

# Global Trends and Opportunities for Energy Efficiency

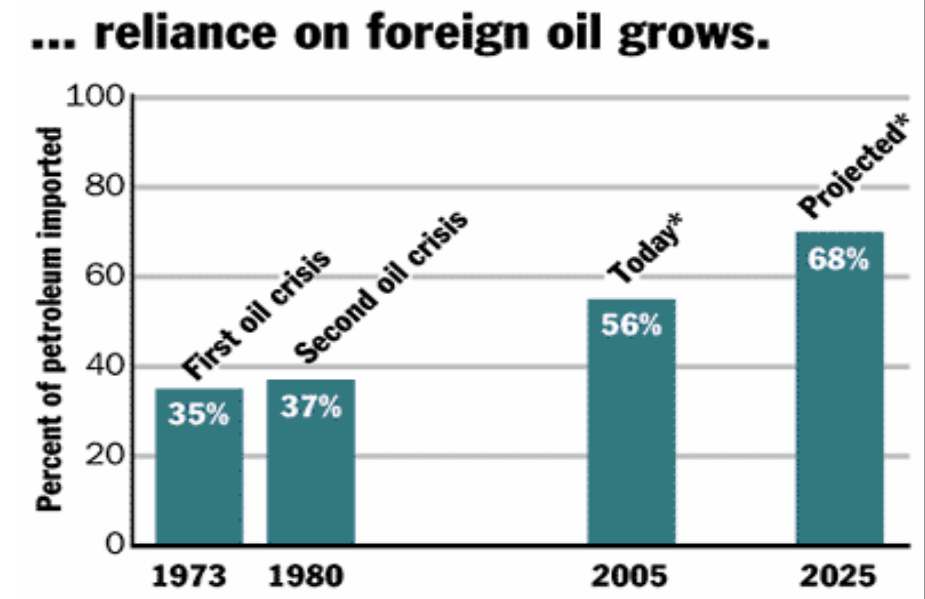
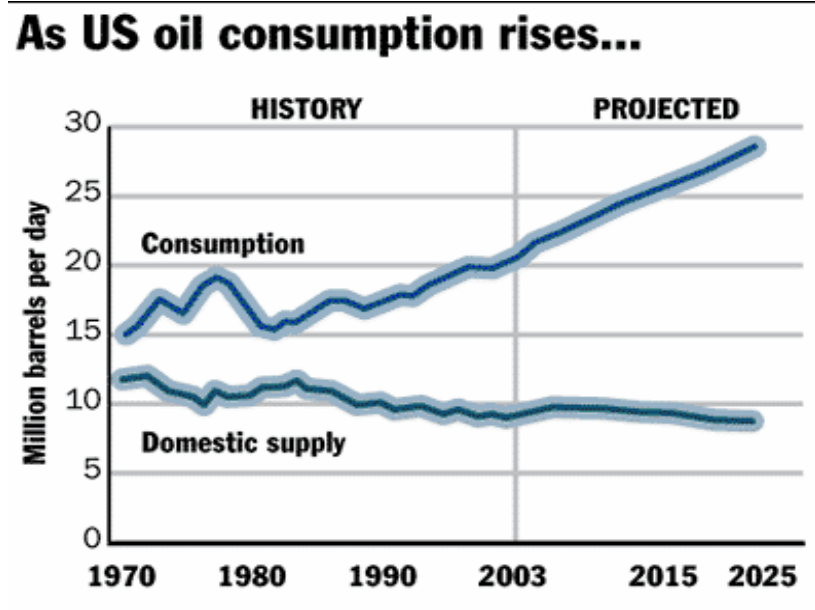
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# Signs of Changing Times

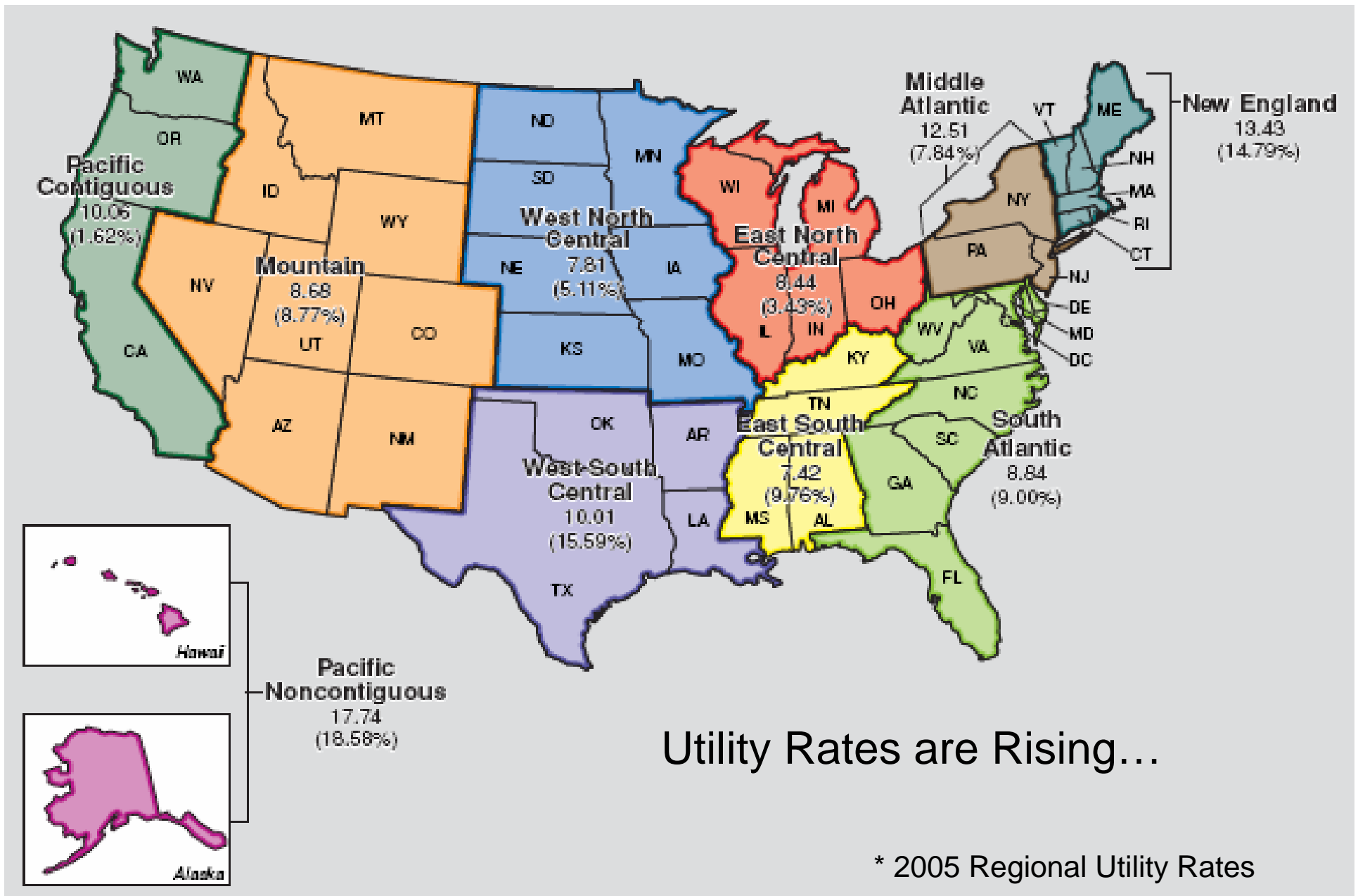
- More than ever - investors, insurers, product manufacturers, policy makers and the public are taking a serious interest in energy and the environmental issues
- Here are just some of the signs...  
...And what it means

# U.S. Energy Security & Supply Challenges

- U.S. reliance on foreign oil continues to climb
  - 1973 - 35% oil imported; 2003 - 56% imported; 2025 **projection -68% imported**
  - U.S. demand for oil projected to grow 37% in next 20 years\*



\* Deutch, Philip J. "Think Again: Energy Independence." *Foreign Policy* November/December 2005.

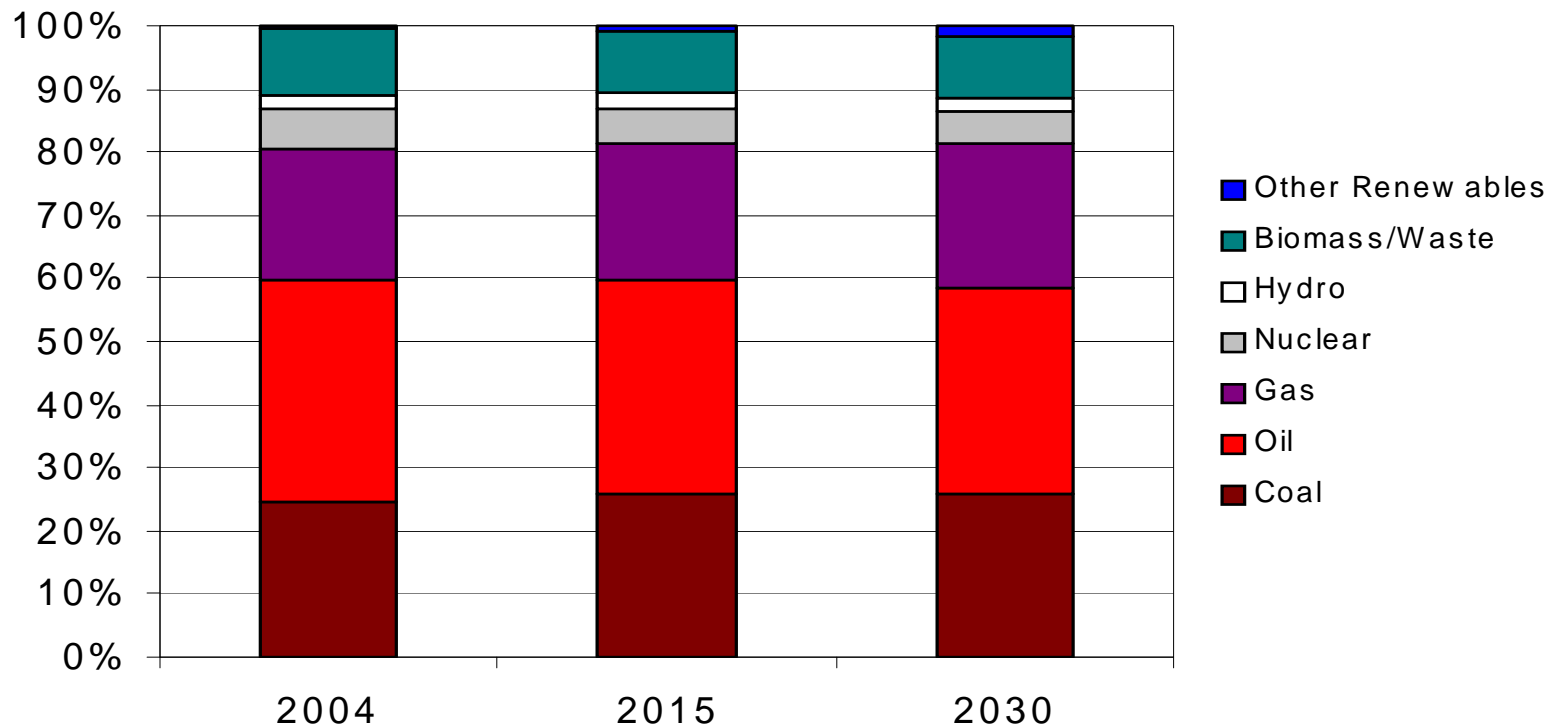


# State Response to Tight Electric Markets, i.e., *“The Straight Jacket”*

- Tight electric markets leading to surge in proposed coal plants ~ 150 plants proposed
- Cost of Super Critical Pulverized Coal plants soaring: 50-100% increase in capital cost (w/o considering carbon capture)
- Coal electricity now 8 - 12¢/kWh in many markets
- New coal could lock in high-cost electricity and emissions for 35-50 years

# World Primary Energy Demand By Major Fuel

- Fossil fuels account for 80% of world energy demand and will account for 83% of the increase in overall demand from 2004-2030



From the World Energy Outlook 2006, International Energy Agency

# Climate Change: Scientific Consensus

- There is a scientific consensus that Earth's surface temperatures are increasing and human activities are part of the reason.
- Many scientists and science groups have issued statements concluding compelling evidence for human modification of climate.
  - IPCC (1988, 2001, 2006)
  - National Academy of Sciences (2006)
  - American Meteorological Society (2003, 2006)
  - American Geophysical Union (2003)
  - American Association for the Advancement of Science (2004)

# Media Attention an Issue Driver





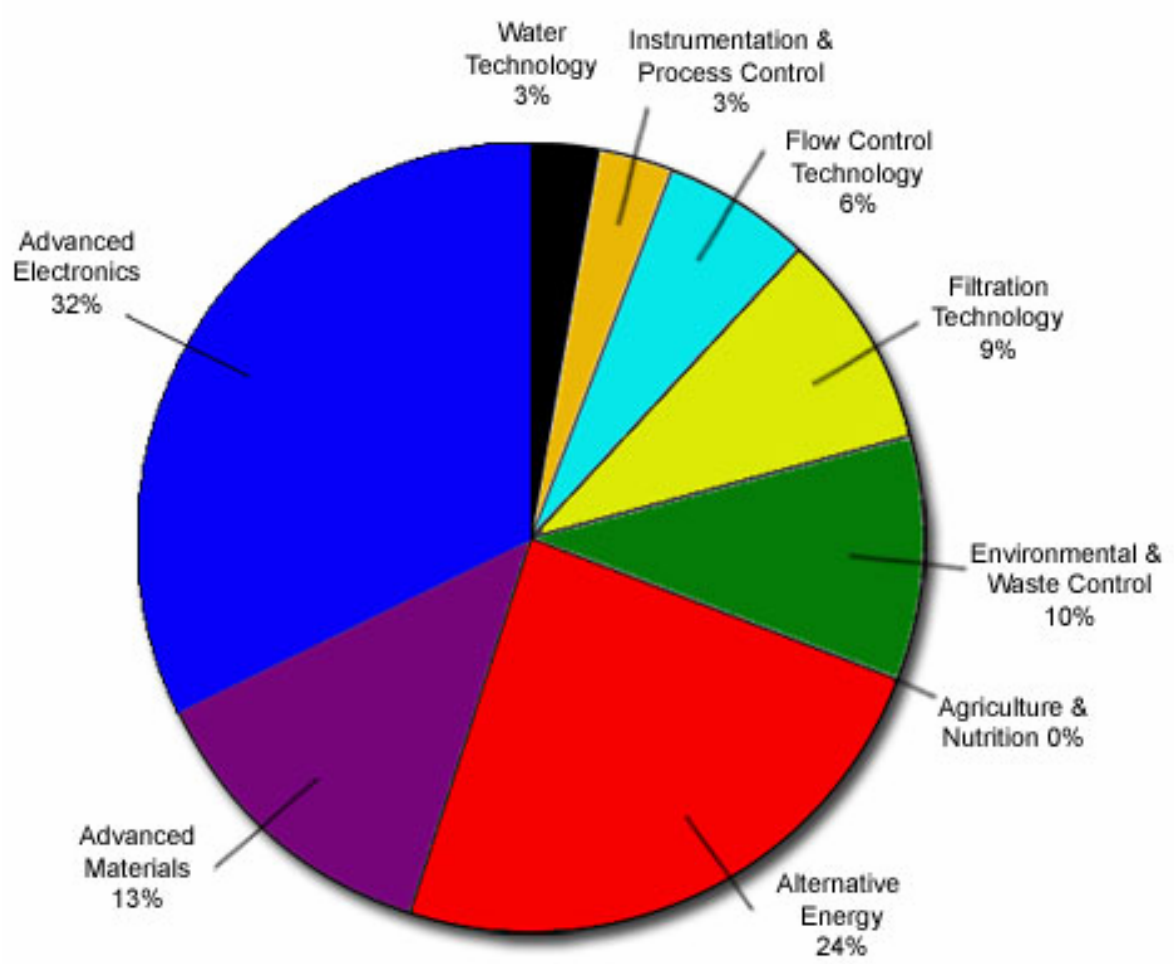
# Insurance Industry: New Policies

- 2005 - Insurance industry **shelled out record \$57 billion** in weather-related losses
  - Industry calls to curb GHG emissions have accelerated
- U.S. based global insurer, **AIG**, investing in projects and technologies that reduce GHG emissions
- **Fireman's Fund** introducing insurance policies that reward “green” buildings that save energy
- **St. Paul Travelers Companies** offers 10% discount on car insurance for owners of hybrid cars
- **State Farm Insurance Cos.** has suspended sales of any new commercial or homeowner policies in Mississippi

Sources: Gunther, Marc. “Insurance Companies Take on Global Warming.” *Fortune* 24 August 2006 and “State Farm: No new home policies in Miss.” MSNBC February 14, 2007.

# Markets Emerging: Clean Technologies

## Cleantech Index: Subsectors



Source: Cleantech Venture Network®

The Cleantech Index™ (CTIUS)...Over 50 US publicly traded "clean" technology companies that offer a diverse range of products, services, and processes designed to improve productivity and efficiency, while reducing environmental impact. All are listed on the NYSE, NASDAQ, or the Amex.

# Unique Industry Alliances Forming: U.S. Climate Action Partnership

- January 2007 – “Ours is a unique and diverse group, which is united in the belief that we can, and must, take prompt action to establish a coordinated, economy-wide, market-driven approach to climate protection...Our goal is to help our nation create public policy to slow, stop, and reverse the growth of greenhouse gas emissions.”
  - Joint Statement, United States Climate Action Partnership. Jan 2007
- 10 major U.S. Corps. including **GE, Alcoa, DuPont, Duke Energy, Lehman Brothers** and NGOs
- They are demanding measures to combat climate change

# Where Do Datacenters Fit In?

## What is the Governments vision?

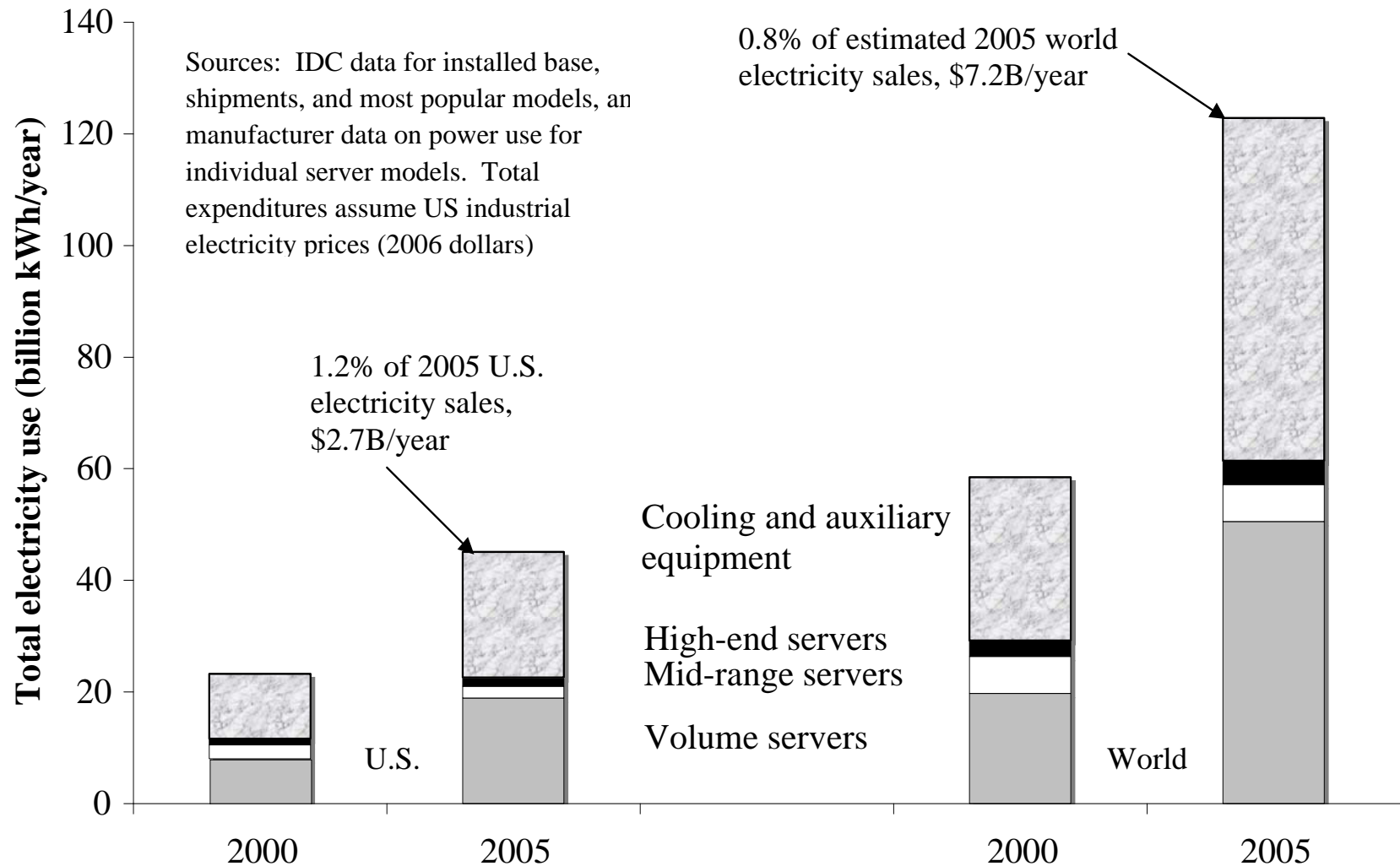
- Drive demand for more efficient equipment, new building design, and best practices building management strategies...**Why?**
- Datacenters are critical national infrastructure
  - 10 million servers and 10k datacenters est. in the US
  - Typical facility may consume 1MW but can be > 20
- Economic growth, scientific advances, & quality of life increasingly depend on our vital ability to harness growing computing power & mushrooming data
- Datacenters are good candidates for efficiency investments by utilities to reduce peak loads
- Investment in efficient equipment to create a “spillover effect” into other product and building sectors

# IT Equipment Potential

- Study by Jonathan G. Koomey, Ph.D. (Feb.2007)
  - Total power used by servers in 2005 is **0.6%** of total U.S. electricity consumption
  - Add cooling and auxiliary infrastructure: **1.2%**, comparable to color televisions
  - Aggregate electricity use for servers doubled over the period 2000 to 2005 both in the U.S. and worldwide.
  - Server power projected to increase another **40% to 76%** from 2005.

Web site: <http://enterprise.amd.com/us-en/AMD-Business/Technology-Home/Power-Management.aspx>

# Summary results for server electricity use



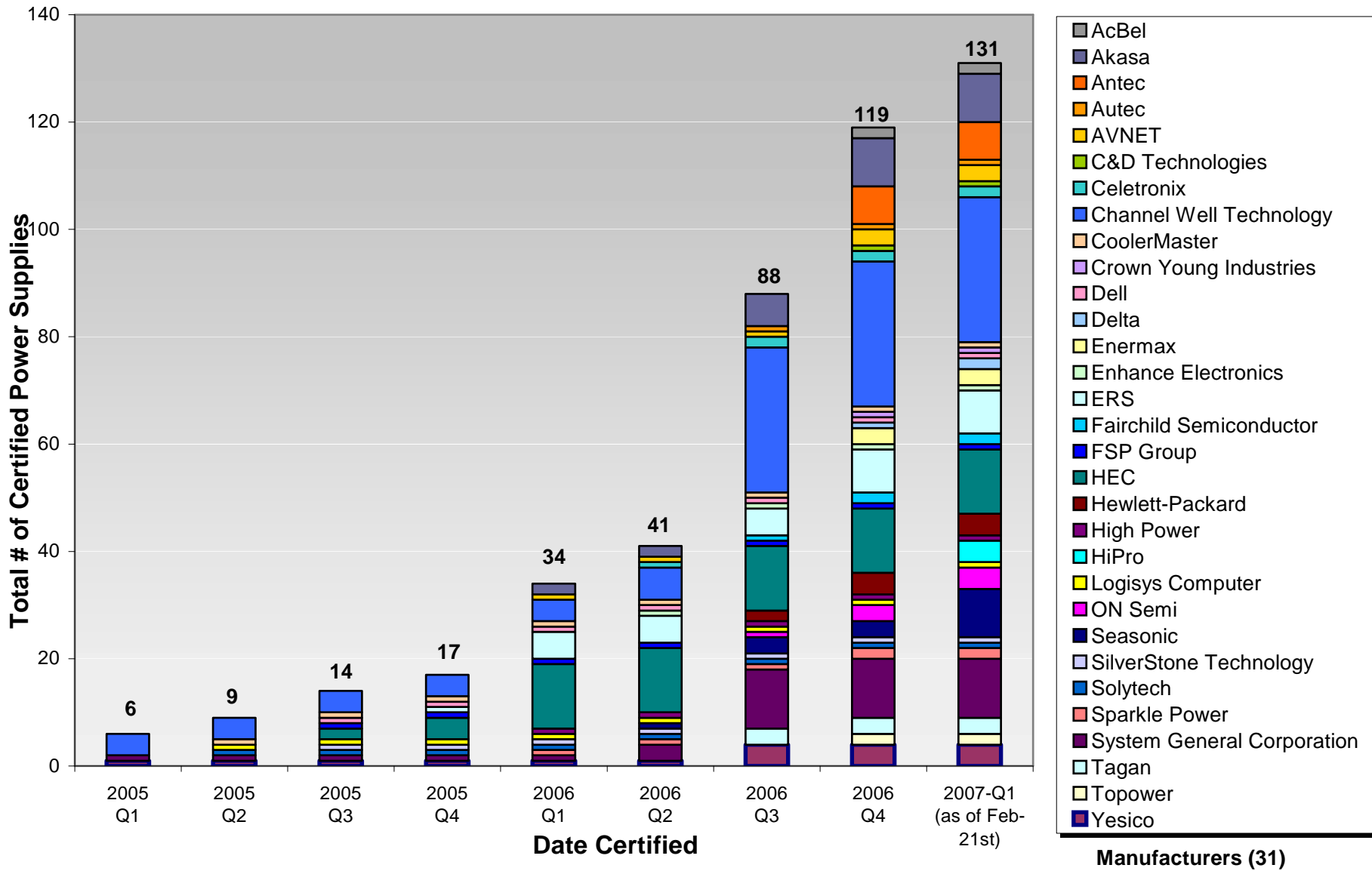
# U.S. EPA Datacenter Initiatives

- EPA study to Congress underway on server and datacenter energy efficiency opportunities
  - Will include recommendations on voluntary initiatives
- ENERGY STAR specification for servers
  - Server energy efficiency measurement protocol released in November, 2006
  - Performance, reliability, and efficiency will be important elements
- ENERGY STAR building benchmark for datacenters
  - Start with buildings that also house datacenters

# Other U.S. Datacenter Initiatives

- Several industry leaders already introducing more energy efficient components, equipment, and solutions to the U.S. marketplace
- PG&E and other utilities developing datacenter and server incentive programs
- 80 PLUS program now testing server power supplies
  - Opportunity for new energy-efficient designs to enter market





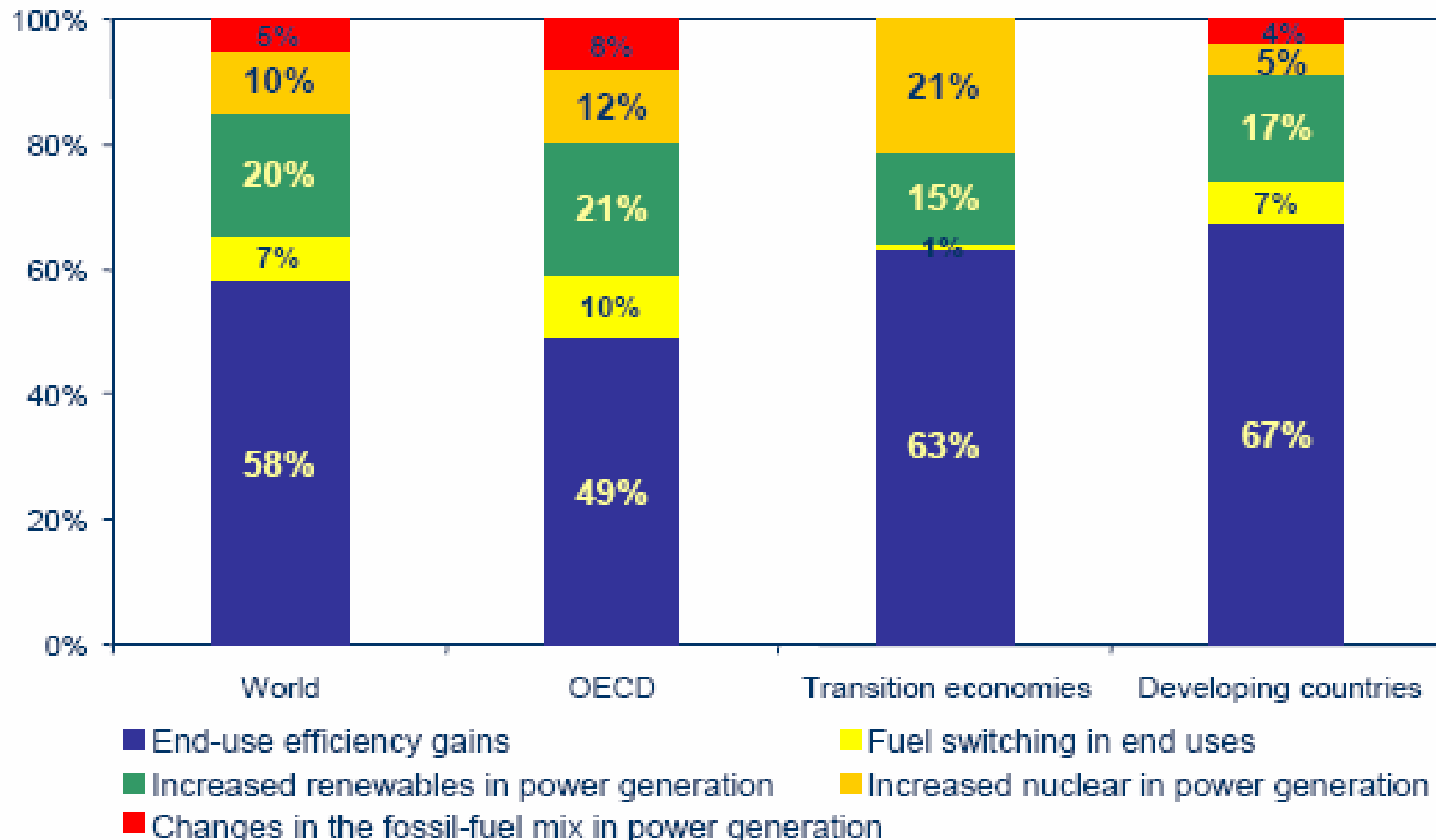
# International Coordination

- IT equipment --- global economy
- Issues faced within the datacenter are shared worldwide
- EPA is working with UK, EU, and China to harmonize efforts in the datacenter sector

# Why We are Here Today

- Energy & climate concerns not going away
- Investors and public want firms to have better strategic energy management plans
- Datacenters are a key E<sup>2</sup> opportunity - High tech sector a *first mover*
- Encourage customers to demand standards and international harmonized test procedures and protocols

# Contributing Factors in CO<sub>2</sub> Reductions 2004-2030



Source: Noé van Hulst, IEA

# Benefits of Reduced Electricity Consumption



- Improve air quality
  - Less: smog, acid rain, respiratory illness
- National security
  - Less dependence on foreign sources
  - Less price volatility
- Help mitigate climate change
  - Fewer greenhouse gas emissions
- Improve electricity grid reliability
  - Fewer brown & black outs
- Lower energy bills
  - Consumers & businesses save

# Contact Information & Resources

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[www.energystar.gov/datacenters](http://www.energystar.gov/datacenters)

Koomey Report

<http://enterprise.amd.com/us-en/AMD-Business/Technology-Home/Power-Management.aspx>