Global Trends and Opportunities for Energy Efficiency

Andrew Fanara, EPA
ENERGY STAR Program Manager
fanara.andrew@epa.gov
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*

Utility Rates are Rising…

* 2005 Regional Utility Rates

Datacentre Energy Dynamics 2007
LIFECYCLE ENERGY-EFFICIENCY CONFERENCE / EXPO
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

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.
  – 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

Markets Emerging: Clean Technologies

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.

Cleantech Index: Subsectors

- Advanced Electronics 32%
- Water Technology 3%
- Instrumentation & Process Control 3%
- Flow Control Technology 6%
- Filtration Technology 9%
- Environmental & Waste Control 10%
- Agriculture & Nutrition 0%
- Advanced Materials 13%
- Alternative Energy 24%

Source: Cleantech Venture Network®
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.”

• 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 Government’s 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.

Summary results for server electricity use

Sources: IDC data for installed base, shipments, and most popular models, and manufacturer data on power use for individual server models. Total expenditures assume US industrial electricity prices (2006 dollars).

1.2% of 2005 U.S. electricity sales, $2.7B/year

0.8% of estimated 2005 world electricity sales, $7.2B/year

Cooling and auxiliary equipment

High-end servers
Mid-range servers
Volume servers

U.S.
World

Datacentre Energy Dynamics 2007
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
To total # of Certified Power Supplies

AcBel
Akasa
Antec
Autec
AVNET
C&D Technologies
Celetronix
Channel Well Technology
CoolerMaster
Crown Young Industries
Dell
Delta
Enermax
Enhance Electronics
ERS
Fairchild Semiconductor
FSP Group
HEC
Hewlett-Packard
High Power
HiPro
Logisys Computer
ON Semi
Seasonic
SilverStone Technology
Solytech
Sparkle Power
System General Corporation
Tagan
Topower
Yesico

Date Certified

2005 Q1
2005 Q2
2005 Q3
2005 Q4
2006 Q1
2006 Q2
2006 Q3
2006 Q4
2007-Q1 (as of Feb-21st)

Manufacturers (31)
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 E² opportunity - High tech sector a first mover
• Encourage customers to demand standards and international harmonized test procedures and protocols
Contributing Factors in CO$_2$ 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

Datacentre Energy Dynamics 2007
Contact Information & Resources

Andrew Fanara, EPA
fanara.andrew@epa.gov
www.energystar.gov/datacenters

Koomey Report