



Technical Session III

Indian Data Centers for the 21st Century

January 24, 2008

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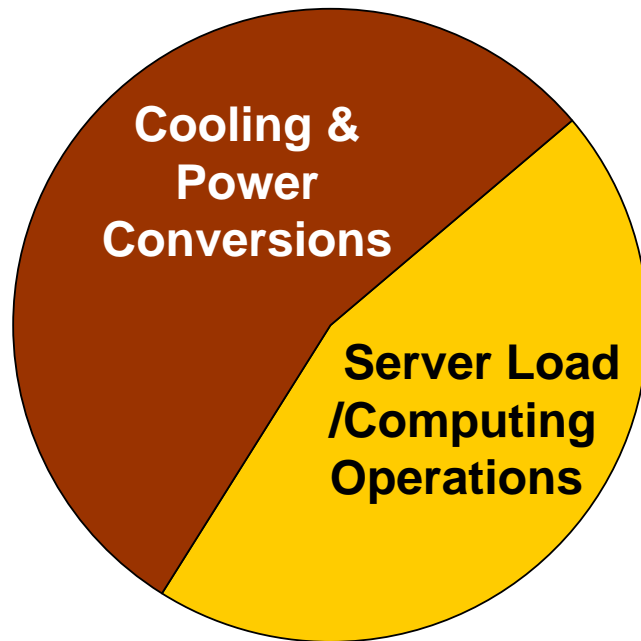




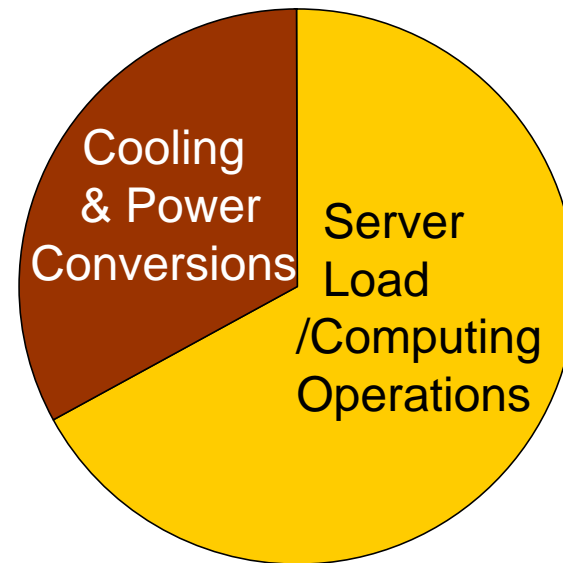
Topics:

- Summary of Workshop
- Resources

IT Equipment Efficiency, Data Center Cooling and Power Conversion Performance Varies



Typical Practice



Better Practice



Summary of Opportunities for Energy Efficiency:

- IT equipment optimization
- Air management
- Right-sizing
- Central plant optimization
- Efficient air handling
- Free cooling
- Humidity control
- Power chain incl. UPSs and power supplies
- On-site generation
- Liquid cooling
- Design and M&O processes

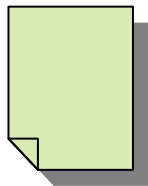
Resources:



Web-based Resource:

<http://hightech.lbl.gov/datacenters.html>

Good starting point for those seeking efficiency measures



Best Practices



Self-benchmarking Guide



Benchmark data



Case Studies



Design Guidance



**Other Reports
(demonstrations)**

Design Guidance is Summarized in a Web Based Training Resource:

Data Center Energy Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://hightech.lbl.gov/dctraining/TOP.html

mozilla.org Latest Builds

Home >

DATA CENTER ENERGY MANAGEMENT

About Benchmarking Best Practices Checklist Design Intent Documentation Economics Non-energy Benefits Case Studies Tools Emerging Technologies

- This website will give you the tools and information to capture cost-effective savings opportunities to the design of new data centers or to retrofit existing ones.
- Data center energy costs can be 100-times higher than those for typical buildings.
- Inefficiencies can hurt the bottom line, erode competitiveness, and reduce uptime.

Presentations
Chart Room
Resources
Exercises
Credits

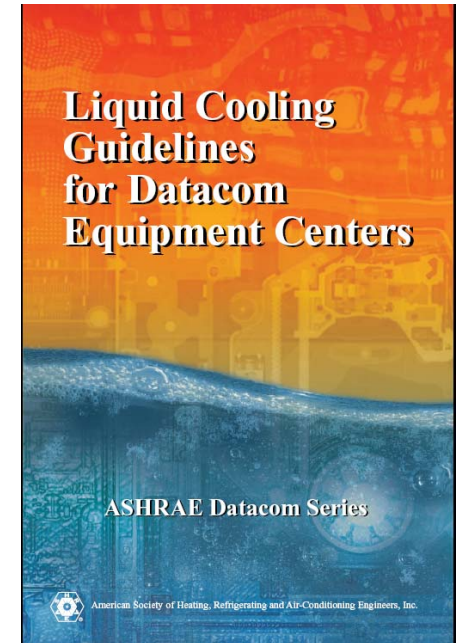
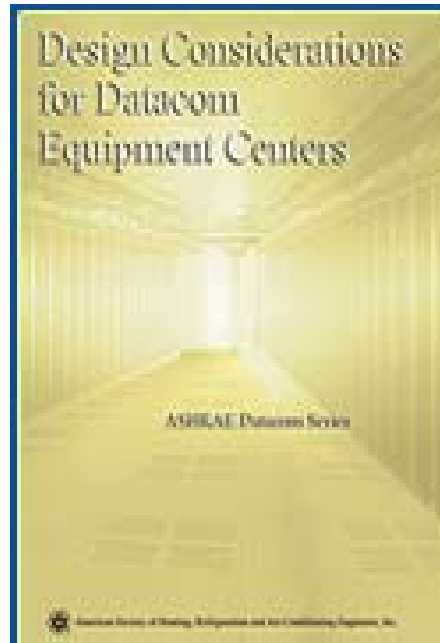
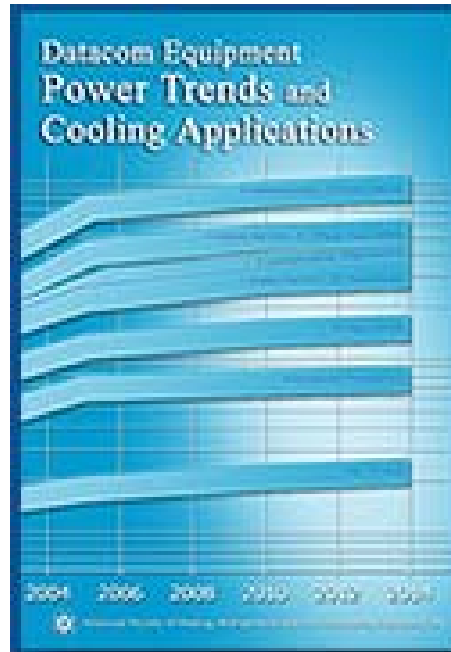
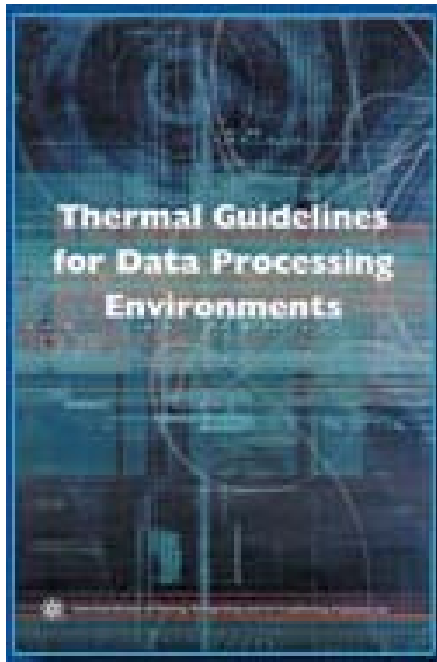
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High-Tech Research ■ Applications Team ■ Environmental Energy Technologies Division ■ Berkeley Lab

<http://hightech.lbl.gov/dctraining/TOP.html>


ASHRAE Resources

Four books published—
more in preparation



ASHRAE, Thermal Guidelines for Data Processing Environments, 2004, Datacom Equipment Power Trends and Cooling Applications, 2005, Design Considerations for Datacom Equipment Centers, 2005, Liquid Cooling Guidelines for Datacom Equipment Centers, 2006, © American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., www.ashrae.org

Order from <http://tc99.ashraetcs.org/>

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- ASHRAE (<http://www.ashrae.org>)
 - Technical Committee (TC) 9.9 Mission Critical Facilities
<http://tc99.ashraetcs.org/>
 - Design Considerations for Datacom Equipment Centers
 - Datacom Equipment Power Trends and Cooling Applications
 - Thermal Guidelines for Data Processing Environments
 - Additional Guidelines in Development
 - TCO and Energy Efficiency
 - High Density Data Centers
 - Liquid Cooling
 - Filtration
 - Structural



Other Resources

- PG&E CoolTools™ Chilled Water Plant Design Guide (http://taylor-engineering.com/publications/design_guides.shtml)
- LBNL High Performance Datacenters, A Design Guidelines Sourcebook (http://hightech.lbl.gov/documents/DATA_CENTERS/06_DataCenters-PGE.pdf)
- Uptime Institute (<http://www.uptime.com/TUIpages/tuihome.html>)
- Green Grid (<http://www.thegreengrid.org/home>)
- DOE Website: Sign up to stay up to date on new developments (www.eere.energy.gov/datacenters)
- EPA/Energy Star (http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency)

Sponsors and Stakeholders

- Sponsors:

- California Energy Commission (CEC)

<http://www.energy.ca.gov/pier/>

- U.S. Department of Energy (DOE)

http://www1.eere.energy.gov/industry/saveenergynow/partnering_data_centers.html

- U.S. Environmental Protection Agency

<http://www.energystar.gov/datacenters>

- Pacific Gas and Electric Company (PG&E)

http://www.pge.com/docs/pdfs/biz/rebates/hightech/06_DataCenters-PGE.pdf

- Stakeholders:

- Industry Organizations

e.g., Green Grid, ASHRAE, AFCOM, 7x24, SVLG

- Equipment suppliers

- Research organizations

- Consultants



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