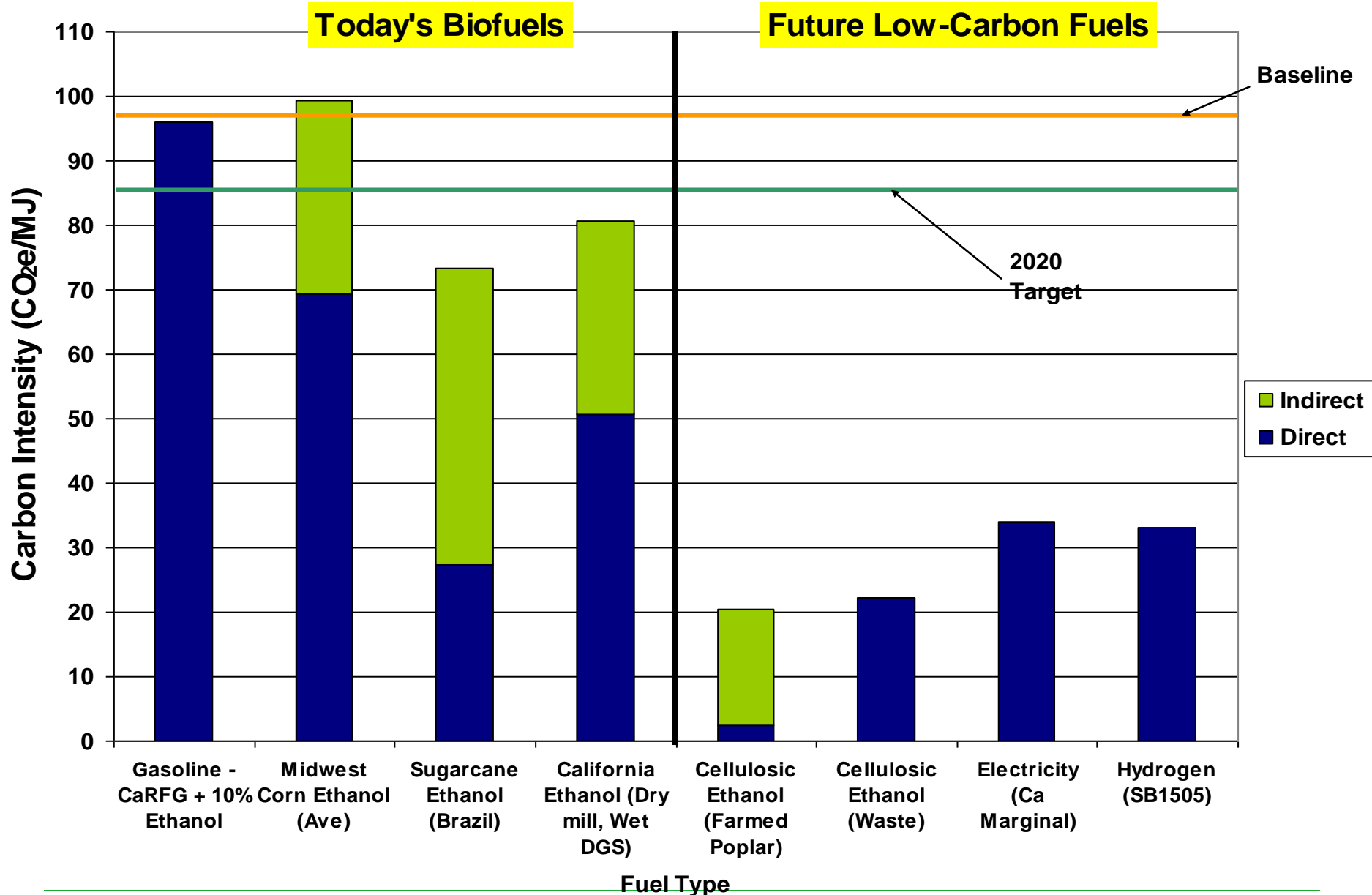
Source: California Public Utilities Commission

The Chronicle

2009: Over 3,000 MW of solar and wind are forecast

2010: Over 20,000 MW of solar and wind are now scheduled for California

Carbon Intensity of Fuels



Clean Energy Municipal Financing

(PACE: Property Assessed Clean Energy)

see Fuller, Portis and Kammen (2009) *Environment*, 51 (1), 22 - 32,
and <http://rael.berkeley.edu/berkeleyfirst>



\$\$ Upfront



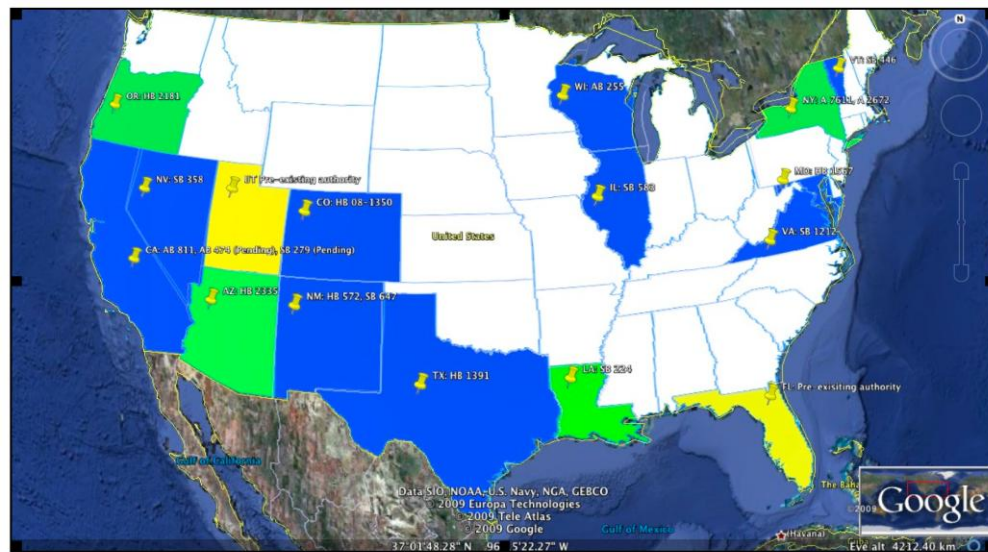
\$\$ Repaid
on **tax bill**



- Creates financing district & approval process
- Provides upfront capital
- Attaches repayment obligation to the building

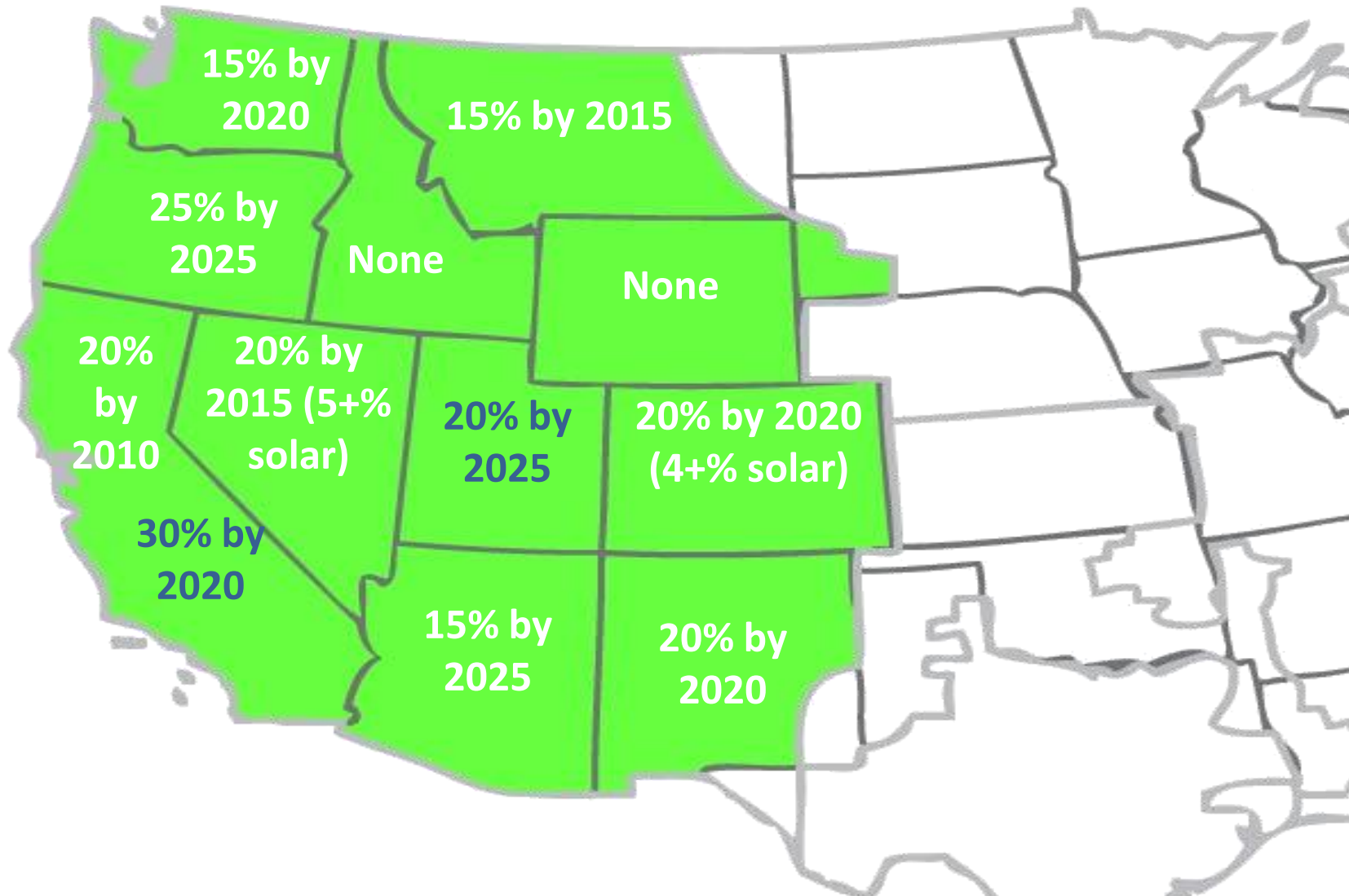
- Identifies work & chooses contractor
- Repays financing as a line item on the property tax bill
- **Repayment obligation transfers with ownership**

Property Assessed Clean Energy (PACE): State Actions

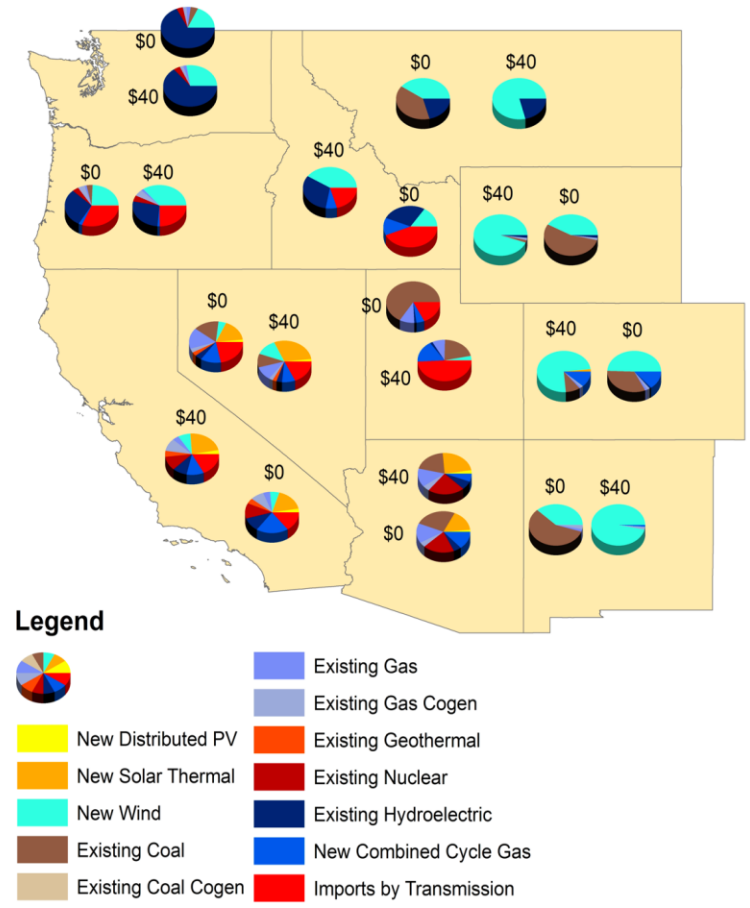


STATE & BILL	STATUS
Federal – National Home Energy Savings Revolving Fund Act – HR 1573 Inslee HR 2212 Bingaman S 949 Waxman Markey HR 2454 Dingell Amendment	In committee – House Energy and Commerce (3/17/09) HR 2212 House Energy and Environment Subcommittee (5/5/09) S 949 Committee on Energy and Natrl Resources (4/30/09)
Arizona – HB 2335	Passed House-In Senate (6/16/09)
California – SB 279 ; AB 811 ; AB 474	SB 279: In committee Passes Senate, in Assembly, Re-referred to com. On L. Gov (5/27/09) AB 811: Signed into law (2008) AB 474: Passed Assembly; in Senate (5/21/09)
Colorado – HB 08-1350	Signed into law (5/08)
Florida existing authority	Pre-existing Authority
Hawaii – existing authority	Existing county legal authority
Illinois- SB 583	Passed both houses 5/19/09
Louisiana – SB 224	Pending House Final Passage (6/15/09)
Maryland – HB 1567	Signed into law (4/09)
Nevada – SB 358	Approved by Governor (5/28/09)
New Mexico – HB 572 SB 647	Signed into law (4/9/09)
New York – A 7611 ; A 2672	A 7611 referred to ways and means as of 6/16/09 A 2672 no action since intro on 1/29/09
Oregon – HB 2181	In committee – Subcommittee on Natural Resources (5/18/09)
Texas - HB 1391	Pending Governor's signature (5/11/09)
Utah	May have pre-existing authority
Vermont – H.161 (subsumed into H. 446)	Passed as part of the VT Renewable Energy & Energy Efficiency Act of 2009 – HB 446 (5/28/09)
Virginia – SB 1212	Signed into law (3/30/09)
Wisconsin AB 255	Enacted 5/15/09












U. S. Renewable Portfolio Standards



2022 Generation & Transmission Shares of Total State Demand
With Carbon Pricing of \$0 and \$40/ton CO2 Initiated in 2014



Legend

-  Existing Gas
-  Existing Gas Cogen
-  New Distributed PV
-  Existing Geothermal
-  New Wind
-  Existing Nuclear
-  Existing Coal
-  Existing Hydroelectric
-  Existing Coal Cogen
-  New Combined Cycle Gas
-  Imports by Transmission

