



Energy and Climate Policy

Hon. James L. Connaughton
Chairman
Council on Environmental Quality

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APP Organizational Chart

Policy and Implementation Committee
(USA, Chair)

Administrative Support Group
(USA)

Cleaner Fossil Energy Task Force

Australia
(Chair)
China
(Co-Chair)

Renewable Energy and Distributed Generation Task Force

Korea
(Chair)
Australia
(Co-Chair)

Power Generation And Transmission

USA
(Chair)
China
(Co-Chair)

Steel Task Force

Japan
(Chair)
India
Co-Chair)

Aluminum Task Force

Australia
(Chair)
USA
(Co-Chair)

Cement Task Force

Japan
(Chair)

Coal Mining Task Force

USA
(Chair)
India
(Co-Chair)

Buildings And Appliances Task Force

Korea
(Chair)
USA
(Co-Chair)

U.S. National Initiatives Since 2001

\$35 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 EPA 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 – EPA 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
- 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

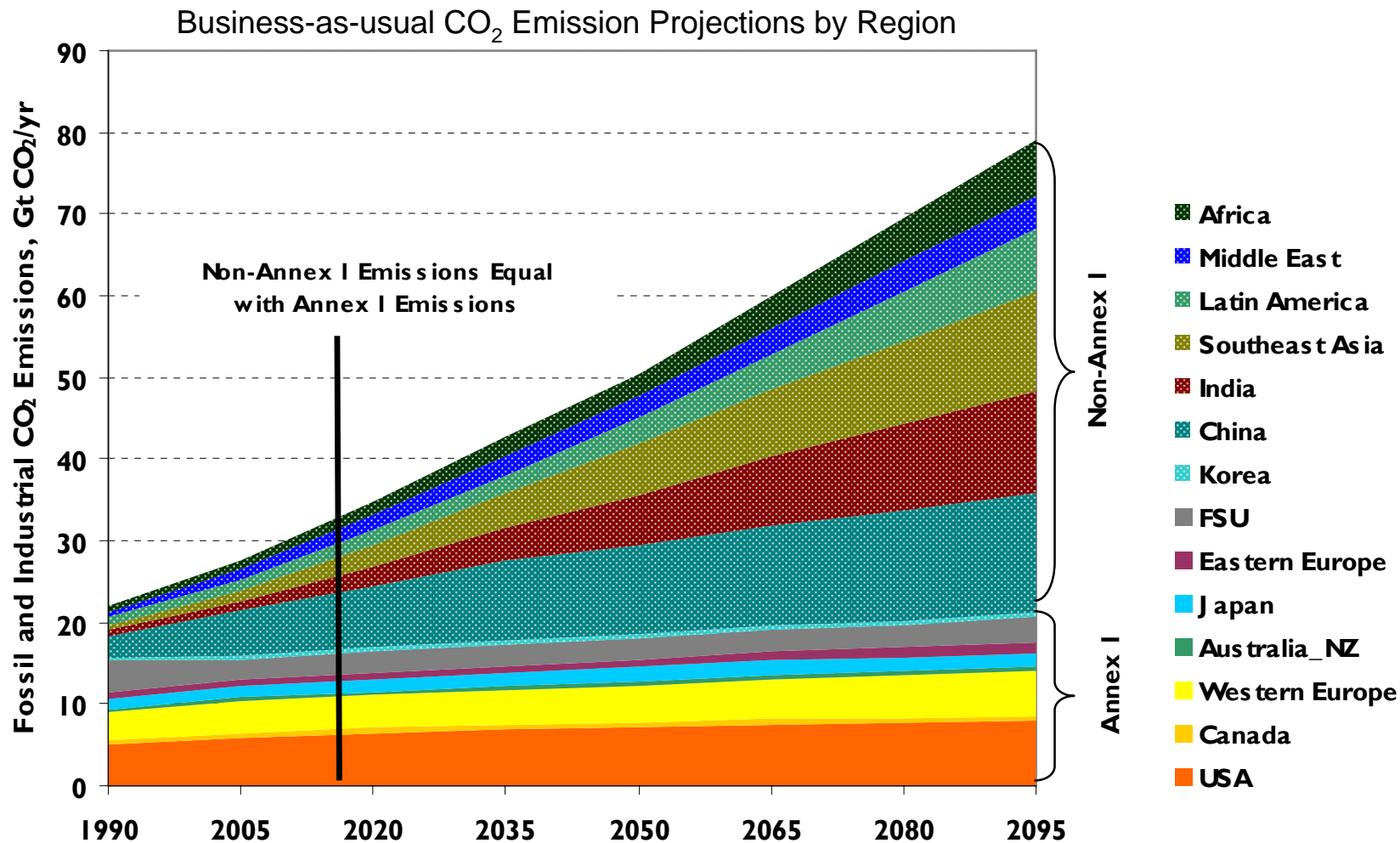
Global Action Programs

- Asia-Pacific Partnership (7 Nations)
 - Accounts for 50% of emissions
 - Over 100 actions
- G-8 Dialogue (13-20 Nations)
 - More than 40 programs
- Methane to Markets (18 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

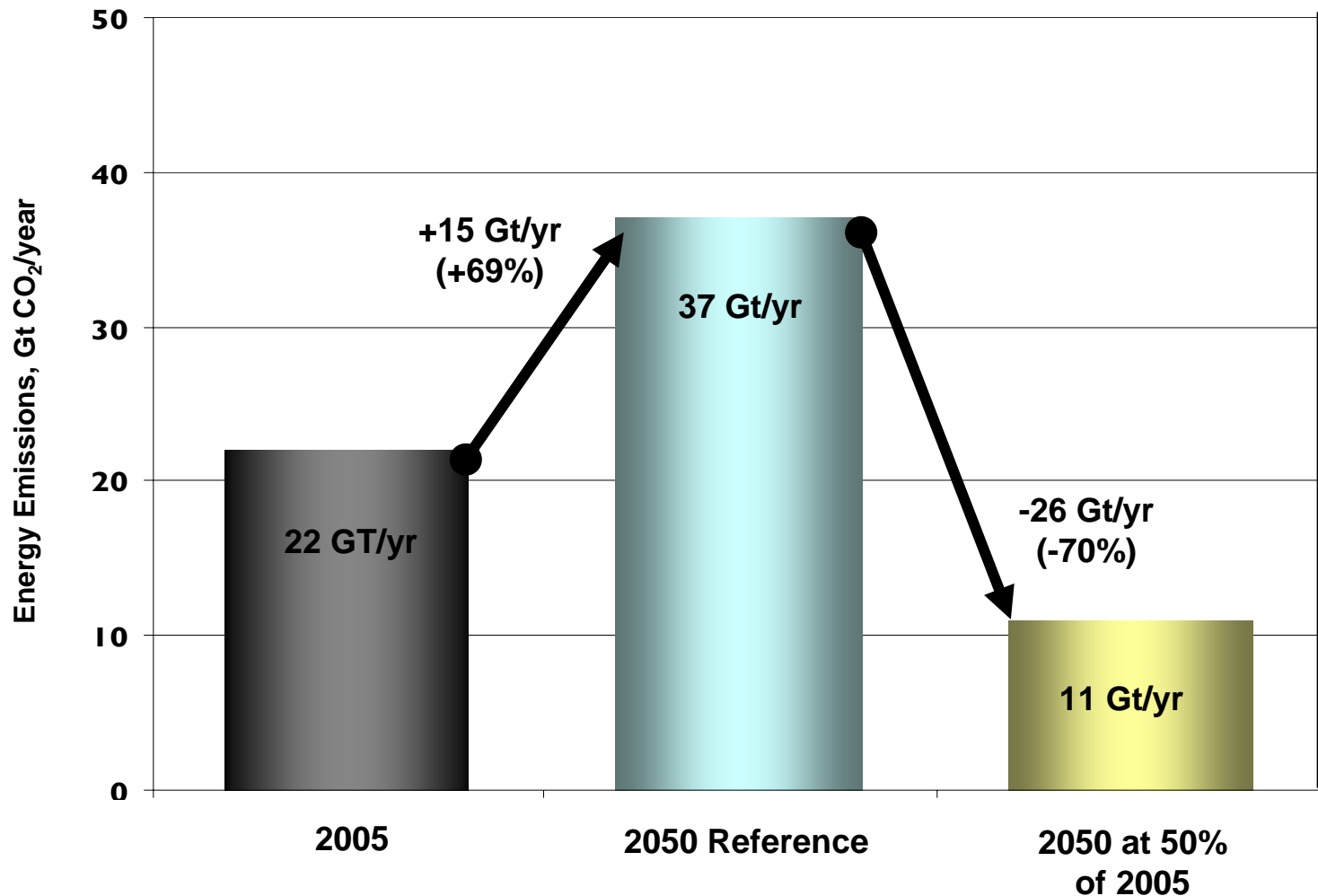
- Carbon Capture and Storage (22 Nations)
- Future Gen Coal (5+ Nations)
- Hydrogen (17 Nations)
- Global Nuclear Energy Partnership (6+ Nations)
- Gen IV Nuclear (10 Nations)
- Fusion Energy (7 Nations)
- Global Earth Observation (64 Nations)
 - Recommended by National Academy of Sciences

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 CO₂ 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 CO₂?

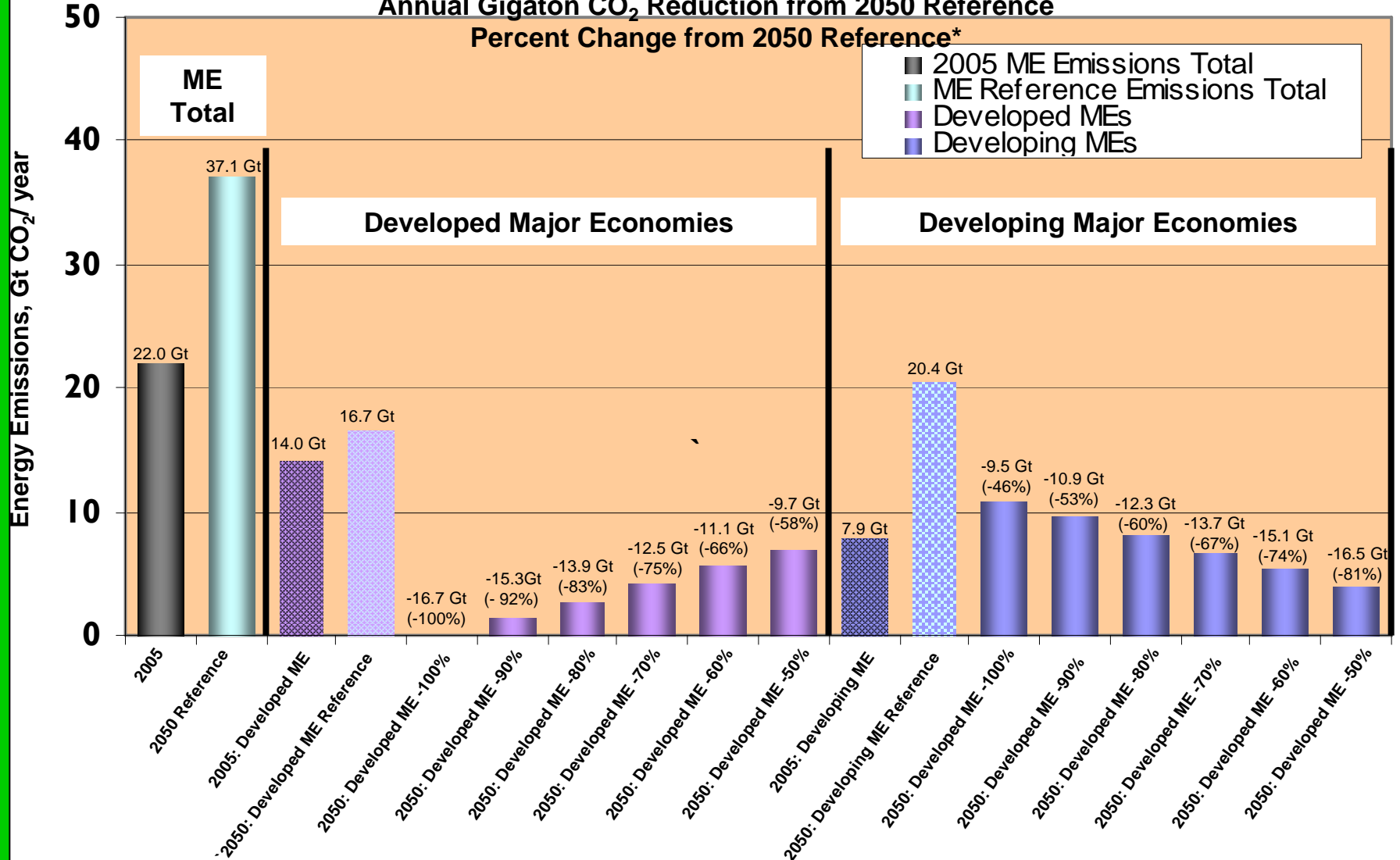
| Technology | Actions that Provide One Gigaton CO ₂ / Year of Mitigation or Offsets |
|---------------------------------------|---|
| Coal-Fired Power Plants | Build 273 “zero-emission” 500 MW coal-fired power plants* <i>Equivalent to about 7% of current global installed coal-fired generating capacity of 2 million MW</i> |
| Geologic Sequestration | Install 1,000 sequestration sites like Norway’s Sleipner project (1 MtCO ₂ /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 14 times current global wind generation of 74 GW* <i>Equivalent to more than 1 million, 1 MW wind turbines</i> |
| 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 = 10⁹ Metric tons (1000 Kilograms)

* Instead of coal-fired power plants without CCS

Comparative 2050 Energy CO₂ Emissions and Emissions Reductions Needed for Developed and Developing Major Economies to Achieve in 2050 a Combined 50% Reduction in Emissions Below 2005 Under Different Reduction Goals (-100% to -50%) for Developed ME:

Annual Gigaton CO₂ Reduction from 2050 Reference



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

**2050 Annual Energy CO₂ Emission Reductions Required for Combined MEs to Reduce Energy CO₂ Emissions 50% Below Total ME 2005 Level if Developed MEs Achieve a Specific Percentage Reduction Goal:
Percent Annual CO₂ Reduction in 2050 Compared to 2050 Reference**

| Developed ME Energy CO₂ Emissions Goals | Developed MEs* Reduction from Developed ME 2050 Reference | Developing MEs** Reduction from Developing ME 2050 Reference |
|--|--|---|
| Developed MEs* at -100% Below Developed ME 2005 Level | -100% | -46% |
| Developed MEs* at -90% Below Developed ME 2005 Level | -92% | -53% |
| Developed MEs* at -80% Below Developed ME 2005 Level | -83% | -60% |
| Developed MEs* at -70% Below Developed ME 2005 Level | -75% | -67% |
| Developed MEs* at -60% Below Developed ME 2005 Level | -66% | -74% |
| Developed MEs* at -50% Below Developed ME 2005 Level | -58% | -81% |

*Developed MEs include: U.S., Europe, Russia, Japan, Canada, Korea, and Australia.

** Developing MEs include: China, India, South Africa, Mexico, Brazil, and Indonesia.

**2050 Annual Energy CO₂ Emission Reductions Required for Combined MEs to Reduce Energy CO₂ Emissions 50% Below Total ME 2005 Level if Developed MEs Achieve a Specific Percentage Reduction Goal:
Annual Gigaton CO₂ Reduction in 2050 Compared to 2050 Reference**

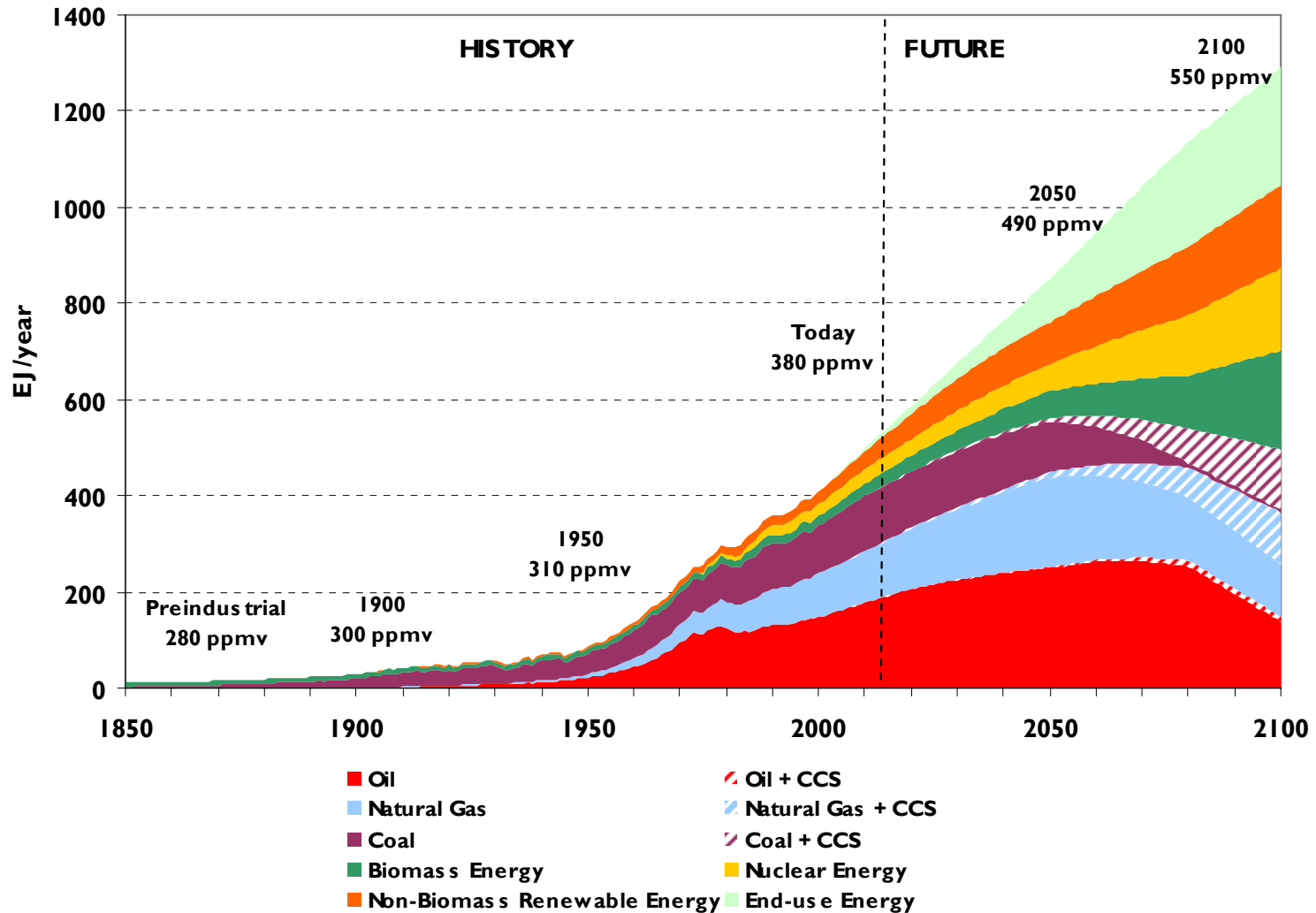
| Developed ME Energy CO₂ Emissions Goals | Developed MEs* Reduction from 2050 Developed ME 2050 Reference | Developing MEs** Reduction from 2050 Developing ME 2050 Reference |
|--|---|--|
| Developed MEs* at -100% Below Developed ME 2005 Level | -16.7 | -9.5 |
| Developed MEs* at -90% Below Developed ME 2005 Level | -15.3 | -10.9 |
| Developed MEs* at -80% Below Developed ME 2005 Level | -13.9 | -12.3 |
| Developed MEs* at -70% Below Developed ME 2005 Level | -12.5 | -13.7 |
| Developed MEs* at -60% Below Developed ME 2005 Level | -11.1 | -15.1 |
| Developed MEs* at -50% Below Developed ME 2005 Level | -9.7 | -16.5 |

*Developed MEs include: U.S., Europe, Russia, Japan, Canada, Korea, and Australia.

** Developing MEs include: China, India, South Africa, Mexico, Brazil, and Indonesia.

Addressing Climate Change Requires Energy Mix Transformation

Energy Technology Penetration for a 550 ppmv scenario - Other Scenarios Possible



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