

Global Trends: Government Initiatives to Reduce Energy Use in Data Centers

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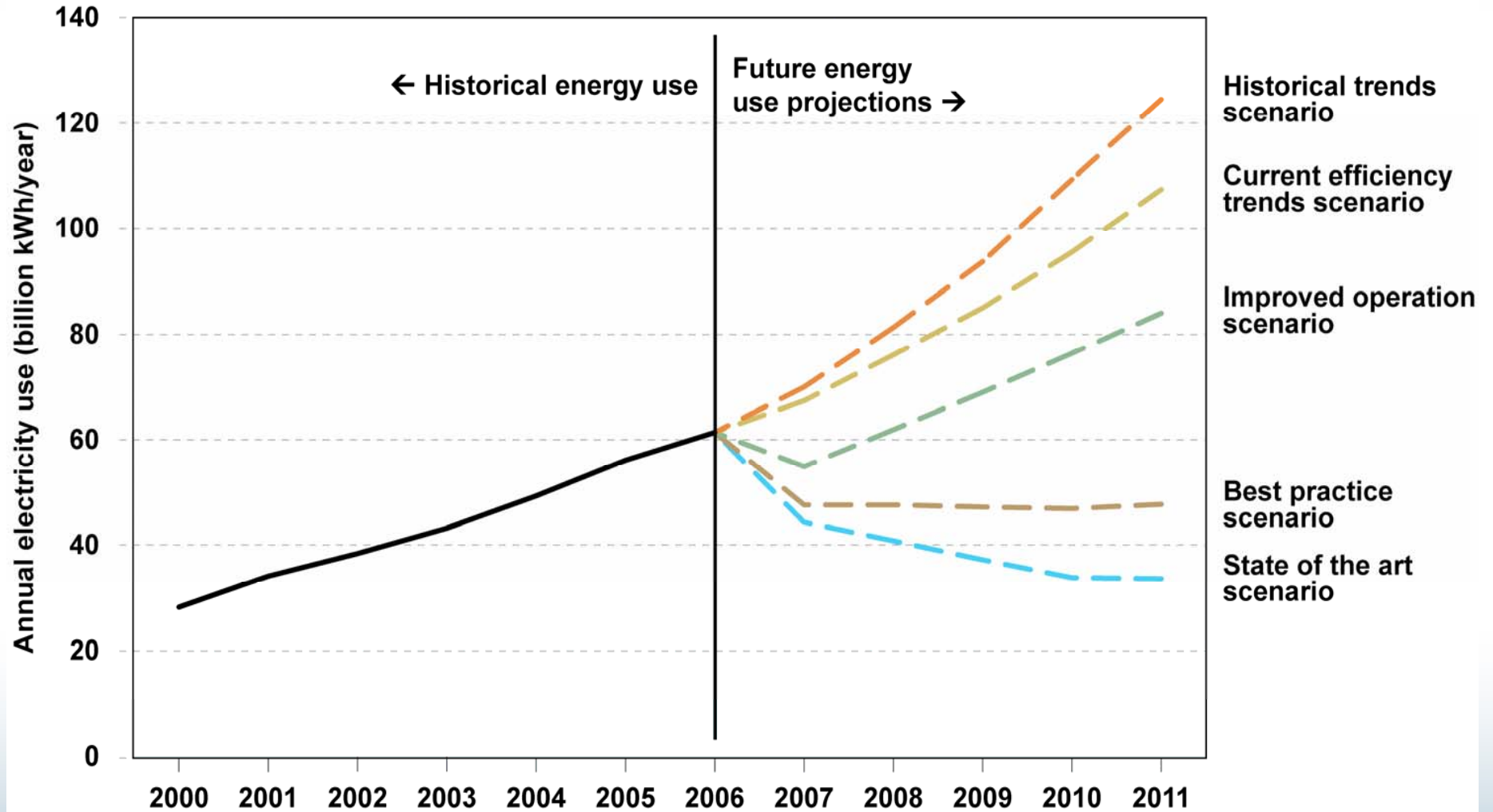
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Global Interest: Data Centers



- Services provided by data centers are in global demand
- Need for increased capacity and strain on electricity supply is a worldwide issue
- Public and private sectors under pressure to improve energy security and reduce carbon emissions
- IT market is global -- technology & best practices sharing, harmonization opportunities can be shared

Comparison of Projected Electricity Use All Scenarios 2007 - 2011



Australia – Dept. of Environment & Water Resources



- Equipment Energy Efficiency Program Committee
 - Includes New Zealand representatives
 - Regulatory and voluntary market intervention programs
- Energy Efficiency in Government Operations (EEGO) Policy 2006
 - Requires government departments and agencies to report annual energy usage and to commit to energy intensity portfolio targets along with other e-e commitments
- **Goal:** Agencies must develop strategies for energy efficiency in govt. operated data centers with an expected 20% improvement over 5 years

Datacenter Project

Key elements



- 3 stage process involving issue papers, case studies and final report to government to lay out plan to achieve 20% goal
 - Targeted completion Q4 / 2008
- Developing MEPs for CCU and CRAC Units
 - Targeting Q1 - Q2 / 2008 for proposal & industry consultation
 - Regulatory impact statement
- Expressed intent to use ENERGY STAR building and product metrics

India



Primary Objective: Assist in market transformation and capacity building for energy efficiency in Indian buildings for high tech industries starting with data centers

- Asia Pacific Partnership on Clean Development (APP)
 - Building & Appliance Task Force (BATF)
- Project Description
 - Funding from the US Department of Energy (DOE)
 - Partnership with US Agency for International Development (USAID)'s ECO-III Project

India Project Goal



- To assess the state of the art for energy efficiency in Indian data centers and to identify opportunities for improvement
- Activities included:
 - Meetings with Indian government agencies, NGOs, industry organizations, industry leaders, and USAID
 - Site visits to three data centers in Bangalore (India's "Silicon Valley")
 - Organization and participation in a half-day brainstorming meeting with government and industry to establish an efficiency initiative
 - Organization and participation in an all day awareness building workshop

Barriers to Energy Efficiency



- Barriers to improving Indian data center efficiency identified at half-day “charette”:
 1. Lack of awareness
 2. Lack of technical expertise (capacity building)
 3. Lack of institutional framework (e.g. to share information and to develop a value proposition)
 4. Lack of energy benchmarking
- Universal agreement on the need to establish an industry led initiative to address barriers:
 - Government and international organizations could play a catalytic role and provide technical resources for such an initiative

Recommendations



- Recommendations fell into five main categories:
 1. Create Information/Awareness Framework
 2. Perform Capacity Building/Training
 3. Establish an industry forum to facilitate capacity building and to stimulate peer to peer exchanges of information (lessons learned)
 4. Develop Performance Indicators and Benchmarking Framework
 5. Create Regulatory, Standards, and Incentives Framework
- In addition, India specific technical research and development needs were identified.

Awareness Workshop



- 65 Attendees representing a broad spectrum of the private and public sector
- 3 Technical Sessions
 - 1st Session reviewed market & trends and benchmarked performance, and described IBM's Project Big Green
 - 2nd described international best practices in data center design and operation, looked at data center power optimization in two Intel India data centers, and presented a case study of efficiency at India's Network Appliance.
 - 3rd covered HP's Dynamic Smart Cooling application in India (1st full scale application in the World), energy efficiency from APC, and information resources.
- Included an interactive panel discussion on a national data center efficiency initiative

Observations



- Data centers appear to be consistent with world wide trends
 - Some included international state-of-the-art efficiency technologies
- Indian-only companies (non-multinational companies including data center owners, designers, and builders) need access to unbiased information and industry forums
- The Indian IT/data center industry is poised to take on a leadership role in establishing an energy efficiency initiative

More Information



- Dale Sarter, LBNL DASartor@LBL.gov
- <http://hightech.lbl.gov/DC-India/India-datacenters.html>

China



- Staggering economic growth coincident & dependent on increased development of new datacenters
 - Serious electricity supply and quality issues
- Pressure to reduce emissions and pollution
- EPA's Goal: Develop project to transfer knowledge to build data centers of the future -- not of the past
- Workshop held in Beijing December 2007
 - Industry experts provided an overview of issues, products, technologies, and best practices to China National Institute for Standards (CNIS) staff

China-Next Possible Steps



- Establish local network of government (CNIS) & industry contacts
 - Building design, utilities, customers, IT, site infrastructure etc.
 - Leverage knowledge and financial resources locally and regionally
 - Share situational analysis & facility best practices information
- Identify existing & planned data center projects to highlight as flagships
- Work with Chinese government to identify needs for building codes industry standards
 - Similar to ASHRAE or other building code standards

US - EPA Report to Congress



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**

Key Report Recommendations



- **Standardized performance measurements for IT equipment and data centers**
 - ENERGY STAR label for servers, considering storage and network equipment
 - Development of benchmark/metric for data centers
- Encouragement of private and public organizations and the creation of incentives to pursue efficiency options
- Information on best practices
- Research and development
- Federal facilities show leadership

Leadership by US Government



EPA National Computing Center RTP, NC

- 95,322 gross square feet, 46 Billion Btu/year
- LEED[®] silver certification in 2005
- Solar roof system and street lighting
- Energy efficient lighting in facility
- Building automation system, outside air economizers, variable speed HVAC systems
- **Energy audit scheduled for first week in February**

ENERGY STAR for Servers



Server energy demand **drives DC power and cooling needs**

- **Goal**: Create protocol to measure server energy efficiency to allow fair competition
- Technical specification would have several key elements:
 - Definitions of product types eligible for ENERGY STAR
 - Test procedure for energy efficiency and computing performance
 - Performance levels representing most efficient models available in the market today
 - Road map for future specification requirements (Tier 2)

Specification Timeline



Goal: Finalized Tier 1 spec before end of 2008 & lay ground work for Tier 2

- EPA released draft framework document July 2007
- **Draft 1 specification release targeted for Feb 7**
 - Stakeholders will have 3-4 weeks to comment
- Draft available at:
www.energystar.gov/productdevelopment

US - Energy Supply Environmental & Climate Pressures



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PacifiCorp labels coal a no-go for new plants

Going green - The utility says its long-range plans will look elsewhere for resources to generate electric power

Friday, December 07, 2007

TED SICKINGER
The Oregonian Staff

PacifiCorp has backed away from plans to build any new coal plants within the next 10 years, conceding that coal no longer can overcome tightening regulations and environmental opposition.

In recent filings and communications with regulators in Utah and Oregon, the Portland-based company said three coal plants included earlier this year in long-range resource plans and subsequent requests for proposals were "no longer viable options."

PacifiCorp cited as reasons for its decision: The likelihood of national carbon emissions legislation, which it said makes accurate cost projections and risk assessment for coal plants "futile," and the fact that most of the coal plants proposed around the United States recently have been canceled, denied permits or been involved in protracted litigation.

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North America – Utility Programs



- U.S. & Canadian utilities pursuing data center programs
 - Motivated by grid capacity, peak demand, reliability concerns, regulatory uncertainty, higher feedstock prices
 - **PG&E, Austin Energy, Efficiency Vermont, Energy Trust of Oregon, Sempra, SCE, BC Hydro with programs**
 - **Others showing considerable interest -- Xcel Energy, NYSERDA, Wisconsin Focus on Energy**
 - Contacts: Jason Erwin Jerwin@cee1.org
Mark Bramfitt MJB9@pge.com
- Utilities funded research by 80 PLUS to extend incentives to data enterprise servers
 - Contact: Ryan Rasmussen
rrasmussen@ecosconsulting.com

US – International Collaboration



- Initial focus on information and data sharing
 - Characterize domestic market opportunities and barriers to efficiency
- Encourage country counterparts to consider:
 - ☐ Cost effective *Bottom up* and *top down* EE strategies
 - Adoption of ENERGY STAR IT specs & data center rating tool, system upgrades etc.
 - Take a leadership role by implementing solutions in government facilities
 - ☐ Engage utilities sector to create programs and incentives for data center efficiency measures

Takeaways



- Rising global concern over energy supply, security and climate change
 - US electricity demand growth - 1.8% / Off a huge base
 - Large transmission and generation investments in an uncertain economic environment
 - Economy needs standard metrics and energy transparency to prevent “green washing”
- Financial and reputational risk associated with status quo
 - Boardrooms, investors, and customers taking notice of energy cost and carbon footprint
 - Energy efficiency a 1st resource in any action plan
- DCs a key economic and CO2 reduction opportunity
- Contact: fanara.andrew@epa.gov