

Lessons from the U.S. Low-Carbon Energy Supply Policy Experience and Their Impact on Proposed Legislation



Open Seminar on Low-Carbon Energy Supply Policies for APEC

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Strategic Energy Analysis

March 10, 2010

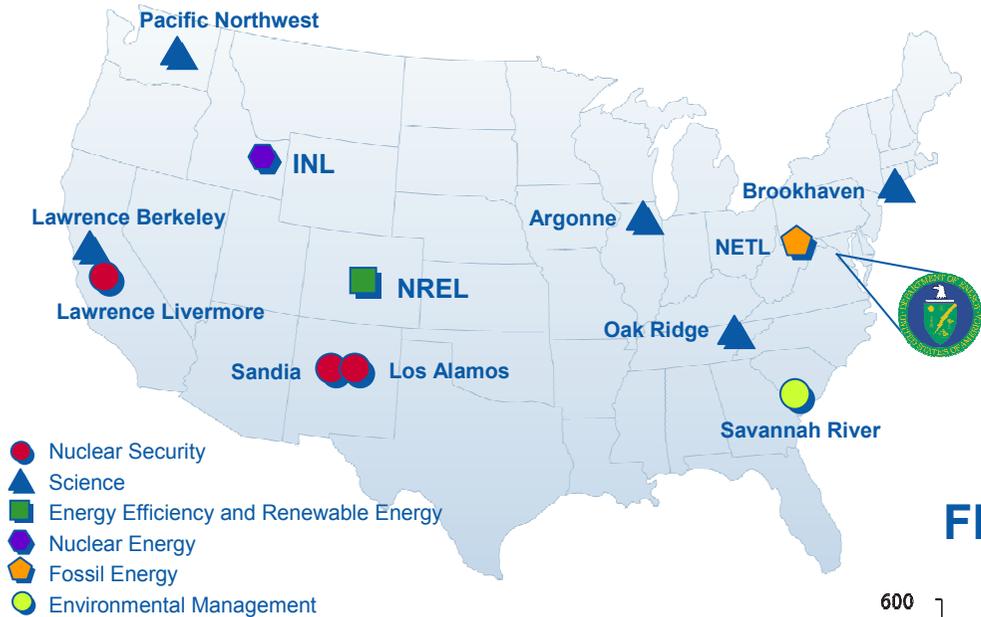
Agenda

- Overview of U.S. Energy Supply and Policy
- U.S. Government Roles and Policy Trends – Federal and State
- Policy Response to the Economic Crisis, and Next Steps

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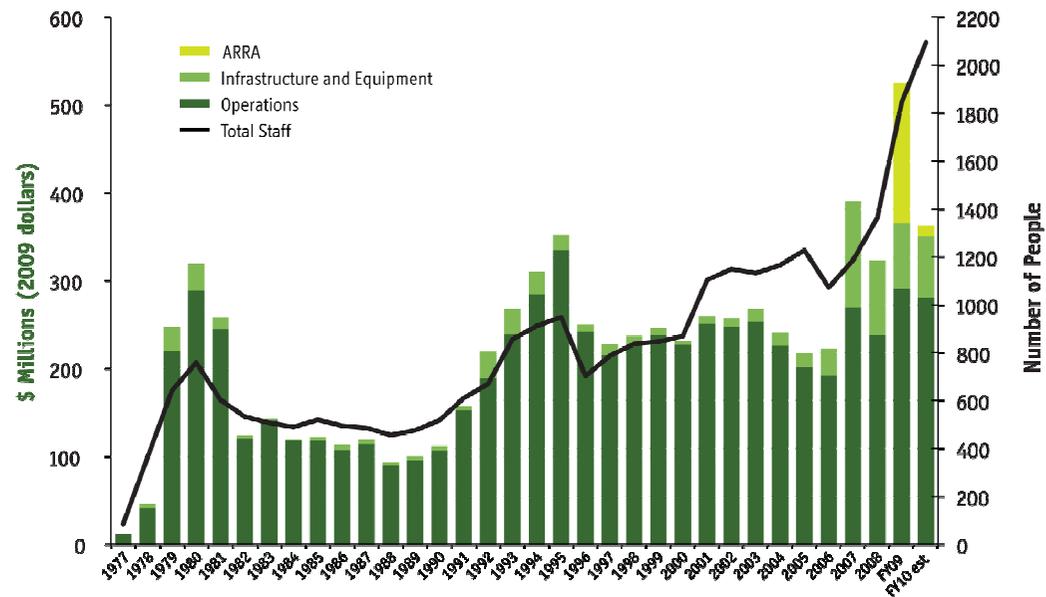
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About the National Renewable Energy Laboratory...



- Government Owned, Contractor Operated
- Two primary RD&D sites in Colorado
- ~1800 full-time staff

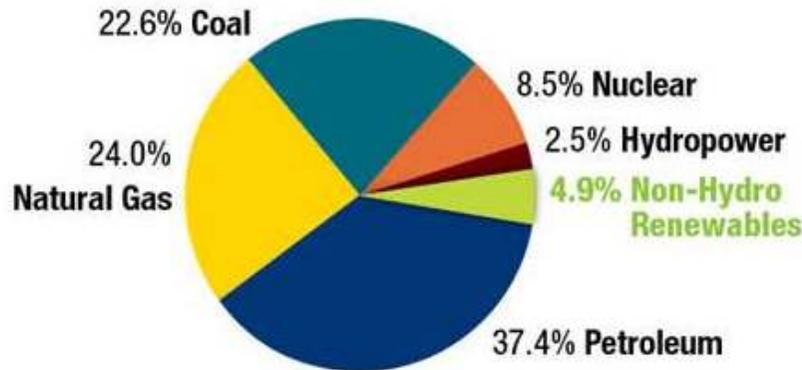
Fluctuations in Funding and Staffing



Updated October 2009

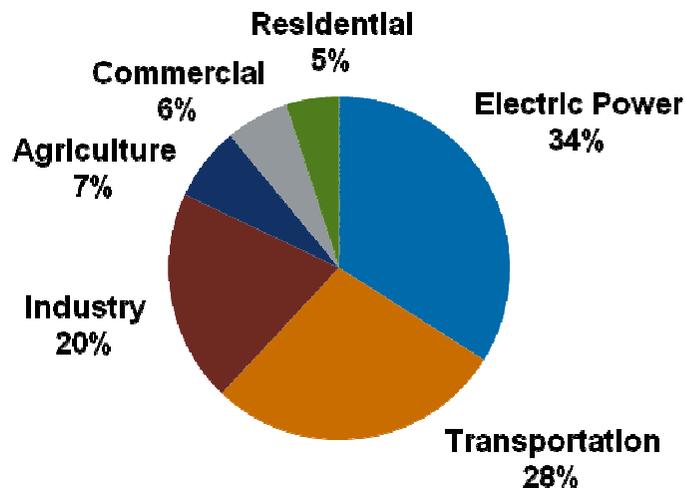
U.S. primary energy consumption and GHG emissions

U.S. Energy Consumption (2008): 99.3 Quadrillion Btu



- Nearly 60% of petroleum is imported
- Coal supplies 50% of electric power
- Nuclear, hydro stagnant since 1980s
- Renewable technologies growing rapidly from a small base

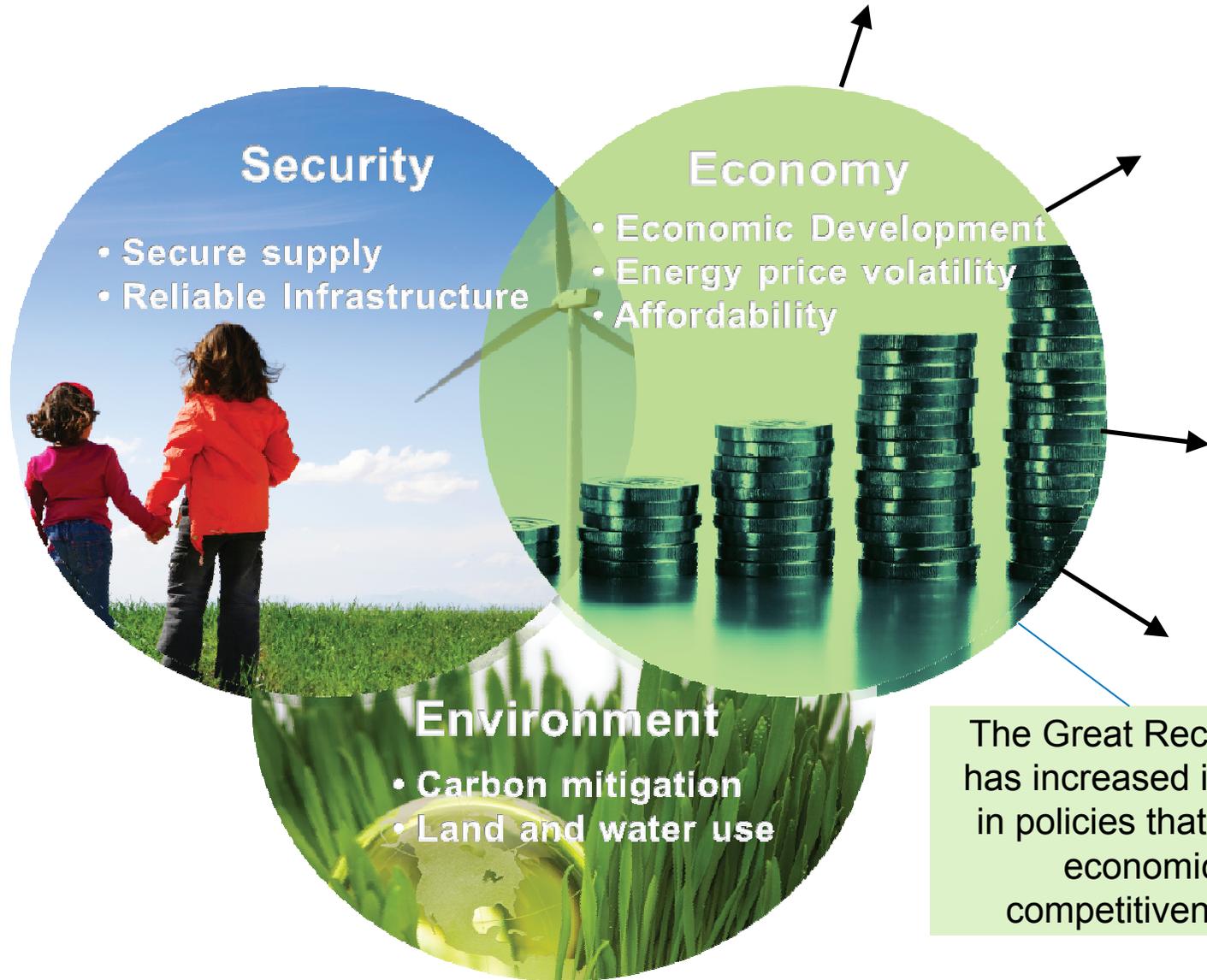
U.S. GHG Emissions by Sector (2007)



- U.S. is world's 2nd largest GHG producer
- Aging infrastructure
- Buildings account for 35-40% of all GHG emissions

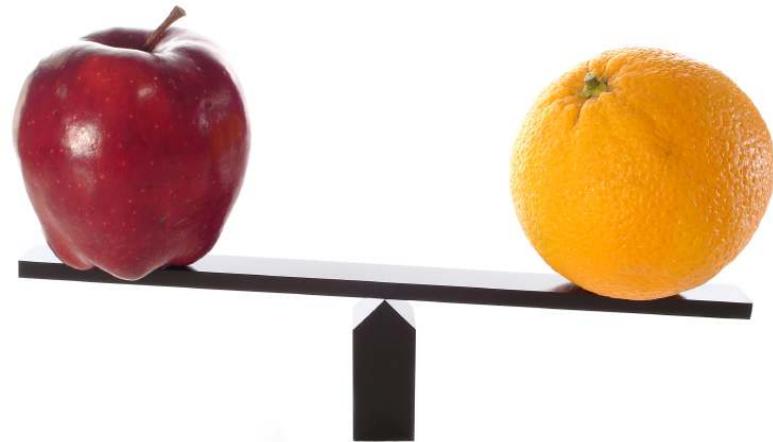
Sources: 2008 Renewable Energy Databook. DOE. 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007. EPA. April 2009. Pg. 2-18. And U.S. Green Building Council.

Momentum of the “Three Es” defines policy opportunities



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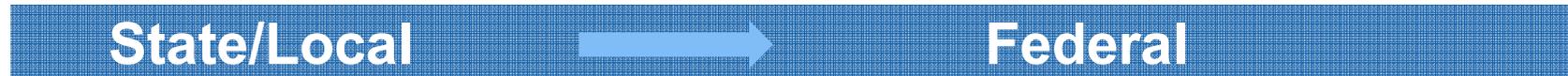
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U.S. government structure and implications

	Local (generally)	State	Federal
Legislation	Proposal	Bill	Bill
Who drafts policy?	City Commissioners/ City Attorney	State Legislature	Congress
Who approves?	City Council – Mayor	Governor + Legislature	President + Congress
Who spends?	Local	State and Local	Mostly federal

Strengths and challenges: different levels of policy



Segmented action

Range of policies across 50 states

Cohesive national policy

Broader impacts can drive markets

Policy innovation

New opportunities when federal role is absent

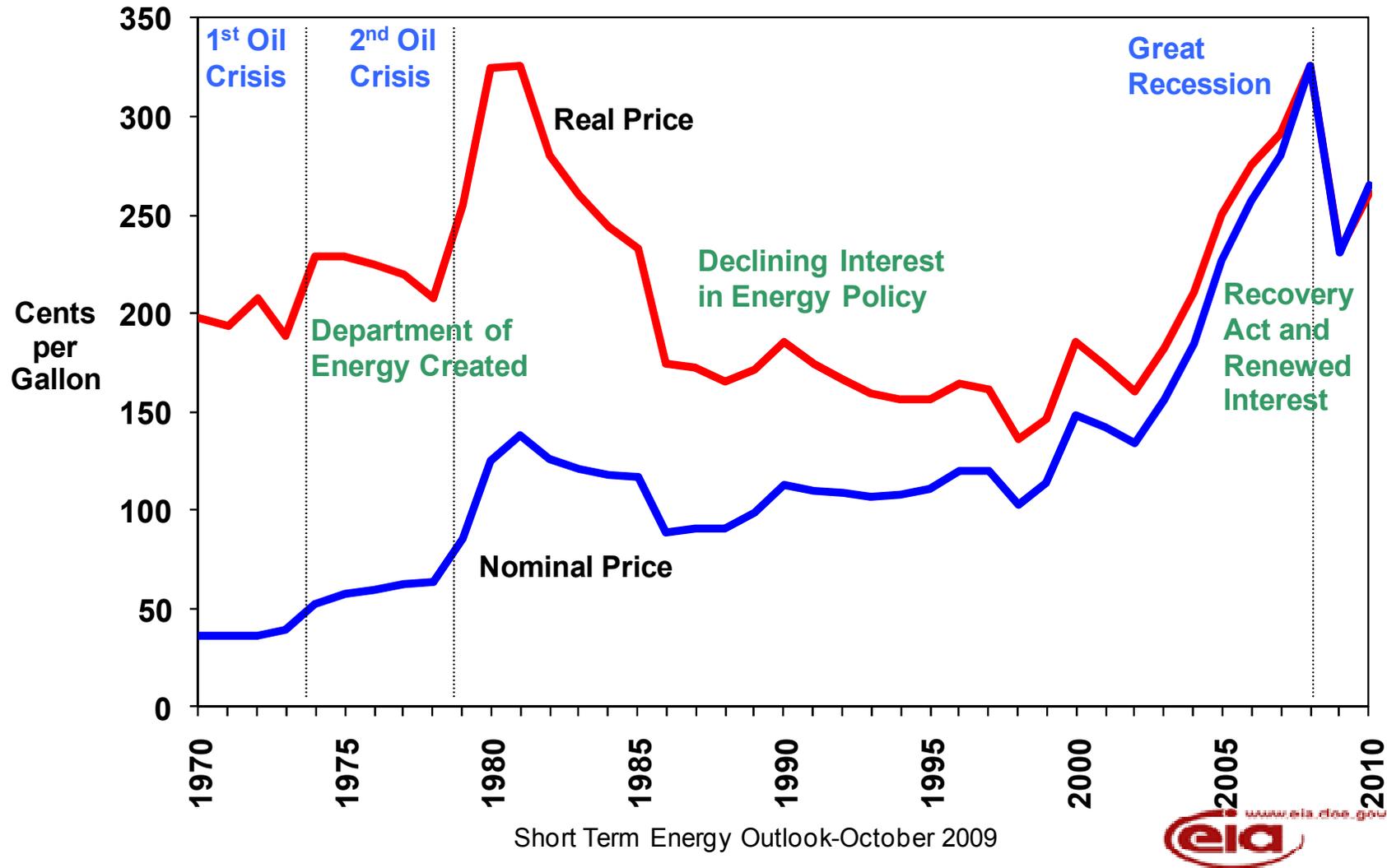
Opportunities for scale-up

Leveraging policy experimentation

- Federal policy must override or supplement existing policy
- **Slower federal action** on major policy; political climate is *very polarized*

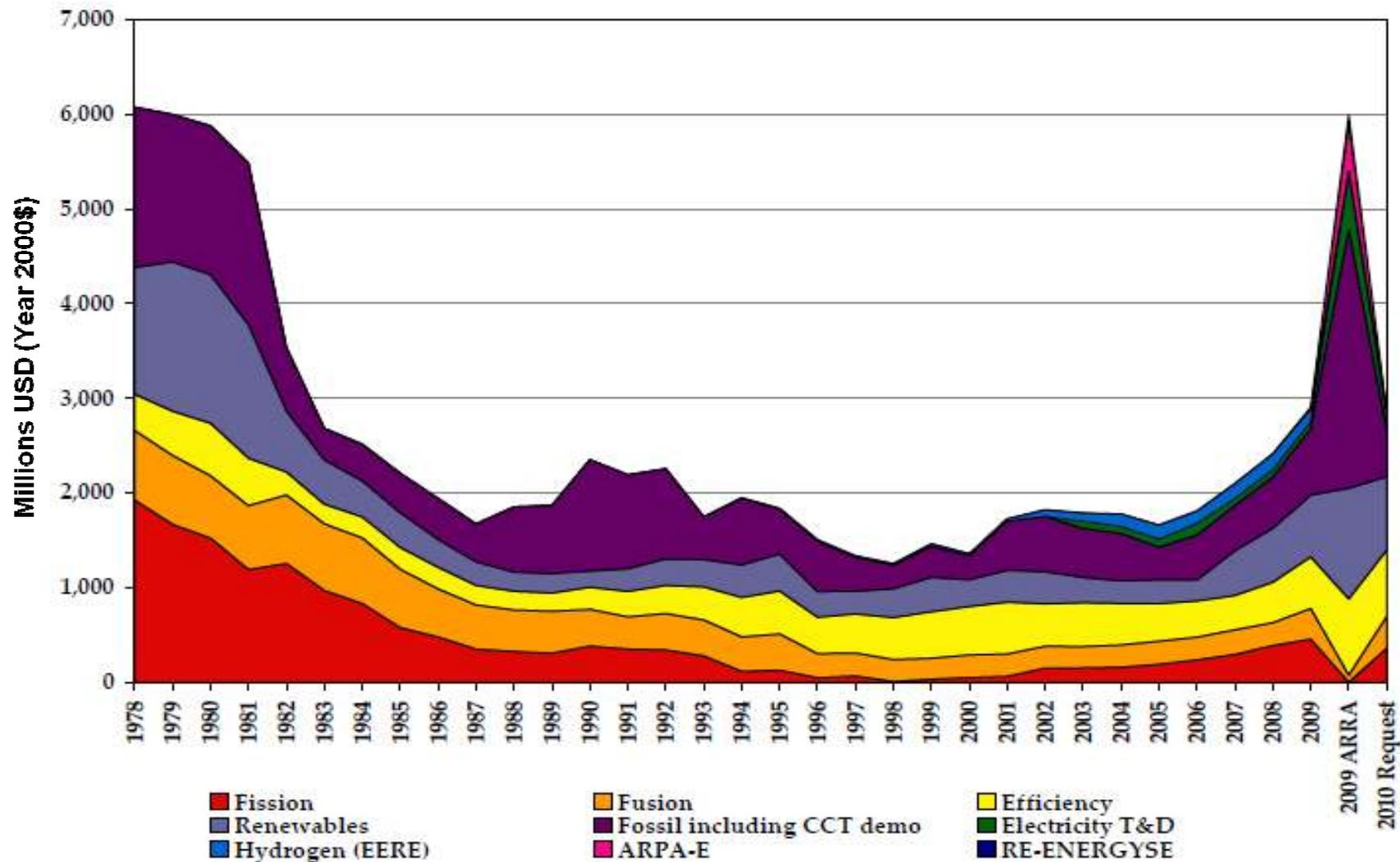
U.S. federal energy policy is strongly tied to oil prices

U.S. Average Annual Gasoline Prices, 1970- 2010



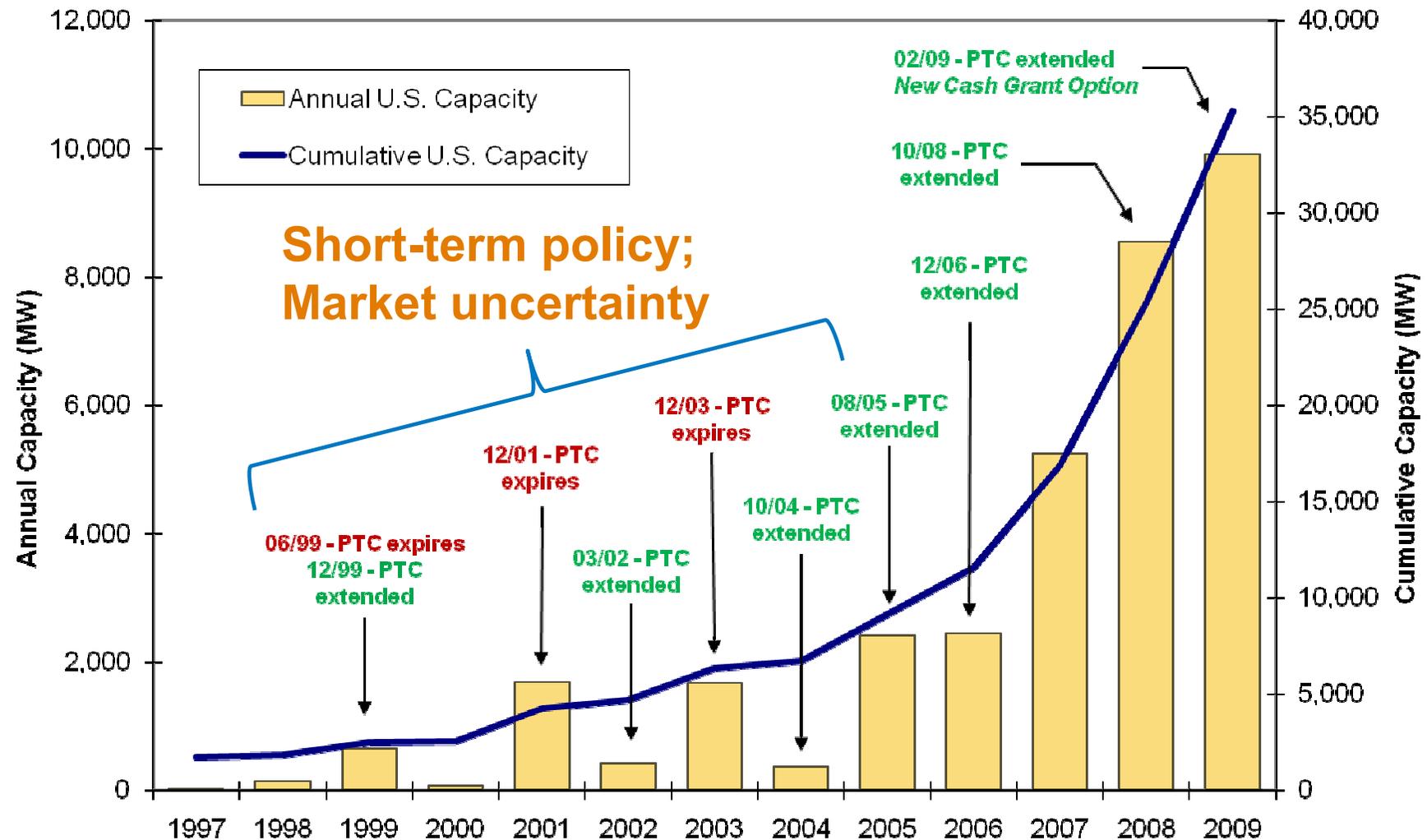
Short Term Energy Outlook-October 2009

U.S. Department of Energy (DOE) budget for research, development, and demonstration



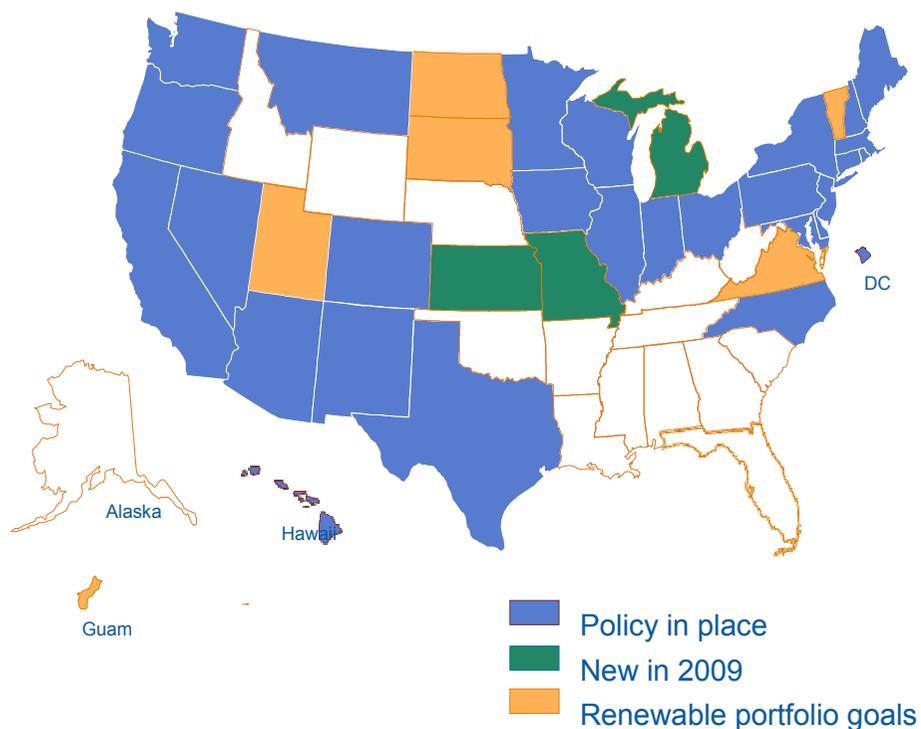
Source: Gallagher, K.S. "DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Policy, John F. Kennedy School of Government, Harvard University, June 2009.

A federal production tax credit (PTC) incentivizes wind power installations



Source: Data from AWEA 2010. For more information, see P. Schwabe, T. James, K. Cory, "U.S. Renewable Energy Project Financing: Impacts of the Global Financial Crisis and Federal Policy." International Sustainable Energy Review. Pgs. 16-19. Issue 3. 2009.

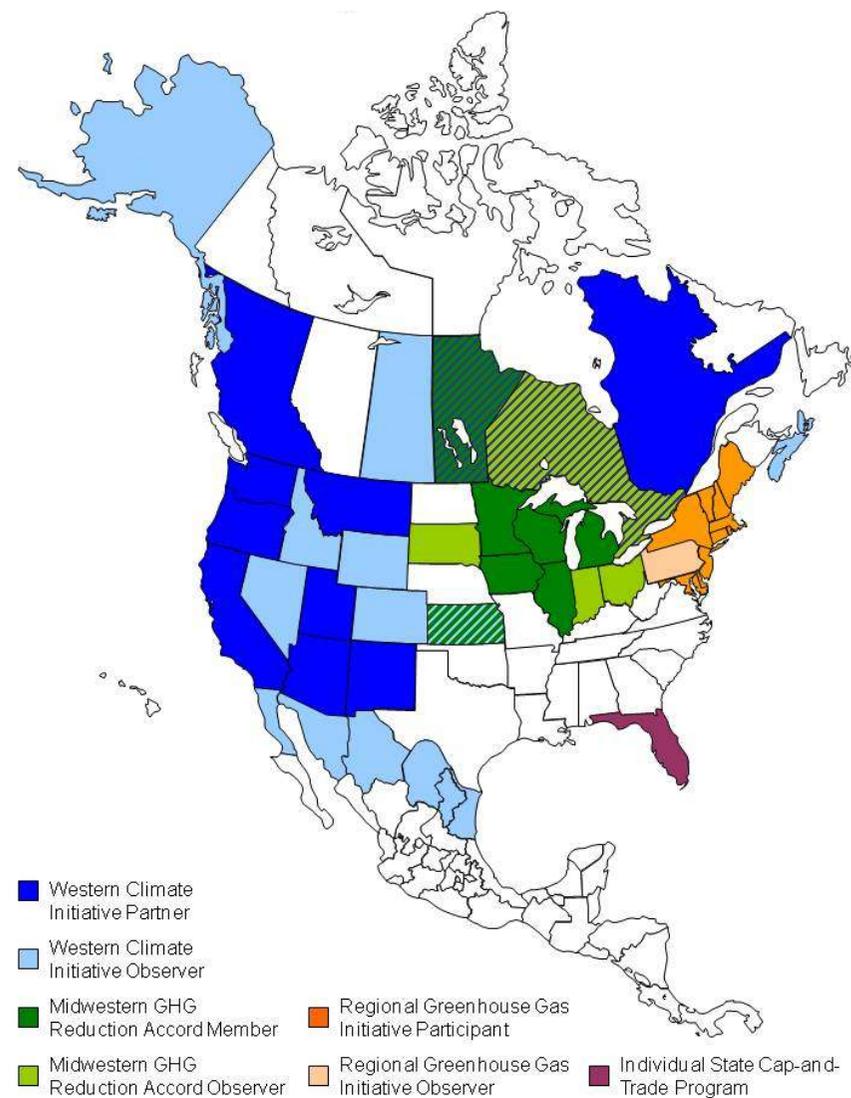
State Renewable Portfolio Standards – Increasing Participation



Source: NREL, July 2009

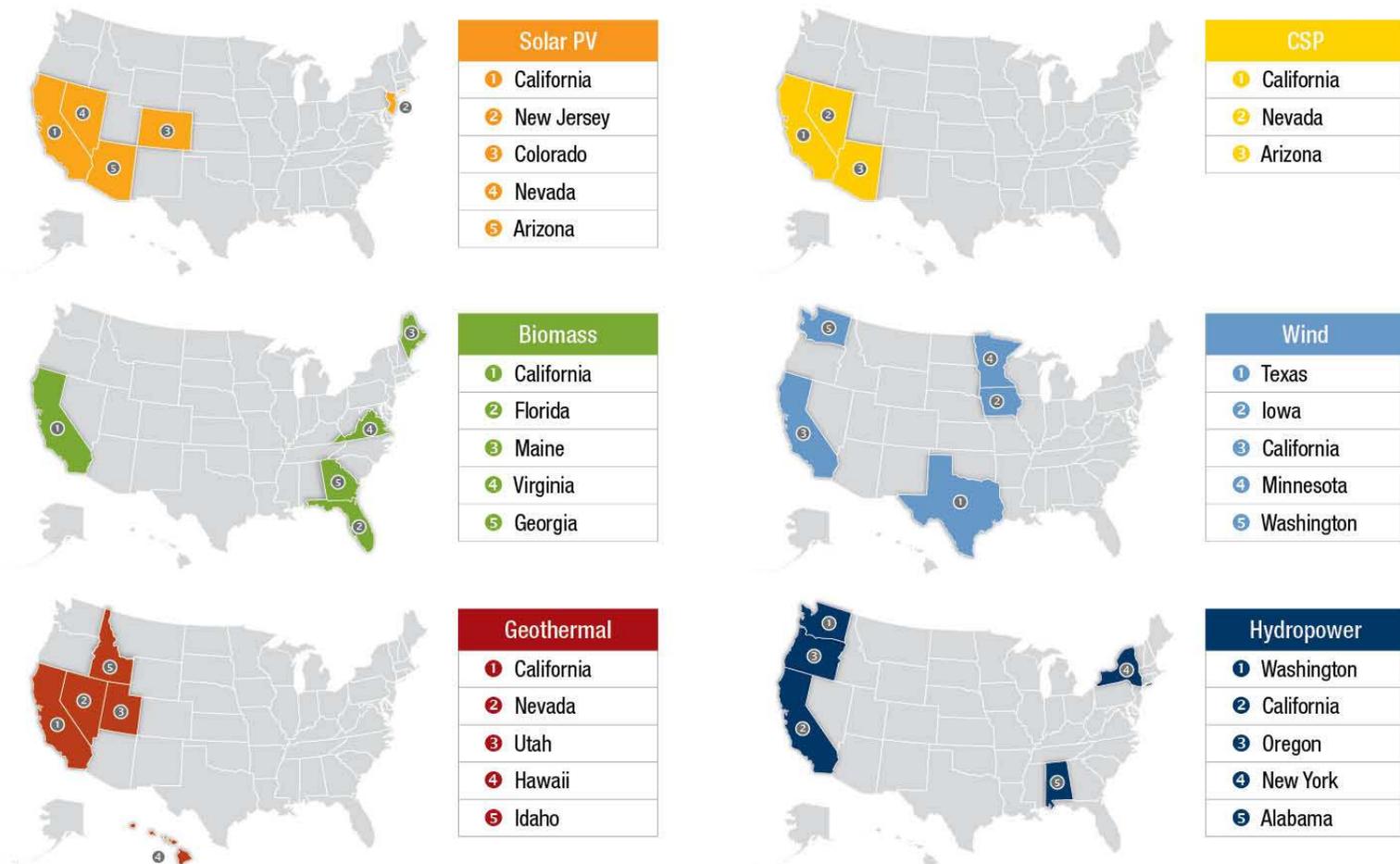
- 29 States (and Washington, D.C.)
- Additional 6 states have set goals

North American Cap-and-Trade Initiatives



Source: Pew Center on Climate Change

Policy, as well as *contextual factors*, affect deployment – Top states for renewable electricity installed nameplate



Sources: EIA, Navigant, AWEA, GEA, NREL, EERE, Larry Sherwood/IREC

EERE 2008 Renewable Energy Data Book

Renewable Electricity in the U.S. | July 2009

p.33

Factors affecting renewable energy markets

Common State Policies

- Renewable Portfolio Standards
- Tax Incentives
- Public Benefit Funds
- Required Generation Disclosure
- Required Green Power Programs
- Contractor Licensing
- Equipment certification
- Interconnection standards
- Line extension analysis
- Rebates

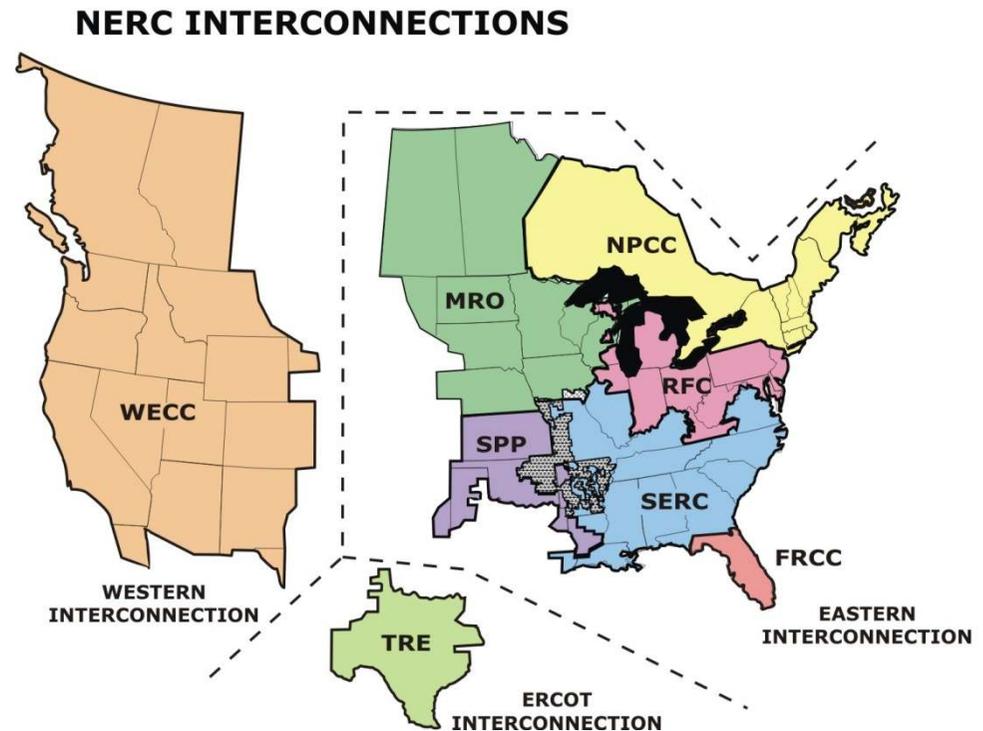
Contextual Factors



E. Doris, J. McLaren, V. Healey, and S. Hockett. "State of the States 2009: Renewable Energy Development and the Role of Policy." NREL Technical Report. October 2009. <http://www.nrel.gov/docs/fy10osti/46667.pdf>

Policy options to advance electrical infrastructure are bound by a balkanized system

- **No national grid**
 - Three main power grids
 - Patchwork of legacy designs
- **Jurisdictional conflicts**
 - State siting authority cannot be overruled by federal regulations
 - **Other Institutional challenges**
 - Structure of utilities and regulation
 - 10 regional transmission organizations
- **Accommodating Variable generation technologies**
- **Storage**
- **“Smart Grid”**



North American Electric Reliability Corporation. Interconnections Map.
http://www.nerc.com/fileUploads/File/AboutNERC/maps/NERC_Interconnections_color.jpg

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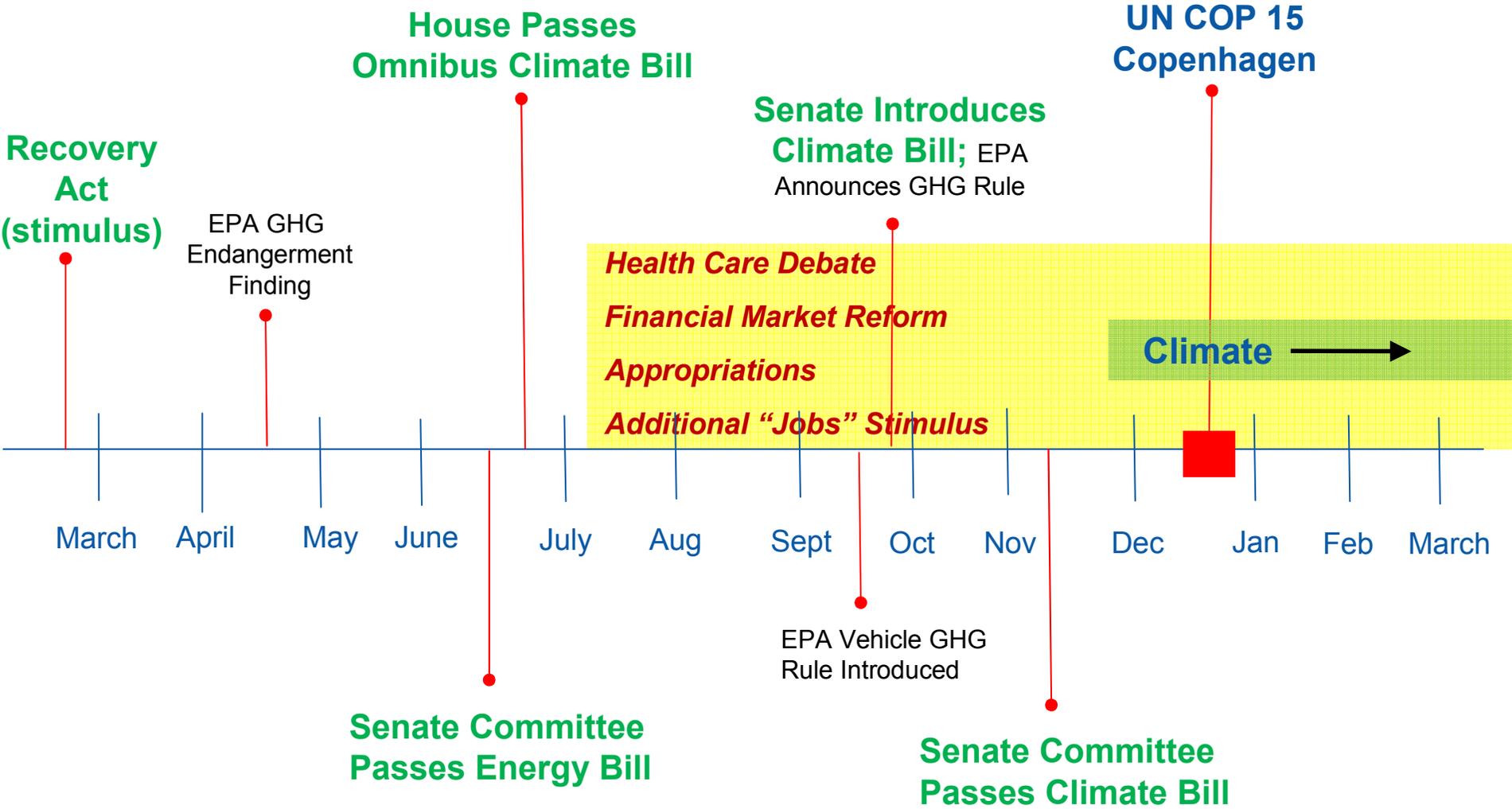
The Great Recession and two federal stimulus packages have reshaped the energy policy landscape

- ***Fuel Switching***
 - Supply-side changes in natural gas
 - Reduced energy demand
- ***Efficiency***
 - Stimulus focus on weatherization (\$5 bn)
- ***Renewables***
 - Multi-year tax credit extensions
 - Cash grants in lieu of tax credits (over \$2.5 bn issued)
 - Manufacturing tax credit (\$2.3 bn)
 - Loan guarantee program (\$6 bn program)
- ***Electric Grid***
 - “Smart grid” grants (\$4 bn)
- ***Coal and Carbon Capture and Storage (CCS)***
 - Support for demonstration projects
- ***Nuclear***
 - Loan guarantees (>\$8 bn announced)



www.recovery.gov

Congressional progress toward climate legislation



Lessons from the U.S. energy policy experience and impacts on new legislation...

- The economic crisis resulted in a stronger federal role, though a draw-back is likely as the economy improves.
- The lack of national consensus on climate policy will create more opportunities for state leadership.
- A national debate will continue over the role that low-carbon technologies have on U.S. economic competitiveness.
- Several federal renewable electricity standards (RES) have been proposed. One version, a “clean electricity standard,” includes nuclear and carbon capture storage (CCS) technologies. These proposals reflect the current state of politics.



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