Data Centers & Servers

Creating a Data Center Energy Efficiency Framework to Accelerate Efficiency Gains

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Ground Rules

- Interactive
- Flexible and focused
- Use of “parking lot”
- 100% Participation
- No such thing as a dumb question
- All perspectives are valid and valued
- Follow CEE committee conduct guidelines

Session Objectives

- To identify and refine preferred outcomes for a energy efficiency (EE) framework that would organize efficiency opportunities in data centers
- To identify and catalogue preferred approaches for organizing data center markets and EE opportunities
- To begin to construct a framework that categorizes the approaches and identifies areas of overlap and agreement
- To identify and categorize outstanding information needs and questions and then identify roles to address these needs during the next year.

Session Agenda

- Introductions & CEE Context
- EE Program & Government Presentations
  - Roland Risser, PG&E; Mike Zatz, EPA
- *Lunch 12:30 – 1:00pm*
- IT Industry Panel Presentations
  - Jay Dietrich, IBM; Derek Schwartz, Technology Deployment Solutions; Jon Haas, Intel

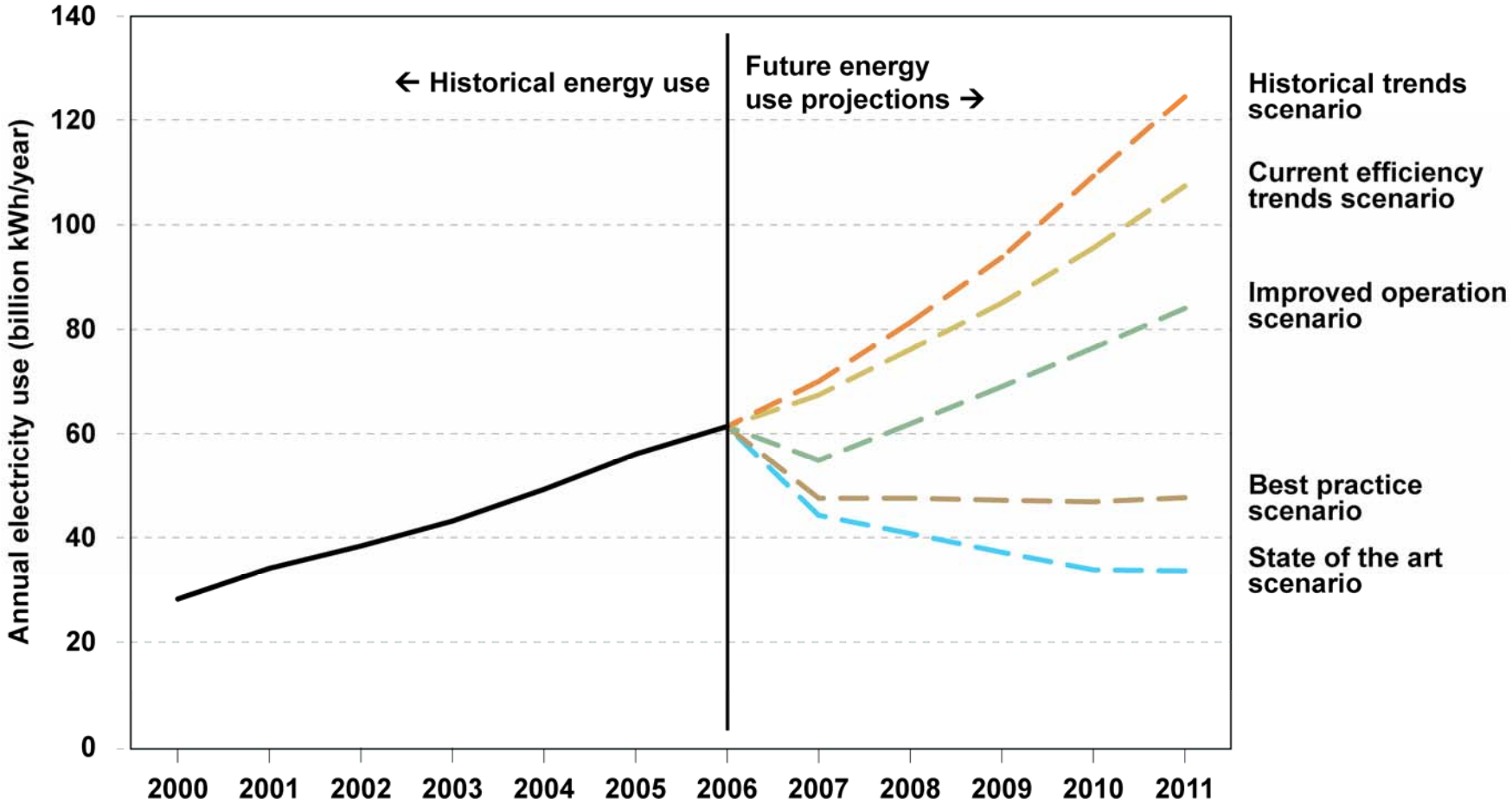
Session Agenda (cont.)

- Program Framework, Guidance Brainstorming
- Program/Pilot Approach Development
- Wrap Up & Next Steps

Introductions

- Name?
- Organization, Role?
- Relative to the session objectives and agenda, biggest desired outcome?

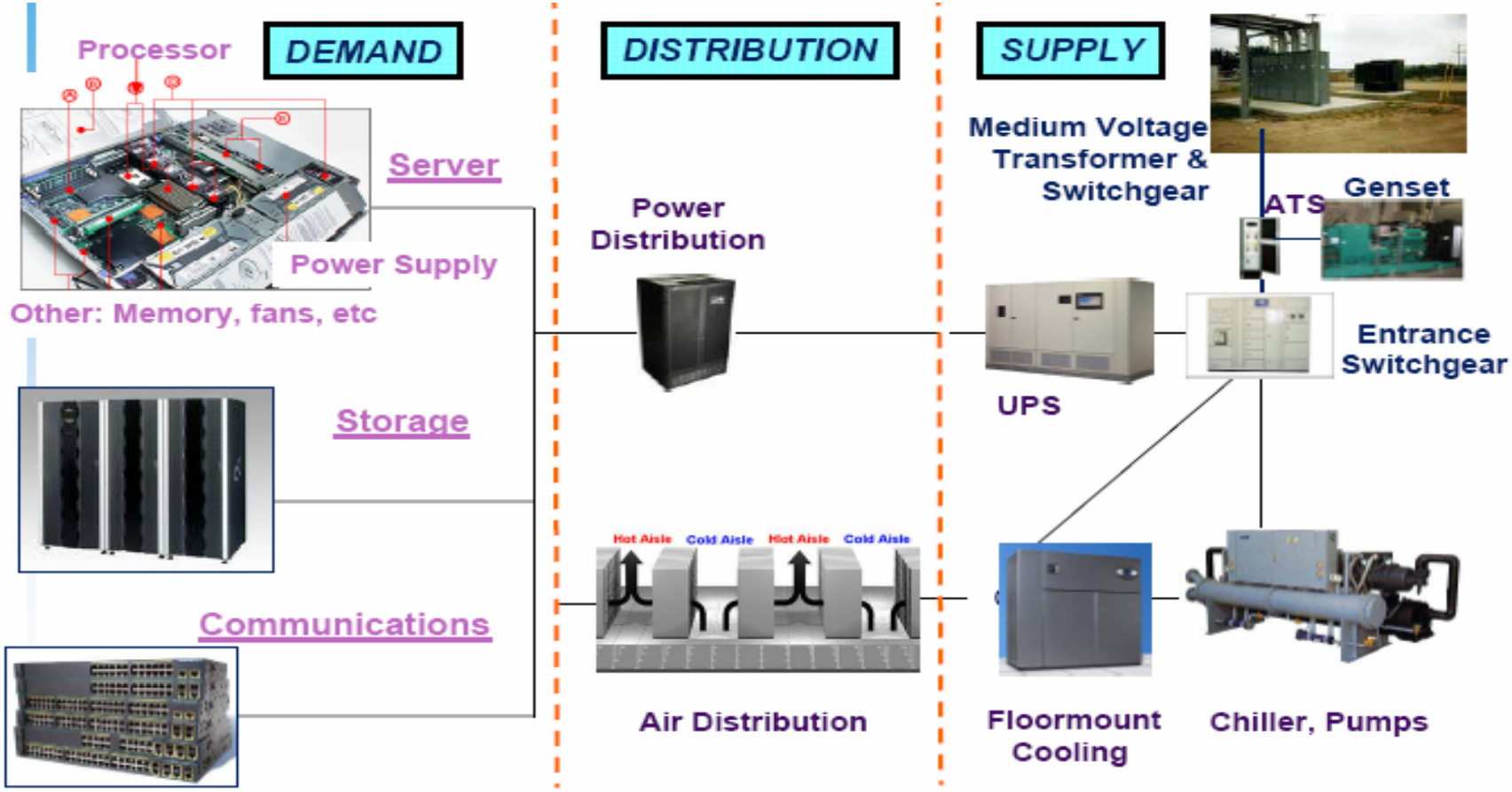
Why a CEE Data Centers Initiative?



Source: EPA Report to Congress (2007)

Why a CEE Data Centers Initiative?

IT: 30-50% **Cooling: 25-30%** **Distribution: 25-30%**



Source: Emerson Network Power, Data Center Users Group 2007

Advancing Data Center Energy Efficiency

Enabling Platforms, Processes, Technologies

- Corporate environmental, energy goals
- Energy benchmarking (e.g., DCiE, output/W)
- Financial and procurement policies (e.g., TCO, buy ENERGY STAR)
- Data center thermal assessments
- Continuous monitoring, commissioning systems
- Asset management, accounting systems
- Integrated design process

Physical Space Optic

IT Systems

- More e-efficient servers, storage, network devices (e.g., E-STAR servers, SPEC benchmark)
- PC and server power management
- Virtualization (servers)
- Data de-duplication (storage)

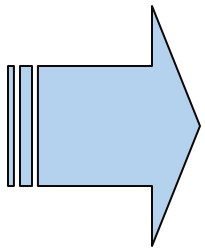
Facility Systems

- Environmental conditions
- Air management
- Right sizing cooling, central plant optimization
- Free cooling
- Improve power chain, UPS efficiency
- Liquid cooling

Why a CEE Data Centers Initiative?

Challenges

- Need for definitions of efficiency, performance metrics and test procedures
- Many, competing messages to end users
- Split incentives between IT & facility managers
- Risk and business considerations – reliability, uptime, performance, etc.
- Dynamic nature of software and hardware operations



CEE Objectives

- Develop & support consensus-based definitions and performance specs
- Facilitate EE program industry's collective understanding of opportunity, market players & industry motivations
- Identify recommended program strategies to help move more of the market to a preferred outcome

Data Center Definitions

- “A building or a portion of building whose primary function is to house a computer room and its support areas; data centers typically contain high-end servers and storage products with mission critical functions.” (ASHRAE Thermal Guidelines for Data Processing Environments, 2004)
- “Spaces specifically designed to accommodate dense arrangements of computer equipment. This currently includes telephone company “central offices” or “telcos”, and computer labs. Any space where dedicated HVAC is installed to handle computing equipment load is likely to be considered a datacenter.” (PG&E EE Baselines for Data Centers, 2008)

Data Center Definitions

- “A facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices.” (Wikipedia)
- “A facility that contains concentrated equipment to perform one or more of the following functions: store, manage, process, and exchange digital data and information. Equipment includes computers, servers (e.g., web, application and database), mainframe computers, switches, routers, data storage devices, load balancers, wire cages or closets, vaults, and racks.” (CEE Initiative Description, Working Definition 2007)

Advancing Data Center Energy Efficiency

- CEE 2009/2010 collaborative effort to frame:
  - Data centers definitions
  - Taxonomy, organization relative to energy saving opportunities
  - Variables that significantly influence energy consumption
  - Available metrics, KPIs, measurement protocols and other guidance to inform e-baselines and tracking
  - Accepted practices, guidance to achieve savings, including EM&V approaches for measures

Advancing Data Center Energy Efficiency

- Desired outputs:
  - Empirical, more comparable data sets for use by CEE community to inform program design
  - Accelerated program development, increased consistency and harmonization
  - A credible, consistent platform that identifies savings opportunities, high impact efficiency practices (“slam dunks”) and methodologies to measure and validate performance claims

EE Program, Government Presenters

- Roland Risser
  - Director, Customer Energy Efficiency, Pacific Gas & Electric
- Michael Zatz
  - Chief, ENERGY STAR Market Sectors Group, EPA

IT Industry Panel

- Jay Dietrich
  - Senior Technical Staff Member, Corporate Environmental Affairs, IBM
- Derek Schwartz
  - Principal, Technology Deployment Solutions, LLC
- Jon Haas
  - Director, Eco-Technology Program Office, Intel

Program Framework, Guidance Brainstorming

- Approaches used to organize data center efficiency opportunities
  - What are the common areas of overlap? Preferred ways to organize?
  - Can efficiency programs act on the organizational approaches?
- Did we capture the critical pieces?
  - Elements, categories of info and questions that we want to develop, address or test over time? Anything missing?
- What aspects are the most defined and the least defined?
- Are there development priorities in terms of the types of products/outputs that would come out of this process?

Exercise: Program/Pilot Approach Development

- Split up into 3-4 groups. Each group has some time to identify a data center program or pilot approach.
  - Each group should identify a reporter and note-taker
- Keep in mind these aspects:
  - Define the focus and target market.
  - What approach would you use? Who are your allies? Channels?
  - What action do you want the customers to take? Short, medium, long term?
  - How would you evaluate progress over time (market level)?
  - How would you track project results to inform a pre and post measurement?
  - What are the limitations of the approach?