Energy Security:
Role of Energy Efficiency

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The New Energy Reality

Energy Security is part of our national and economic security

- Demand to increase 50% by 2030
  - 70% in developing world
- Electricity demand to increase 100%
- 1.6 billion people without electricity
- $20 trillion of new investment by 2030 to meet rising demand
- Environmental Sustainability - over 70% of the current anthropologic GHG emissions are energy related

The New Energy Reality

Energy Security is part of our national and economic security

- Access to reserves is limited
  - 2/3 of world's reserves becoming inaccessible
- Rising importance of NOCs
  - Own 50% of reserves
- Lack of investment in exploration
- Significant rise in project costs
- Resource Nationalism
- Lack of qualified engineers
- BANANA Syndrome

Global Challenges

China

- China relies on coal for 70% of their energy needs, building approximately one coal-fired plant a week
- By 2025, they could have 300 million cars on the road, compared to 30 million today
- By 2030, energy-related CO2 emissions from China are projected to account for 26% of the world total and 48% of total coal-related emissions worldwide

India

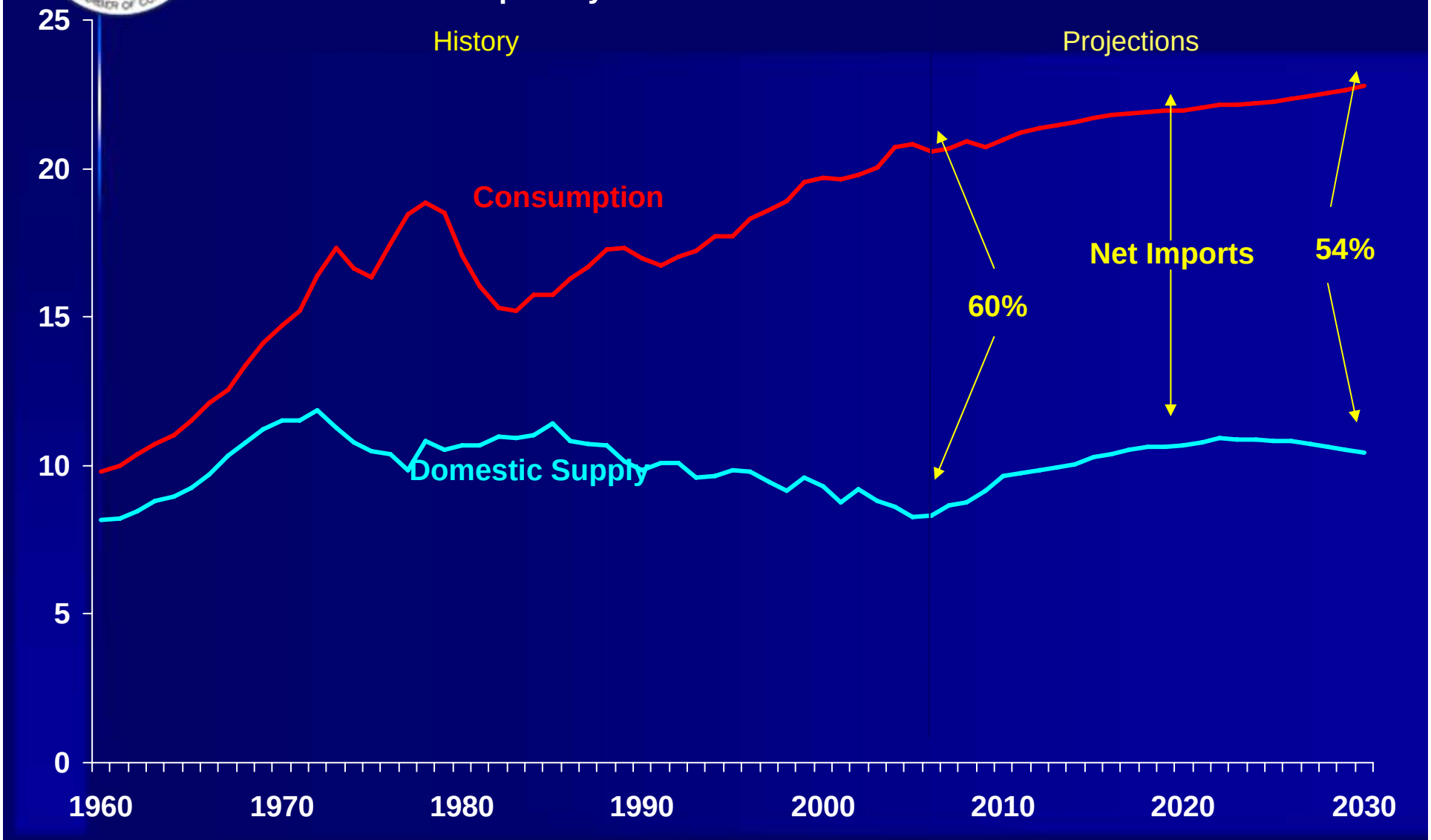
- Oil consumption has increased sixfold over the past 25 years

Market Situation

- Market fundamentals are driving prices up
  - Economic growth boosting demand
  - OPEC production decisions
  - Low OPEC spare capacity
  - Moderating non-OPEC production –growth
  - Falling inventories
  - Refining bottlenecks
  - Geopolitical risks
- Increased speculation is a symptom of tight market fundamentals

Dependence on imports of liquid fuels and other petroleum by 2030

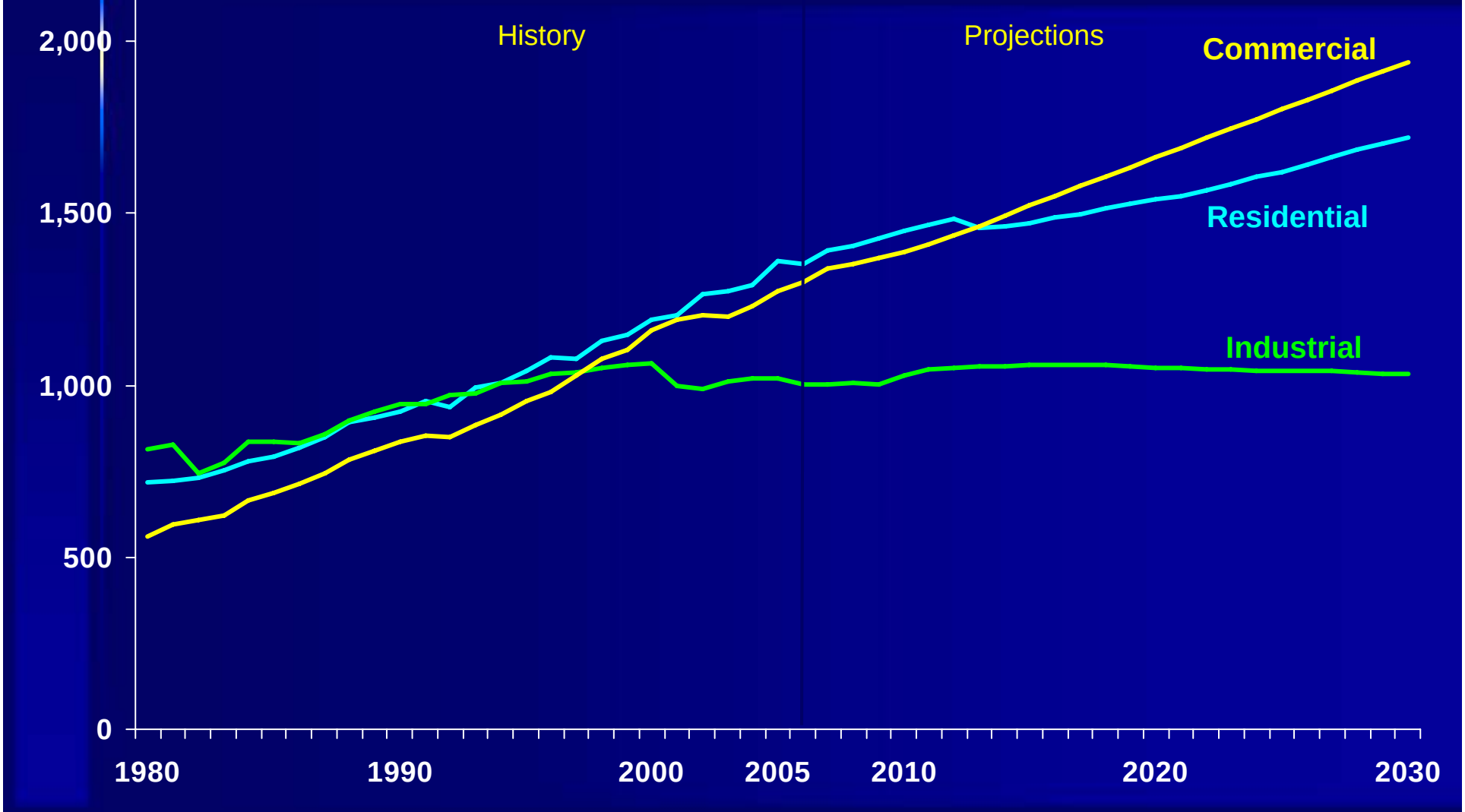
million barrels per day



Annual Energy Outlook 2008

U.S. electricity consumption grows slowly in all sectors

billion kilowatthours



Annual Energy Outlook 2008

Energy use per capita declines slightly and energy intensity falls by 1.7 percent per year

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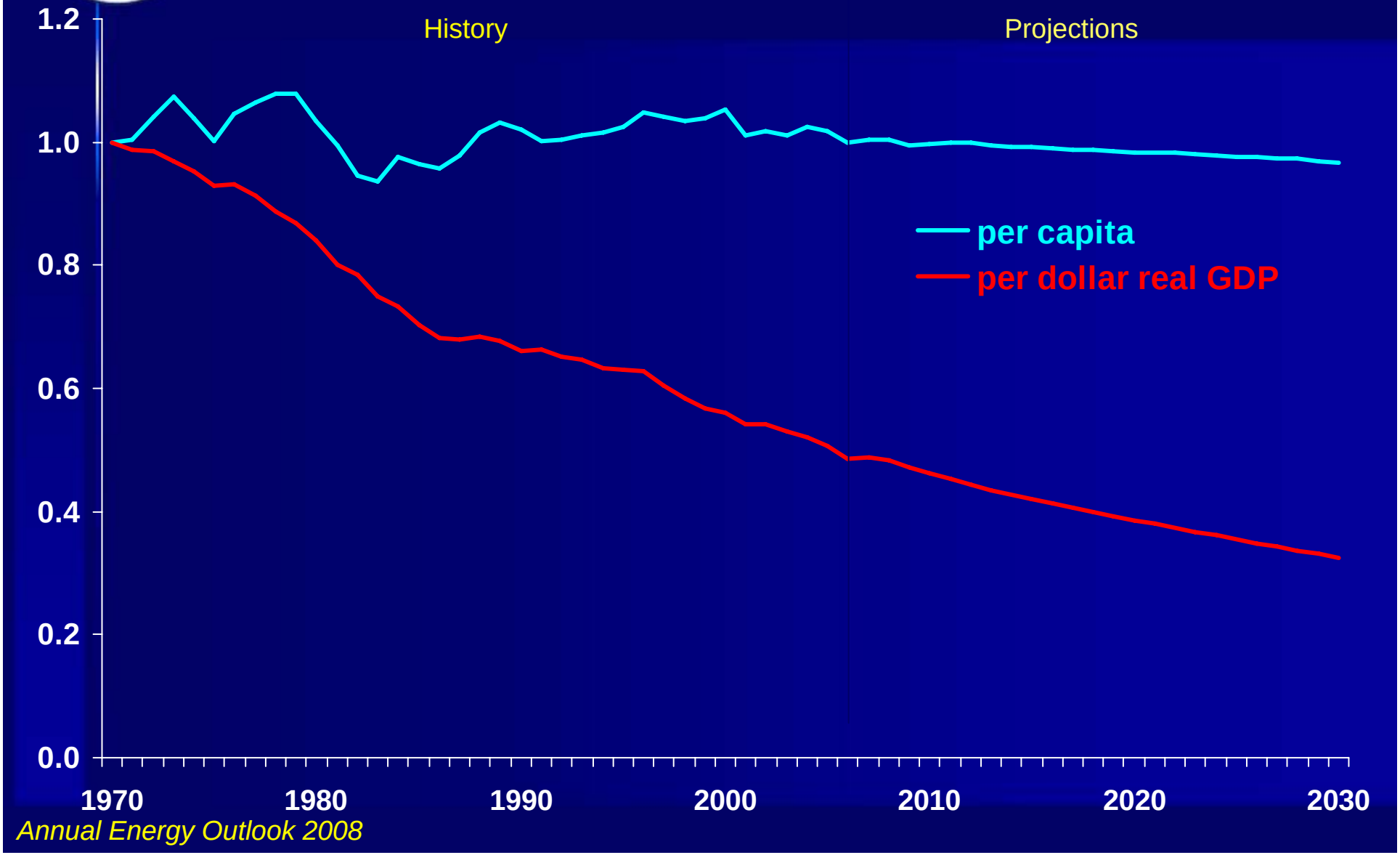


Annual Energy Outlook 2008

U.S. Energy Challenges

- It is not unimaginable to expect a tripling of energy demand within the century as we seek to alleviate energy poverty
- In order to decrease our reliance on imported oil, coal is expected to fill increasing energy demand.
- 20% of our energy is nuclear, yet there hasn't been a new facility opened or expanded in thirty years.
- Liquids, Gas and Coal imports are all expected to grow

U.S. Energy Strategy

- Increase and Diversify Supply
- Increase Suppliers
- Accelerate Energy Efficiency
  - Technology Development and Deployment
- Increase use of alternative and renewable sources of energy
- Improve Environmental Stewardship
- Critical Infrastructure Protection

SO?

Energy Efficiency becomes more important in addressing the twin challenges of growing demand and climate change

The most immediate benefits will be realized through better utilizing the energy resources we currently waste

YET, Global underinvestment in efficiency technologies and clean energy

Energy Efficiency

The Cheapest and Most Available Energy is That Which We Waste Daily

HOW? MIXED SUITE

Increase advanced Technology Development
Accelerate Deployment
Innovative Financing (ESCOs)
Tax Credits
Mandates
Encourage Good Personal Choices
Reduce Entry Barriers (Tariffs)

In 2007, Americans switched over 126 million incandescent light bulbs to energy efficient Compact Fluorescent Lights, and purchased over 300,000 hybrid automobiles

Energy Efficiency

The Cheapest and Most Available Energy is That Which We Waste Daily

Efficient Homes and Buildings

- **Building Technologies: integrating efficient components and equipment into building design**
- **Energy Efficient Mortgages Program: helps homebuyers finance cost of energy efficient features to new or existing home at time of purchase or refinancing**
- **Model Building Codes**

Efficient Appliances

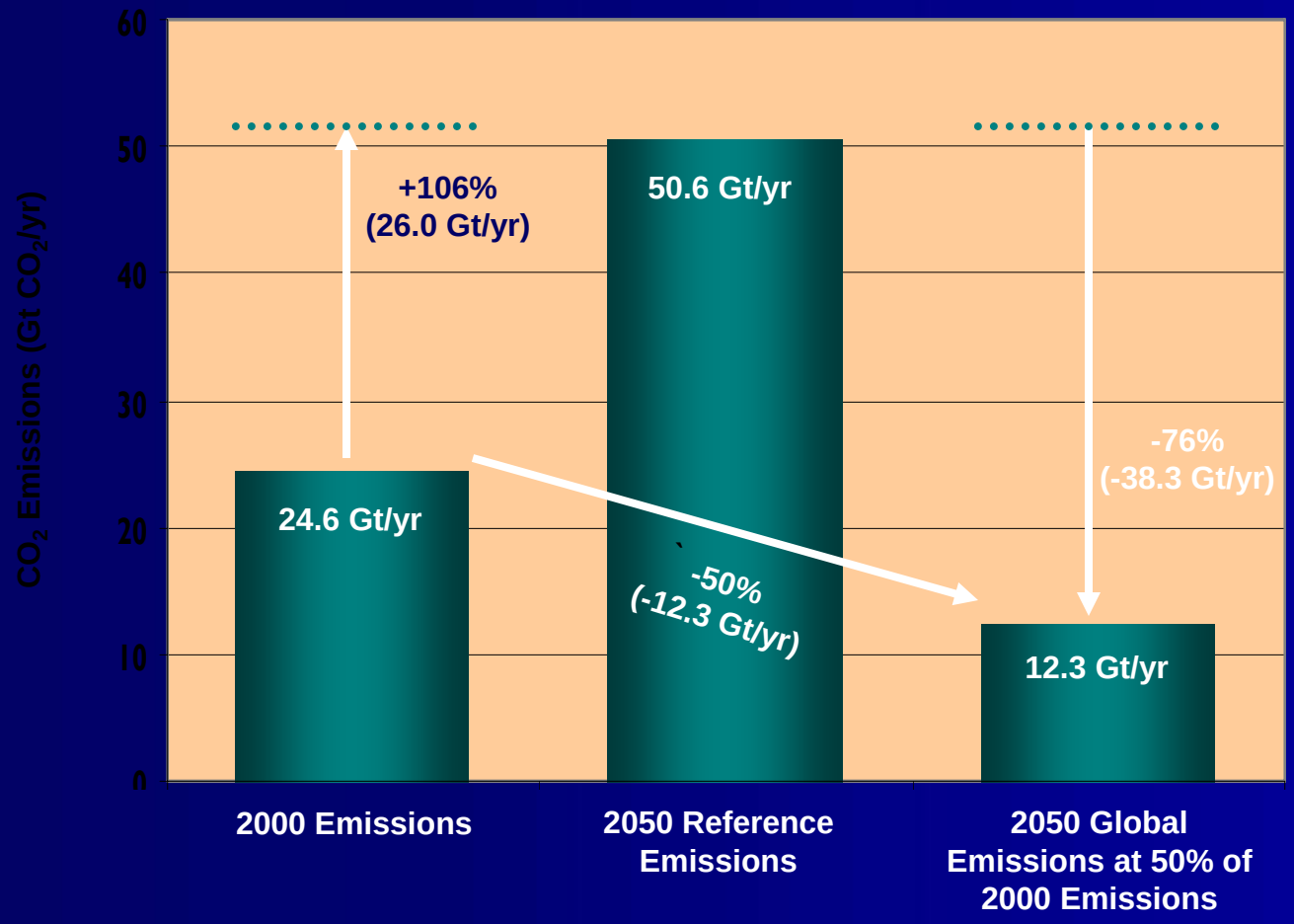
- **Expand Energy Star**
- **Accelerate, Update and Harmonize Standards**

Efficient Vehicles

- **Fuel Economy Standards**
- **Hydrogen Fuel Cells / Batteries**

Efficiency and the Environment

Global CO_2 Emissions[1]—2000, 2050 Reference Case, and 2050 at 50% of 2000:



[1] Includes fossil and other industrial CO_2.

Source: Climate Change Science Program. 2007. *Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations* (MINICAM model results).

Just to reduce One Gigaton of CO_2:

Technology	Actions that Provide One Gigaton CO_2/ Year of Mitigation or Offsets
Coal-Fired Power Plants	Build 273 "zero-emission" 500 MW coal-fired power plants* *Equivalent to about 7% of current global installed coal-fired generating capacity of 2 million MW*
Geologic Sequestration	Install 1,000 sequestration sites like Norway's Sleipner project (1 $MtCO_2$/year) *Only 3 sequestration projects of this scale exist today*
Nuclear	Build 136 new nuclear power plants of 1 GW each instead of new coal-fired power plants without CCS *Equivalent to about one third of existing worldwide nuclear capacity of 375 GW*
Efficiency	Deploy 273 million new cars at 40 miles per gallon (mpg) instead of 20 mpg - or at 14 km/L instead of 7 km/L
Wind Energy	Install capacity to produce 14 times the current global wind generation capacity of 74 GW*
Solar Photovoltaics	Install capacity to produce 273 times the current global solar PV generation*
Biomass Fuels from Plantations	Convert a barren area about 2 times the size of the UK (for a total of over 480,000 km^2)
CO_2 Storage in New Forest	Convert a barren area greater than the size of Germany and France together (for a total of over 900,000 km^2)

Gigatons = 10^9 Metric tons (1000 Kilograms)

* Instead of coal-fired power plants without CCS

Road Ahead

- No silver bullets to address the twin challenges of energy security and climate change
- The most immediate benefits will be realized through improved efficiency, better utilizing the energy resources we currently waste
- Open markets, open trade, and transparency in regulatory systems are key to increased energy sector investments and advancement
- There must be a robust investment in technology and innovation, and we must signal to private investors that our policy environment supports sustained investment
- Energy Security is inextricably tied to national and economic security and that relationship needs to be understood over the next decade as rising demand could lead to greater instability
- Opportunity for American Global Leadership