



NABE Washington Economic Policy Conference

“Moving Forward on Climate Change and Energy Security”

March 3, 2009

Guy Caruso

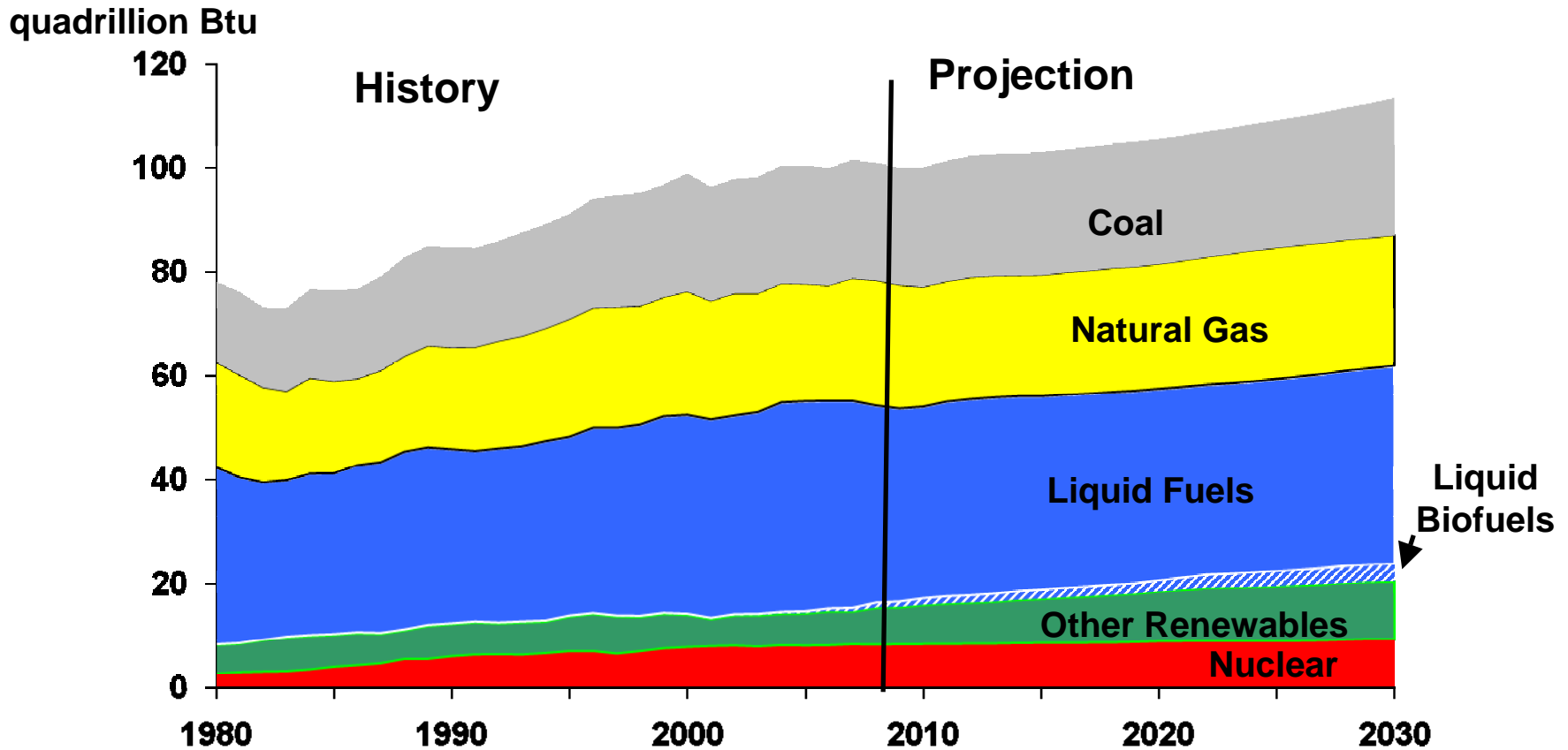
Senior Advisor, CSIS

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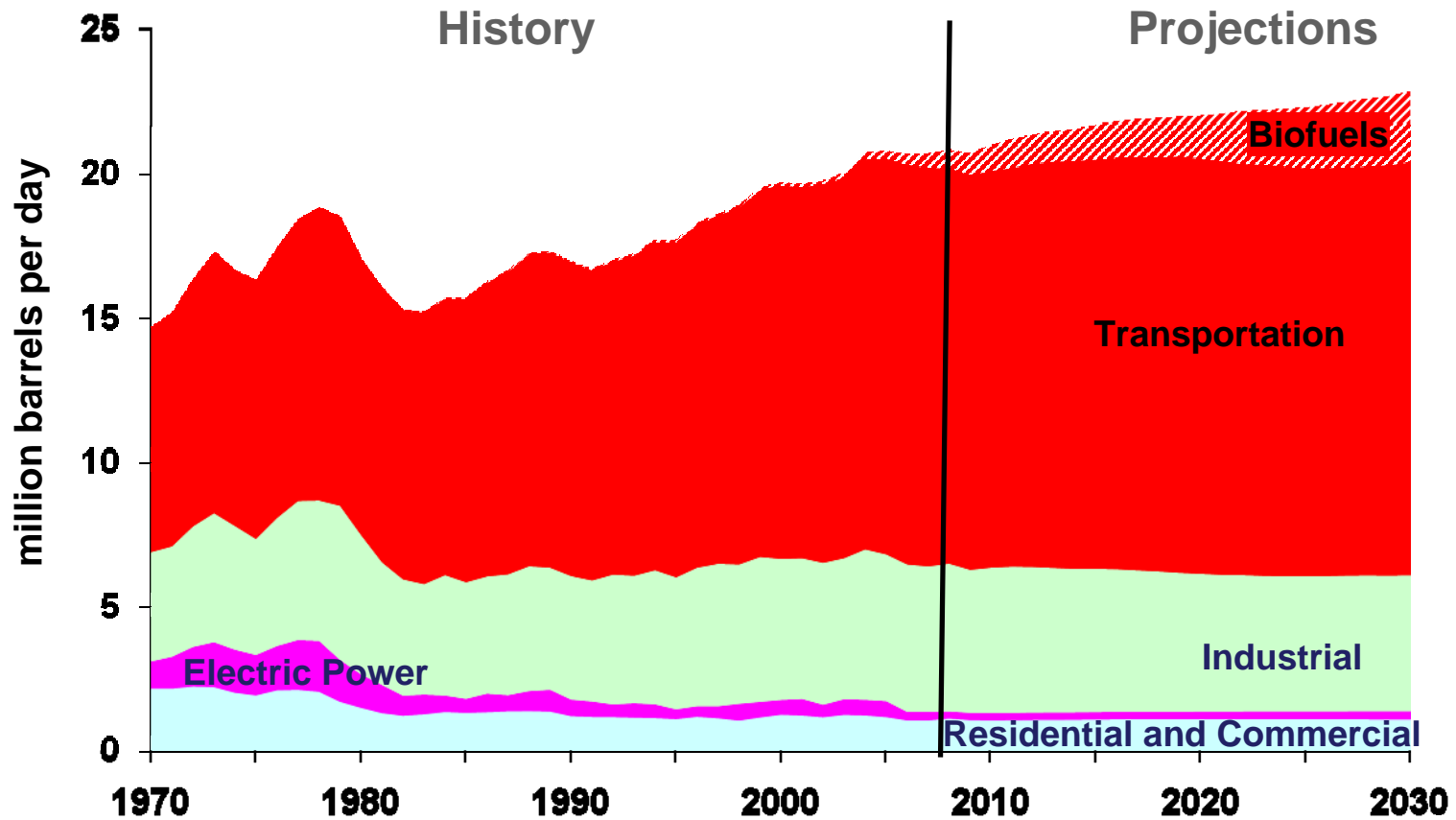
Energy & National
Security Program

U.S. Primary Energy Demand

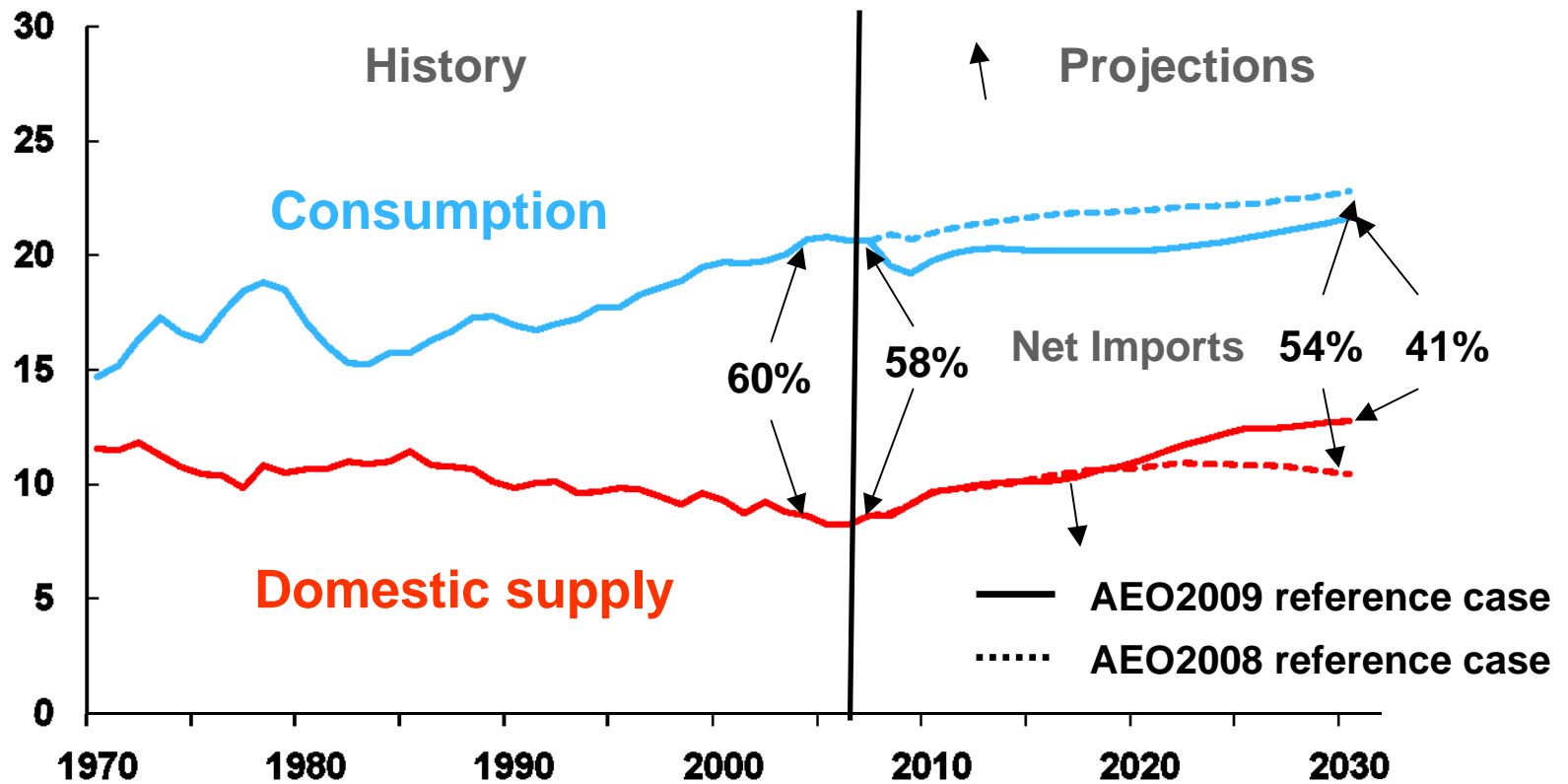


Source: EIA AEO 2009, Reference Case

Liquid Fuels Consumption



Net Imports of Liquids

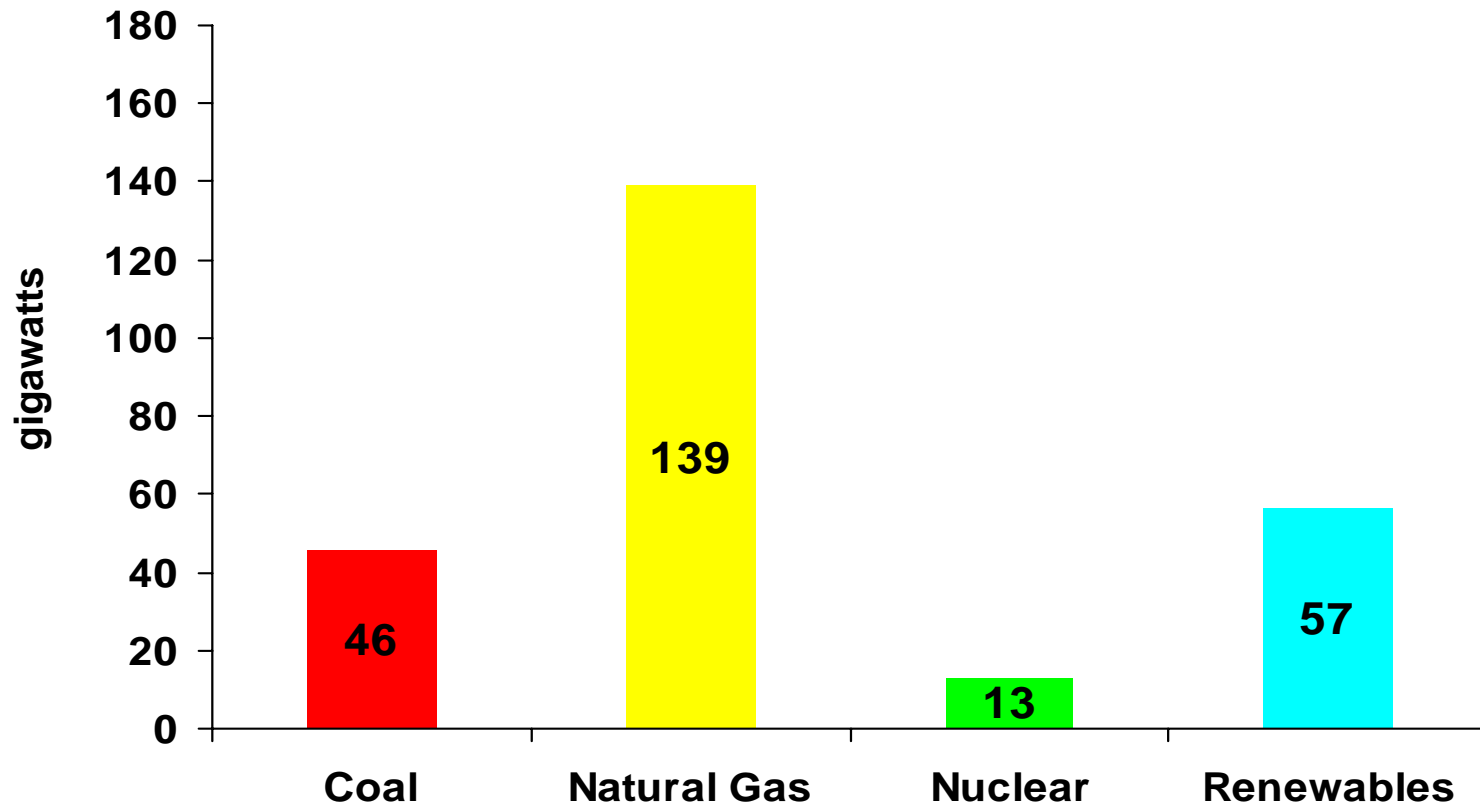


Source: EIA AEO 2009, Reference Case

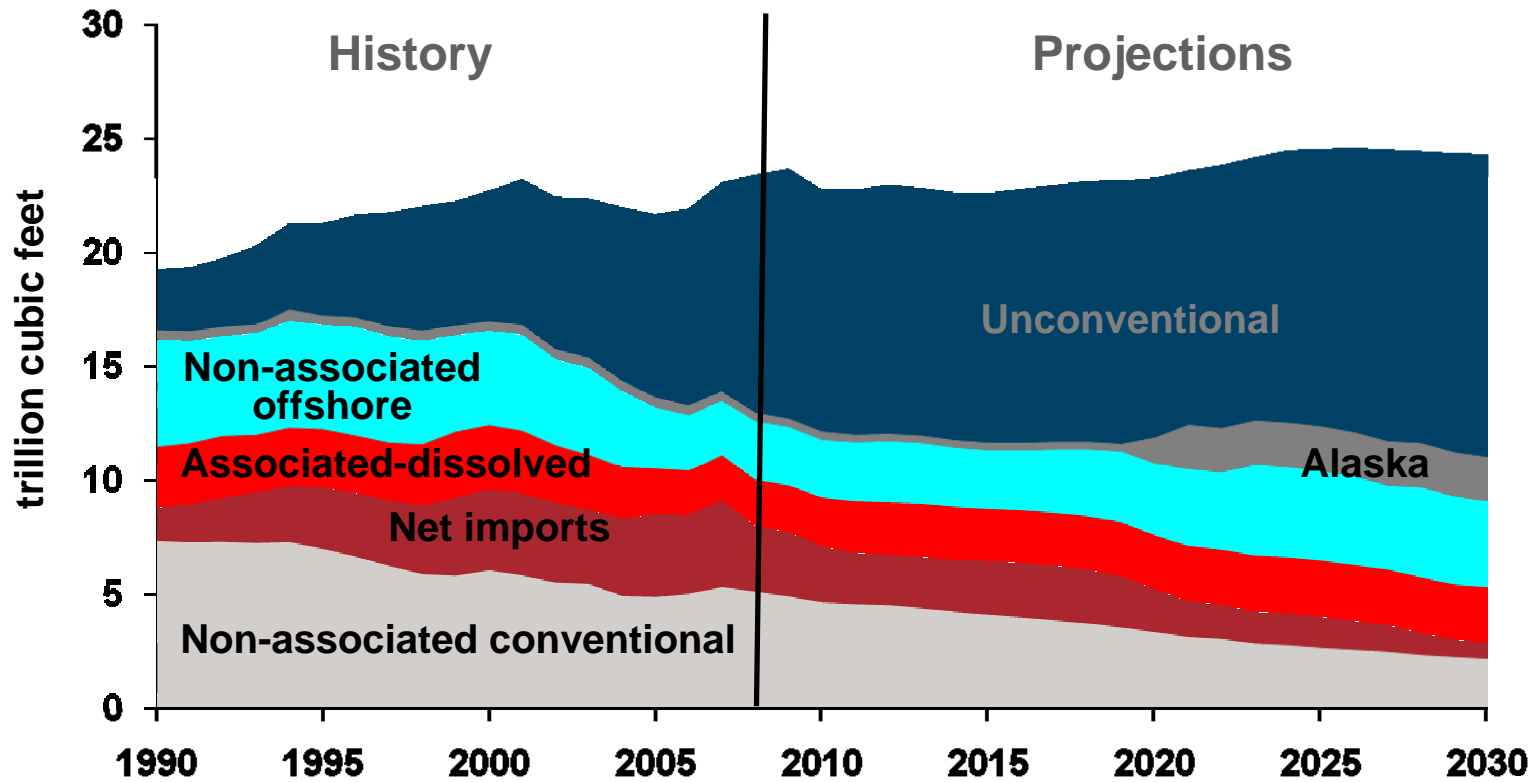
U.S. Petroleum Imports

	2007 Imports (million b/d)	% of total U.S. Imports	% of total U.S. consumption
1. Canada	2.407	17.9	11.6
2. Mexico	1.566	11.7	7.6
3. Saudi Arabia	1.563	11.6	7.5
4. Venezuela	1.195	8.9	5.8
5. Nigeria	1.136	8.5	5.5
6. Algeria	0.778	5.8	3.8
7. Angola	0.574	4.3	2.8
8. Iraq	0.531	4.0	2.6
Persian Gulf + Ven	3.524	26.2	17.0
OPEC	5.980	44.5	28.9
Total U.S. Imports	13.439	100	64.9

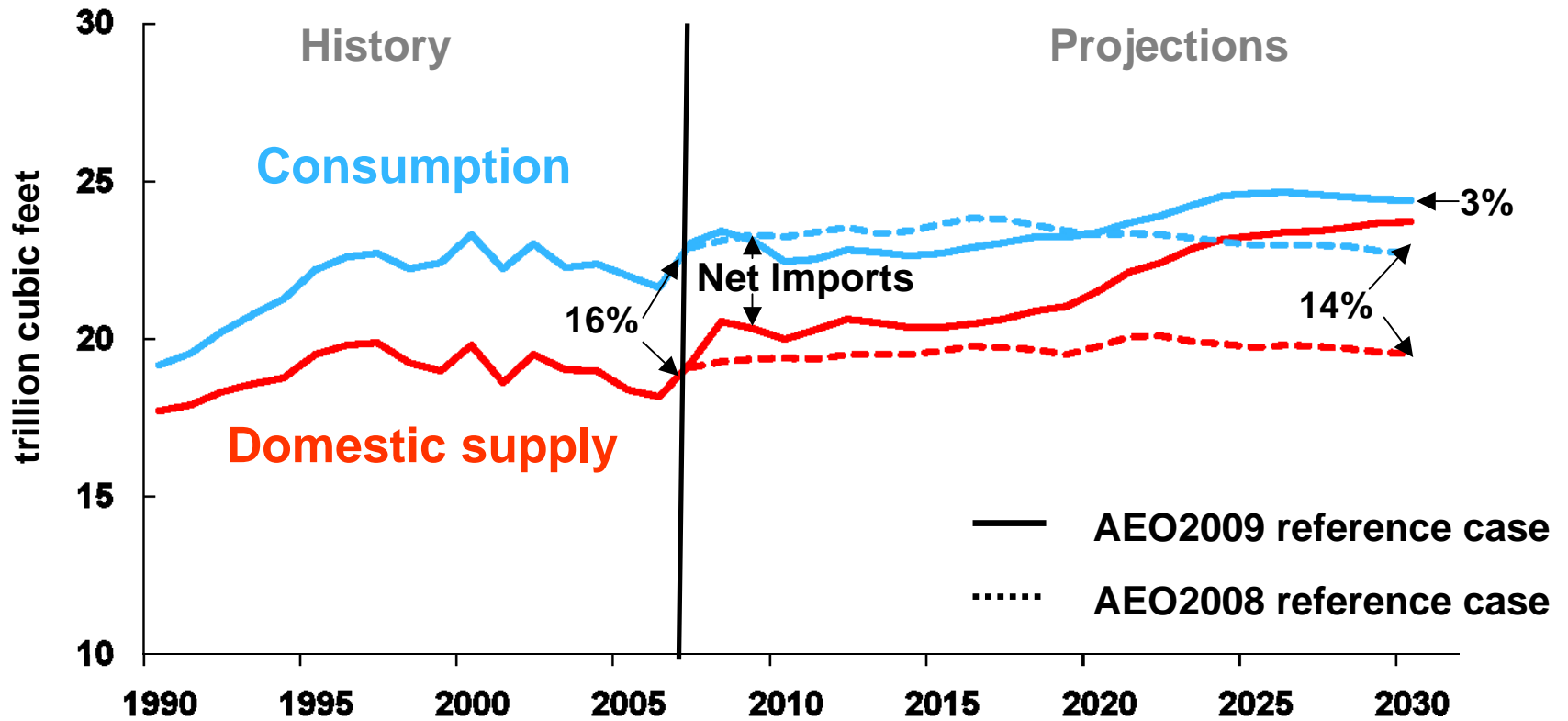
Net Electricity Generation Capacity Additions, 2007-2030



The Gas Supply Picture



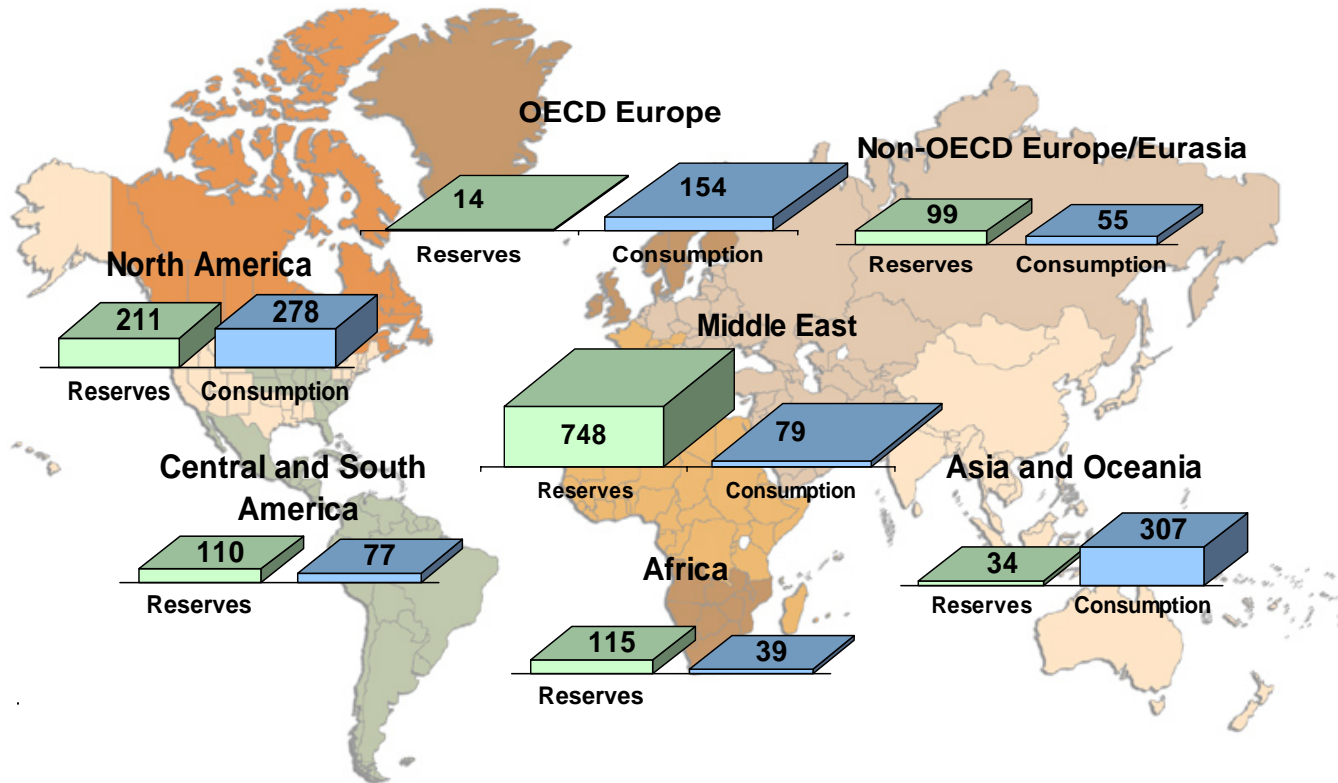
Net Gas Imports



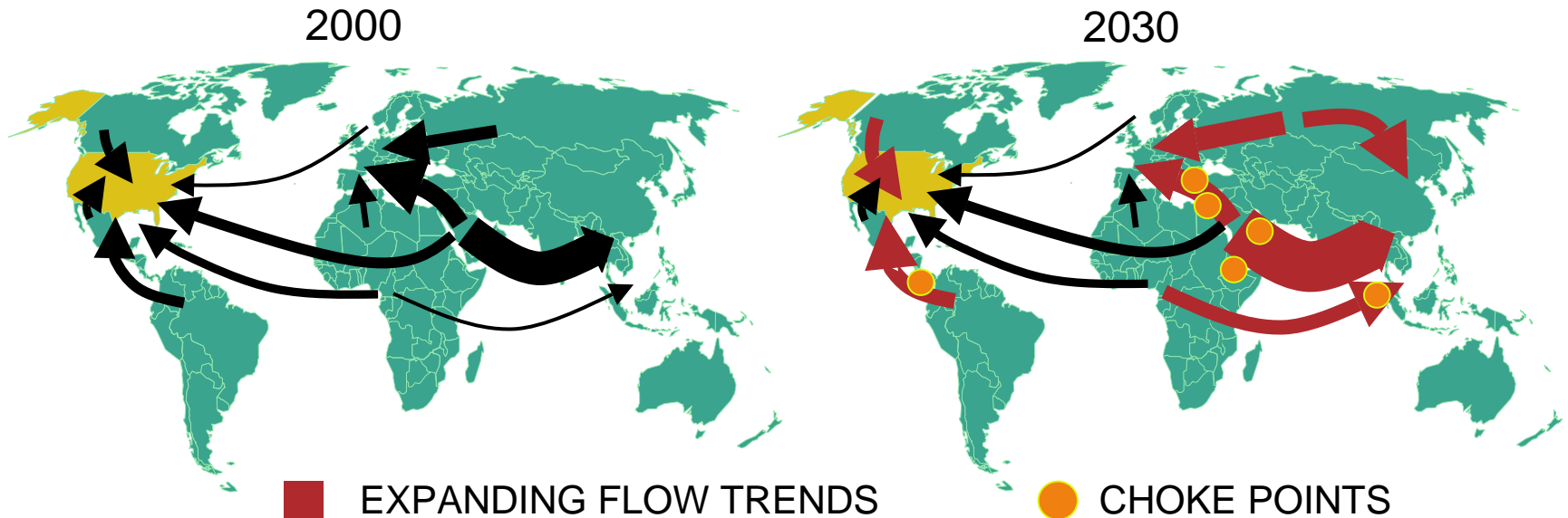
Source: EIA AEO 2009, Reference Case

Resource Distribution

2005 Proved Oil Reserves and Projected Total Liquids Consumption from 2004 through 2030 (bb)

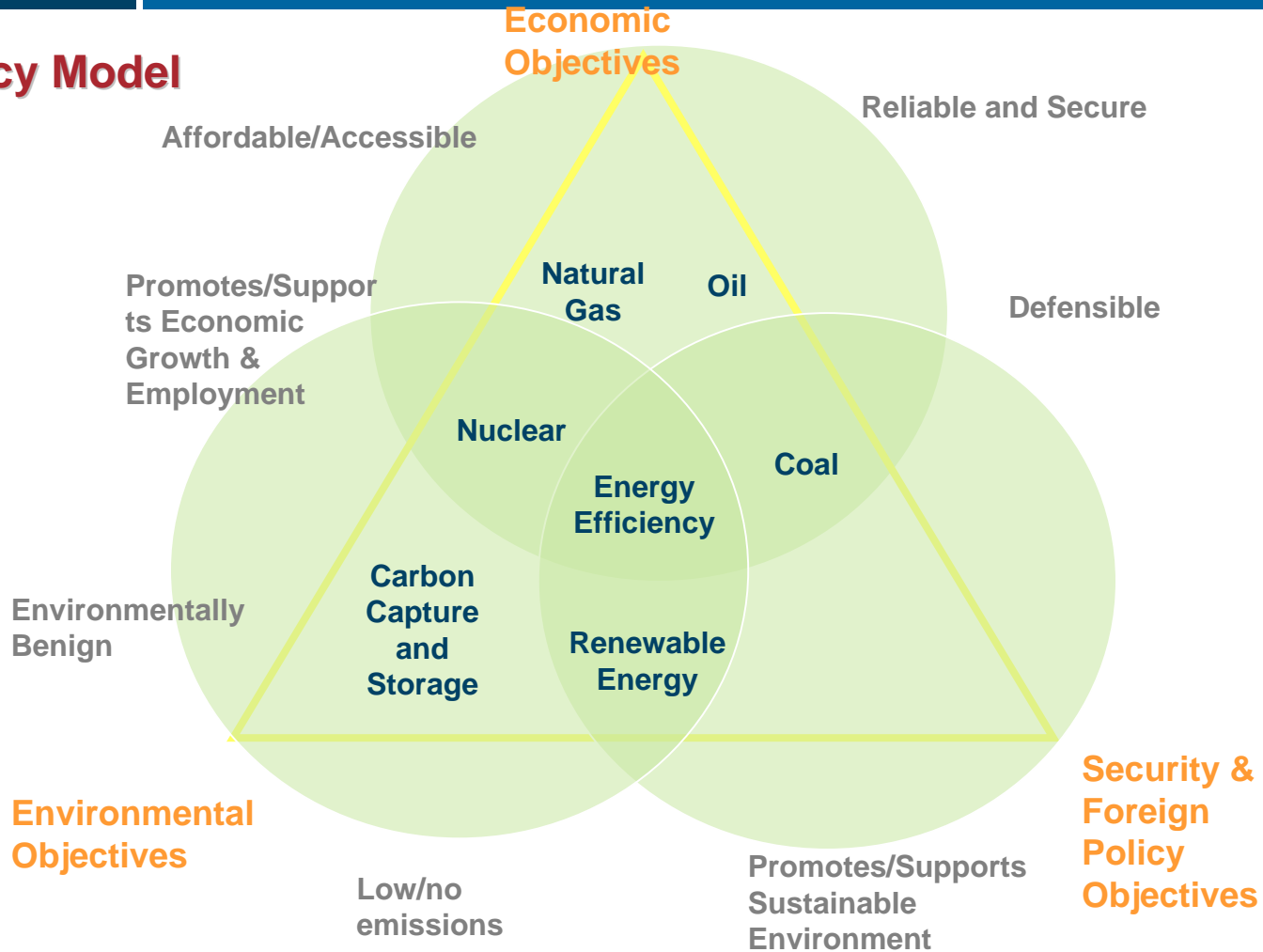


Energy Trade Flows, 2000 & 2030



Energy trade flows will expand, placing additional strain on an already massive and vulnerable system of infrastructure.

New Policy Model





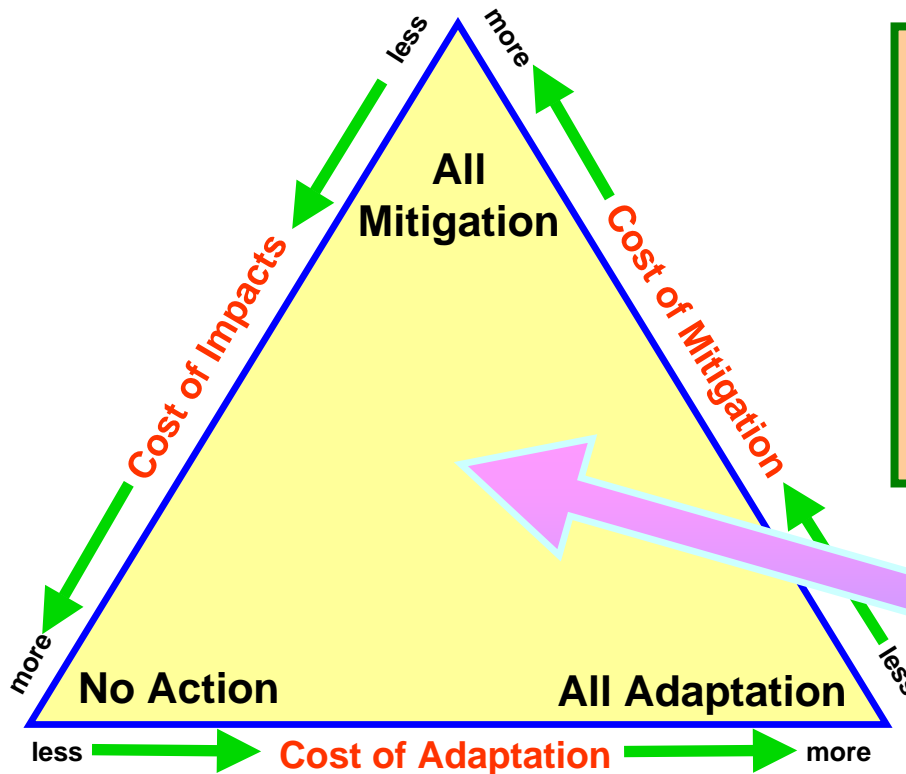
Climate Change Implications

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Balancing Costs of Impacts, Mitigation, and Adaptation



There Will Be Costs

The Question is How We Choose to Pay Them and Who Will Pay

Choices Must Be Made in Context of Balancing “E3” Goals of

- Energy Security
- Economy
- Environment

A schematic overview of inter-relationships between adaptation, mitigation and impacts.

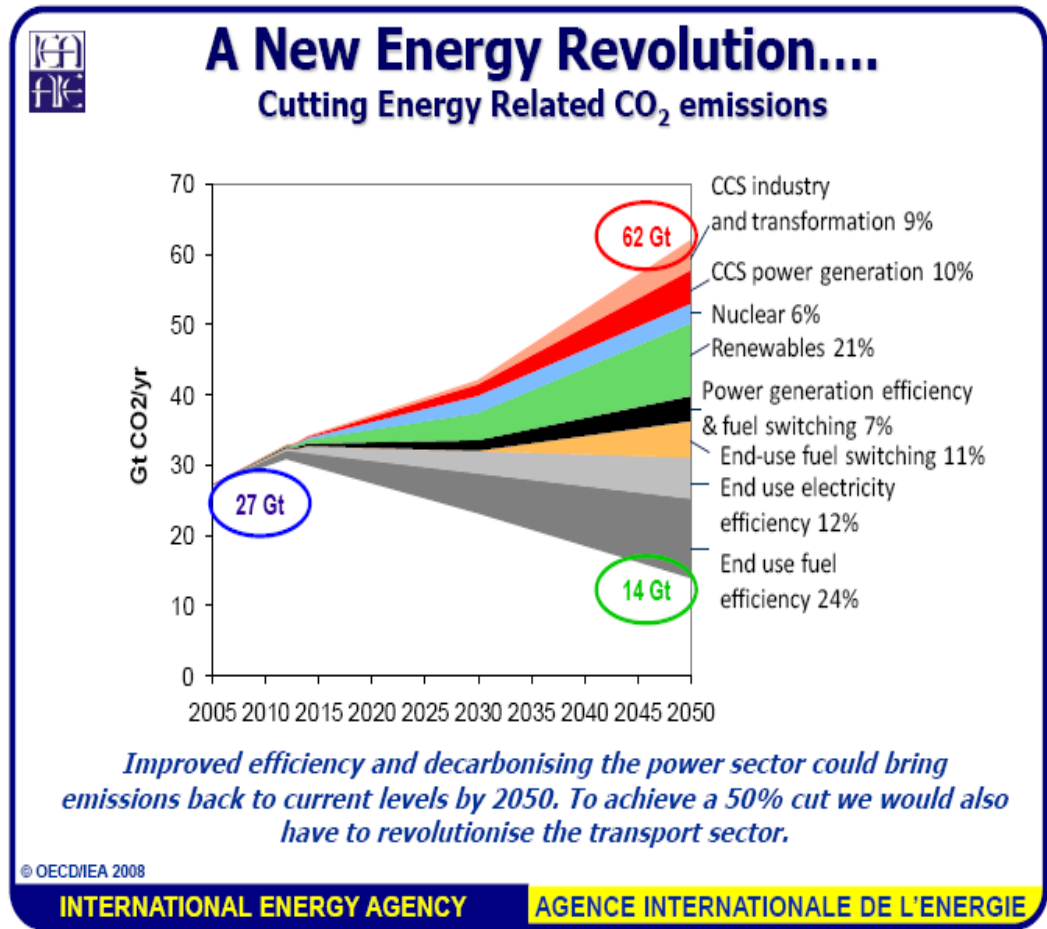
What does a “Low Carbon Revolution” Look Like?

“Scale of economic transformation on par with industrial revolution but must be achieved within one third of the timeframe.”

~McKinsey Global Institute

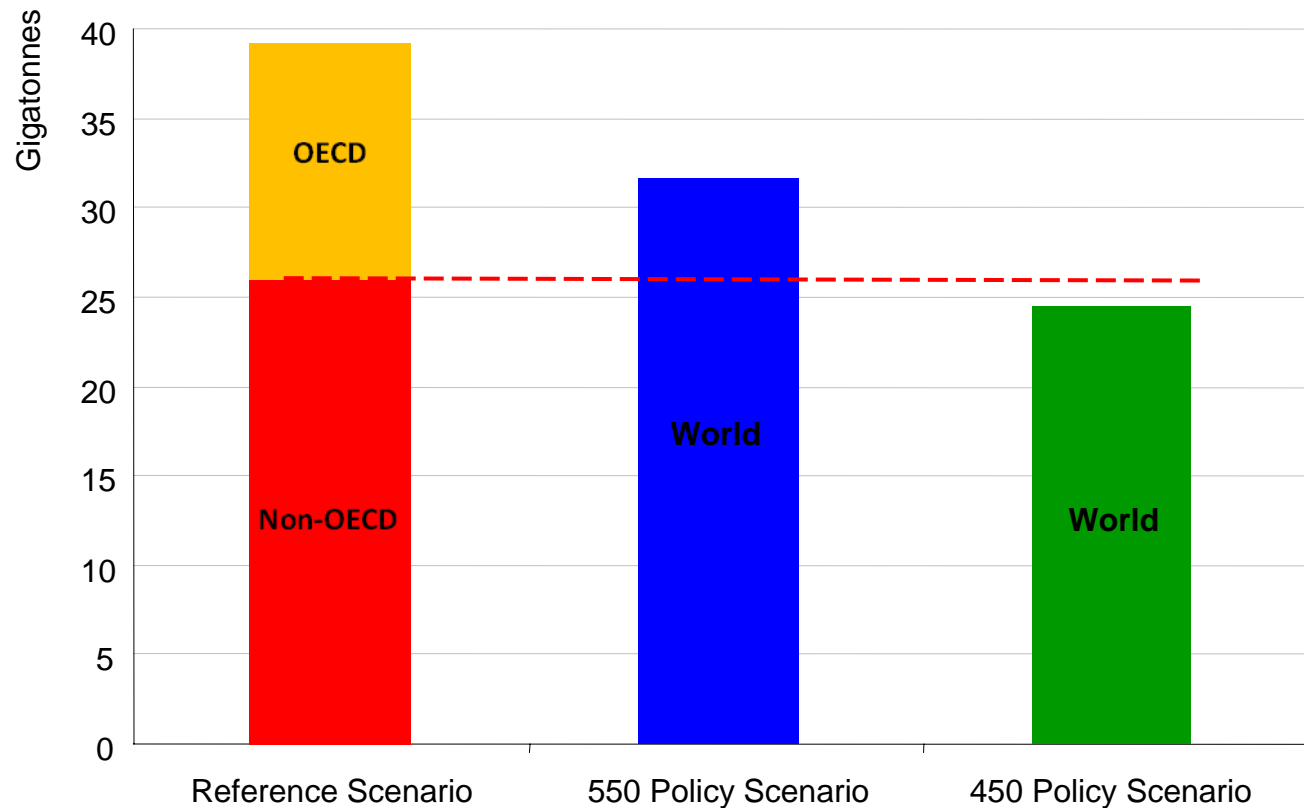
“US\$45 trillion between now and 2050”

~ IEA, *Technology Prospectus*



Improved efficiency and decarbonising the power sector could bring emissions back to current levels by 2050. To achieve a 50% cut we would also have to revolutionise the transport sector.

Global Energy-Related CO₂ Emissions, 2030



What Does it Take to Offset 1 Gigaton of CO₂?

Today's Technology	Actions that Provide 1 Gigaton / Year of Mitigation
Coal-Fired Power Plants	Build 320 "zero-emission" 500-MW coal-fired power plants (in lieu of coal-fired plants without CO ₂ capture and storage) (73% CF)
Geologic Sequestration	Install 1,000 sequestration sites like Norway's Sleipner project (1.0 MtCO ₂ /year)
Nuclear	Build 130 new nuclear power plants, each 1 GW in size (in lieu of new coal-fired power plants without CO ₂ capture and storage) (90% CF)
Electricity from Landfill Gas Projects	Install 7,700 "typical" landfill gas electricity projects (typical size being 3 MW projects at non-regulated landfills) that collect landfill methane emissions and use them as fuel for electric generation
Efficiency	Deploy 290 million new cars at 40 miles per gallon (mpg) instead of new cars at 20 mpg (12,000 miles per year)
Wind Energy	Install 170,000 wind turbines (1.5 MW each, operating at 0.45 capacity factor) in lieu of coal-fired power plants without CO ₂ capture and storage
Solar Photovoltaics	Install 1.7 million acres of solar photovoltaics to supplant coal-fired power plants without CO ₂ capture and storage (10% cell DC eff'cy; 1700 kWh/m ² solar radiance; 90% DC-AC conv. eff'cy).
Biomass fuels from plantations	Convert to biomass crop production a barren area about 5.4 times the total land area of Iowa (about 200 million acres)
CO₂ Storage in New Forest.	Convert to new forest a barren area about 2.5 times the total land area of the State of Washington (over 100 million acres) (Assumes Douglas Fir on Pacific Coast)

Climate Change will be a Game Changer

- **Affects supply & demand**
- Alters fuels choices, increases prices
- **In the extreme, raises security concerns**
- New investment & technologies applied on a global scale
- **Implications of a fractured vs. unified response**
- Concept of “Sustainable Development” challenges traditional view of economic prosperity
- **Requires long-term global policy solutions and trade-off balances**

Uncertainty = Frozen Investment



The Obama Administration: Energy & Environment

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E&E Priorities of Obama Administration

- **American Recovery and Reinvestment Plan – job growth, education and research, new technology, infrastructure & climate**
- **Domestic Energy & Climate Agenda**
 - Green energy and efficiency in jobs package
 - Renewable portfolio and low carbon fuel standards
 - Cap and trade program
- **International: Copenhagen meeting**
- **Energy Security through a reduction in imports**



Steven Chu, Secretary of Energy
Previous : Director,
Lawrence Berkeley
National Laboratory



Carol Browner,
White House Coordinator of
Energy and Climate Policy
Previous : Former Administrator, EPA



Lisa Jackson,
Administrator of the Environmental Protection Agency (EPA)
Previous: Director, NJ Department of Environmental Protection (DEP)



General James Jones,
National Security Advisor
Previous: President and CEO of the
Institute for 21st Century Energy



Larry Summers,
Chair, White House National Economic Council
Previous : Secretary of the
Treasury under Clinton



Nancy Sutley,
Chair, White House Council on Environmental Quality
Previous: Deputy Mayor for Energy and Environment
City of Los Angeles, California



Hillary Clinton,
Secretary of State
Previous: US Senator
from New York



Ken Salazar,
Secretary of the Interior
Previous: US Senator from Colorado



John Holdren,
Director of White House
Science and Technology Policy
Previous: Harvard University

OBAMA Energy & Environment Team