The Bush Administration's Climate Change Strategy:
An Overview

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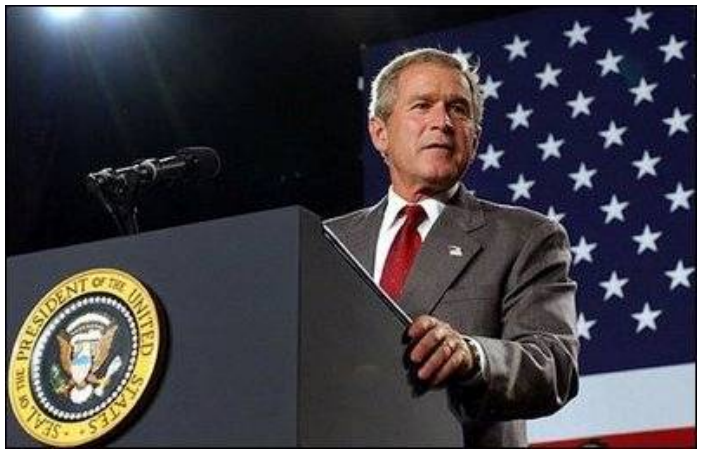
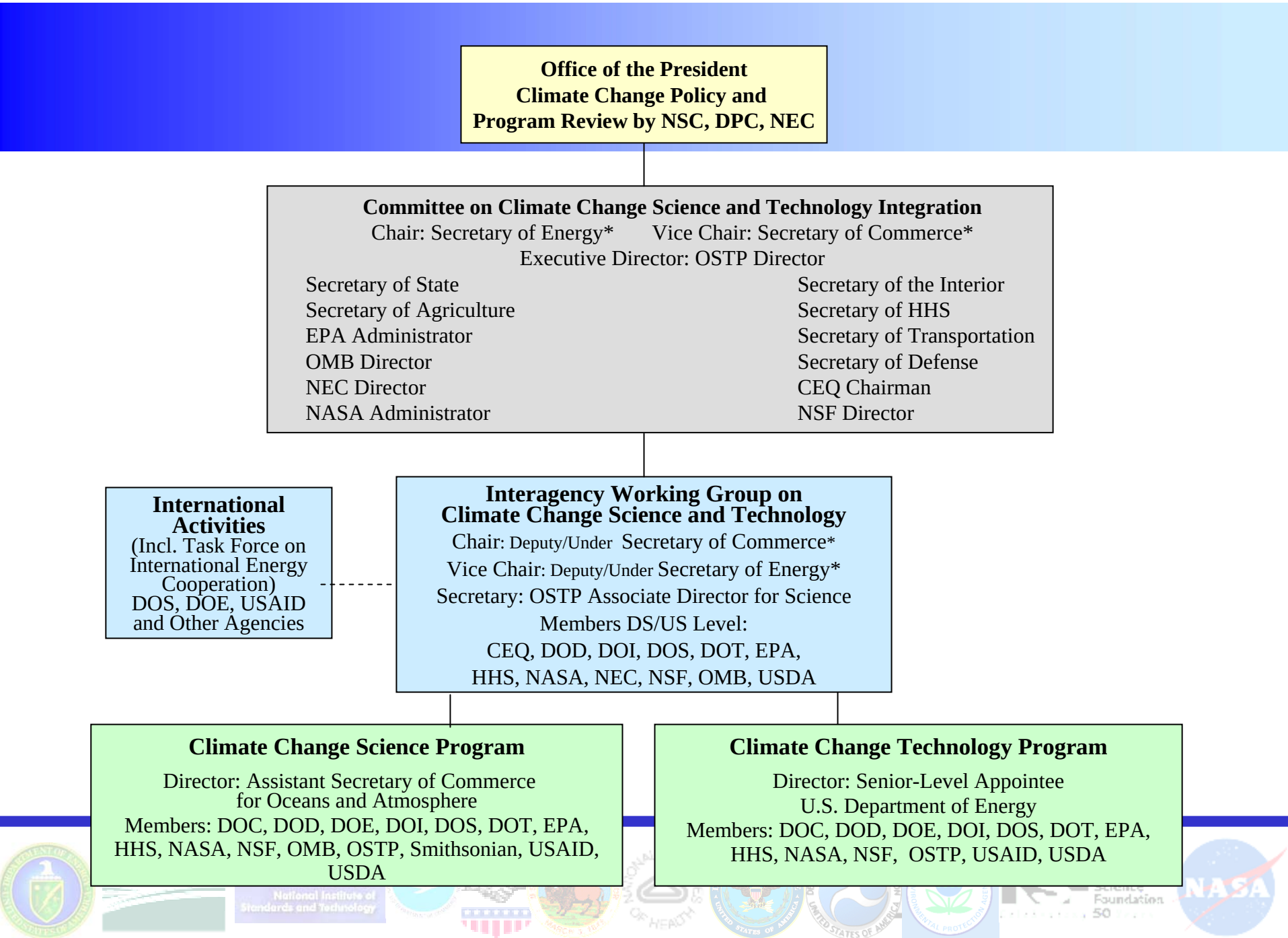
Albany, New York

Reducing GHG Intensity



- On February 14, 2002, President Bush set a goal to reduce U.S. GHG emissions intensity—i.e., GHG per unit of GDP—18% by 2012
- This is equivalent to an estimated 500 million metric tons of cumulative carbon equivalent reductions from 2002 - 2012


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

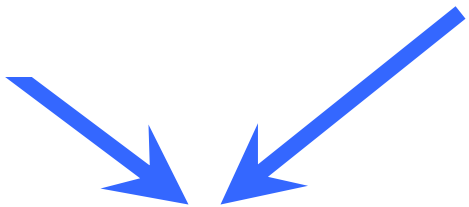
Approach

Climate Change Science Program

- Reduce Scientific Uncertainty
- Illuminate Risks/Benefits
- Guide and Pace Strategy

Climate Change Technology Program

- Advance Technology Options
- Improve Performance/Reduce Costs



Interagency Working Group and Cabinet Level Committee on Climate Change S&T Integration

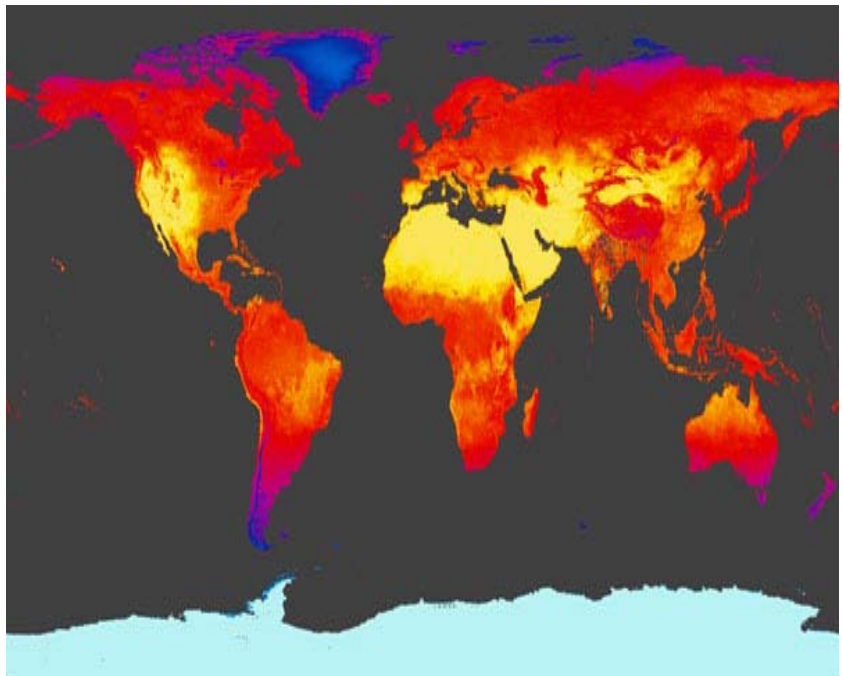
Pursue a Sensible, Integrated Policy

CCTP Process

- **Technology inventory**
  - Technology Options for the Near and Long Term
  - Current Activities Report
- **Gap analysis**
  - NCCTI RFI Report
- **Budget baseline**
  - Working draft
- **Strategic Plan**

CCTP Strategic Plan – June 2004

- **Introduction/Context**
- **Goal Chapters**
  - Role for Technology
  - R&D Strategy
  - Current Portfolio Emphasis
  - Future Applied Research Directions
- **Focusing Basic Science Contributions**
- **Conclusion and Appendices**



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
- Non-road Diesel Rule
- Interstate Air Quality Rule
- USDA Incentives for Sequestration
- USAID and GEF funding
- Initiative Against Illegal Logging
- Tropical Forest Conservation

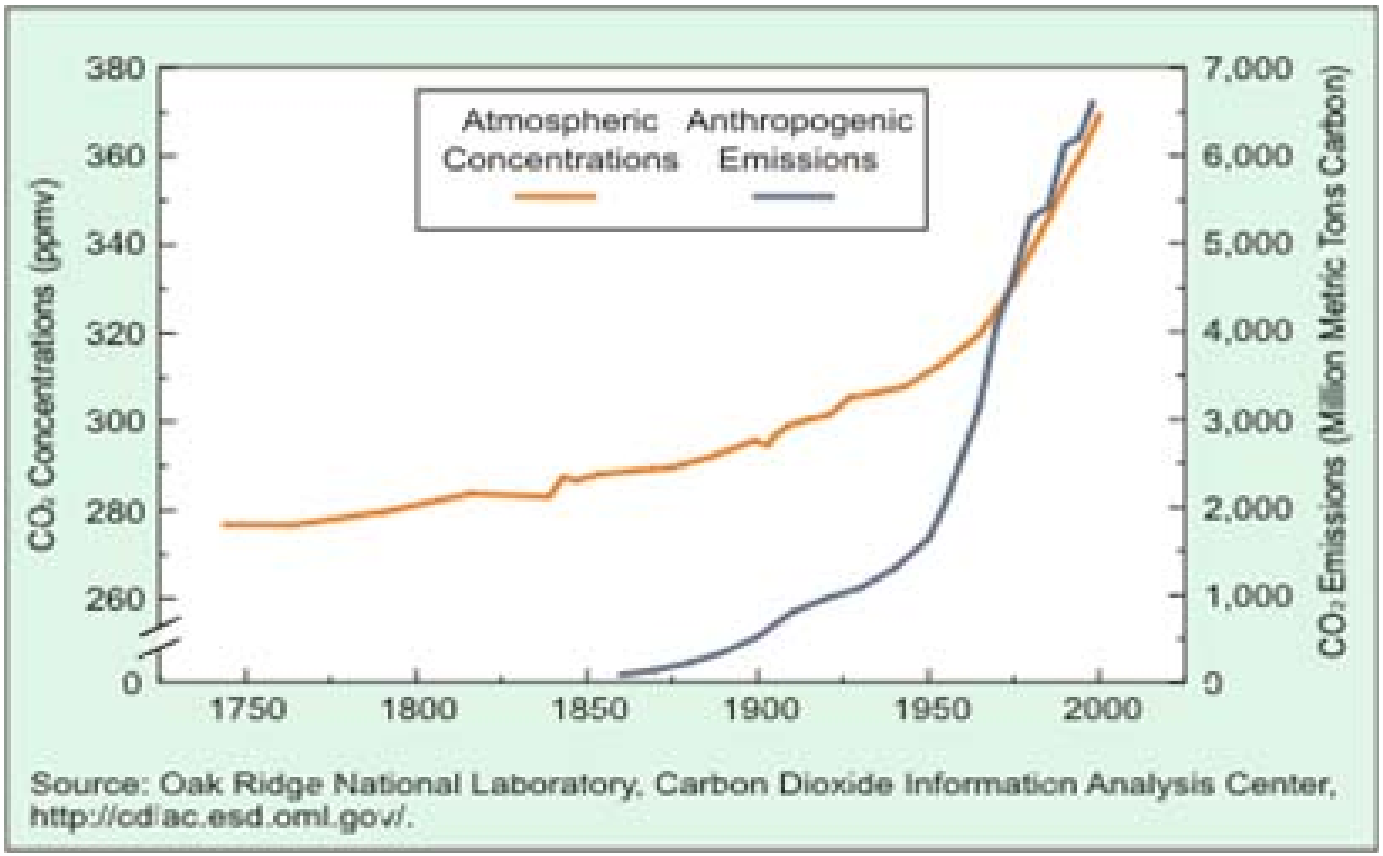
The Key Long Term Challenge

"I reaffirm America's commitment to the United Nations Framework Convention and its central goal, to stabilize atmospheric greenhouse gas concentrations at a level that will prevent dangerous human interference with the climate."

"(We will) set America on a path to slow the growth of our greenhouse gas emissions and, as science justifies, to stop and then reverse the growth of emissions."

- President George W. Bush
February 14, 2002

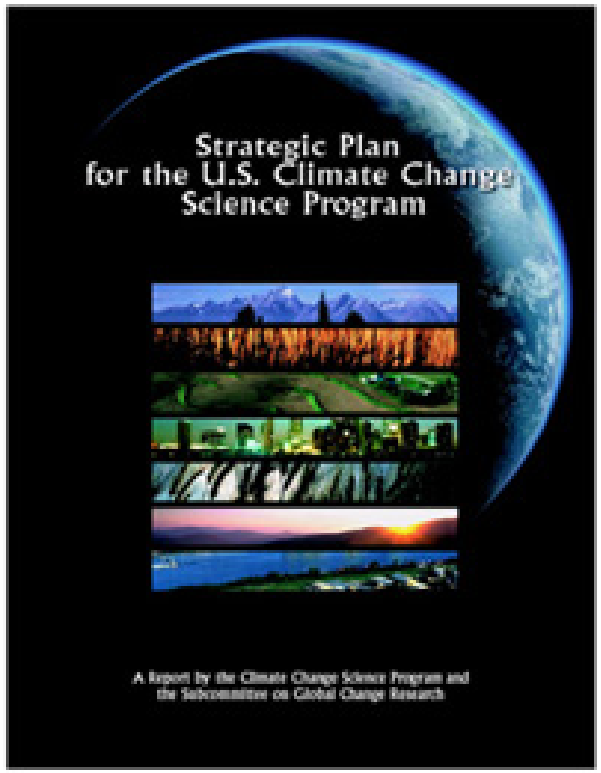
Emissions and Concentrations



Source: Oak Ridge National Laboratory, Carbon Dioxide Information Analysis Center, http://cdiac.esd.ornl.gov/.

Science: An ambitious plan

- **Advance the state of knowledge of:**
  - climate variability
  - climate system response to human-induced changes
  - the implications of these potential changes and management options
- **What's causing it?**
- **What may happen**
- **What can we/should we do about it?**

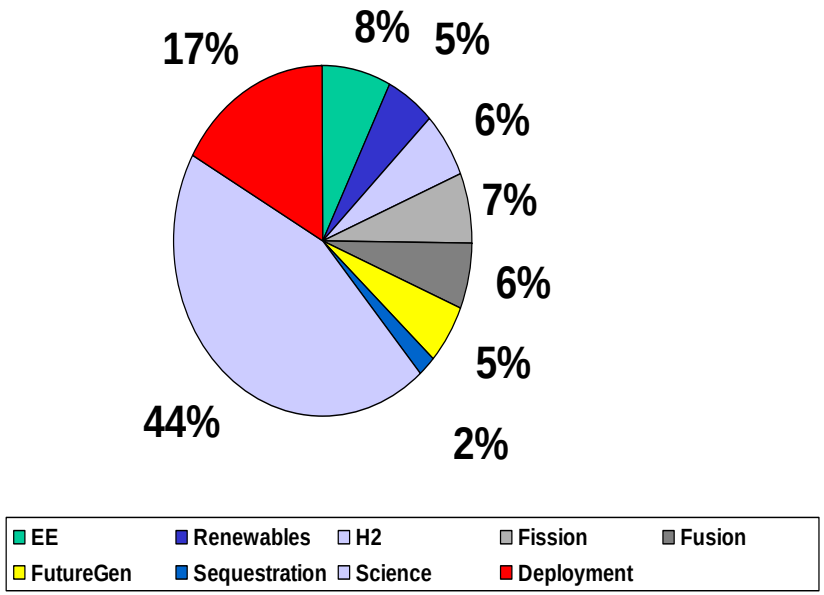


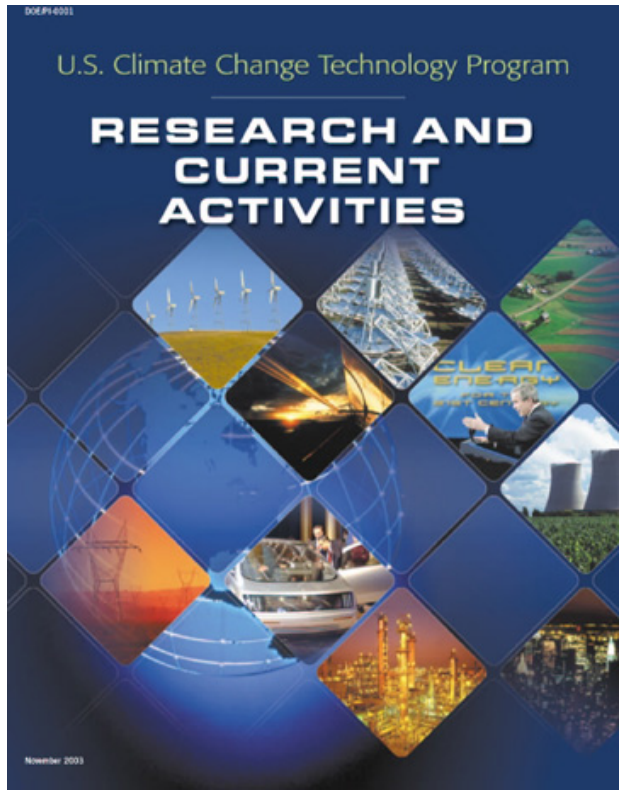
Science: Understanding the risks

- **21 Synthesis & Assessment Products – Highlights:**
  - Temperature trends in the lower atmosphere
  - Aerosols properties & impacts
  - Risks of abrupt changes
  - Ecosystem changes and climate change
  - Scientific uncertainty and decision support

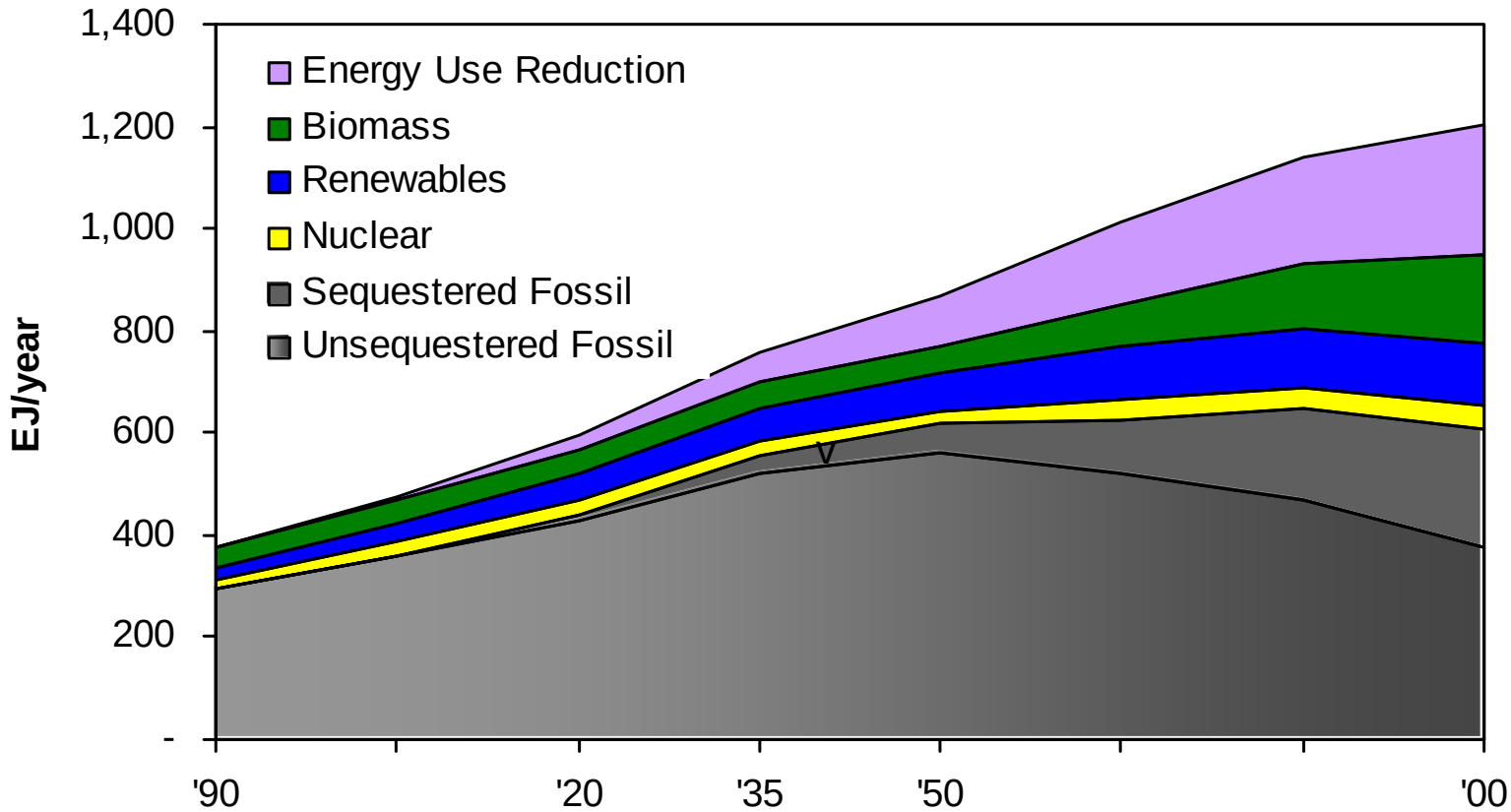
Science & Technology: Leading the World

$5 Billion in US public investments





Stabilization requires a diverse portfolio



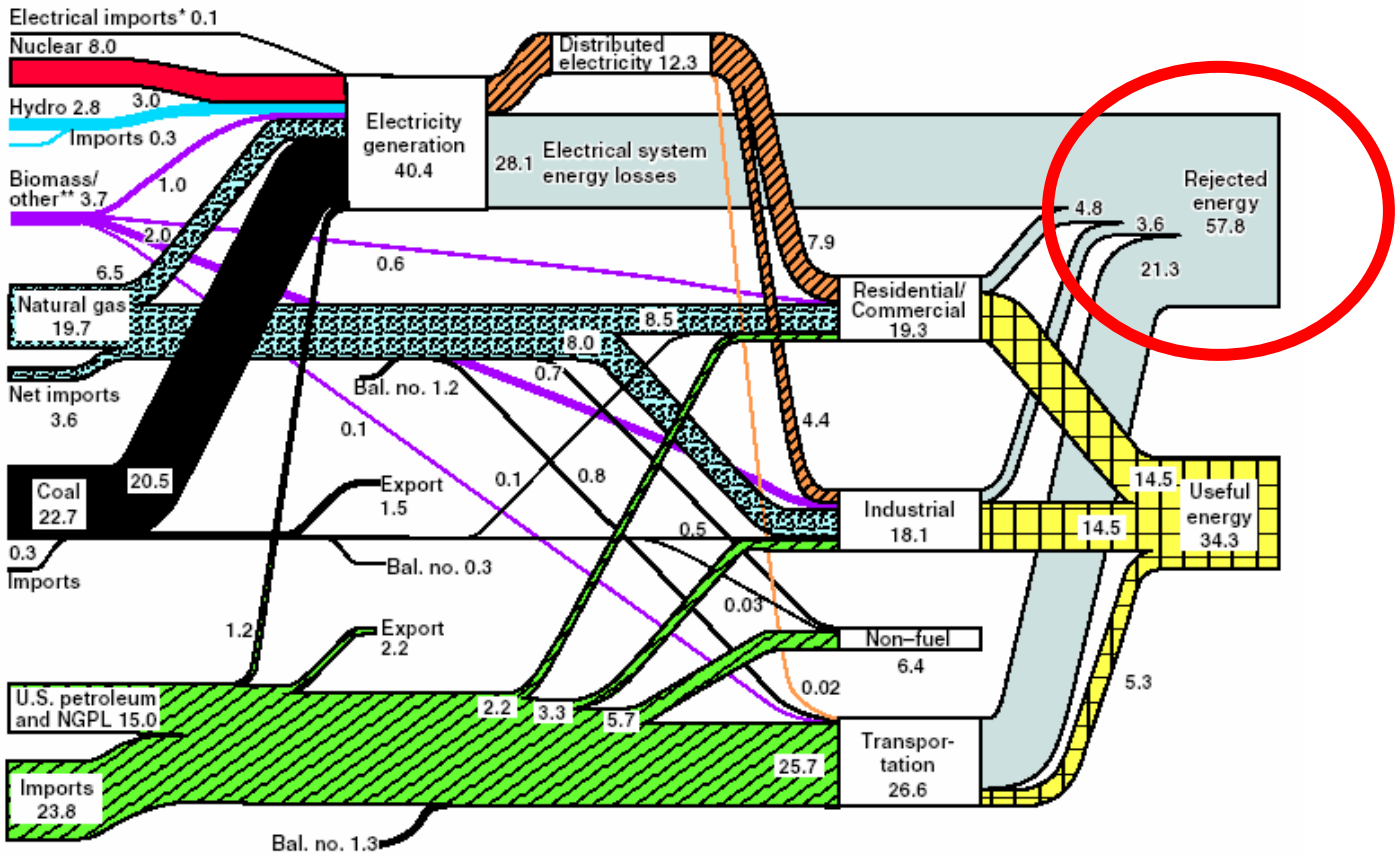
Technology: Program goals

- **Reduce emissions from energy end use & infrastructure**
- **Reduce emissions from energy supply**
- **Advance CO2 Capture & Sequestration**
- **Reduce emissions from non-CO2 gases**
- **Enhancing Measurement & Monitoring**

Technology Options for the Near and Long-Term

- Transportation
- Buildings
- Infrastructure (Grid)
- Industry
- Low-emissions fossil-based power and fuels
- Hydrogen
- Renewable energy and fuels
- Nuclear fission
- Nuclear fusion
- Geologic sequestration
- Terrestrial sequestration
- Ocean sequestration
- Methane emissions
- Other High GWP Gases
- Tropospheric Ozone Precursors and Black Carbon
- Measurement and Monitoring

Efficiency is a Key Opportunity . . .

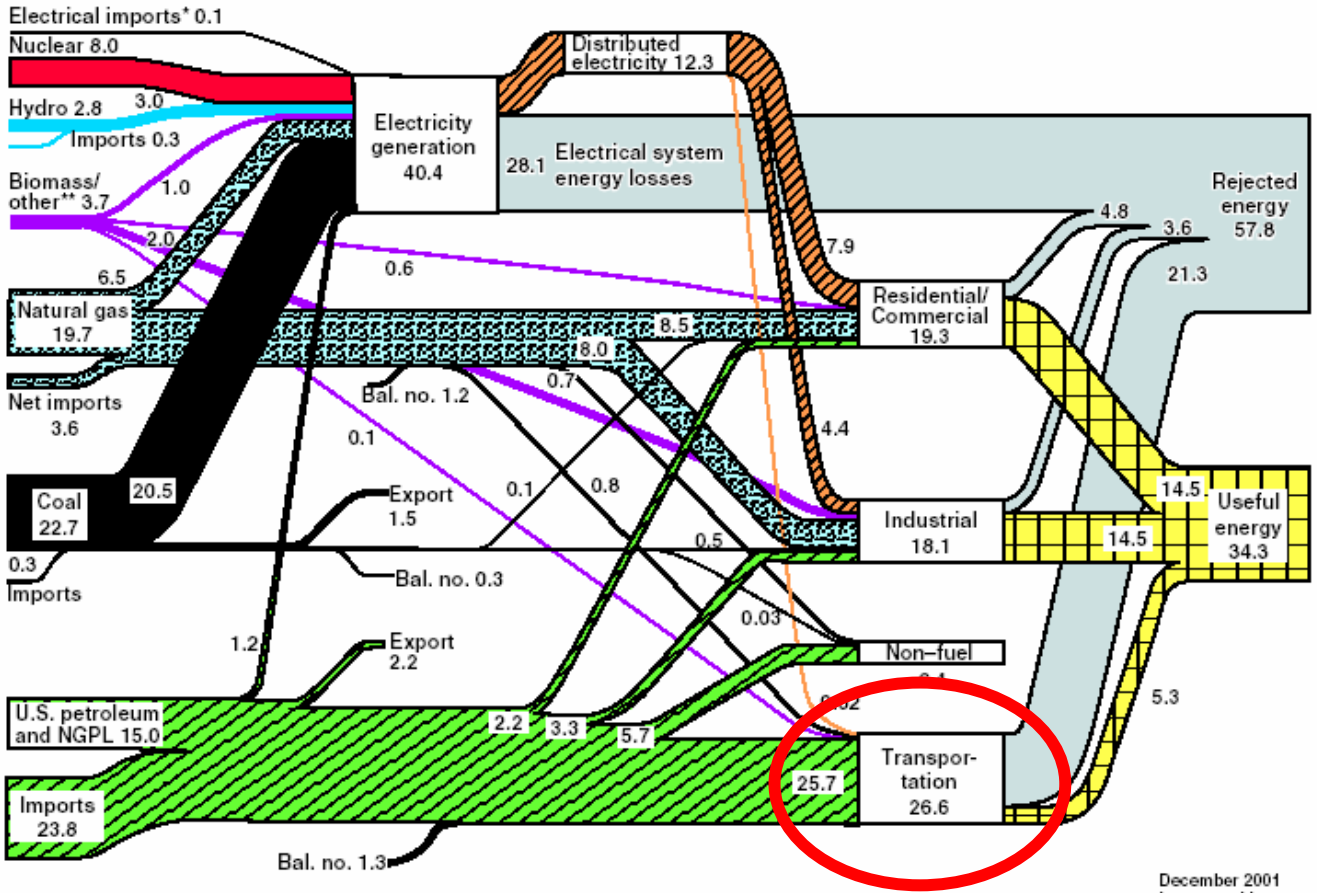


Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2000*
*Net fossil-fuel electrical imports
**Biomass/other includes wood and waste, geothermal, solar, and wind.

Efficiency should be market-driven . . .

- **“Zero” energy buildings**
- **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

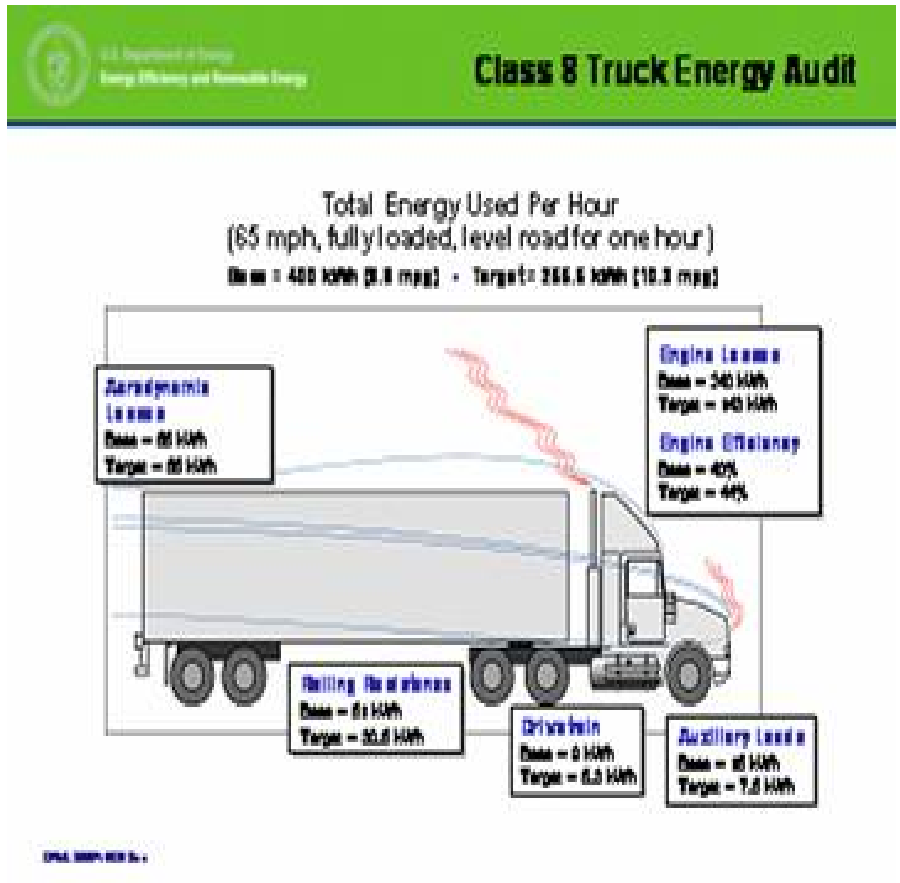


Source: Production and end-use data from Energy Information Administration, *Annual Energy Review 2000*
*Net fossil-fuel electrical imports
**Biomass/other includes wood and waste, geothermal, solar, and wind.

December 2001
Lawrence Livermore
National Laboratory

Technology Options for the Near and Long-Term - Transportation

- **Light Vehicles**
  - Hybrids, Electric, and Fuel Cell
- **Heavy Vehicles**
- **Alternative-Fueled Vehicles**
- **Intelligent Transportation Systems Infrastructure**
- **Aviation**
- **Transit Buses – Urban Duty Cycle, Heavy Vehicles**



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.**
  - Hybrid electric
  - Clean Diesel/Advanced ICE
  - Biofuels

Hydrogen from Diverse Domestic Resources

Renewable

Biomass

Hydro
Wind
Solar

Non-Renewable

Nuclear

Oil

Coal

Natural Gas

Sequestration

HIGH EFFICIENCY & RELIABILITY

H_2

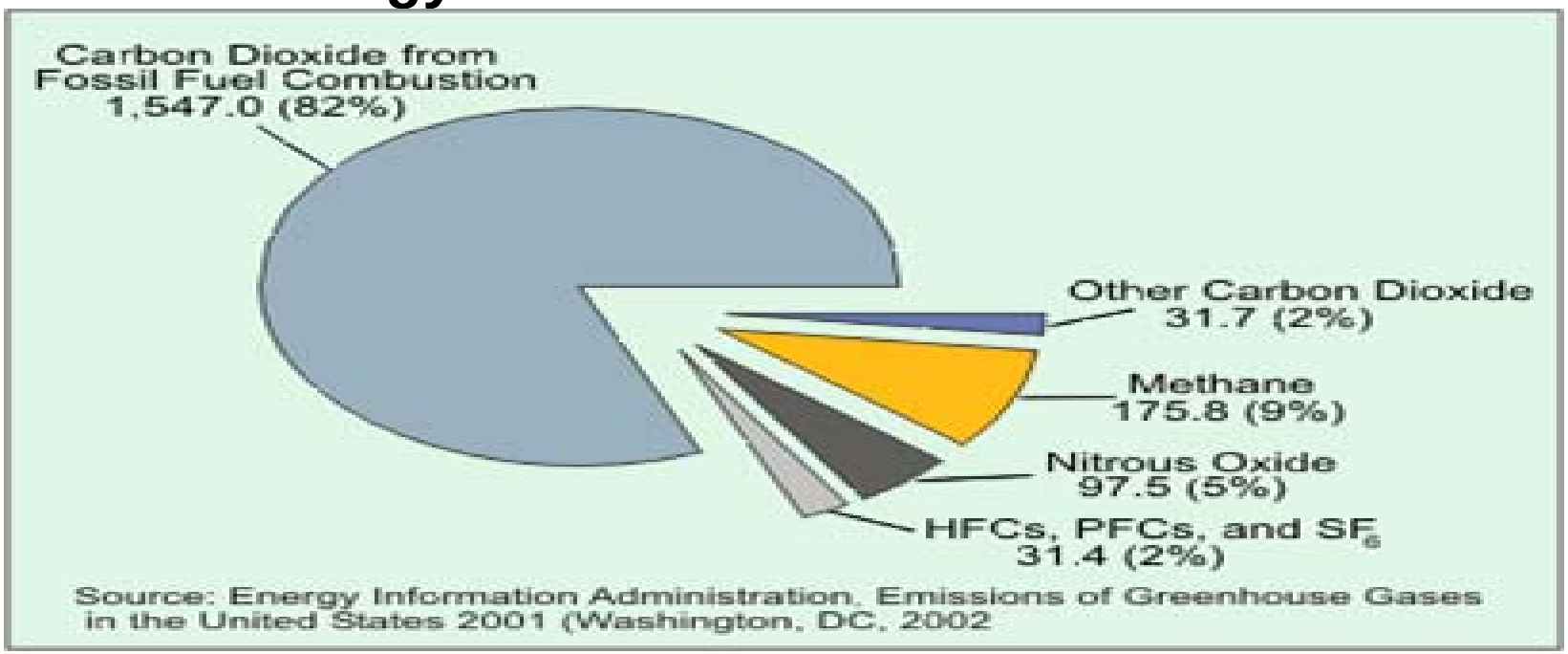
ZERO/NEAR ZERO EMISSIONS

Transportation

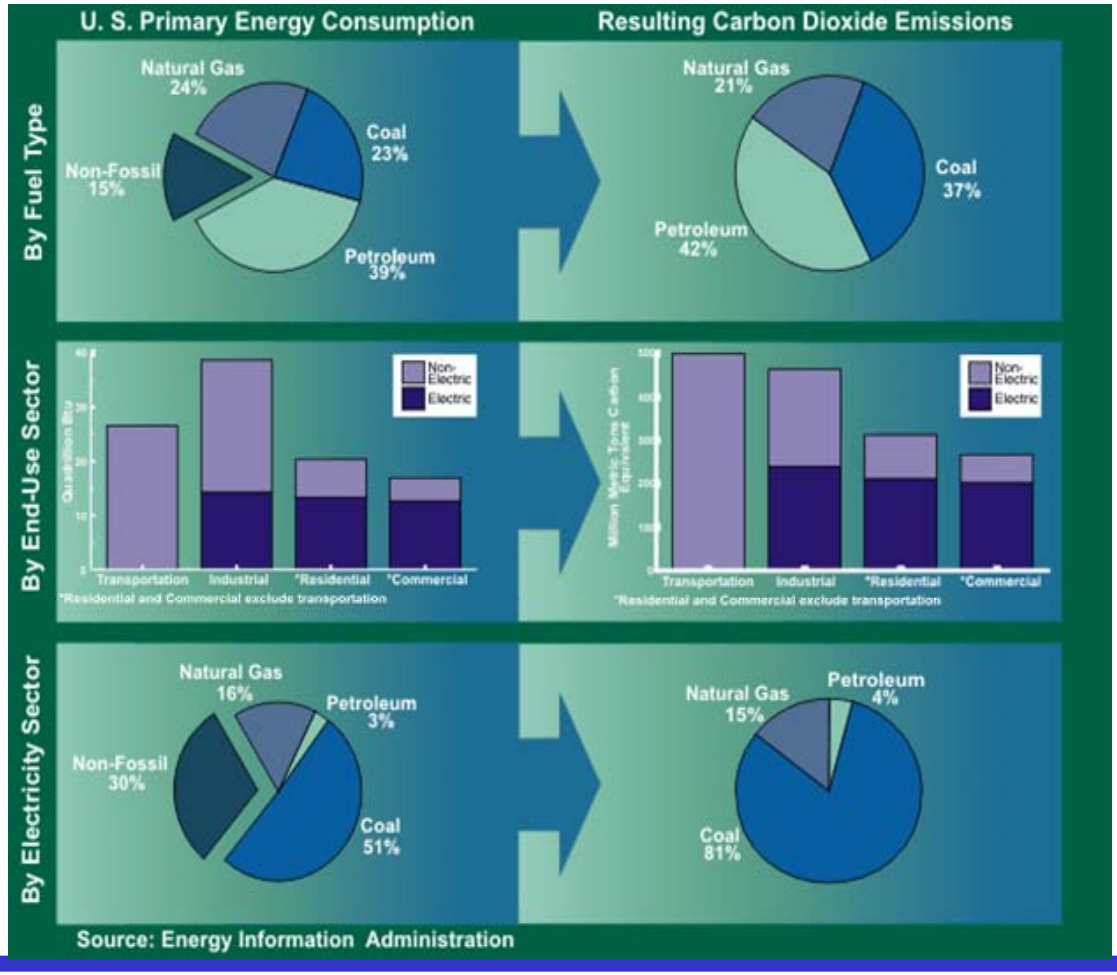
Distributed Generation

Technology: Focusing on energy

- **Any effort to address GHG emissions necessarily involves energy**



Energy: Fossil fuel the driver

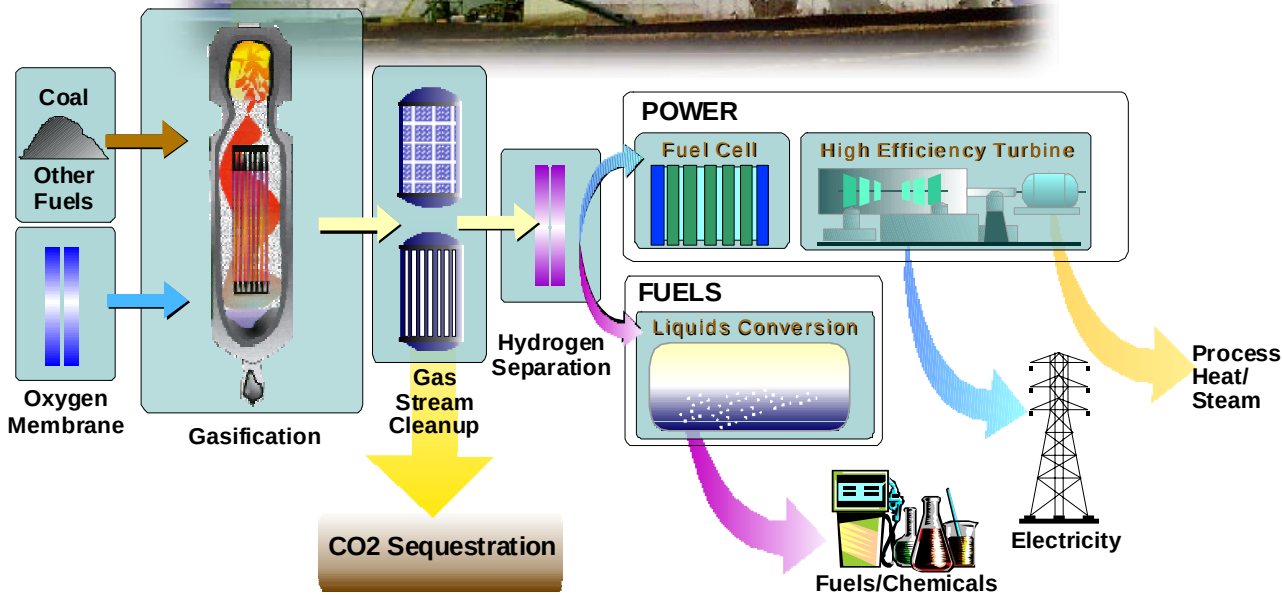


Renewable energy RDD&D strong & productive

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

Future Gen

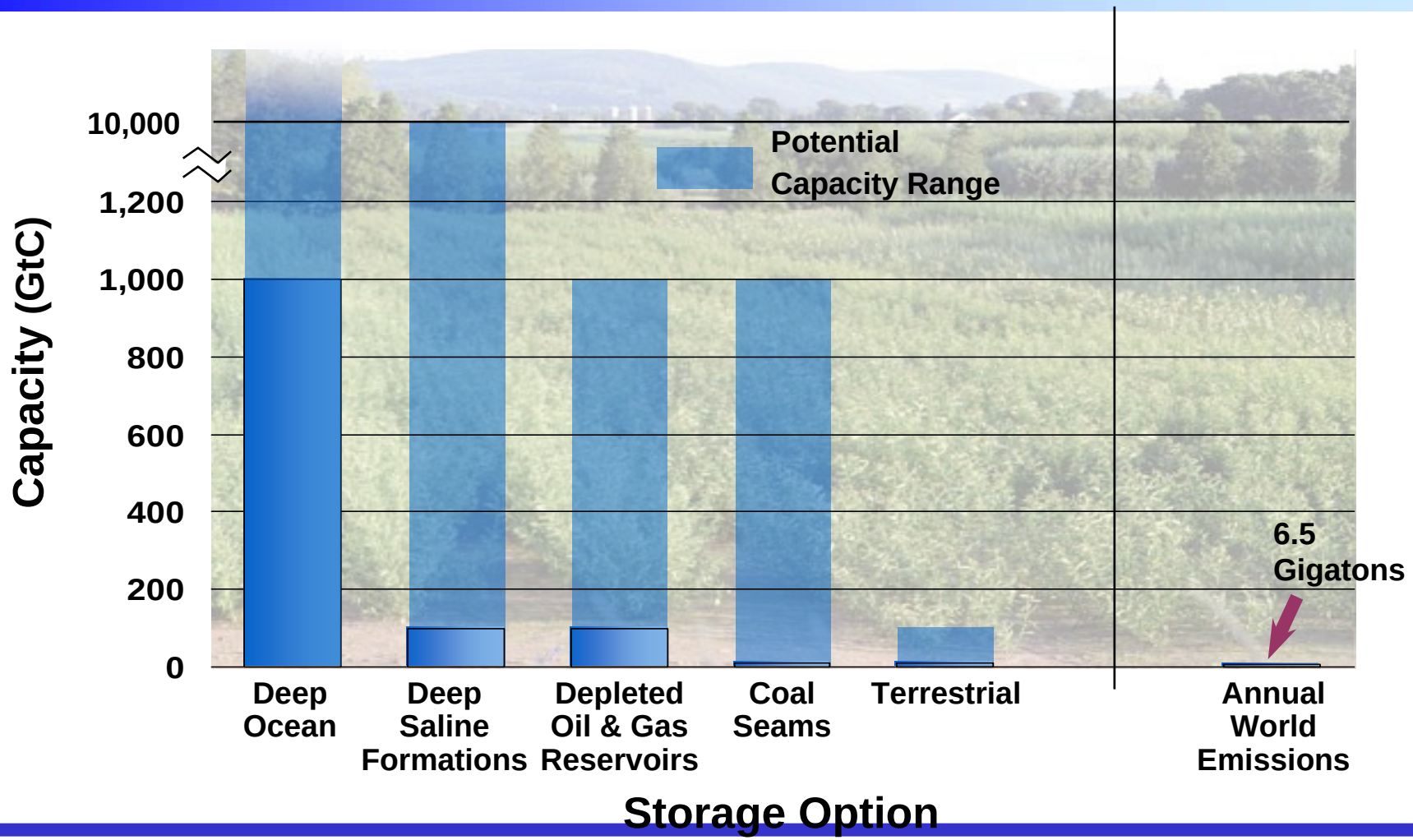
- **Coal's future**
- **Multiple Fuels**
  - Coal
  - Petroleum Coke
  - Biomass
- **CO2 sequestered**
- **Multiple products**
  - Electricity
  - Fuels/Chemicals
    - H2 for transportation
  - Process Heat



National Research Council Hydrogen Report

- **The committee commends the DOE on its initiative in undertaking the FutureGen Project and recommends that the DOE move ahead with the project because of its promise of demonstrating coal-to-hydrogen production coupled with sequestration at a significant scale and its use as a large-scale test bed for related process improvements.**

Large Potential Worldwide Storage Capacity



Storage Options: Carbon Capture & Sequestration Program @MIT
World Emissions: DOE/EIA, International Energy Outlook 2003, Table A10

Sequestration

Capture and Storage of CO_2

Advanced

Conversion to minerals, bioconversion, etc.

Geologic

Injection into oil reservoirs, unusable aquifers, coal seams

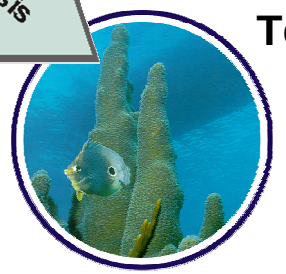
Ocean

Deepwater injection

Enhancing Natural CO_2 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

Nuclear Energy

The Evolution of Nuclear Power

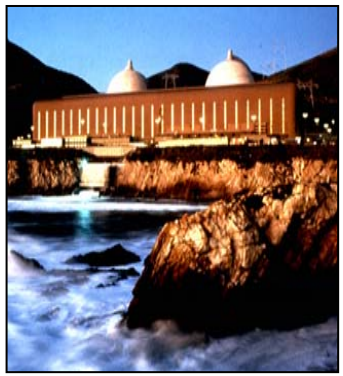
Generation I

Early Prototype Reactors

- Shippingport
- Dresden, Fermi
- Magnox

Generation II

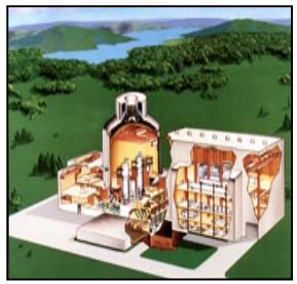
Commercial Power Reactors



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

Generation III

Advanced LWRs



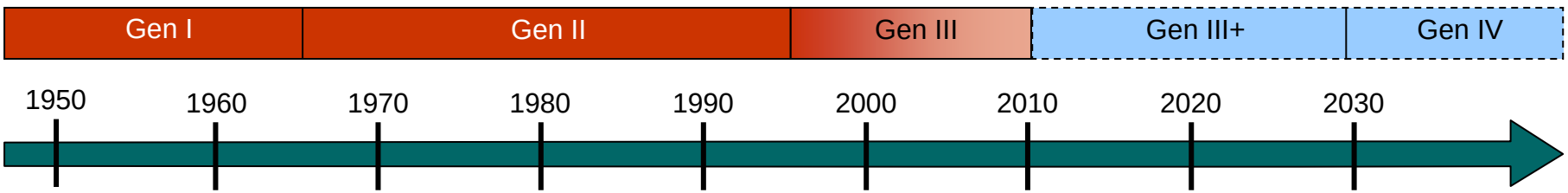
- ABWR
- System 80+
- AP600
- EPR

Generation III+

Generation III Evolutionary Designs Offering Improved Economics

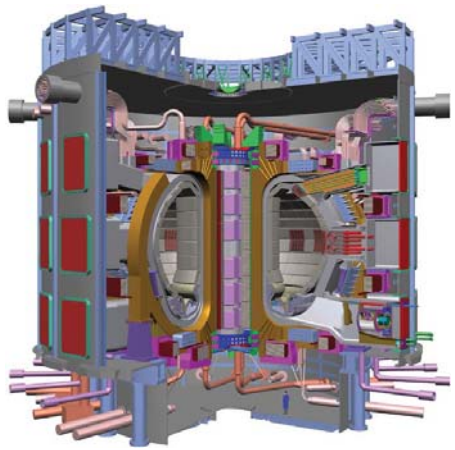
Generation IV

- 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



High Degree of Difficulty

- **Efforts to achieve "near zero" global GHG emissions will be:**
  - A long-term undertaking
  - Expensive compared to current technology
  - Technologically challenging
  - Politically difficult