Observations of Energy Use, Climate Change and Potential Consequences and Strategies for Data Centers

October 30, 2007
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Climate Protection Partnership Division
ENERGY STAR Program
Tonights Topics

• A few recent observations on energy supply and demand and some things to keep in mind on climate change (CC)
• Brief summary of the report to the Congress on energy efficiency opportunities in the data center
• Review of the goals for the Wednesday ENERGY STAR meetings

  ❖ Main goal -- to get the discussion going tonight
Cement Industry Is at Center of Climate Change Debate


By ELISABETH ROSENTHAL
Published: October 26, 2007
**Company Portrait**

**China Shenhua Energy Company Limited ("CSEC")**  

is the leading integrated coal-based energy company focusing on the coal and power businesses in China. Our integrated coal, rail, port and power business model creates significant synergies and value for the company and demonstrates superior profitability and return profile for our shareholders.

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**Investor Relations**

- Overseas Regulatory Announcement-Announcement on Project Progress *(2007.10.28)*  
- Proposed A Share Issue  
- China shenhua 2007.08 Operational Highlights

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**Top News**

- [2007-08-06] Two Units of Yuyao Power passed the 168-hr test

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**More...**
Earlier this month, Puget Sound Energy updated its long-term resource plan and said it will need an estimated $14.4 billion in capital to meet rising electricity demand in the next 20 years, or three times as much money as it projected four years ago when it pegged its capital needs at $4.4 billion. Infrastructure costs have been rising rapidly, and Puget has proposed meeting more of its future needs through renewable-power and energy-efficiency programs.
Kansas Denied Power Plant Operation Permit Over C02 Emission Concerns

October 23, 2007 6:58 a.m. EST

Isabelle Duerme - AHN News Writer

(AHN) - A Kansas power plant has been denied its operation permit due to concerns regarding the amount of carbon dioxide it would potentially produce.

The ban was decided by the Kansas Department of Health and Environment, care of Secretary Rodrick L. Bremby. They are the first government agency in the United States to reject a permit for a coal-fired energy power plant based on global warming concerns.

Despite opposition from the KDHE, Bremby insisted that ignoring the strings of evidence and facts of CO2 and other greenhouse emissions in relation to the global warming concern would be "irresponsible."

He stressed the importance of bringing attention to the "potential harm to our environment and health if we do nothing."

Arguments were met by Bremby's decision.

Stephen J. Miller, a spokesperson for the Sunflower Electric Power Corporation, which would have been the operator and part-owner of the power plant, insisted that the cited ruling merely ordered the regulation of carbon dioxide, and that "there are no carbon dioxide regulations in the federal rules or in
Energy Reduction in Tokyo

• Tokyo Power and Electric is targeting 800 most energy consuming buildings in Tokyo for energy consumption reduction, 100 of which are data centers.

• Data center operators are worried that new reduction targets could force them out of Tokyo and away from the companies/facilities they support.
Measuring Our Carbon Footprint

Back to Climate Change page

In January, we announced that we would measure and publish our total direct carbon footprint as part of our commitment to tackle climate change. Our aim was to establish a clear baseline from which to track progress in reducing our emissions, and enable us to identify those areas of our business we need to prioritise.

We commissioned Environmental Resources Management Limited (ERM) to map the total direct carbon footprint of the Tesco business across all the countries in which we operate.

Our Impact

The direct carbon footprint for the Tesco Group during the financial year to February 2007 was 4.13m tonnes of carbon dioxide equivalent (CO2e)*. Our UK business emitted 2.25m tonnes of CO2e or 55% of our total direct emissions.
• **Purpose**: assess energy impacts on and from datacenters, identify energy efficiency opportunities, and recommend strategies to drive the market for efficiency

• **Goals**:
  – Inform Congress & other policy makers of important market trends, forecasts, opportunities
  – Identify and recommend potential short and long term efficiency opportunities and match them with the right policies
  – Identify areas for additional strategic research outside the scope of the report
Trends in Data Center Energy Use

• Sector consumed about 61 billion KWh in 2006
  – Equates to ~1.5% total U.S. electricity consumption and ~$4.5 billion
  – Federal sector: ~6 billion kWh and ~$450 million

• Projected to increase to 100 billion kWh in 2011
  – Equates to ~2.5% of total U.S. electricity consumption and ~$7.4 billion
Comparison of Projected Electricity Use
All Scenarios 2007 - 2011

Historical energy use
Future energy use projections

Historical trends scenario
Current efficiency trends scenario
Improved operation scenario
Best practice scenario
State of the art scenario
Report Recommendations

• Standardized performance measurements for IT equipment and data centers
  – Development of benchmark/metric for data centers
  – ENERGY STAR label for servers, considering storage and network equipment

• Leadership by federal government to be a catalyst

• Encouragement of private and public organizations and the creation of incentives to pursue efficiency options

• Information on best practices

• Research and development
### EPA/DOE Activities & Goals

#### 2008 Activities

**EPA**
- Server/storage spec
- Data center focus group, look at other buildings

**DOE**
- Pilot project, measure data center energy use

#### Potential Metrics

- Benchmark score/watt
- IT load/total load
- Useful work/IT load or energy

#### Long Term Goals

- ENERGY STAR IT Specs
- ENERGY STAR building benchmark
- DOE auditor certification
- DOE design guide and tools
Track 1: Servers

ENERGY STAR Server Specification Working Group

• Potential Criteria to be Discussed:
  – Product Coverage and Definitions
  – Power Supply Efficiency and Power Factor
  – Standardized Performance Labeling and Reporting
  – Active Power Management
  – Networking, Benchmarking, and Other Considerations

• Discussion to be held in the Anasazi Room / 830 am
ENERGY STAR Industry Focus – Development of Energy Performance Benchmarks for Data Centers

• Topics to be Discussed:
  – EPA and DOE Goals for Metrics
  – Energy Usage in Data Centers: Selecting a performance metric and opportunities for improvement
  – Implementing a Metric (i.e., defining and implementing a metric, data collection efforts, etc.)

• Discussion to be held in the Sunset Room / 830 am
Final Thoughts and Take Aways

- More attention being paid to the implications of energy supply and demand than ever before
- We are seeing the emergence of a more environmentally sensitive consumer class
- Is government leading or following public sentiment?
- Enterprise wide strategic energy management and planning a competitive must have for every organization
- Voluntary and industry schemes (and claims) to save energy will increasingly be questioned for their effectiveness -- they must be challenging and verifiable to be credible
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