

U.S. Climate Change Technology Program

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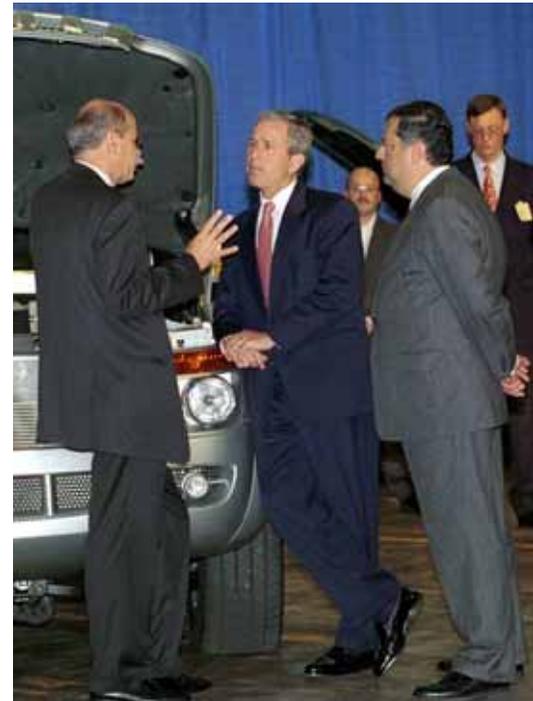
www.climatetechnology.gov

March 11, 2004

Presented to
Energy Options for the Future
Meeting at the U.S. Naval Research Laboratory
11-12 March 2004

President Bush Is Addressing Climate Change and Greenhouse Gas Emissions

- *“While scientific uncertainties remain, we can begin now to address the factors that contribute to climate change.”*
(June 11, 2001)
- *“Our approach must be consistent with the long-term goal of stabilizing greenhouse gas concentrations in the atmosphere.”*
- *“We should pursue market-based incentives and spur technological innovation.”*
- *“My administration is committed to cutting our nation’s greenhouse gas intensity - .. – by 18 percent over the next 10 years”* (February 14, 2002)



The Administration Has Launched Aggressive Initiatives

- We have organized the Administration team and created an intense senior management focus.
- We have initiated large scale technological assault and are leading the world.
- We have streamlined, focused and strengthened the world's largest science program.
- We have launched meaningful and serious voluntary programs.
- We have expanded global outreach and partnerships.

Climate Science and Technology Management Structure

Office of the President
Climate Change Policy and
Program Review by NSC, DPC, NEC

Committee on Climate Change Science and Technology Integration
Chair: Secretary of Energy* Vice Chair: Secretary of Commerce*
Executive Director: OSTP Director

Secretary of State	Secretary of the Interior
Secretary of Agriculture	Secretary of HHS
EPA Administrator	Secretary of Transportation
OMB Director	Secretary of Defense
NEC Director	CEQ Chairman
NASA Administrator	NSF Director

International Activities
(Incl. Task Force on International Energy Cooperation)
DOS, DOE, USAID and Other Agencies

Interagency Working Group on Climate Change Science and Technology
Chair: Deputy/Under Secretary of Commerce*
Vice Chair: Deputy/Under Secretary of Energy*
Secretary: OSTP Associate Director for Science
Members DS/US Level:
CEQ, DOD, DOI, DOS, DOT, EPA, HHS, NASA, NEC, NSF, OMB, USDA

Climate Change Science Program
Director: Assistant Secretary of Commerce for Oceans and Atmosphere
Members: DOC, DOD, DOE, DOI, DOS, DOT, EPA, HHS, NASA, NSF, OMB, OSTP, Smithsonian, USAID, USDA

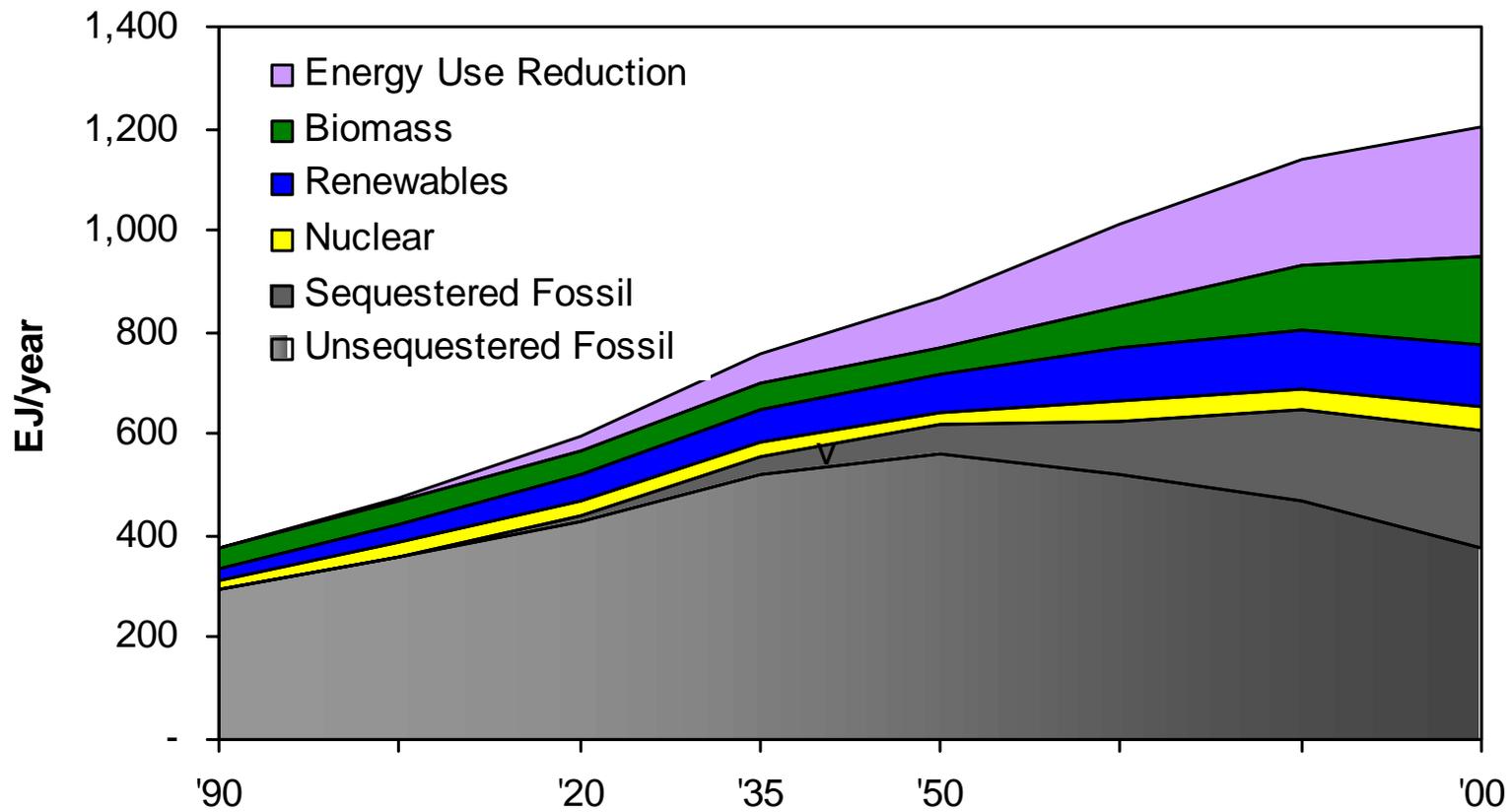
Climate Change Technology Program
Director: Senior-Level Appointee U.S. Department of Energy
Members: DOC, DOD, DOE, DOI, DOS, DOT, EPA, HHS, NASA, NSF, OSTP, USAID, USDA

*Chair and Vice Chair of Committee and Working Group rotate annually

Policy Actions for Near-Term Progress

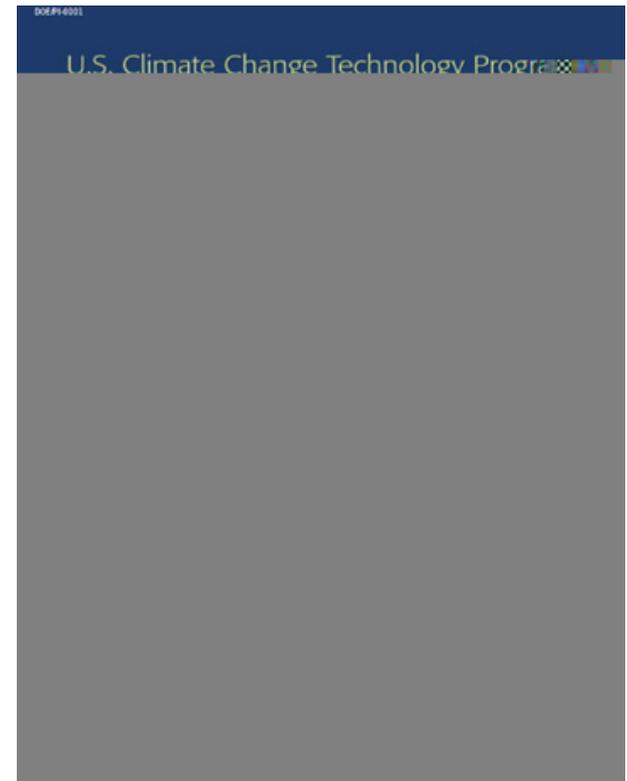
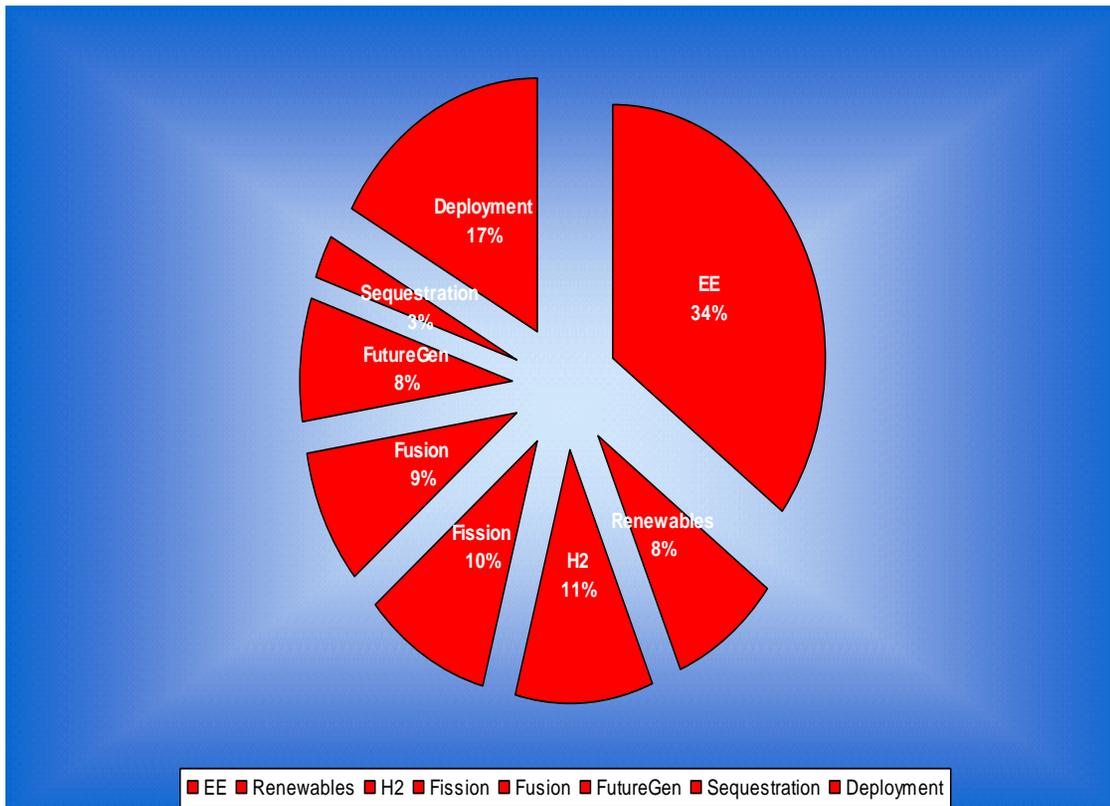
- Voluntary Programs
 - **Climate VISION (www.climatevision.gov)**
 - **Climate Leaders (www.epa.gov/climateleaders)**
 - **SmartWay Transport Partnership (www.epa.gov/smartway)**
 - **1605(b)**
- Tax Incentives/Deployment Partnerships
- Fuel Economy Increase for Light Trucks
- USDA Incentives for Sequestration
- USAID and GEF funding
- Initiative Against Illegal Logging
- Tropical Forest Conservation

Stabilization requires a diverse portfolio

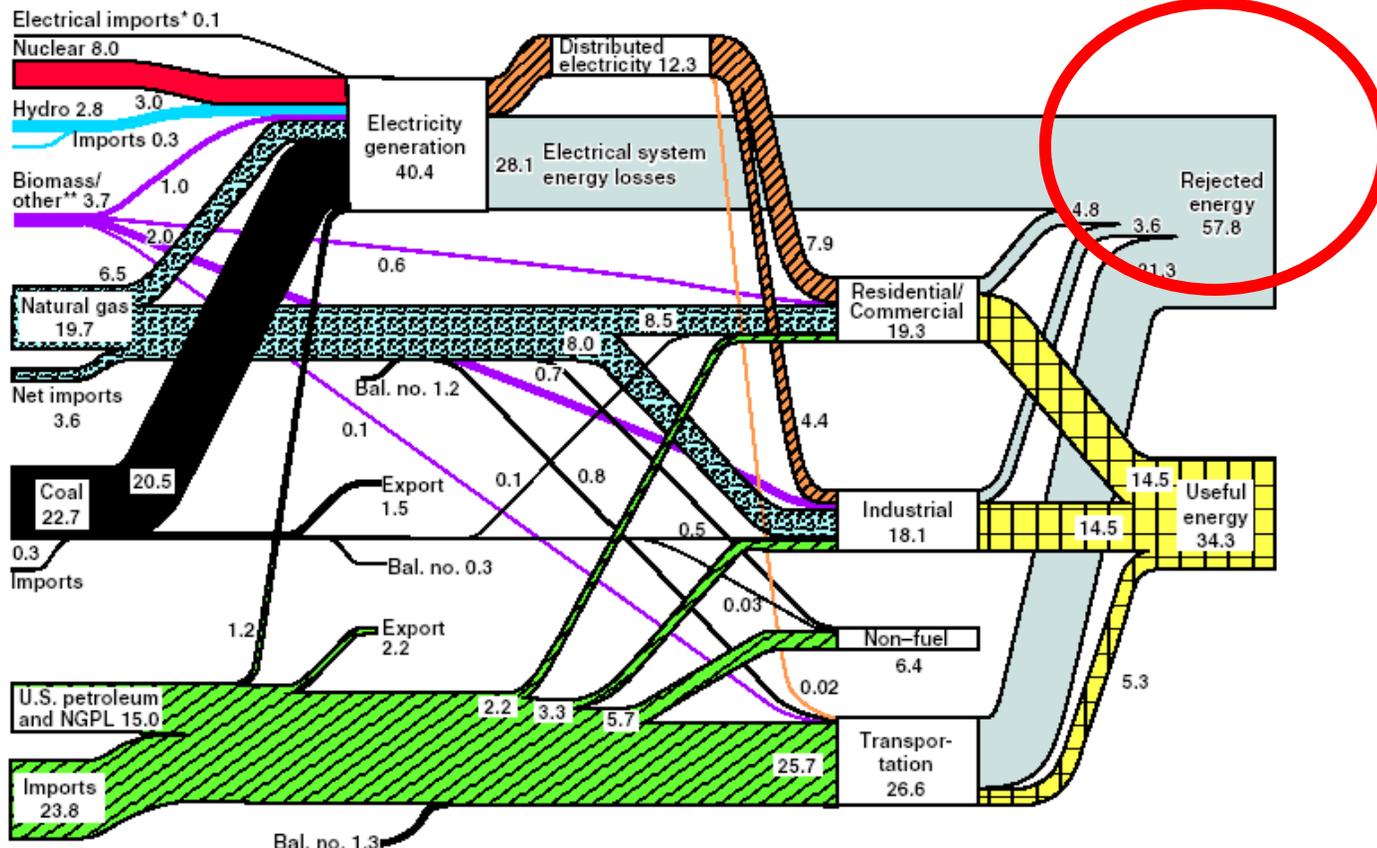


The U.S. Leads the World

\$3 Billion in RDD&D



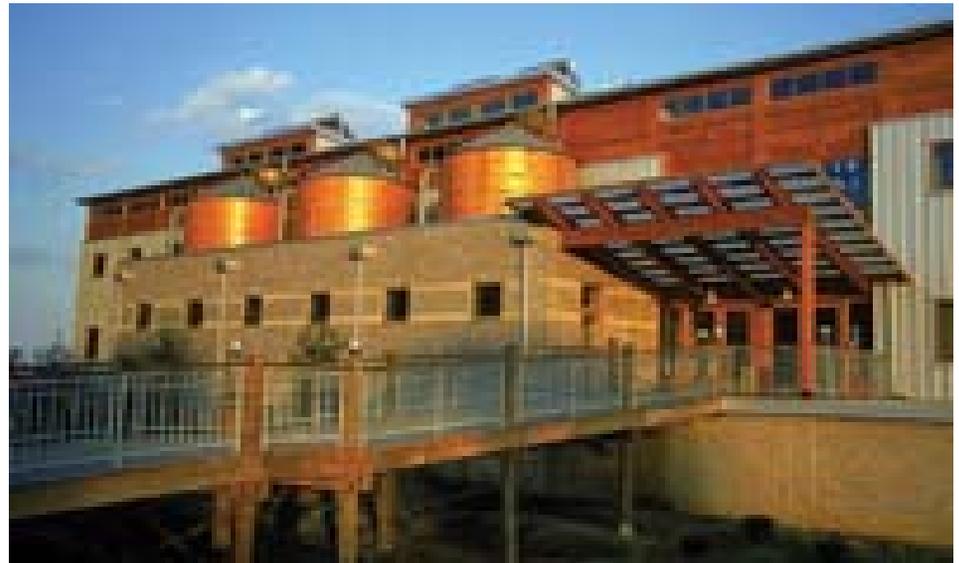
Efficiency is a Key Opportunity . . .



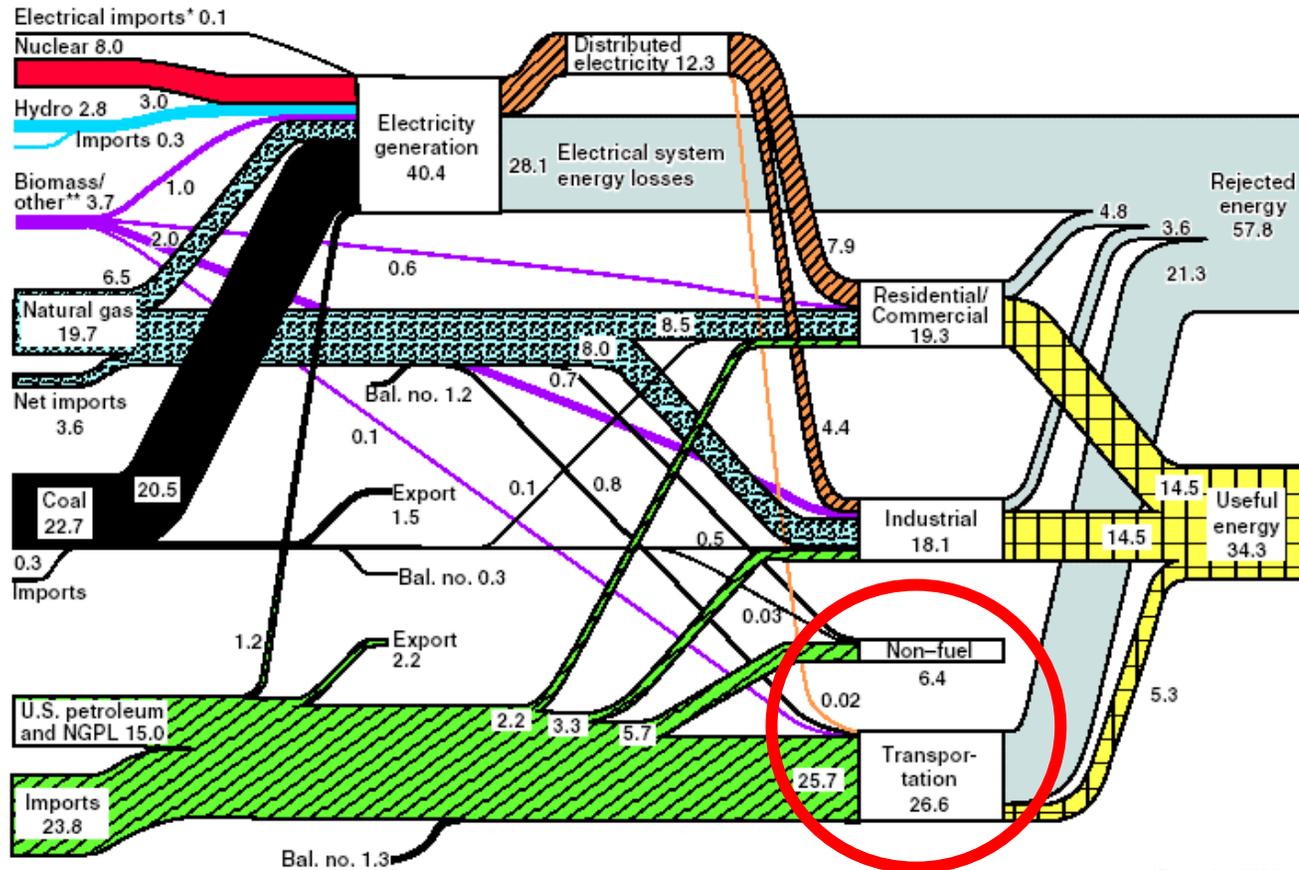
Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2000*
 *Net fossil-fuel electrical imports
 **Biomass/other includes wood and waste, geothermal, solar, and wind.

Efficiency Should be Market-driven . . .

- Low energy prices
 - Average retail electricity prices 7 cents per kw/h
 - Retail gasoline prices \$1.65/gallon
- Federal RDD&D
 - >\$2.5B FY01-04
- Historic 1% annual EE improvement across all sectors must be maintained
- Energy Daily: “Xcel Picks Electric City for Demand-Side Management



The Transportation Challenge



Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2000*
 *Net fossil-fuel electrical imports
 **Biomass/other includes wood and waste, geothermal, solar, and wind.

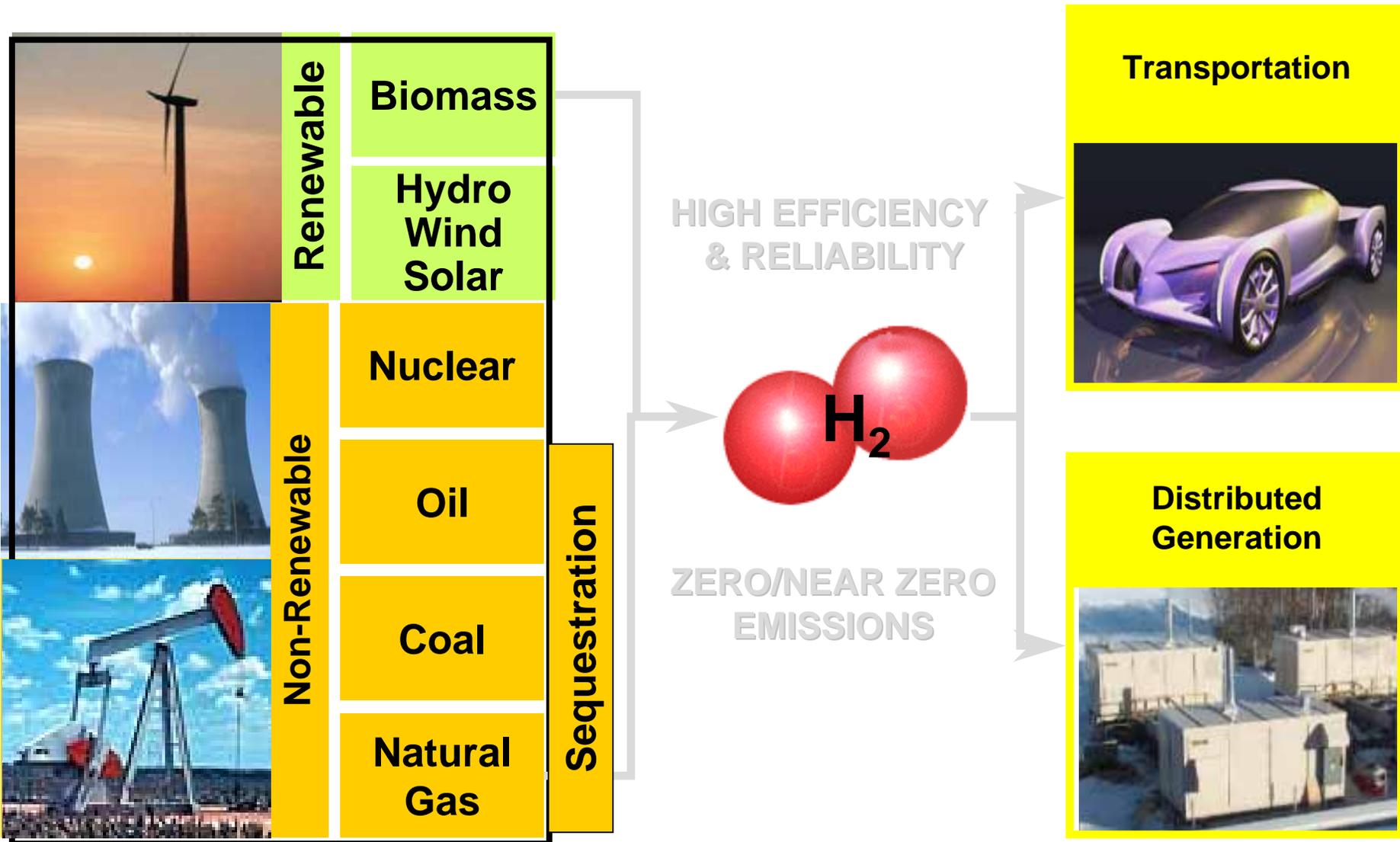
December 2001
 Lawrence Livermore
 National Laboratory

FreedomCAR/Hydrogen Fuel Initiative



- Our long term vision: A transportation system powered by hydrogen derived from a variety of domestic resources.

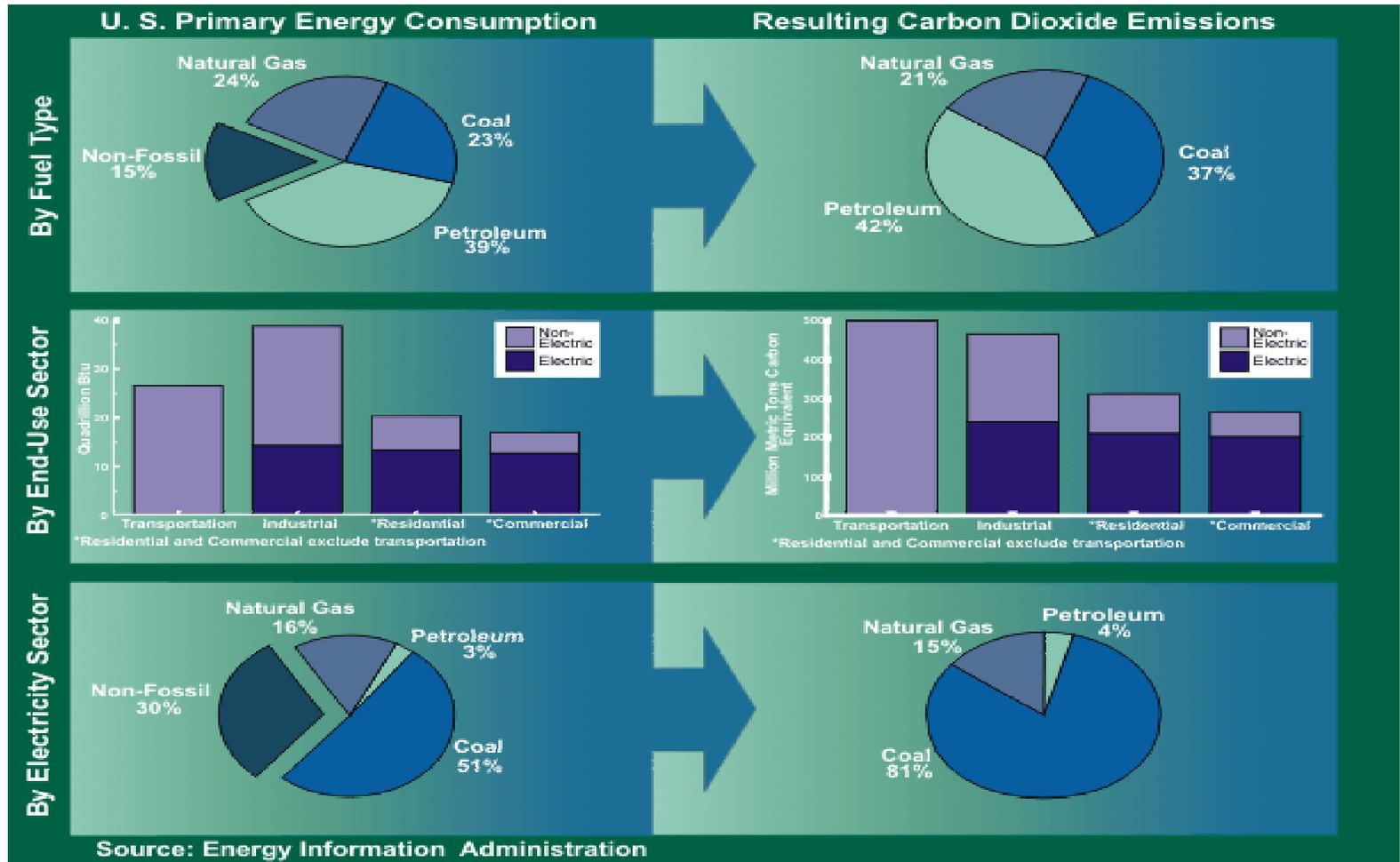
Hydrogen from Diverse Domestic Resources



Strategic Approach

- Develop technologies to enable mass production of affordable hydrogen-powered fuel cell vehicles and the hydrogen infrastructure to support them.
- Continue support for other technologies to reduce oil consumption and environmental impacts.
 - CAFE
 - Hybrid electric
 - Clean Diesel/Advanced ICE
 - Biofuels

Electricity: Dominated by Fossil Fuels



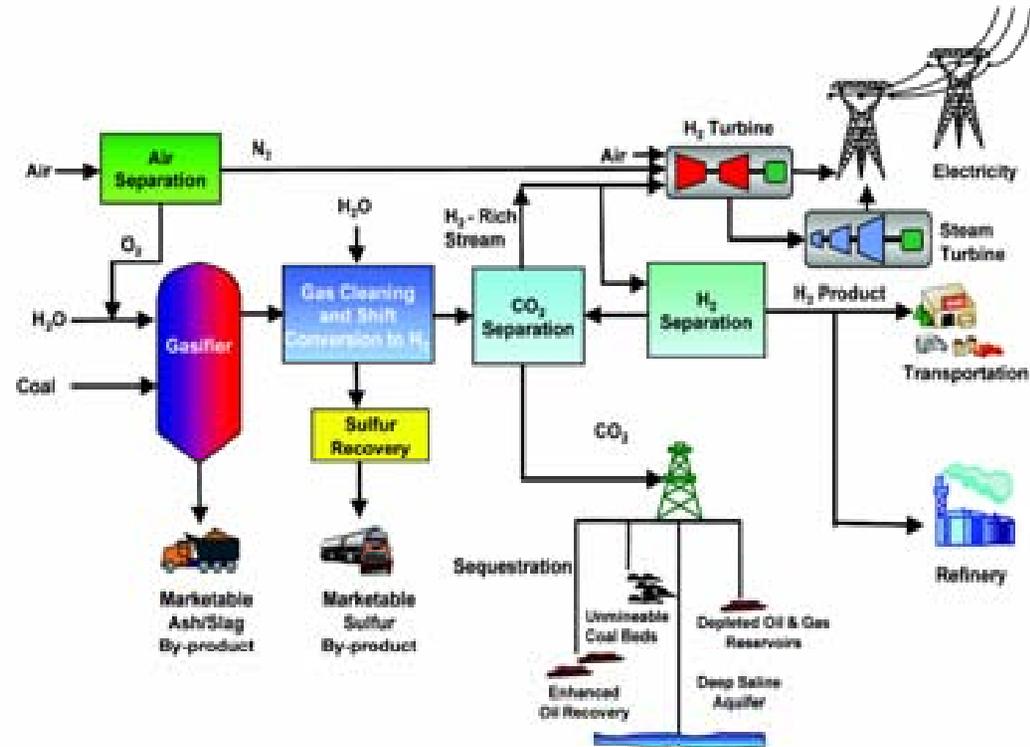
Renewable Energy RDD&D Strong and Productive

- \$263 million annual direct Federal investments; production tax credits to spur deployment



FutureGen

- Future of the coal industry
- Multiple fuels
 - Coal
 - Petroleum Coke
 - Biomass
- CO₂ sequestered
- Multiple products
 - Electricity
 - Fuels/Chemicals
 - » H₂ in transportation
 - Process Heat



Nuclear Energy

Generation I

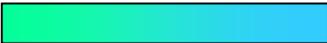


Early Prototype Reactors



- Shippingport
- Dresden, Fermi
- Magnox

Generation II



Commercial Power Reactors



- LWR-PWR, BWR
- CANDU
- VVER/RBMK
- AGR

Generation III



Advanced LWRs



- ABWR
- System 80+
- AP600
- EPR

Generation III+

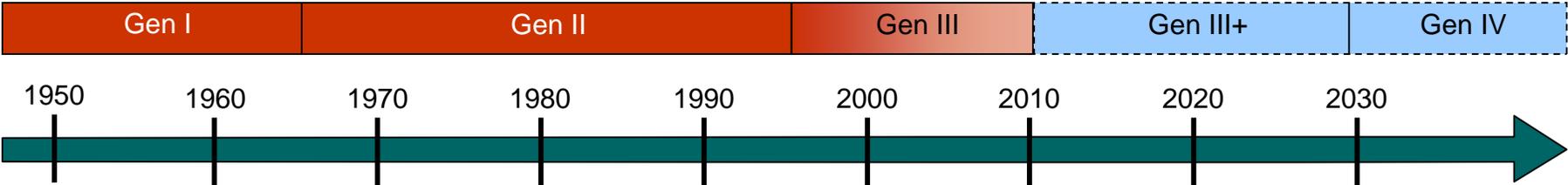


Generation III Evolutionary Designs Offering Improved Economics

Generation IV

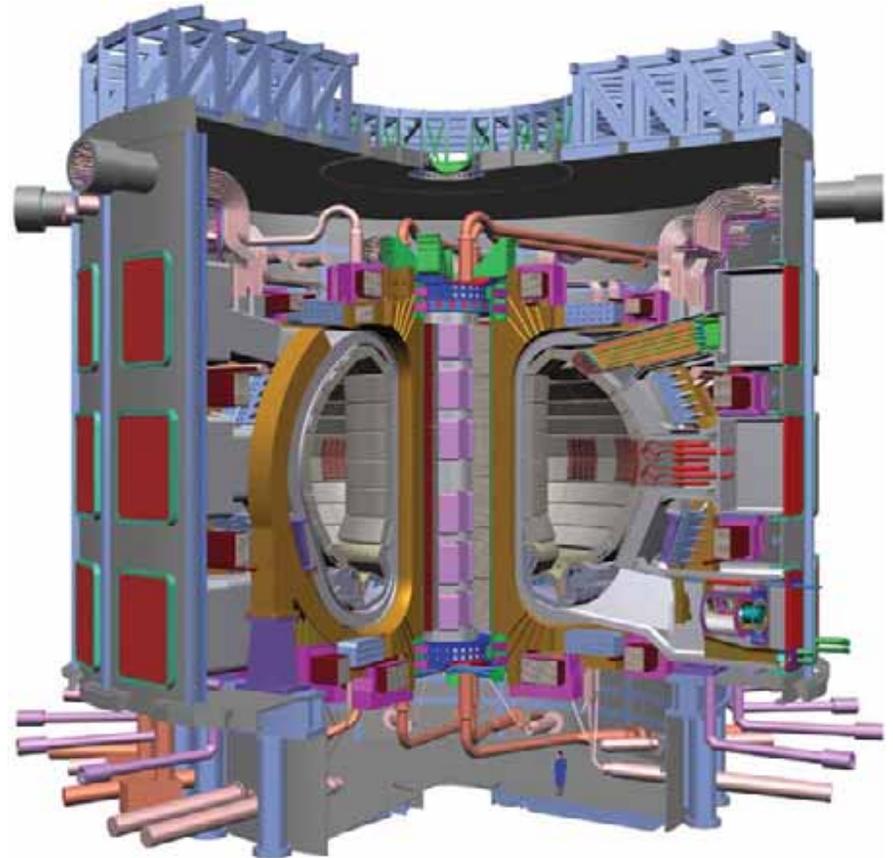


- Highly Economical
- Enhanced Safety
- Minimize Wastes
- Proliferation Resistant



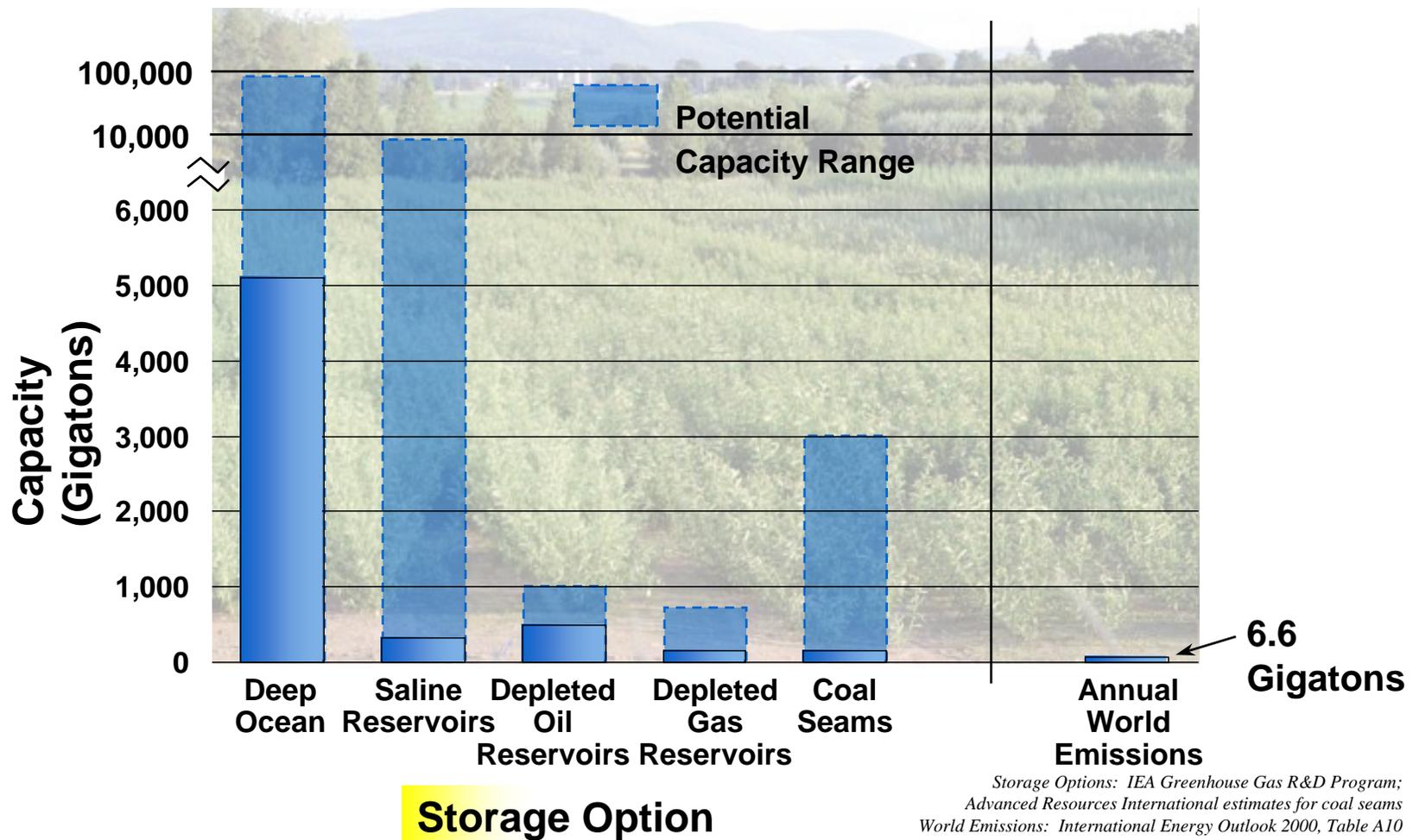
Fusion: The US and ITER

- US rejoined ITER in January 2003
- Negotiations on-going over site
 - Rokkasho or Cadareche
 - March 12-13 in Vienna
- ITER FY05 request \$38M of a total \$264M fusion budget
- Goals
 - 500 MW for 500-2,500 seconds
 - Commercialization by 2050



Active Carbon Sequestration

Large Potential Worldwide Storage Capacity



Sequestration

Capture and Storage of CO₂

Advanced



Conversion to minerals, bioconversion, etc.

Geologic



Injection into oil reservoirs, unusable aquifers, coal seams

Ocean



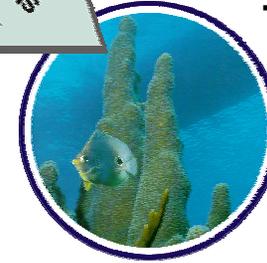
Deepwater injection

Enhancing Natural CO₂ Sinks

Improved nutrients, better agricultural practices



Terrestrial



Enhanced photosynthesis in algae ponds, greenhouses

advanced concepts, feedstock/reuse

geologic sequestration

ocean sequestration

soil & vegetation enhancement

enhanced photosynthesis

CCTP Process

- Federal R&D Portfolio Review & Budget Input
- Strategic Plan
- Working Group Structure
 - Energy Production
 - Energy Efficiency
 - Sequestration
 - Other Gases
 - Monitoring and Measurement
 - Supporting Basic Research
- Competitive Solicitation/RFI seeking new ideas

Keys to Meeting the President's Goals

- Leadership in climate science
- Leadership in climate-related technology
- Better understanding of the potential risks of climate change and costs of action
- Robust set of viable technology options that address energy supply and efficiency/productivity
- Integrated understanding of both science and technology to chart future courses and actions
- Global approach... all nations must participate