

US Department of Energy
***U.S. Clean Technology
Development***



**Presented by Hon. Alexander “Andy” Karsner
United States Assistant Secretary of Energy**

**UN Climate Change Conference 2007
Bali, Indonesia
December 3 - 14**



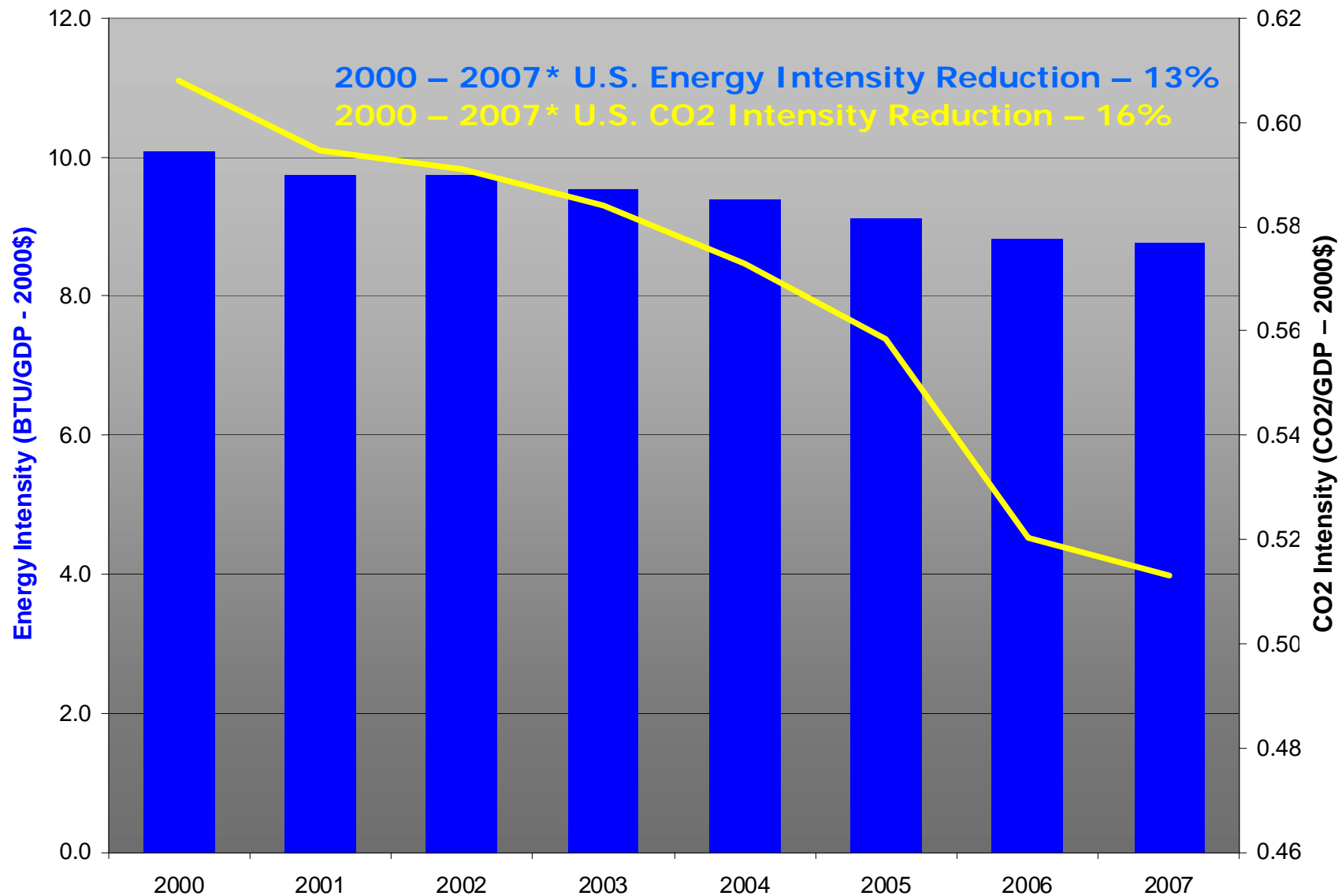


Office of Energy Efficiency and Renewable Energy

We manage America's investment in the research, development and deployment of DOE's diverse energy efficiency and renewable energy applied science portfolio.

Our mission is to develop renewable energy sources and conversion technologies, as well as efficiency best practices, regulations and technologies that collectively strengthen our economy, environment and national security.

U.S. Energy and CO2 Intensity



*All 2007 numbers are projections.



Our applied science and clean energy technology portfolio is dedicated to accelerating market penetration of America's abundant, secure, affordable and clean renewable energy and energy efficiency technologies.

Power Generation

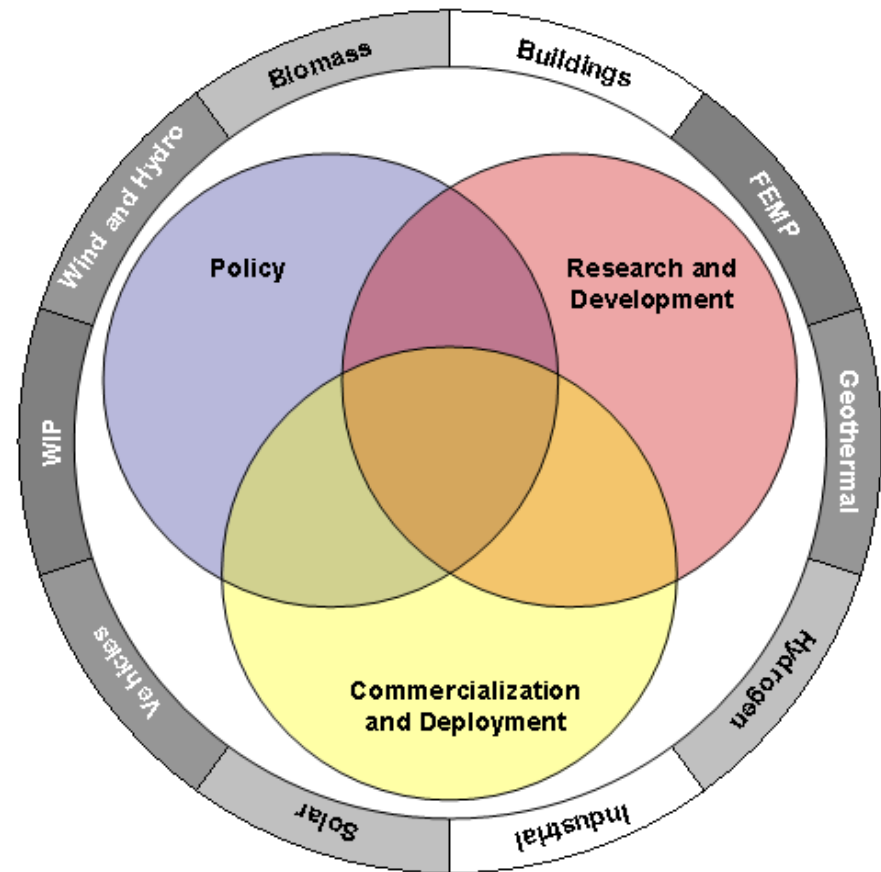
- Solar
- Wind
- Hydropower
- Geothermal

Fuels & Vehicles

- Biomass/Biofuels
- Hydrogen
- Vehicle Technologies
 - o Batteries

Energy Efficiency

- Buildings Technologies
- Industrial Technologies
- Weatherization
- Federal Energy Management



The President's Advanced Energy Initiative aims to change the way we power our homes, business, and automobiles.

Technology Pipeline: Conventional View



Mission: Alter the Pipeline by Accelerating Technology Uptake



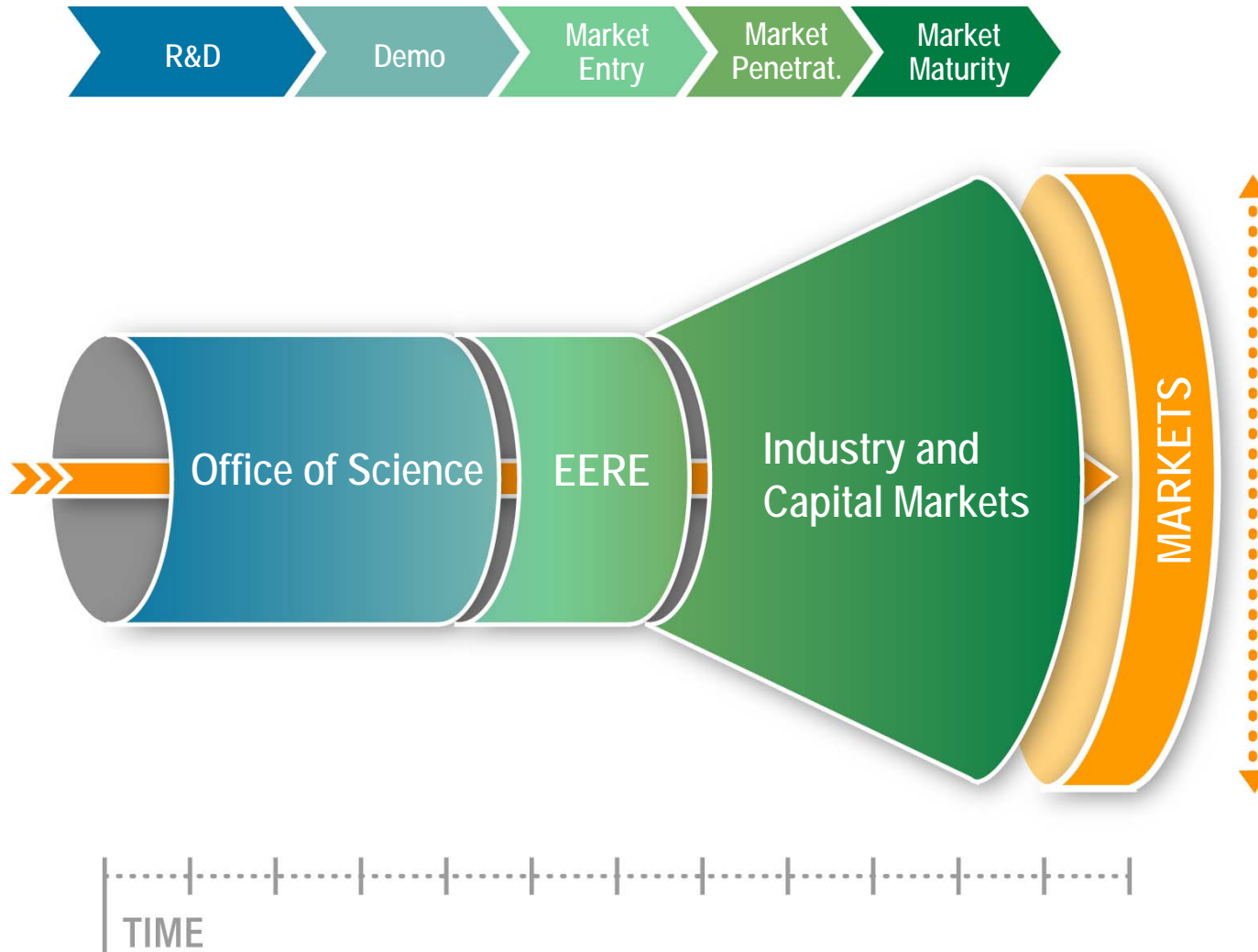
**1. Improve
Technology**

**2. Develop & Implement
Durable Policies**

**3. Facilitate Access
to Capital**



Accelerate and Scale Technologies



Outline



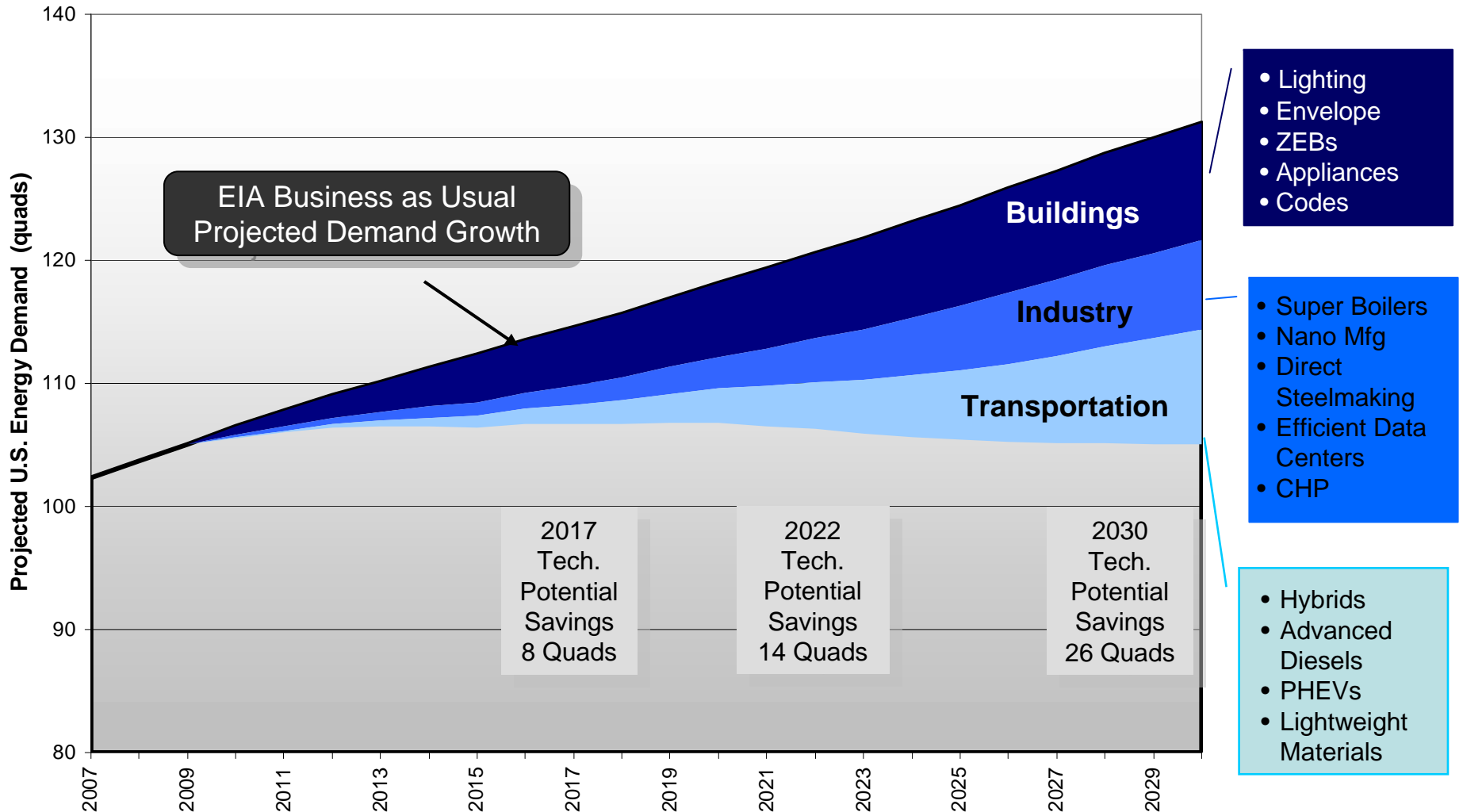
- **Efficiency**
- Transportation
- Gigawatt Scale Renewables
- Commercialization and Deployment
- Partnerships

Prioritization for Energy Efficiency



- **Technology**
 - Continue fundamental and applied R&D for enabling technologies to reduce the energy consumption and transform carbon footprint of the built environment (homes, offices, and manufacturing)
- **Regulation, Codes, Standards**
 - Accelerate, modernize and elevate appliance standards with greater consensus rulemakings
 - Promote superior model building codes with executable plan of coordinated implementation by the States
 - Provide utilities with returns on energy efficiency comparable or superior to investments in generation; provide industry with pathway for best practices
- **Voluntary and Market based Deployment**
 - Establishment of the National Action Plan for Energy Efficiency
 - Expand and Modernize Energy Star program concurrent w technology
 - Expand advocacy for energy efficient lighting (e.g., CFLs, LEDs)
 - Target civic infrastructure (e.g., Energy Smart schools, hospitals, libraries, municipal facilities) to be energy efficient, secure sites for distributed generation
- **Education and Outreach**
 - Multi-generational Education, targeted population, superior communications and behavioral modification

Energy Efficiency Has the Technical Potential to Level Energy Demand Growth

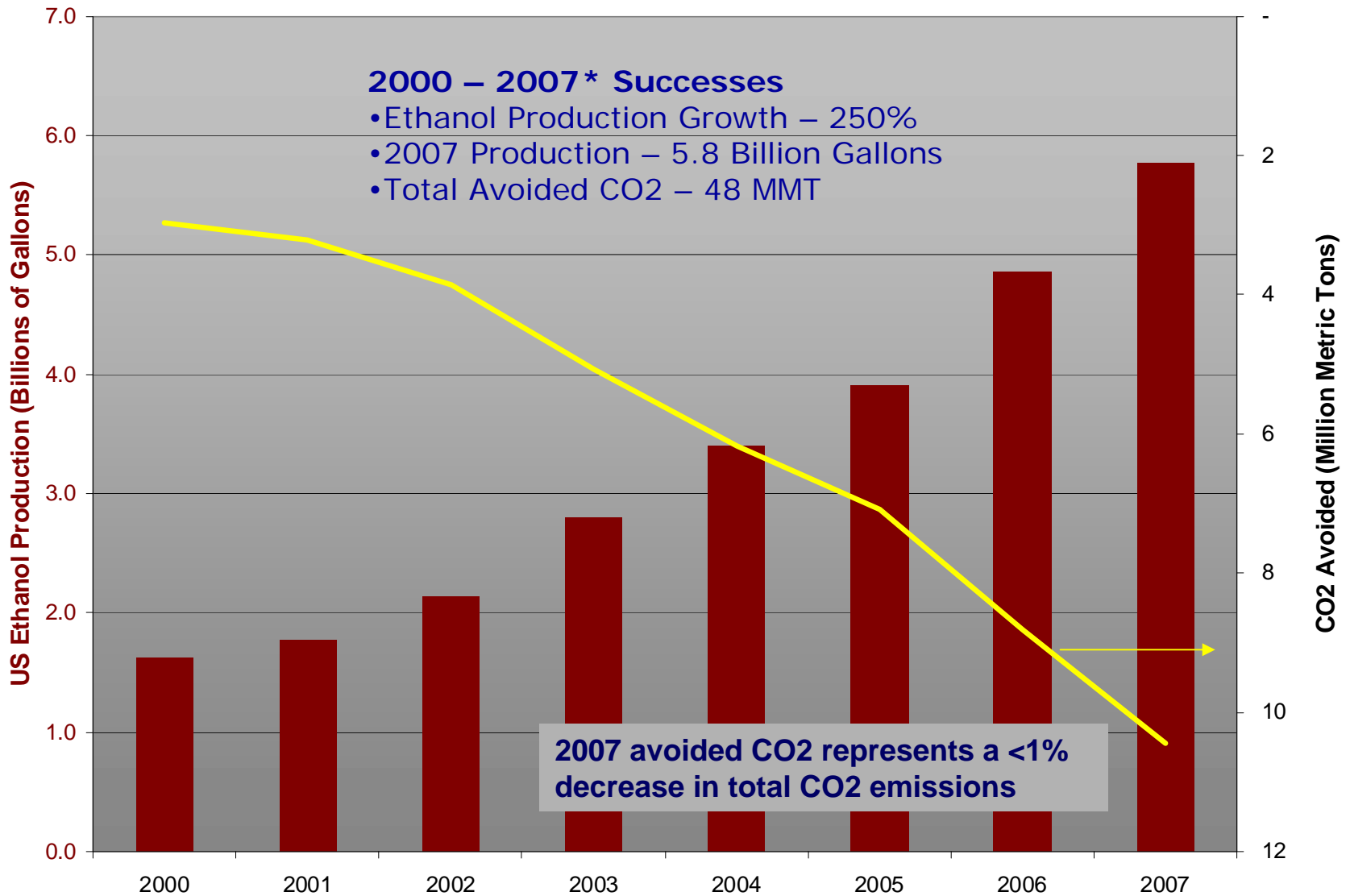


Outline



- Efficiency
- **Transportation**
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U.S. Ethanol Production and Avoided CO2

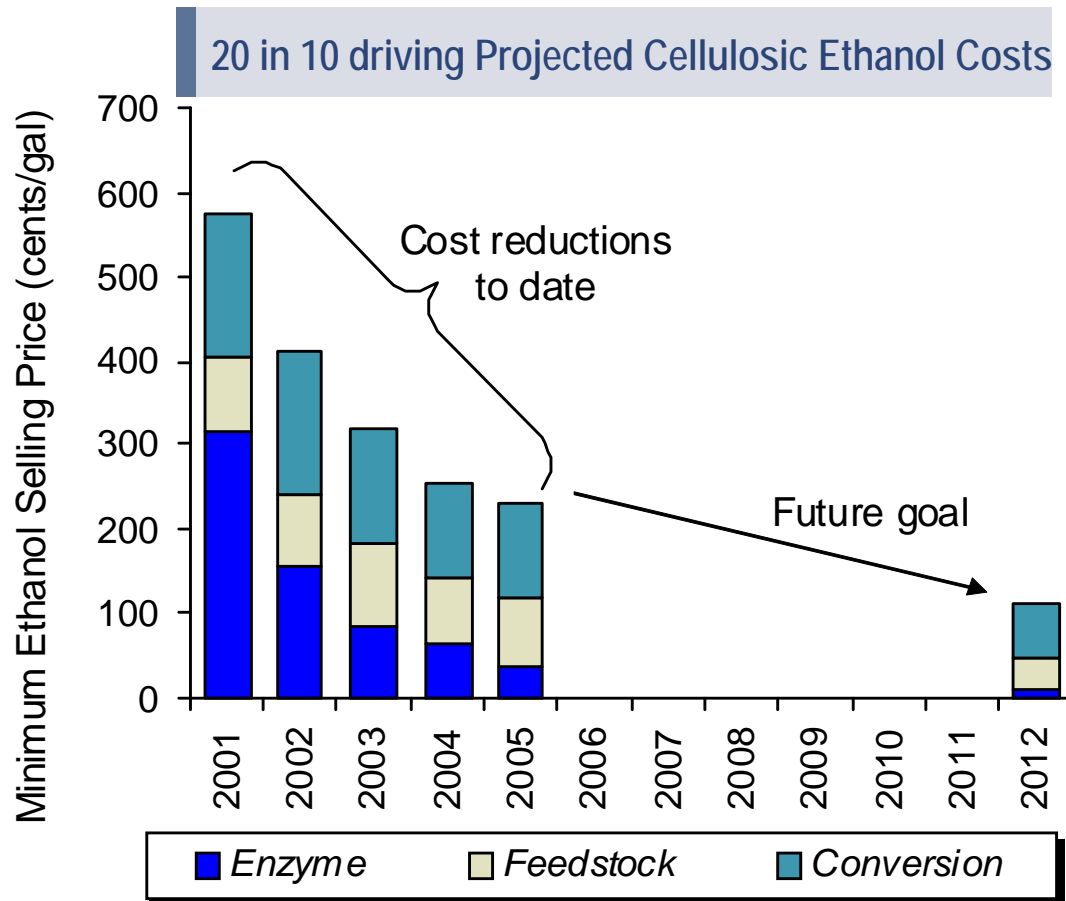


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Biofuels Technical and Economic Potential

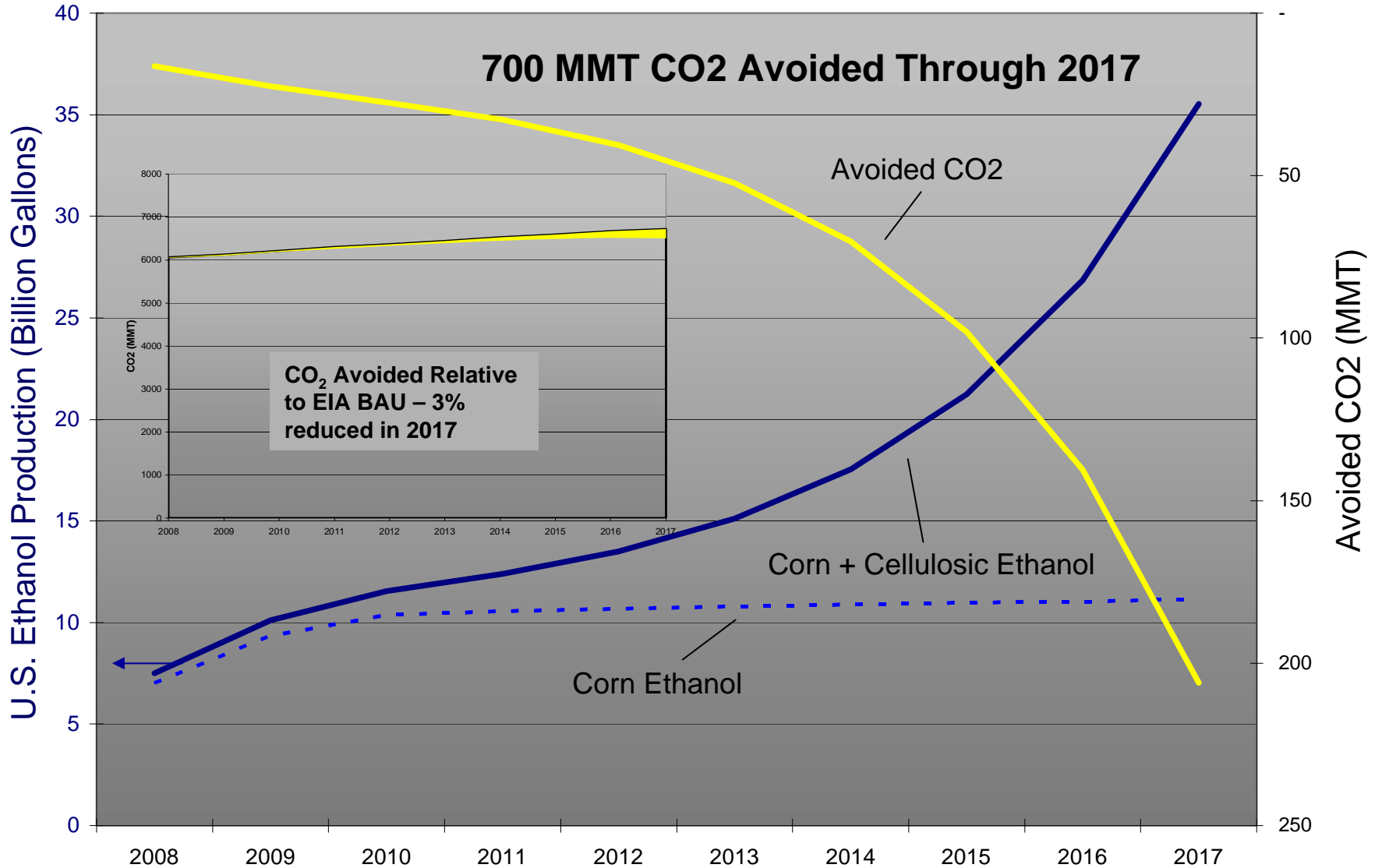


Cellulosic ethanol anticipated cost competitiveness and sustainability attributes are key to biofuels growth potential



Federal research has achieved major reductions in the cost of cellulosic ethanol

20-in-10 Ethanol Ramp and CO2 Impact



Outline



- Efficiency
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Scaling Renewable Electricity



What Scaling RE means:

- **Catalyze access to capital and markets at an unprecedented scale**
- **Integrating technologies for utility grade zero-emission power generation**

Results:

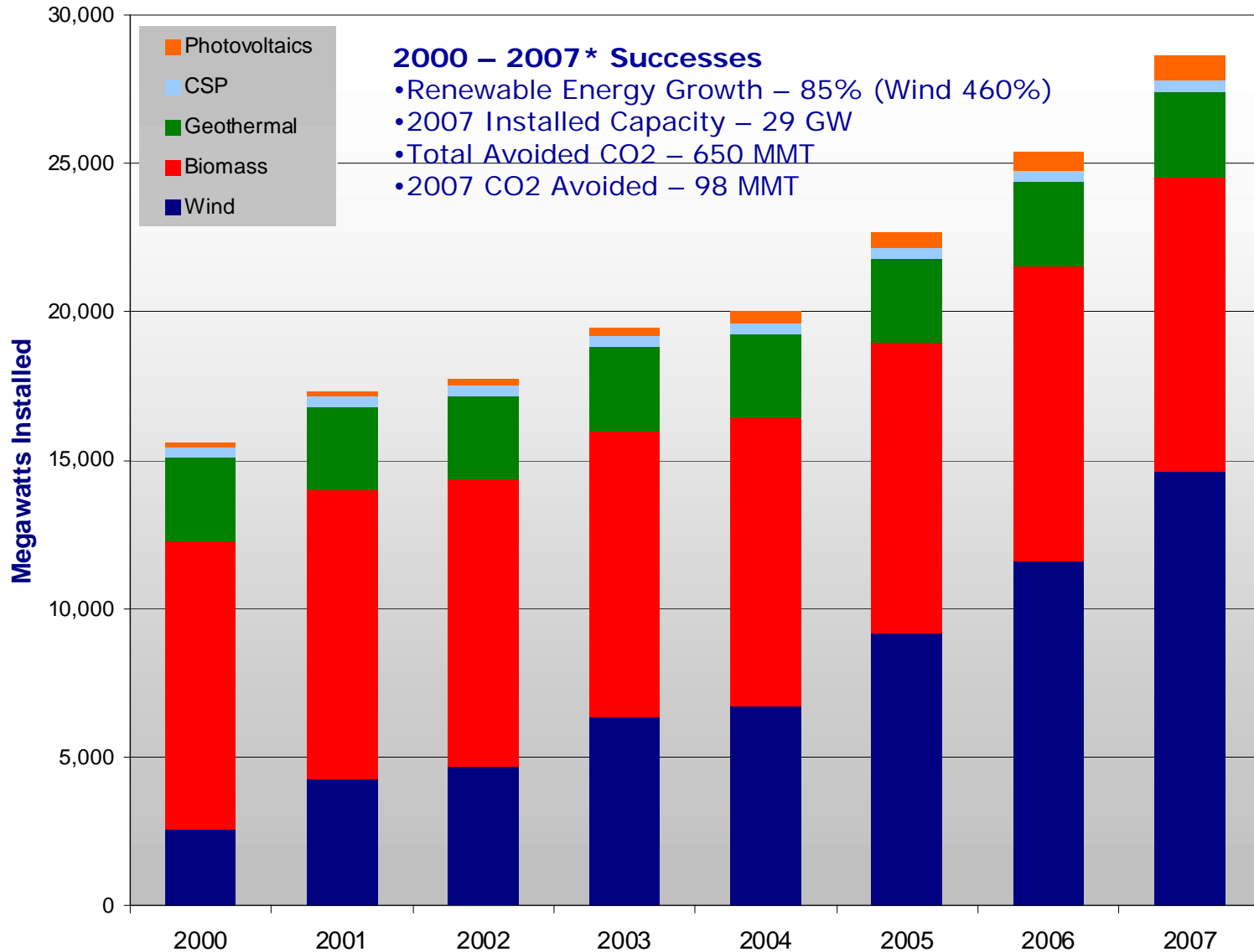
- **Substantially and continually diversify and rebalance the U.S. generation portfolio**
- **RE contributes to a larger and disproportionate percentage of new capacity additions**
- **Executing the Advanced Energy Initiative for Wind Generation at 20%**

U.S. RE Capacity Rapidly Expanding



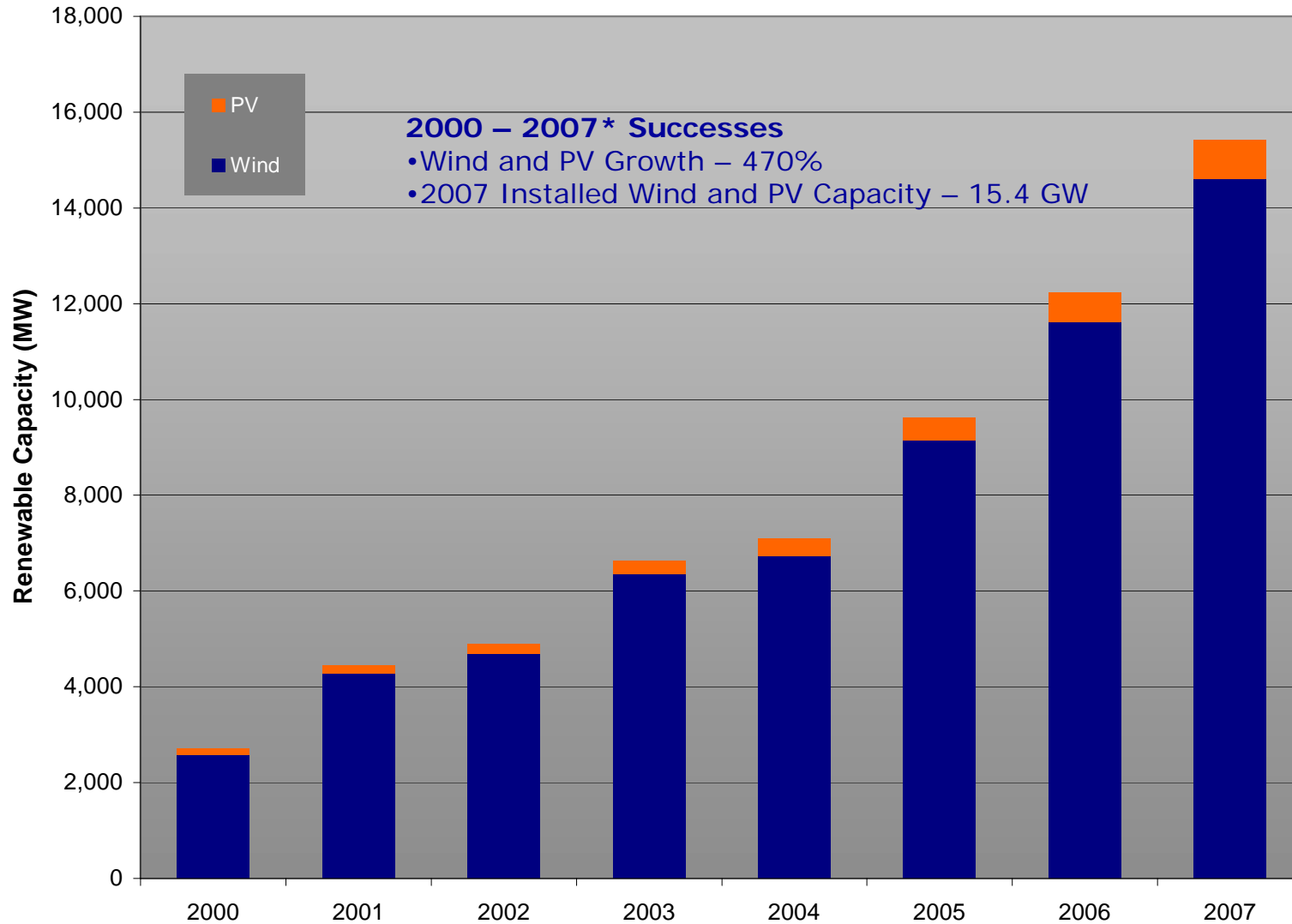
Percent of Annual New Capacity			
	2004	2005	2006
Renewables	2%	11%	22%
Natural Gas	72%	85%	72%
Coal	2%	2%	5%
Petroleum	1%	1%	1%
Dual Fired	22%	0%	0%
Other*	0%	1%	0%

U.S. Renewable Electricity Capacity



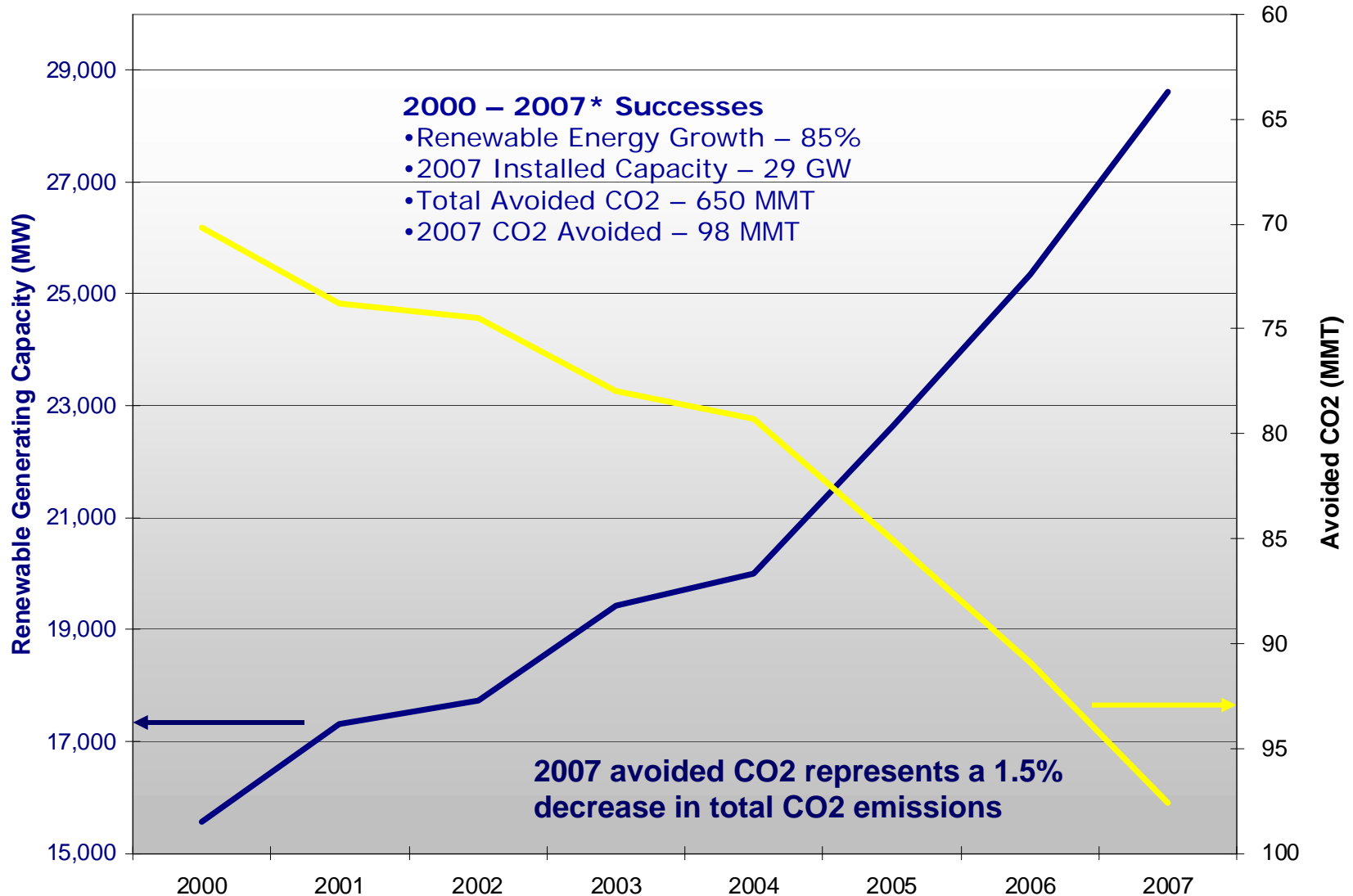
*All 2007 numbers are projections.

U.S. Wind and PV Capacity



*All 2007 numbers are projections.

U.S. Renewable Generation Capacity and Resulting CO₂ Avoided



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Outline

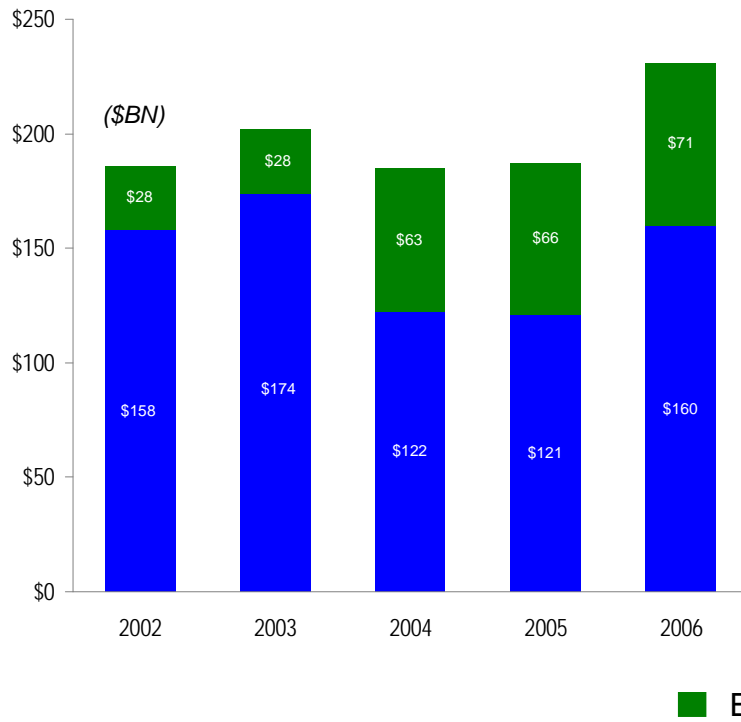


- Efficiency
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- **Commercialization and Deployment**
- Partnerships

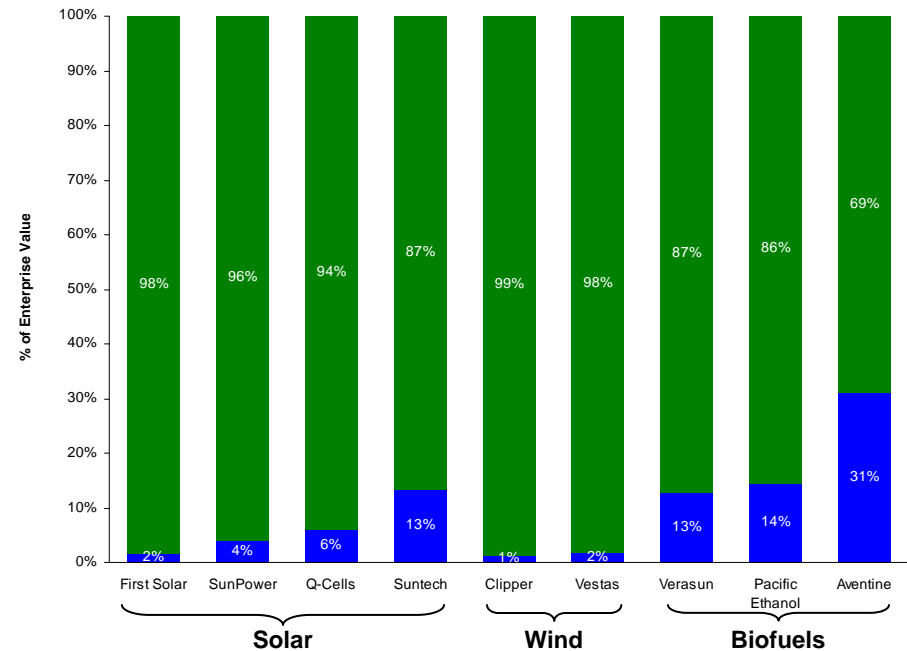
Historically utilities have used a significant amount of debt to finance large-scale infrastructure investments



Historical Global Power and Utility Capital Raises



Enterprise Value Composition of Key Renewable Energy Companies



Source: Thompson Financial.

Source: ThinkEquity Thomson Banker, First Call and Company filings as of, June 25, 2006.

A disproportionate share of the clean energy capital structure is coming from equity investments

Commercialization and Deployment



Technology Commercialization

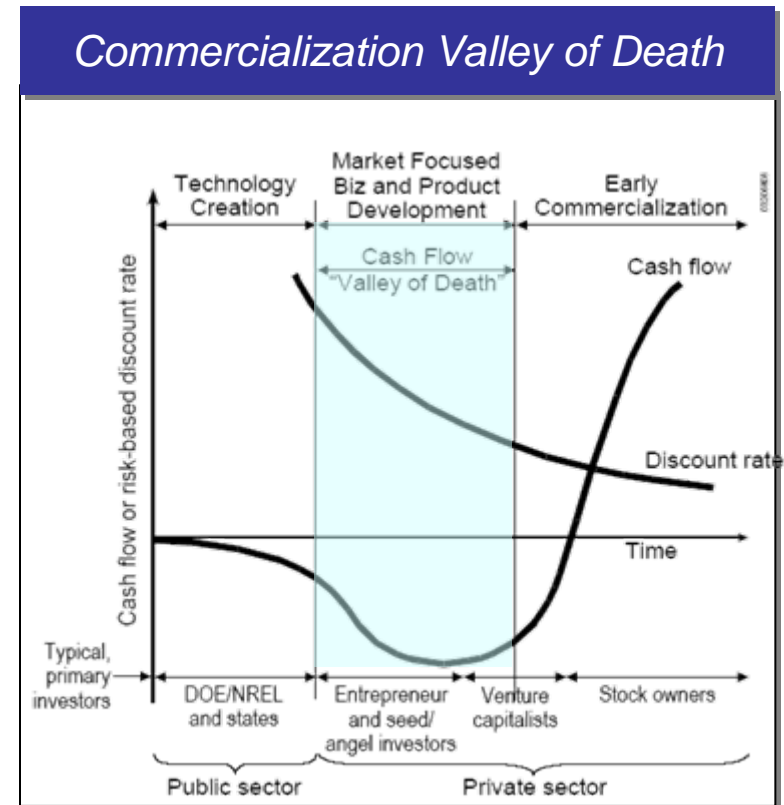
- Technology Commercialization & Deployment Fund
- Entrepreneur in Residence program
- EERE Venture Capital Technology Showcase
- Innovation Study

Capital Formation

- DOE Loan Guarantee Program
- Optimizing the nexus between public sector and capital markets
- Alleviating the “first-mover disadvantage” through grants, loan guarantees and streamlined permitting
- Renewable Energy Certificates (REC) Standardization

Deployment

- DOE TEAM Initiative
- Federal Energy Management Program Reform
- National Parks Deployment Partnership
- Freedom Prize



The EERE Commercialization and Deployment Team focuses on accelerating the deployment the most promising energy technologies into the commercial marketplace

U.S. State and Local Governments Have Jurisdiction Over Many Clean Energy Policies



- The Federal Government (particularly through DOE State Energy Program) coordinates with extensive State jurisdiction over:
 - ❖ Commercial and Residential Building Codes
 - ❖ Electricity Portfolio Standards
 - ❖ Utility/Electricity Regulation, Pricing, and Interconnection
 - ❖ Transmission Siting and Permitting
 - ❖ California Exemption for Vehicle Emission Standards
 - ❖ Fuel Standards and Specifications
- State policies can create opportunities (e.g., portfolio standards, building codes, transmission, etc.)

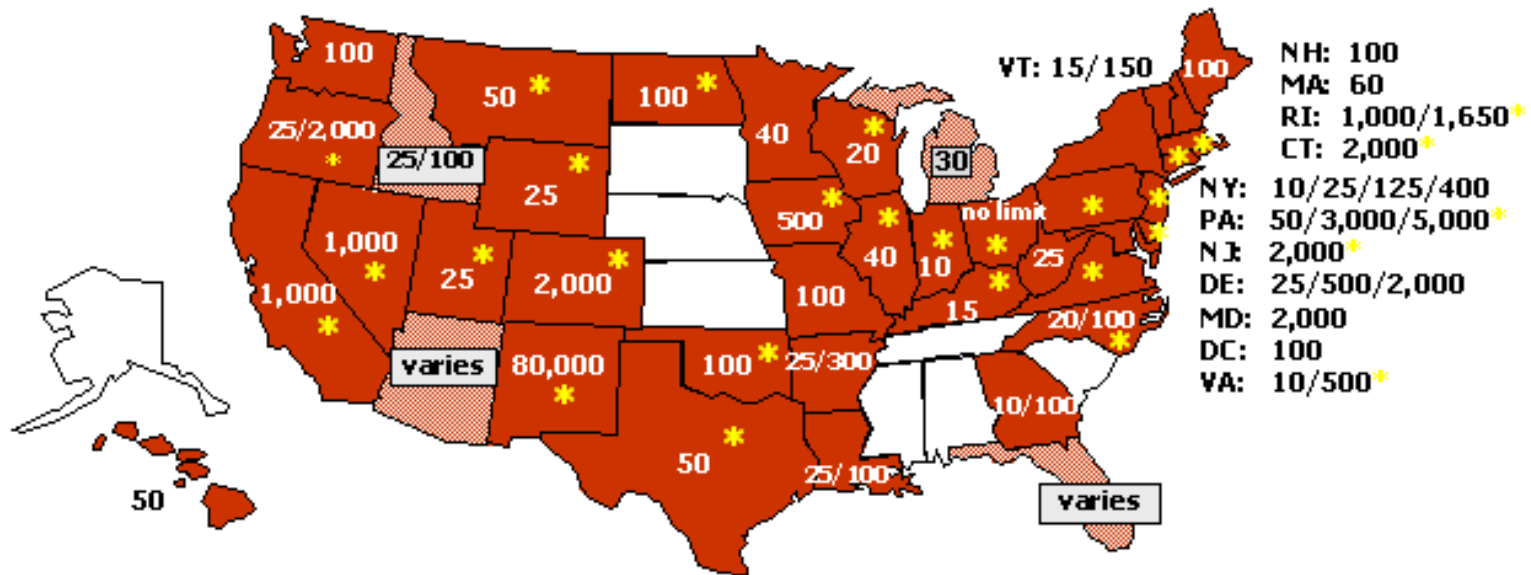
State Policies for Net Metering Allow Consumers to Sell Solar Generated Electricity Back to the Grid



DSIRE: www.dsireusa.org

December 2007

Net Metering



Net metering is available in 42 states + D.C.

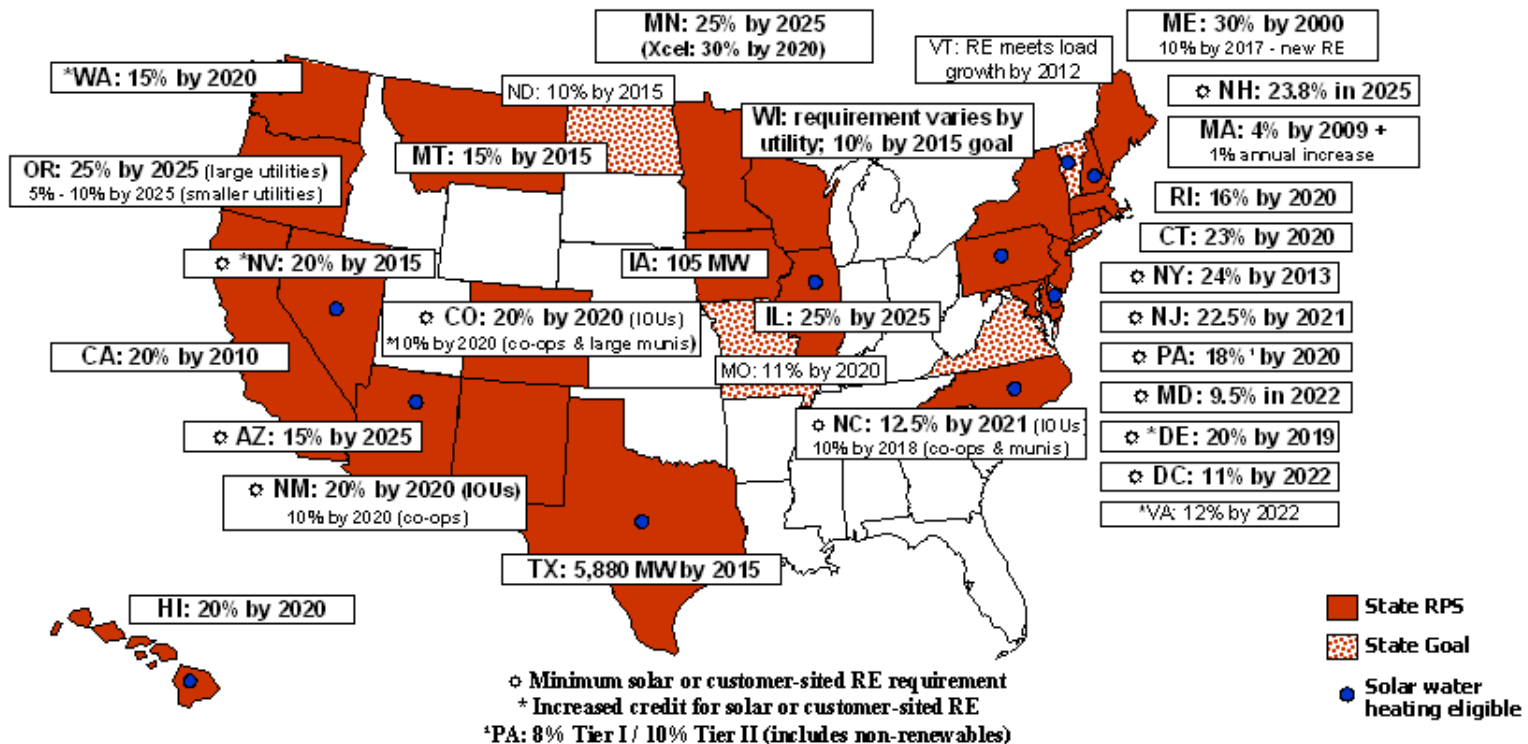
State Portfolio Standards Create Opportunities for Renewable Project Development



DSIRE: www.dsireusa.org

September 2007

Renewables Portfolio Standards

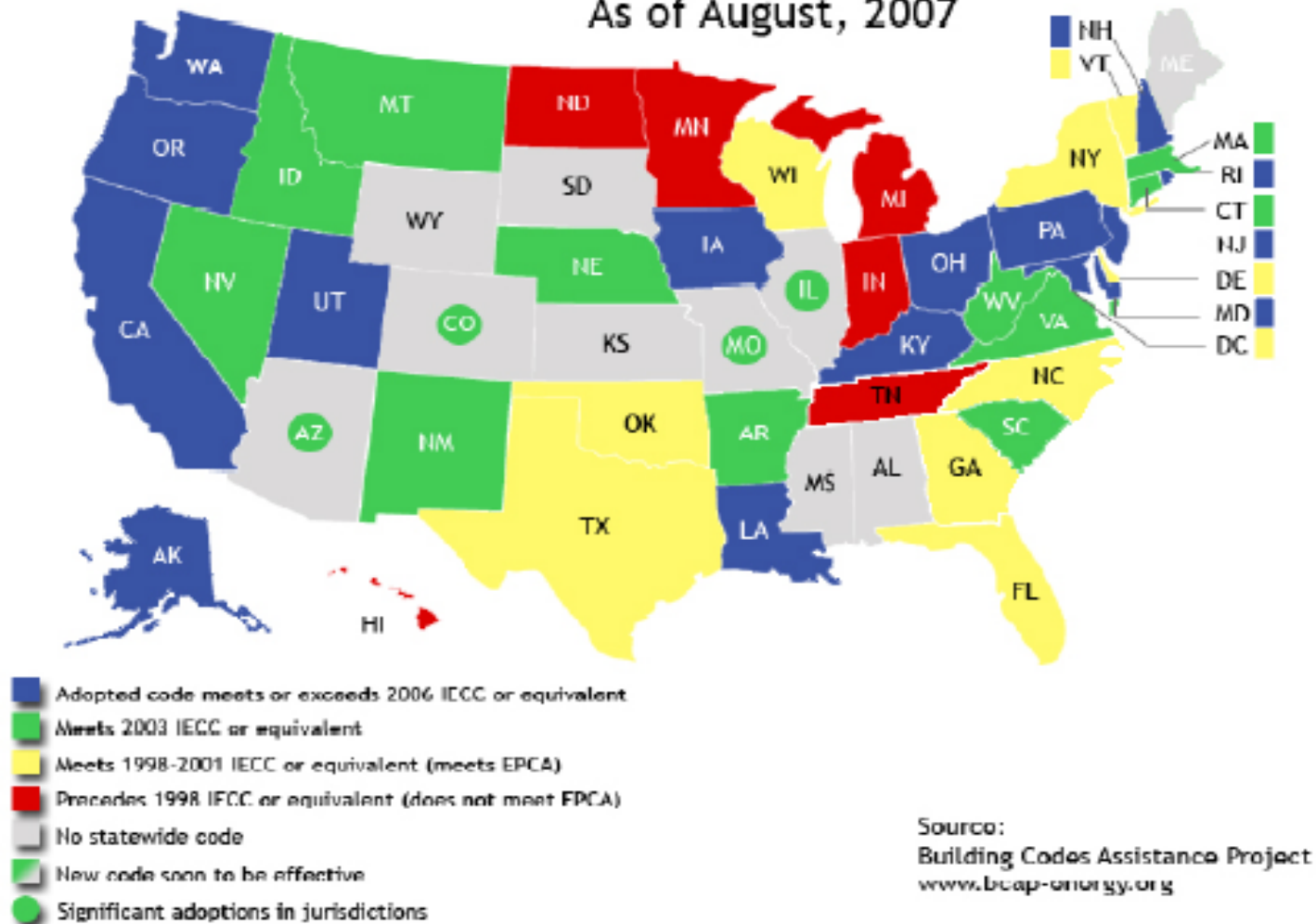


Many States Have Outdated Building Codes



Residential State Energy Code Status

As of August, 2007



Source:
Building Codes Assistance Project
www.bcac-energy.org

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Innovative International Technology Partnerships



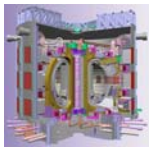
Carbon Sequestration Leadership Forum: **22 members**; focused on **CO₂ capture & storage**.



International Partnership for the Hydrogen Economy: **17 members**; organizes, coordinates, and leverages hydrogen RD&D programs.



Generation IV International Forum: **10 members**; devoted to R&D on next generation of nuclear systems.



ITER: **7 members**; project to develop fusion as a commercial energy source.



Methane to Markets: **20 members**; recovery and use of methane from landfills, mines, oil & gas systems, and agriculture.

Asia-Pacific Partnership on Clean Development & Climate: **7 members**; focuses on accelerating deployment of technologies to address energy security, air pollution, and climate change.



Global Nuclear Energy Partnership: **19 members**; seeks consensus on enabling expanded use of nuclear energy using a nuclear fuel cycle that enhances energy security, while promoting non-proliferation.



U.S. DOE Country Collaborations



U.S. Energy Department International Collaborations

China	India	Japan	Brazil	EU
General EE	General EE	General EE	General EE	Industrial EE
Industrial EE	Industrial EE	Industrial EE	EnergyStar	Buildings
Buildings	Buildings	Buildings	Biomass	EnergyStar
Vehicles	Vehicles	EnergyStar	Hydrogen	Solar
Biomass	Biomass	Vehicles	Nuclear	Hydrogen
Geothermal	Solar	Geothermal	CO2 Sequestration	Nuclear
Wind	Hydrogen	Wind		Fusion Energy
Solar	Nuclear	Solar		CO2 Seques.
Hydrogen	Fusion Energy	Hydrogen		
Nuclear	FutureGen	Nuclear		
Fusion Energy	CO2 Sequestration	Fusion Energy		
FutureGEN		FutureGEN		
CO2 Seques.		CO2 Sequestration		



All Science Is Global...
America is dedicated to
collaborating and relentlessly
advancing clean energy research
and development

Please contact us at

www.eere.energy.gov

for opportunities to work together on clean
energy and CO2 reductions