

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



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Energy Efficiency and Renewable Energy

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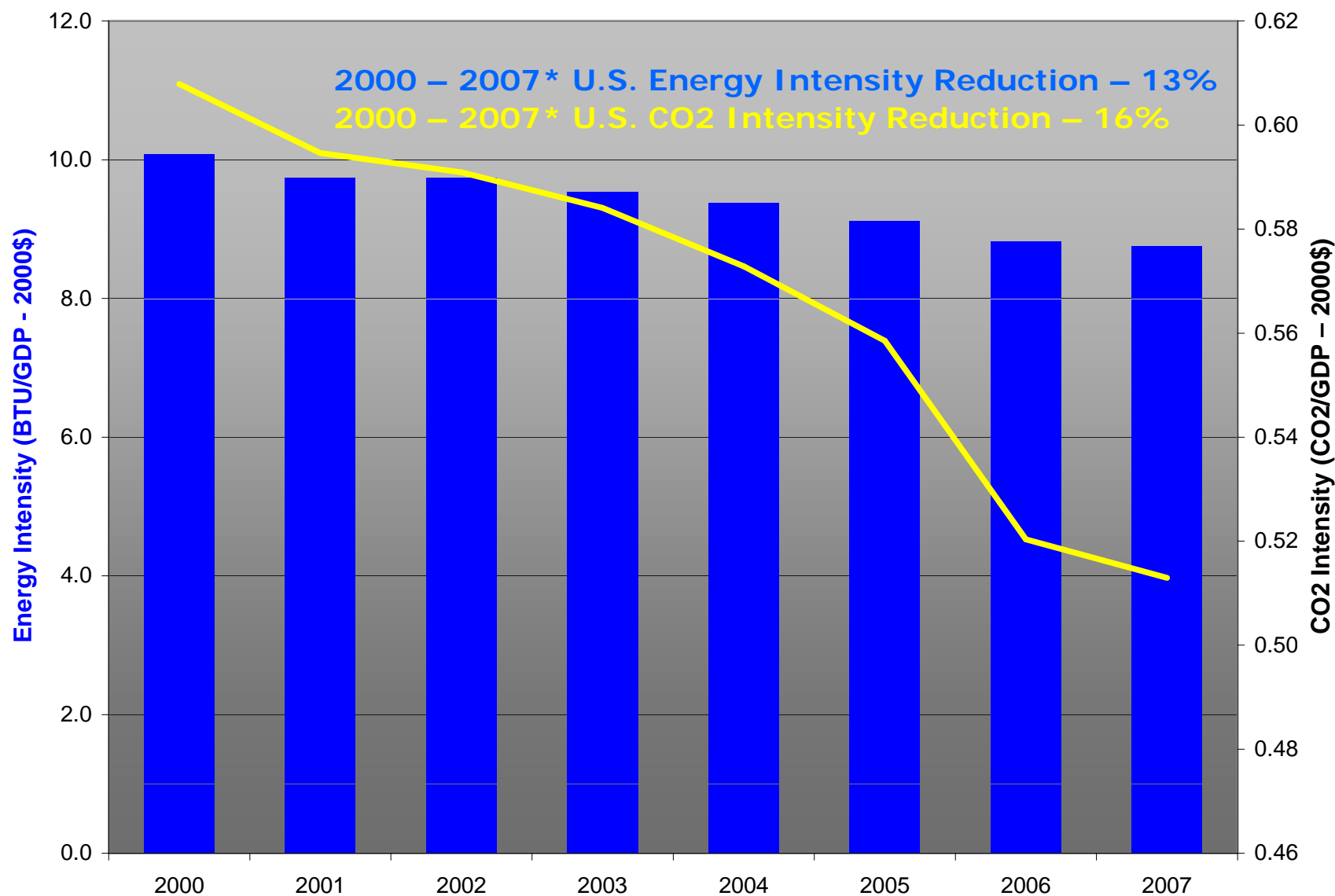


Office of Energy Efficiency and Renewable Energy

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

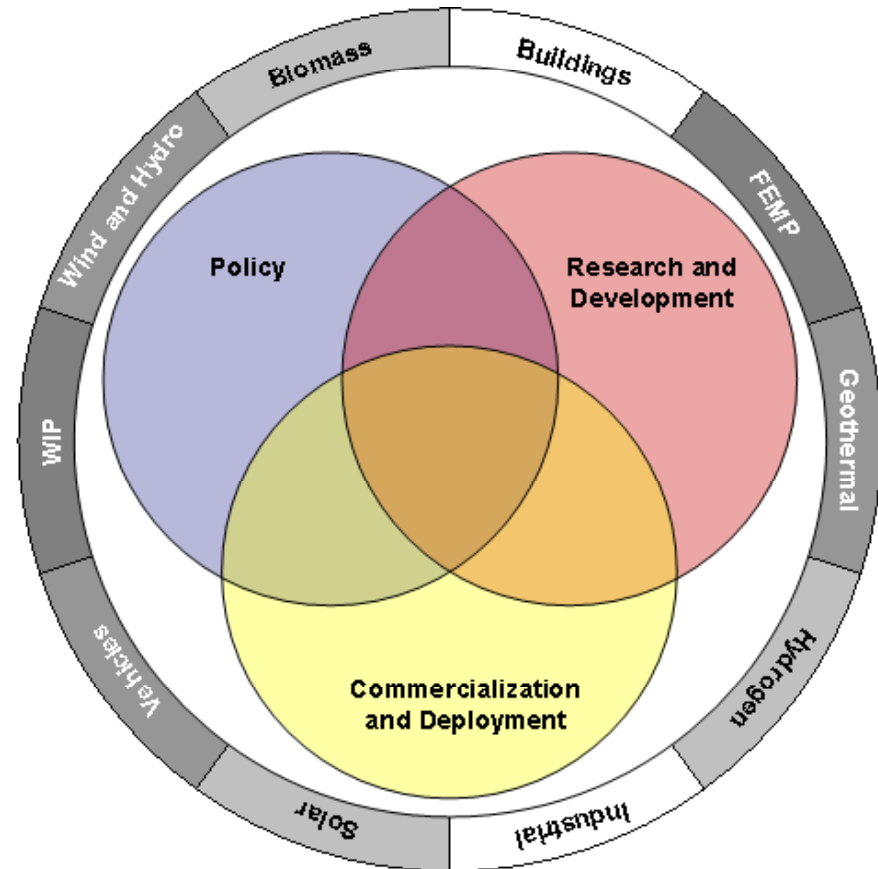
- Solar
- Wind
- Hydropower
- Geothermal

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



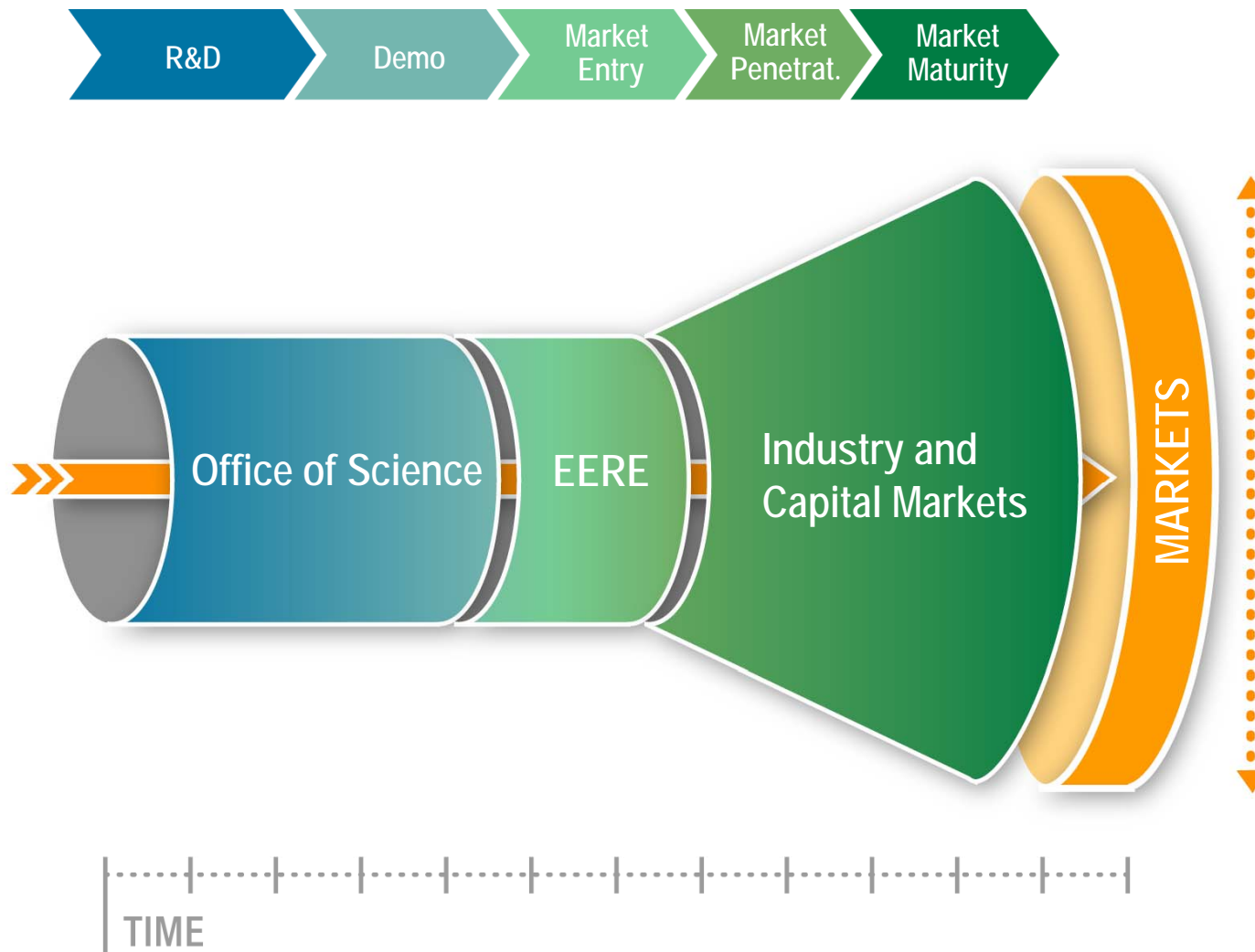
1. Improve
Technology

2. Develop & Implement
Durable Policies

3. Facilitate Access
to Capital



Accelerate and Scale Technologies



Outline



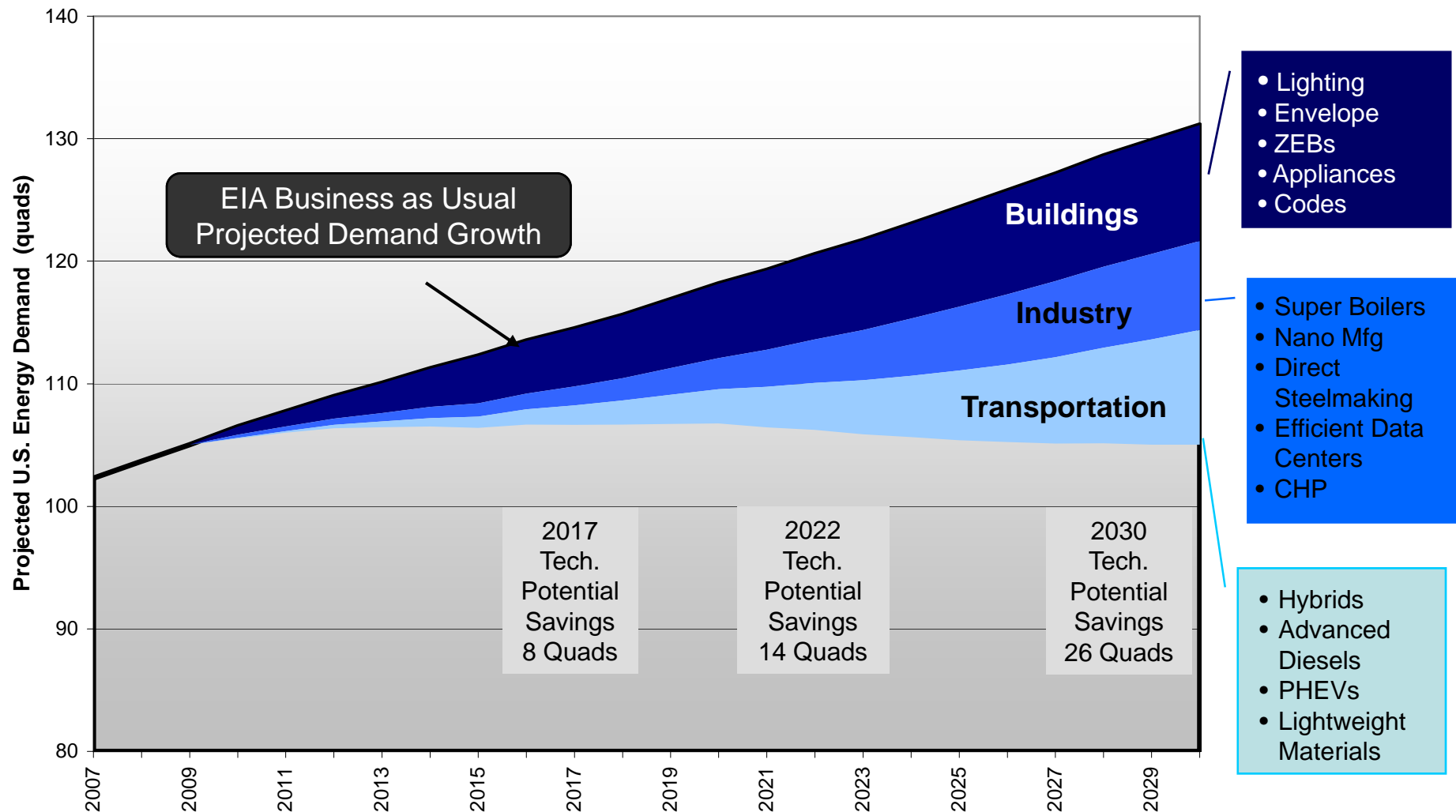
- Efficiency
- Transportation
- Gigawatt Scale Renewables
- Commercialization and Deployment
- FY 2008 Preview

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

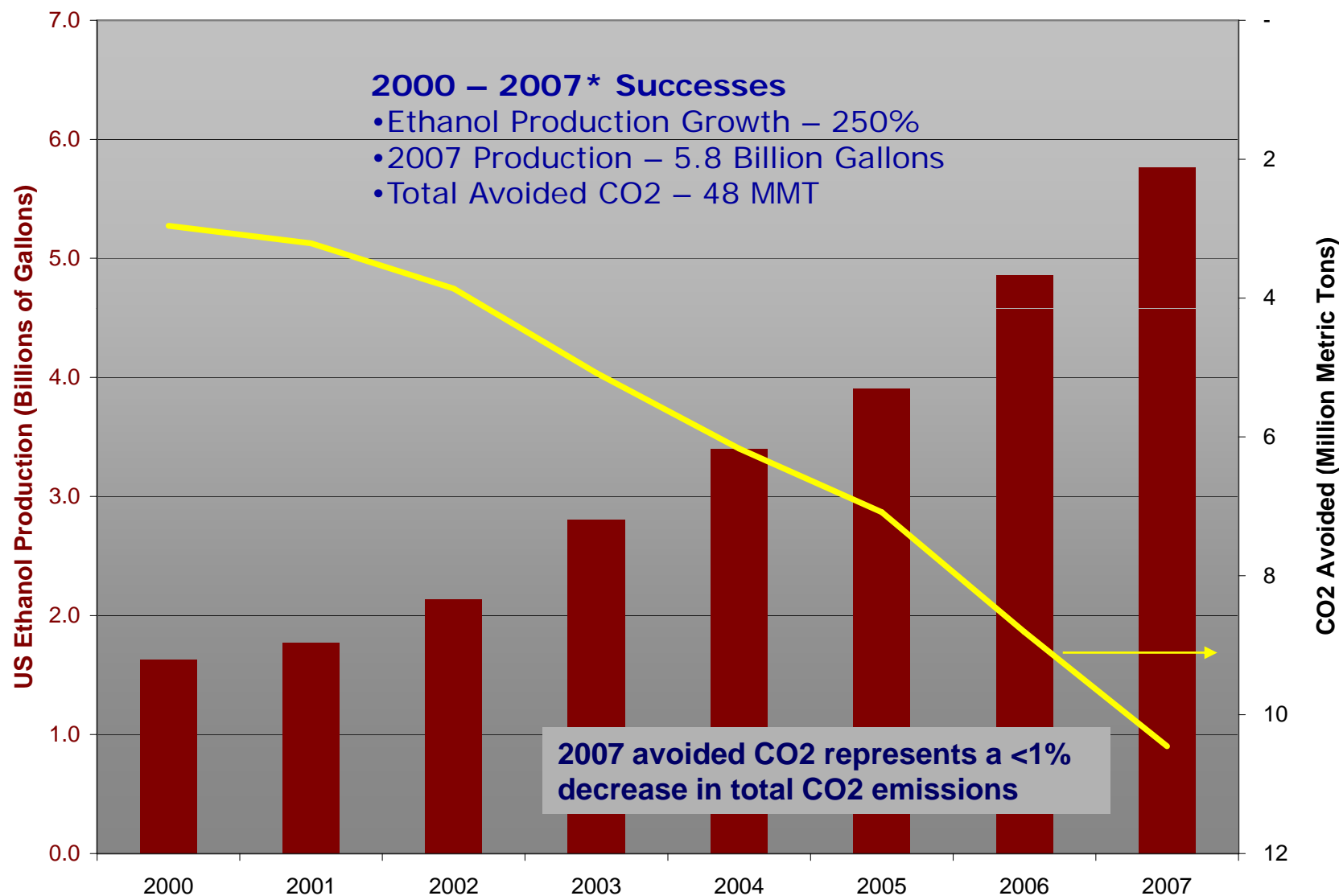


Outline



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



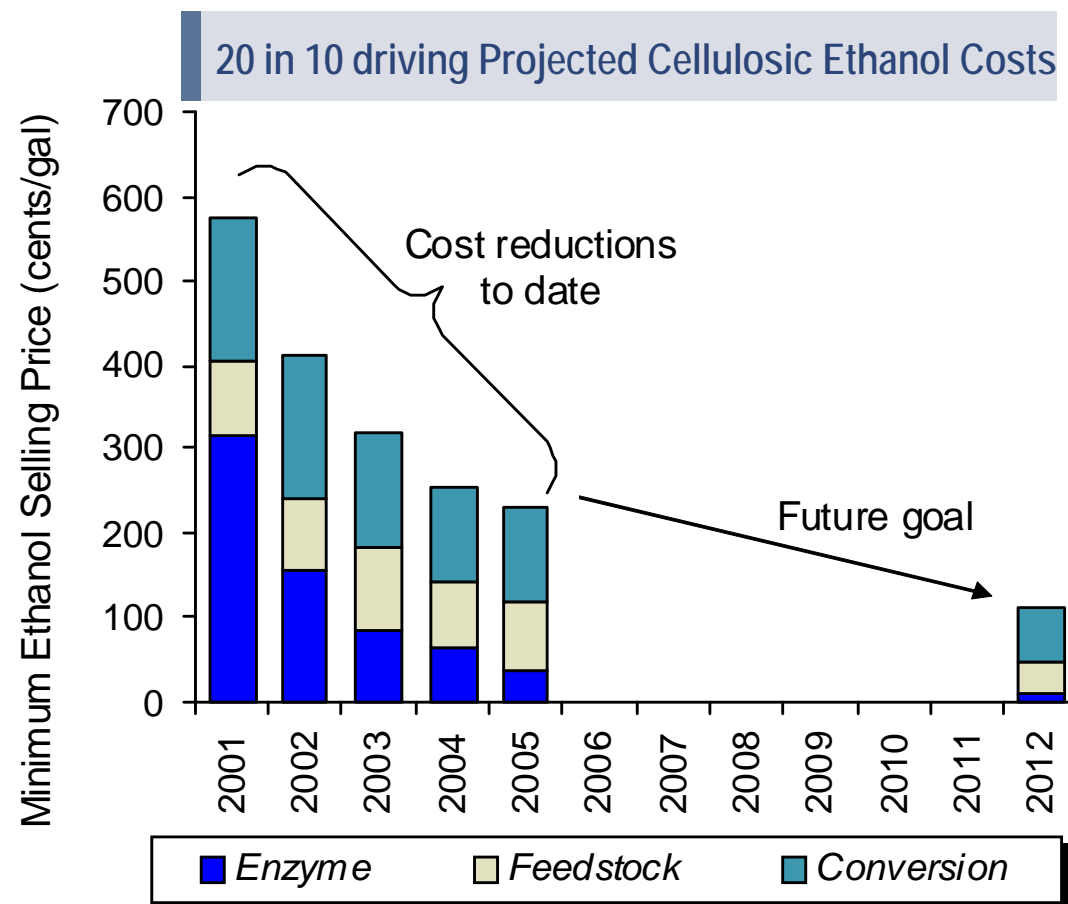
*All 2007 numbers are projections.

Sources: EIA and Renewable Fuels Assoc. 12

Biofuels Technical and Economic Potential

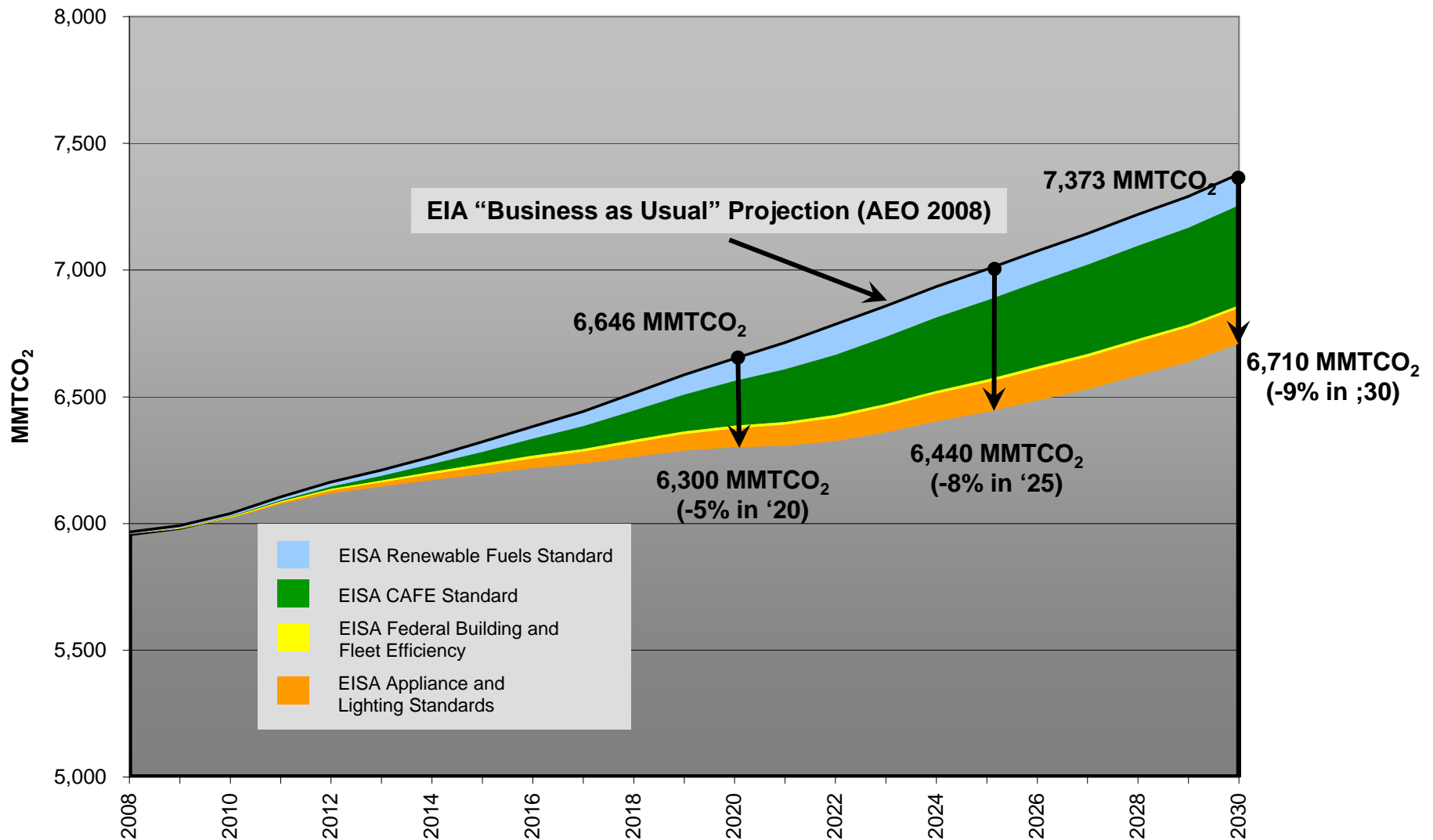


Cellulosic ethanol anticipated cost competitiveness and sustainability attributes are key to biofuels growth potential



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

Estimated Impact of Major Provisions of the Energy Independence and Security Act of 2007 on Projected Energy-Related CO₂ Emissions



Source: DOE, PNNL, ANL, NREL, ACEEE, Navigant

Outline



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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:

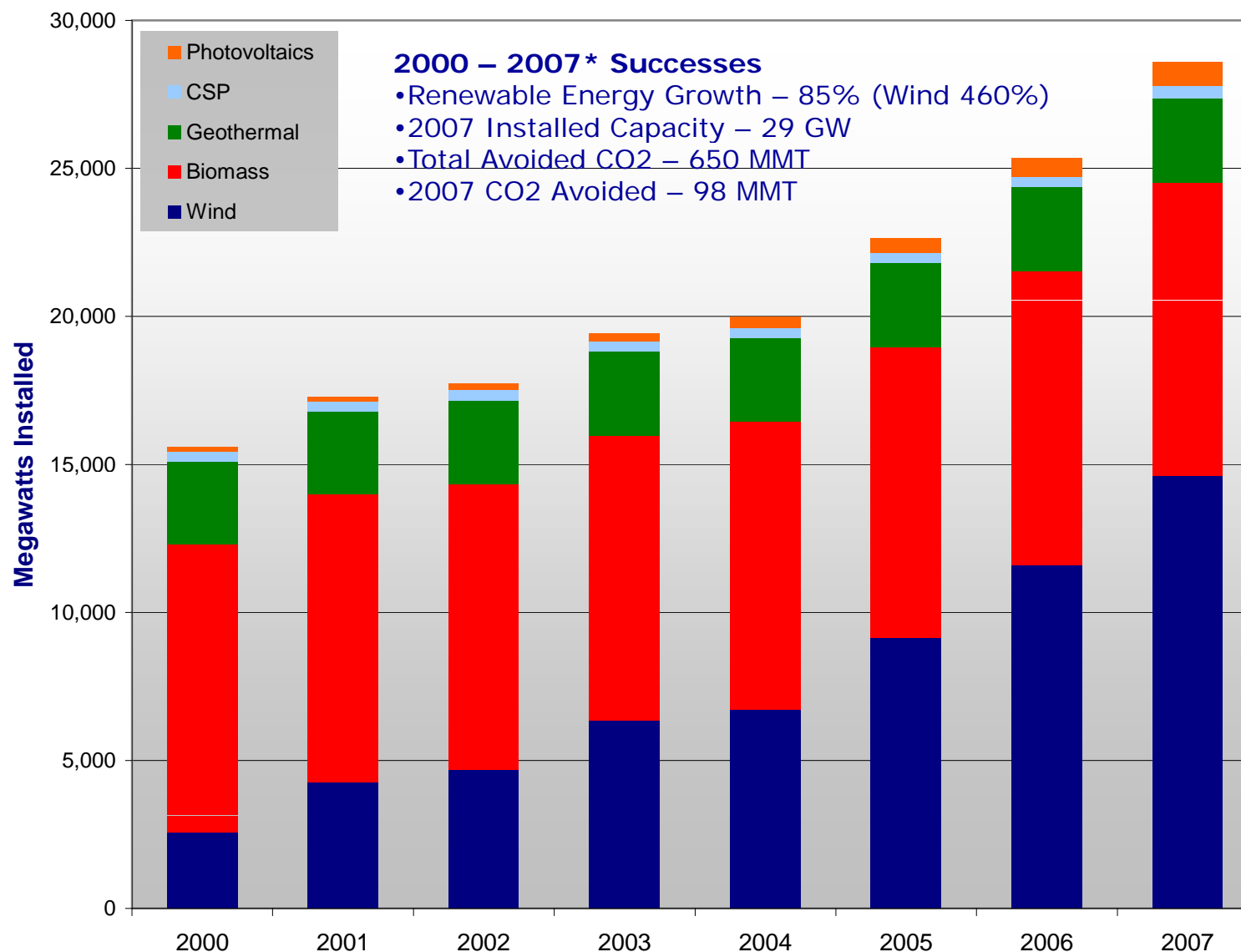
- **Substantially and continually diversify and rebalance the U.S. generation portfolio**
- **RE contributes to a larger and disproportionate percentage of new capacity additions**
- **Executing the Advanced Energy Initiative for Wind Generation at 20%**

U.S. RE Capacity Rapidly Expanding



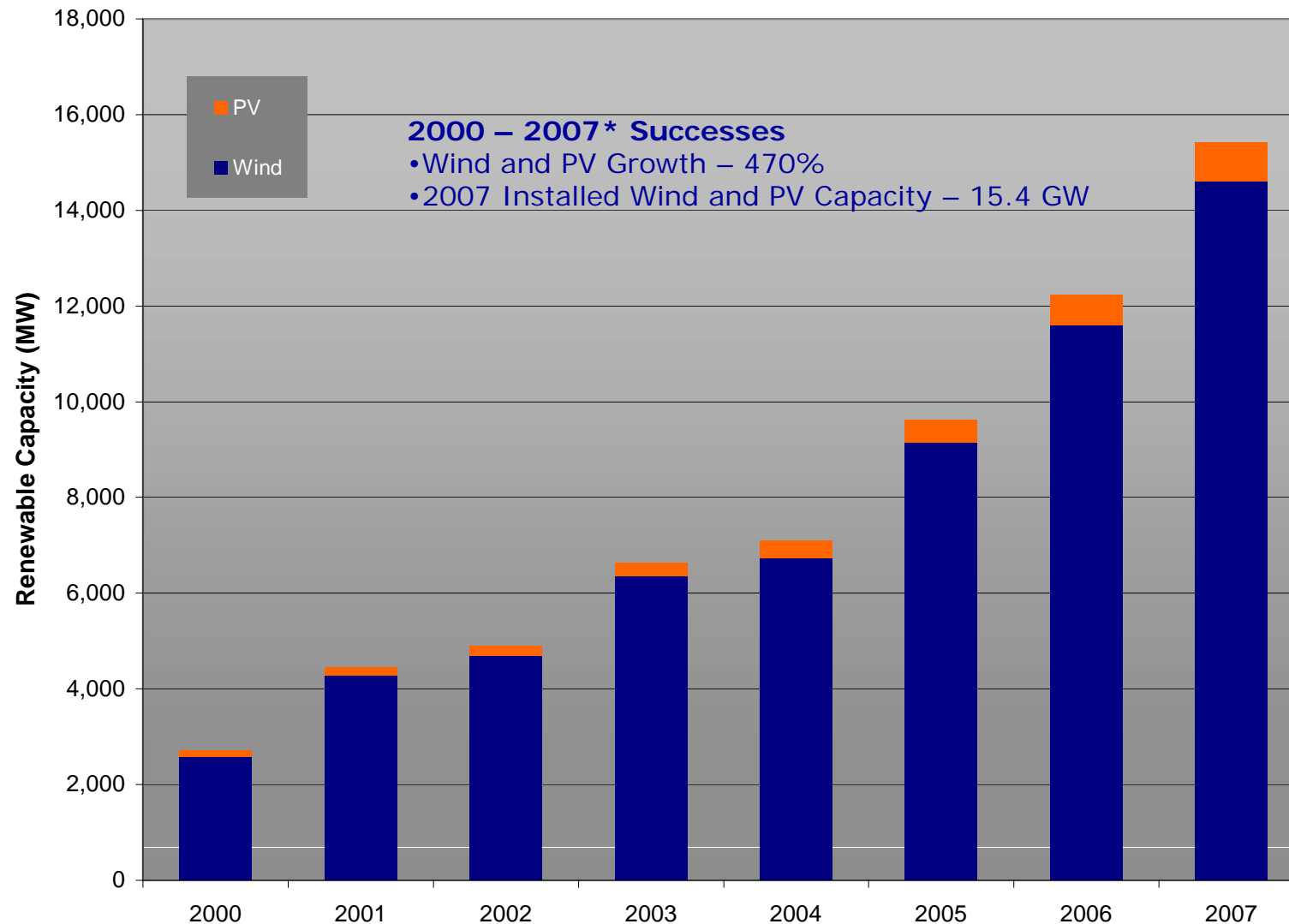
Percent of Annual New Capacity			
	2004	2005	2006
Renewables	2%	11%	22%
Natural Gas	72%	85%	72%
Coal	2%	2%	5%
Petroleum	1%	1%	1%
Dual Fired	22%	0%	0%
Other*	0%	1%	0%

U.S. Renewable Electricity Capacity



*All 2007 numbers are projections.

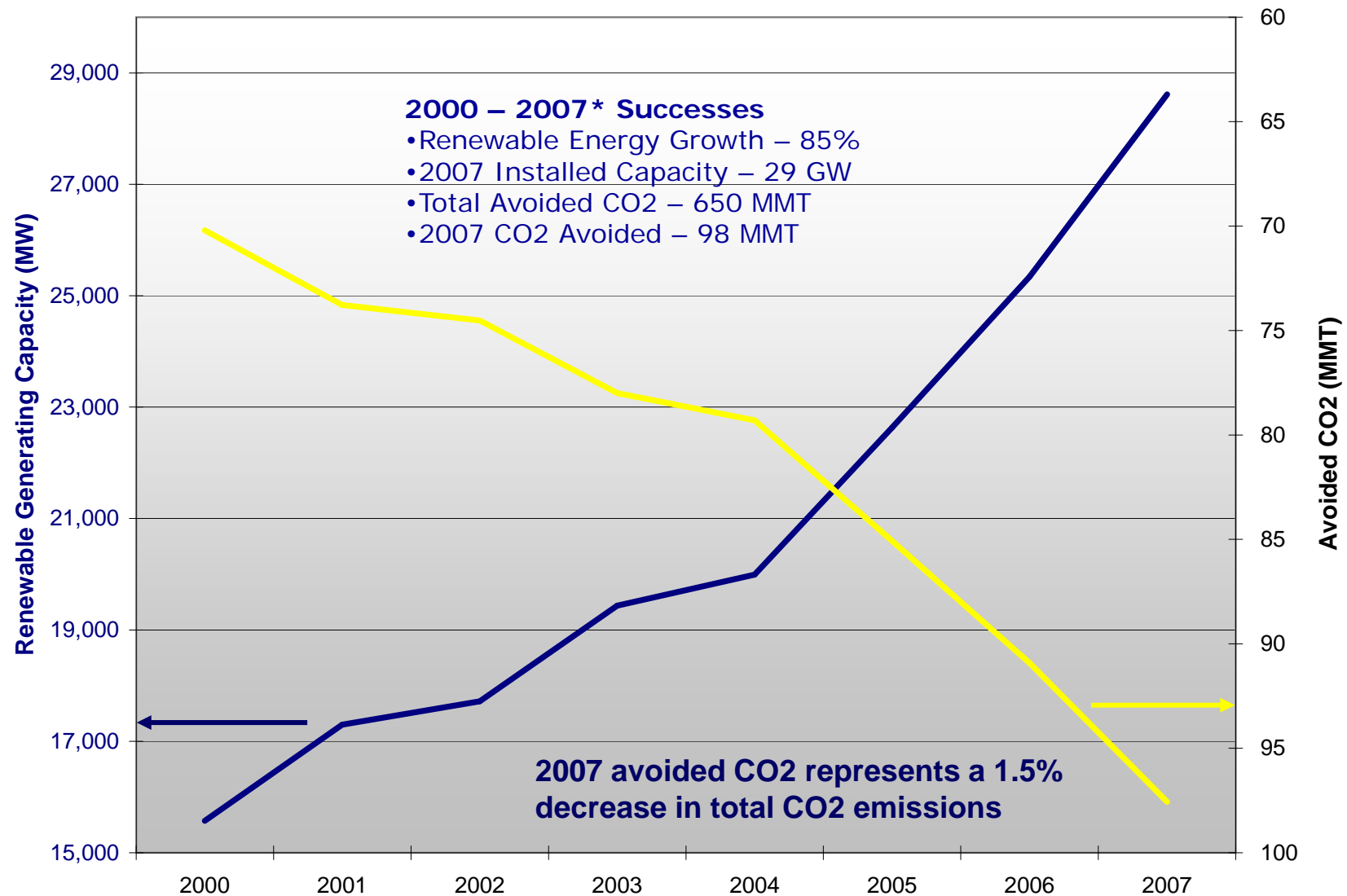
U.S. Wind and PV Capacity



*All 2007 numbers are projections.

Sources: RE capacity numbers – EIA and EERE. CO2 calculations – EERE.

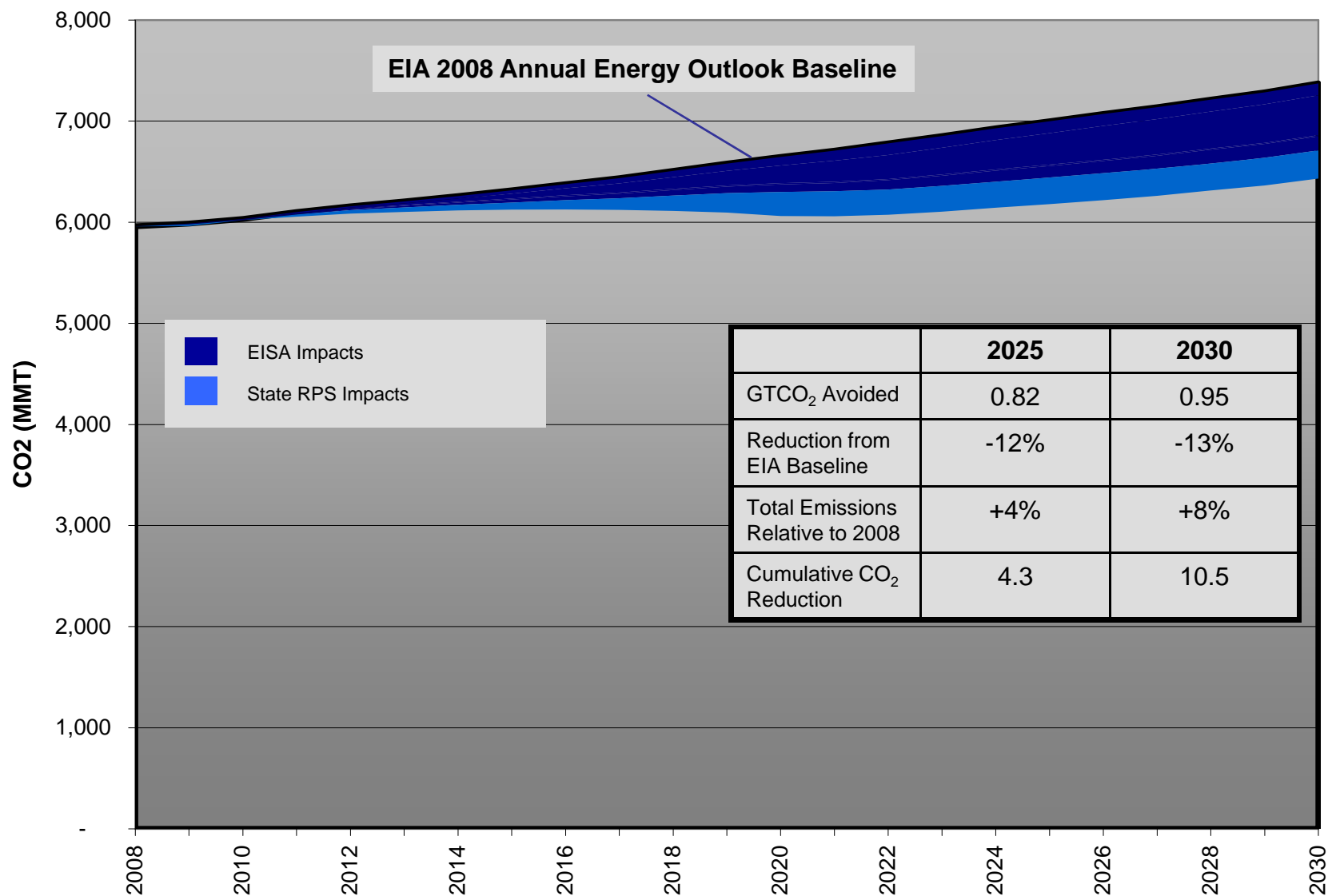
U.S. Renewable Generation Capacity and Resulting CO₂ Avoided



*All 2007 numbers are projections.

Sources: EIA 20

CO₂ Avoided from EISA and State RFS



Sources: ANL, EIA, US DOE, ACEEE, NREL

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- **Commercialization and Deployment**
- FY 2008 Preview

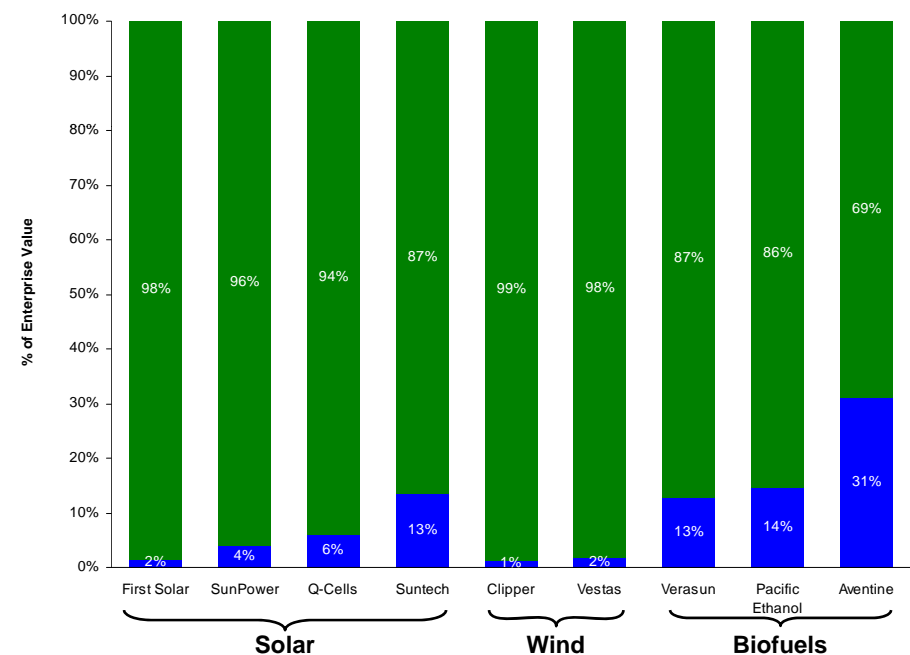
Historically utilities have used a significant amount of debt to finance large-scale infrastructure investments



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

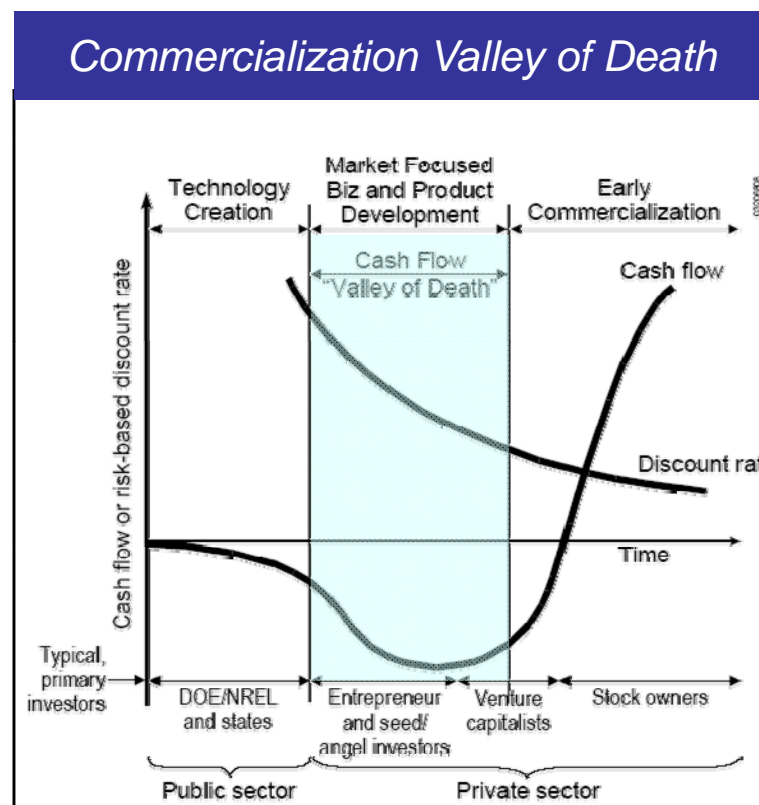
- Technology Commercialization & Deployment Fund
- Entrepreneur in Residence program
- EERE Venture Capital Technology Showcase
- Innovation Study

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

Outline



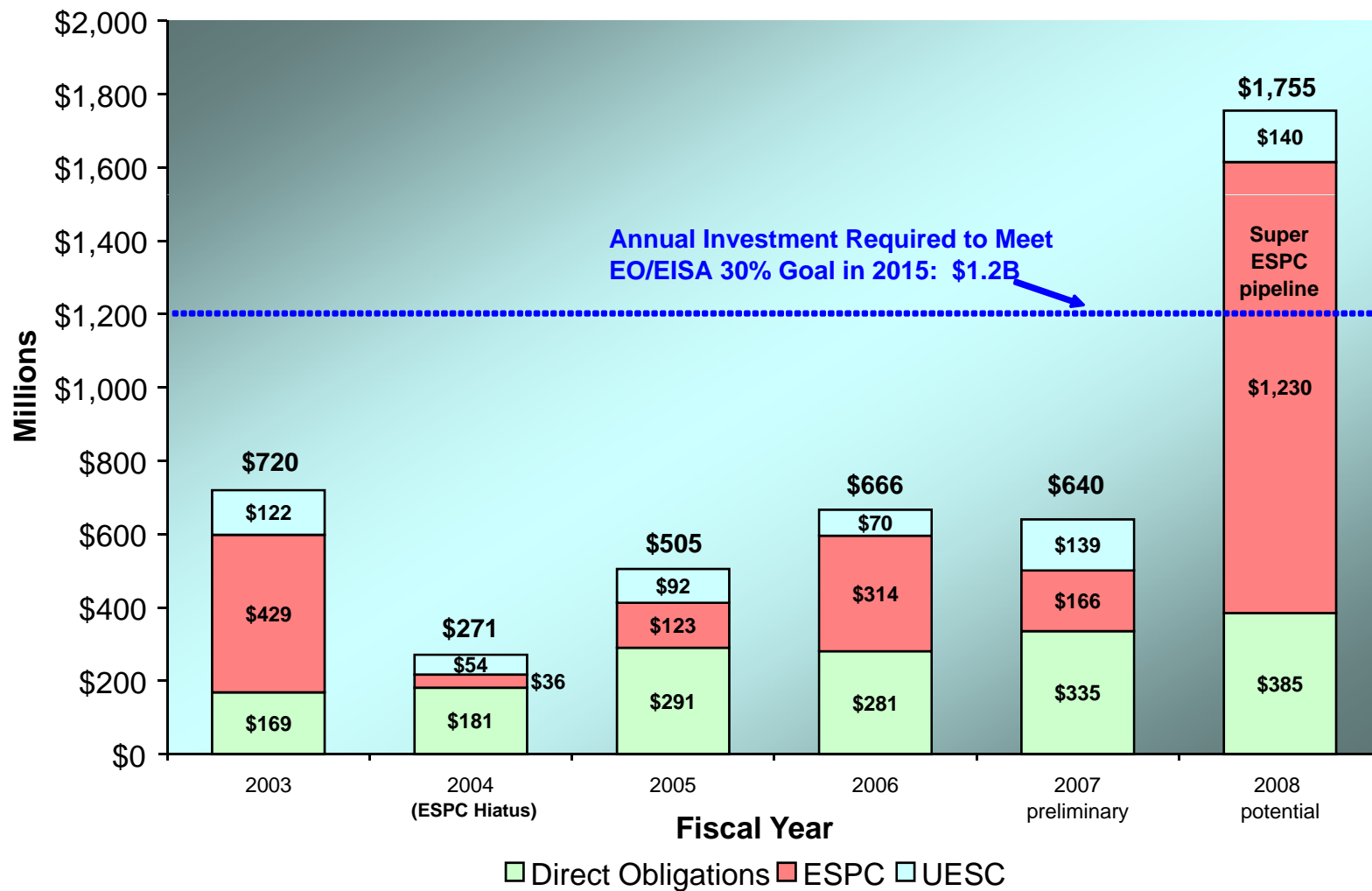
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FY 2008 Preview



- Prioritization for Energy Efficiency
 - National Action Plan
 - Model building codes
 - Lighting and Appliances; expanded Energy Star®
 - Builders Challenge
 - Retail Energy Alliance
 - ESCOs for civic infrastructure
 - Save Energy Now
 - Federal Energy ~~Management~~ Leadership

New Approaches Yield Record-breaking Success



FY 2008 Preview – cont.



- Transportation
 - Continued emphasis on commercial biofuels refineries
 - Testing for intermediate blends
 - Plug in hybrid validation solicitation and roll-out
 - Stronger integration of all vehicle and fuels testing and validation
 - New innovations for advancing R&D

FY 2008 Preview – cont.



- Renewables
 - Restarted geothermal program
 - New water power program
 - Siting/permitting for gigawatt scale renewables
 - Transmission
 - Renewable systems integration to enhance storage and dispatchability

FY 2008 Preview – cont.



- State Partnerships

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.)

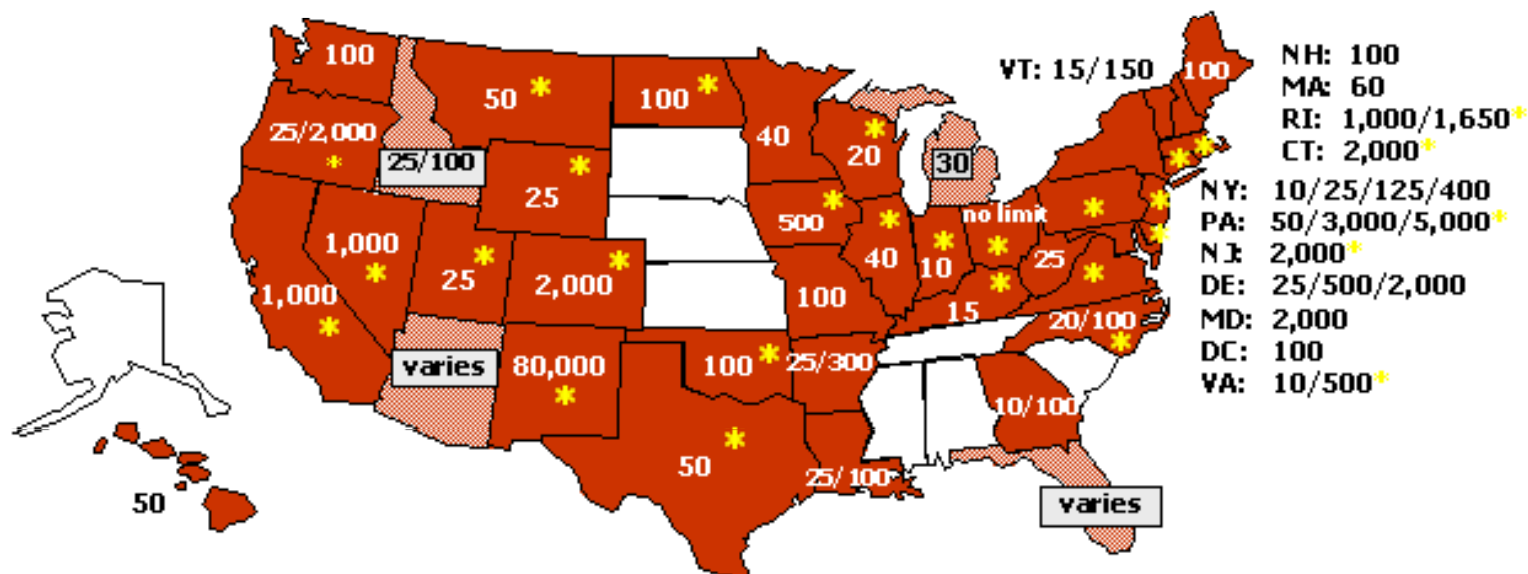
State Policies for Net Metering Allow Consumers to Sell Solar Generated Electricity Back to the Grid



DSIRE: www.dsireusa.org

December 2007

Net Metering



- State-wide net metering for all utility types
- *

 State-wide net metering for certain utility types (e.g., investor-owned utilities only)
- *

varies

 Net metering offered by one or more individual utilities

(Numbers indicate individual system size limit in kilowatts. Some states' limits vary by customer type and/or technology as shown)

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

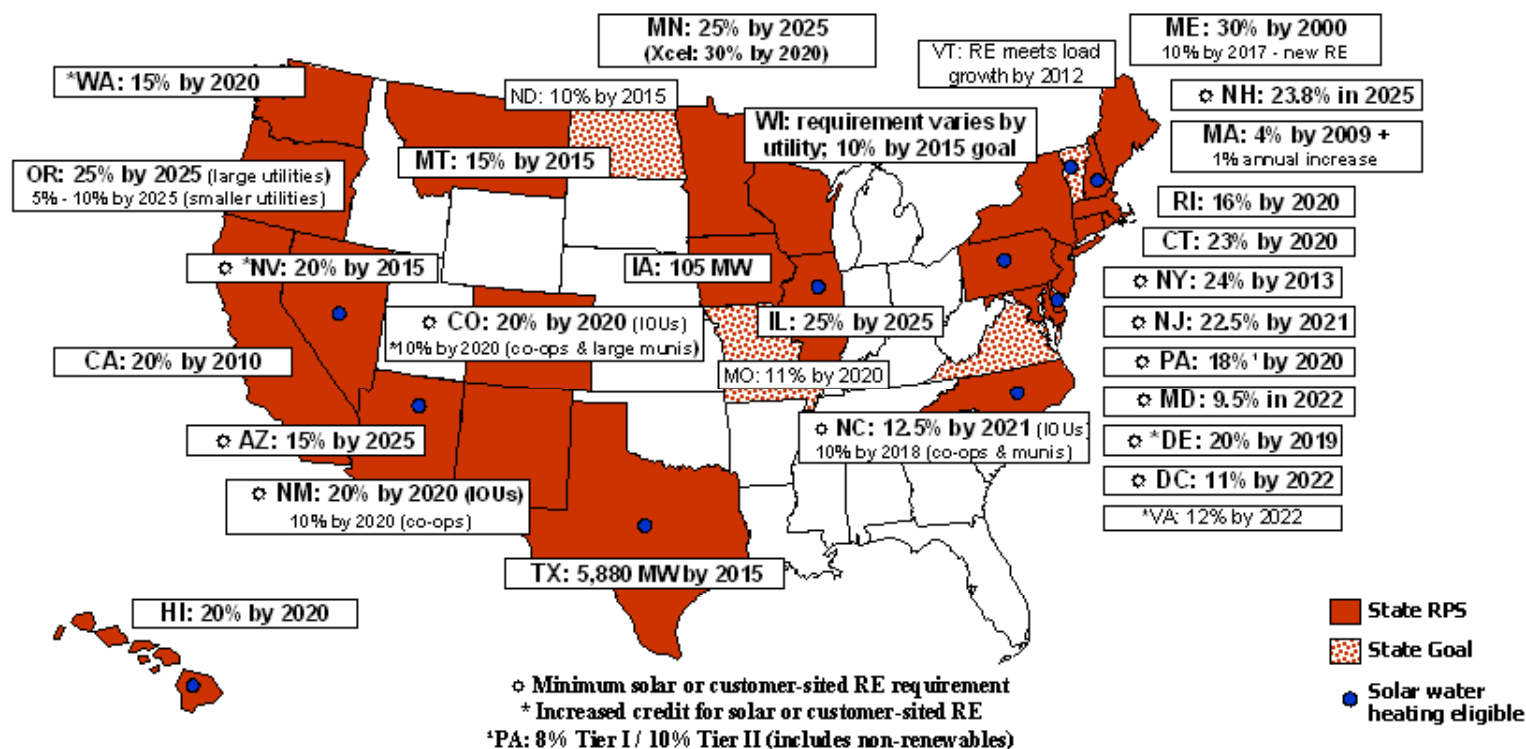
State Portfolio Standards Create Opportunities for Renewable Project Development



DSIRE: www.dsireusa.org

September 2007

Renewables Portfolio Standards

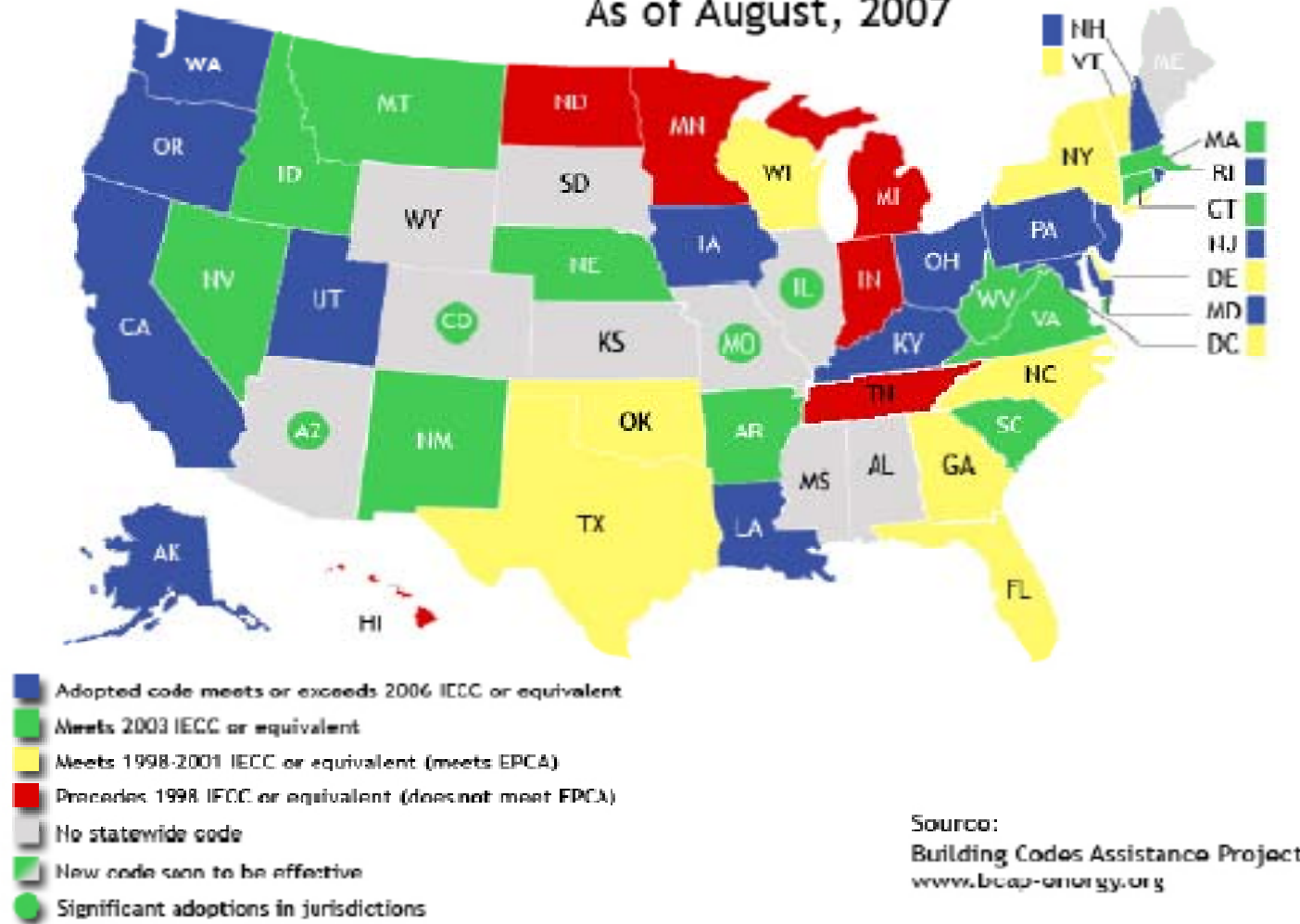


Many States Have Outdated Building Codes



Residential State Energy Code Status

As of August, 2007



FY 2008 Preview – cont.



- State Partnerships
 - Hawaii Clean Energy Initiative: introducing innovations in regulatory and legislative frameworks
 - DOE strategic partnership with the National Governors Association
 - Increasing fungibility of renewable energy credits
 - SEP competitive grants
 - Loan Guarantee Program
 - Education and outreach

Summary



- The level of our success is limited only by our imagination- Aesop
- If you have always done it that way, it is probably wrong – Charles Kettering