



# Energy and Climate Policy

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December 2007

# Key Elements of Major Economies Discussions

- **Long term global goal for greenhouse gas reduction, consistent with economic growth**
- **National plans that set mid-term goals**
  - **Use variety of binding and voluntary policies (mandates, incentives, partnerships)**
  - **Must be environmentally effective and measurable**
- **Collaborative technology development and deployment strategies for key sectors**
  - **Lower carbon fossil power generation, transportation, land use, and near zero carbon energy (e.g., efficiency, nuclear, wind, and solar)**
  - **International working groups on key sectors (to advance global and national efforts)**
- **Support adoption of existing clean technologies and the development of new ones**
  - **Elimination of tariffs and non-tariff barriers for clean energy goods and services**
  - **Enhanced financing tools**
  - **Expanded investment in global research and development**
- **Improved measurement and accounting systems that can more effectively track progress**
- **Robust programs on adaptation, forestry, and technology access for all countries**

# U.S. National Initiatives Since 2001

*\$37 Billion Federal Climate Budget*

*Bi-Partisan Support; More Than Any Other Country*

## **Partnerships**

- Nuclear Power 2010
- Improved NRC Process for Nuclear Power
- Climate Vision (15 Industry Sectors)
- Climate Leaders (100+ Company Leaders)
- Smartway Transportation Partnerships
- Energy Star and Natural Gas Star
- Federal Energy Management Programs

## **Mandates**

- Federal Fuel Economy (“CAFE”)
  - 15% Increase in Light Trucks Through 2011
- Federal Renewable Fuels (“RFS”)
  - 7.5 Billion Gallons By 2012
- Federal Appliance Efficiency
  - 40 Standards (15 From EPAAct 2005)
- State Renewable Power (“RPS”)
  - 24 States; 80% of Generation
  - Going from 5.6GW, now 14.6GW, to 32GW
- Building Codes- Federal Facilities & States
  - DOE Model Code 30% Improvement

## **Incentives**

- About \$10 billion – EPAAct 2005
- Clean Coal Investment Tax Credit (\$1.6B + leveraging over \$10B Private capital)
- Loan Guarantees (power and fuels)
- Up to \$3400 Tax Credit for Efficient Vehicles
- Up to \$4000 in Home Solar Incentives
- Biological Sequestration part of \$40+ Billion 2002 Farm Bill Conservation Programs

## **Technology**

- Renewable Power: Advanced Solar and Wind
- Nuclear Power: Generation IV and Fusion
- Coal: Low Carbon Research; Future Gen Zero Emissions Coal & Hydrogen Power Plant; Regional Carbon Capture & Storage Program
- Fuels: Cellulosic Ethanol, Bio-Diesel, Hydrogen
- Vehicles: Plug-in Hybrids, Hydrogen Fuel Cell
- Zero Energy Home Research

# Major New Initiatives This Year

## State of Union “Twenty in Ten”

### • **Alternative Fuels Mandate**

- Replace 15% projected annual gasoline use in 2017 with renewable and alternative fuels
- Mandate use of 35B gallons of alternatives
- Nearly 5 times 2012 target in current law

### • **Vehicle Fuel Economy Mandate**

- Displace 5% of projected annual gasoline use in 2017 with new mandatory rules
- Produce up to 8.5 billion gallons in fuel savings over the next 10 years
- New car standards; extend light truck rules
- Specific targets should be set by experts at the National Highway and Traffic Safety Administration based on feasibility, safety, and benefit/cost assessment

## Executive Order

### **Strengthening Federal Government Environmental, Energy and Transportation Management**

- Reduce Oil Consumption in Vehicles – 2%/year
- Increase Use of Renewable Fuels - 10%/year
- Improve energy efficiency – 30%/10 years
- Use More Renewable Power

## Farm Bill Conservation

- Portion of \$50+B for Biological Sequestration
- \$1.6B in New Funding for Energy Innovation
- \$2B in Loans for Advanced Biofuel Plants

## 2008 Budget

- \$2.7 B for the Advanced Energy Initiative
- Hydrogen Fuel
- Advanced Batteries for Plug-In Hybrid Vehicles
- Bio-Diesel
- New Ethanol Production Methods

# U.S. International Initiatives Since 2001

*More Cooperative, Faster, Real Results*

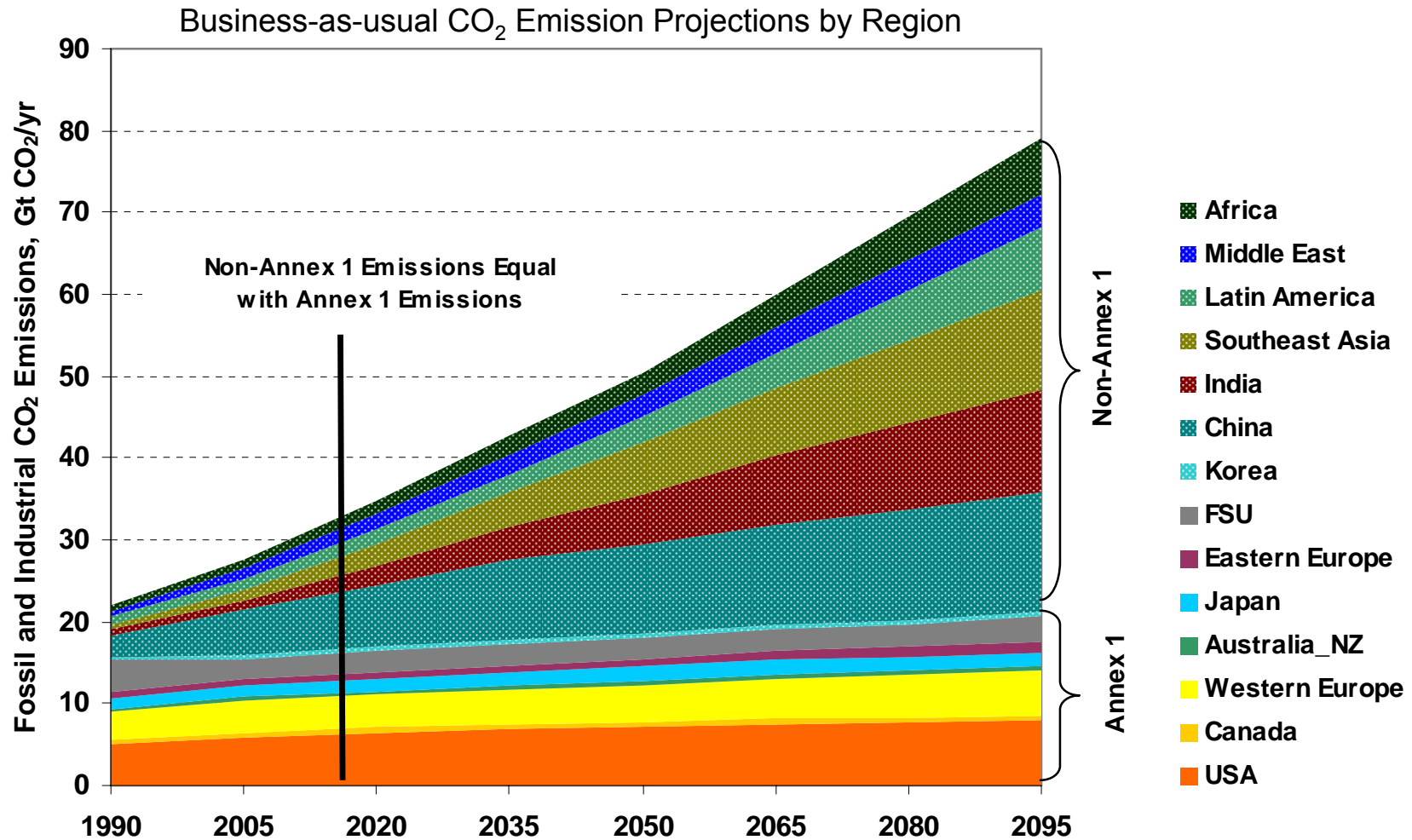
## Global Action Programs

- Asia-Pacific Partnership (7 Nations)
  - Accounts for 50% of emissions
  - Nearly 100 actions
- G-8 Dialogue (13-20 Nations)
  - More than 40 programs
- Methane to Markets (20 Nations)
  - 180+ million tons reduced by 2015
- Renewable Energy and Efficiency (17 Nations)
- 12+ Bilateral Agreements on Technology and Lower Emissions
- Tropical Forest Conservation
- Stopping Illegal Logging

## Technology Advancement

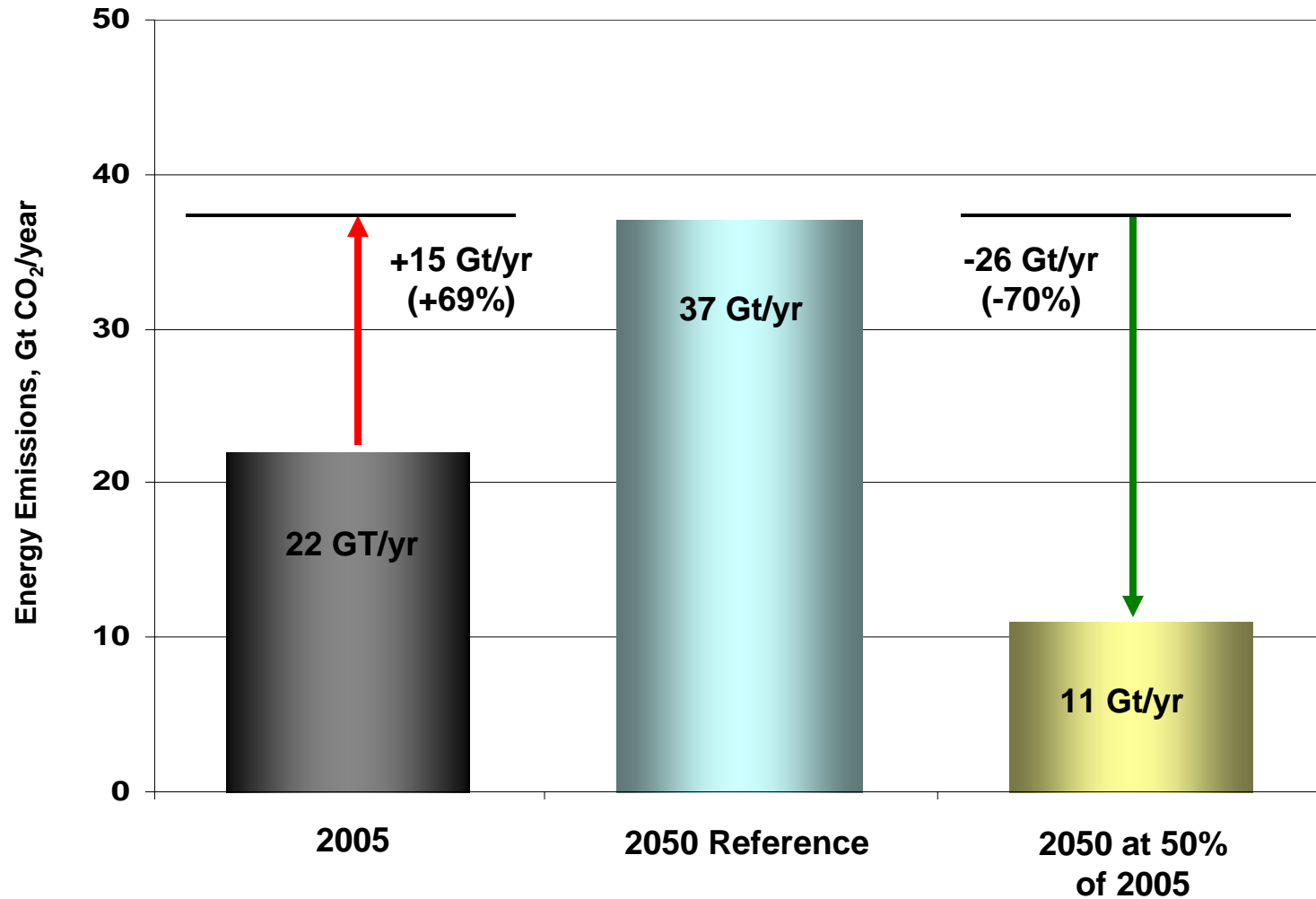
- Carbon Capture and Storage (22 Nations)
- Future Gen Coal (5 Nations)
- Hydrogen (17 Nations)
- Global Nuclear Energy Partnership (19 Nations)
- Gen IV Nuclear (10 Nations)
- Fusion Energy (7 Nations)
- Global Earth Observation (71 Nations)
  - Recommended by National Academy of Sciences

# Important Transitions in Emitting Countries Over the Coming Century



Data derived from *Global Energy Technology Strategy, Addressing Climate Change: Phase 2 Findings from an International Public-Private Sponsored Research Program*, Battelle Memorial Institute, 2007.

# Major Economies Energy CO<sub>2</sub> Emissions: 2005, 2050 Reference Case, and 2050 at 50% of 2005



Illustrative scenarios based on the CCSP MiniCAM reference scenario. Categories may not match exactly with other aggregations. For example, Europe includes here the following countries from EIA accounting: Belgium, France, Germany, Italy, Netherlands, Poland, Romania, Spain, United Kingdom, and Other Europe. MiniCAM does not include several countries as individual regions: Russia, South Africa, Australia, Mexico, Brazil, and Mexico. Growth rates for the appropriate aggregate regions were used as proxies for growth rates in these individual countries. This is one illustrative scenario: other scenarios would have different emissions growth rates over the century. Results should be taken as illustrative of potential trends rather than as a best guess projection of the future.

# How Big is One Gigaton of CO<sub>2</sub>?

Technology	Actions that Provide One Gigaton CO <sub>2</sub> / Year of Mitigation or Offsets
Coal-Fired Power Plants	Build 273 “zero-emission” 500 MW coal-fired power plants* <i>Equivalent to about 7% of estimated current global installed coal-fired generating capacity of 2 million MW</i>
Geologic Sequestration	Install 1,000 sequestration sites like Norway’s Sleipner project (1 MtCO <sub>2</sub> /year) <i>Only 3 sequestration projects of this scale exist today</i>
Nuclear	Build 136 new nuclear power plants of 1 GW each instead of new coal-fired power plants without CCS <i>Equivalent to about one third of existing worldwide nuclear capacity of 375 GW</i>
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 ≈4 times global wind generation of about 74 GW* <i>Equivalent to about 270,000 1 MW wind turbines</i>
Solar Photovoltaics	Install about 750 GW of solar PV, which is 125 times current global installed capacity of 6 GW*
Biofuels	Using existing production technologies, convert a barren area about 2 times the size of the UK (for a total of over 480,000 km <sup>2</sup> )
CO <sub>2</sub> 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 <sup>2</sup> )

Gigatons = 10<sup>9</sup> Metric tons (1000 Kilograms)

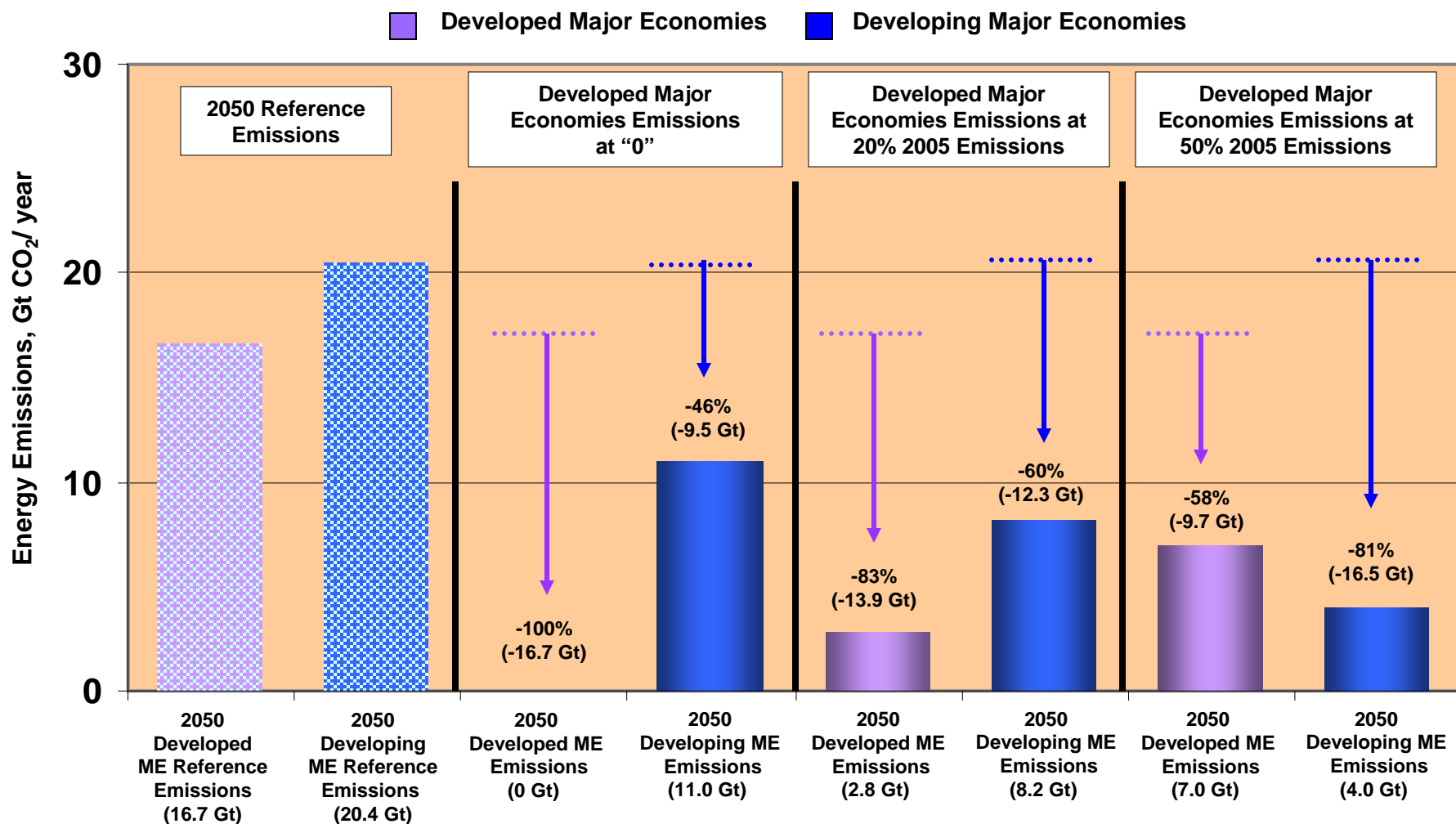
\*Instead of coal-fired power plants

Source: Climate Change Technology Program *Strategic Plan*, September 2006.



# Energy CO<sub>2</sub> Emissions Reductions Needed in 2050 for Major Economies to Achieve a Combined 50% Reduction in Emissions Below 2005<sup>1</sup> Under Different Reduction Goals for Developed Major Economies:

Annual Gigaton CO<sub>2</sub> and Percent Reduction from 2050 Reference<sup>2</sup>



<sup>1</sup> 50% of 2005 total Major Economies energy CO<sub>2</sub> emissions equals 11.0 Gt.

<sup>2</sup> Equals reduction from the 2050 reference case for that ME group (*i.e.*, Developed or Developing). Developed MEs include: U.S., Europe, Russia, Japan, Canada, South Korea, and Australia. Developing MEs include: China, India, South Africa, Mexico, Brazil, and Indonesia.