LBNL High-tech Buildings Energy Efficiency Activities

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LBNL High-tech Building Sponsors

- California Energy Commission – PIER program
- Pacific Gas and Electric Company
- New York State Energy and Development Agency (NYSERDA)
- US - Environmental Protection Agency
- US – Department of Energy
- Northwest Energy Efficiency Alliance
- Universities

Data Center research activities

- Research Roadmap
- Benchmarking, case studies, best practices
- Self-benchmarking protocol
- Power supply efficiency study
- UPS systems efficiency study
- Standby generation losses
- Performance metrics – Computation/watt
- Market study
- EPA report to Congress

Cleanroom research activities

- Research Roadmap
- Benchmarking, case studies, best practices
- Standby generation losses
- Fan-filter and mini-environment studies
- Demand controlled filtration
- Market study
- Training/outreach

Laboratory
Energy Efficiency Activities

- Laboratories for the 21st Century (LABS 21)
- Low flow fume hood development
- Benchmarking and case studies
- Training/outreach

Next Phase California Projects (Public Interest Energy Research)

- Develop LEED type criteria for data centers
- Evaluate modular and scalable cooling solutions
- Promote use of air side economizers
  - study filtration
  - failure research and failure data collection
  - collaborate with ASHRAE
- Demonstrate spray cool technology
- Continue DC power initiative

Next phase California projects

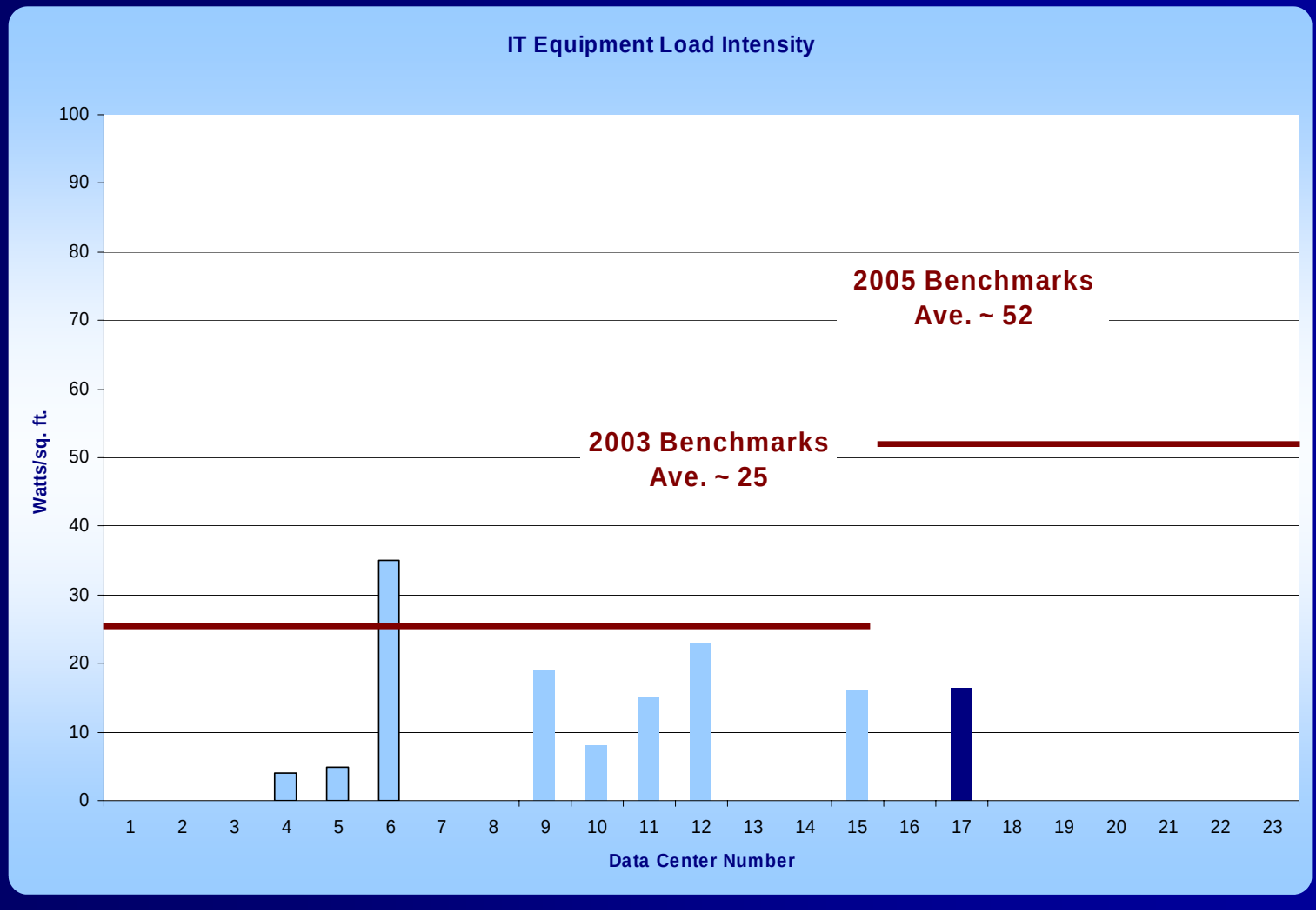
- Develop LEED type criteria for cleanrooms
- Case Studies
- Investigate heat recovery options
- Investigate process efficiency opportunities

Next phase California projects

Investigate cross-cutting issues:

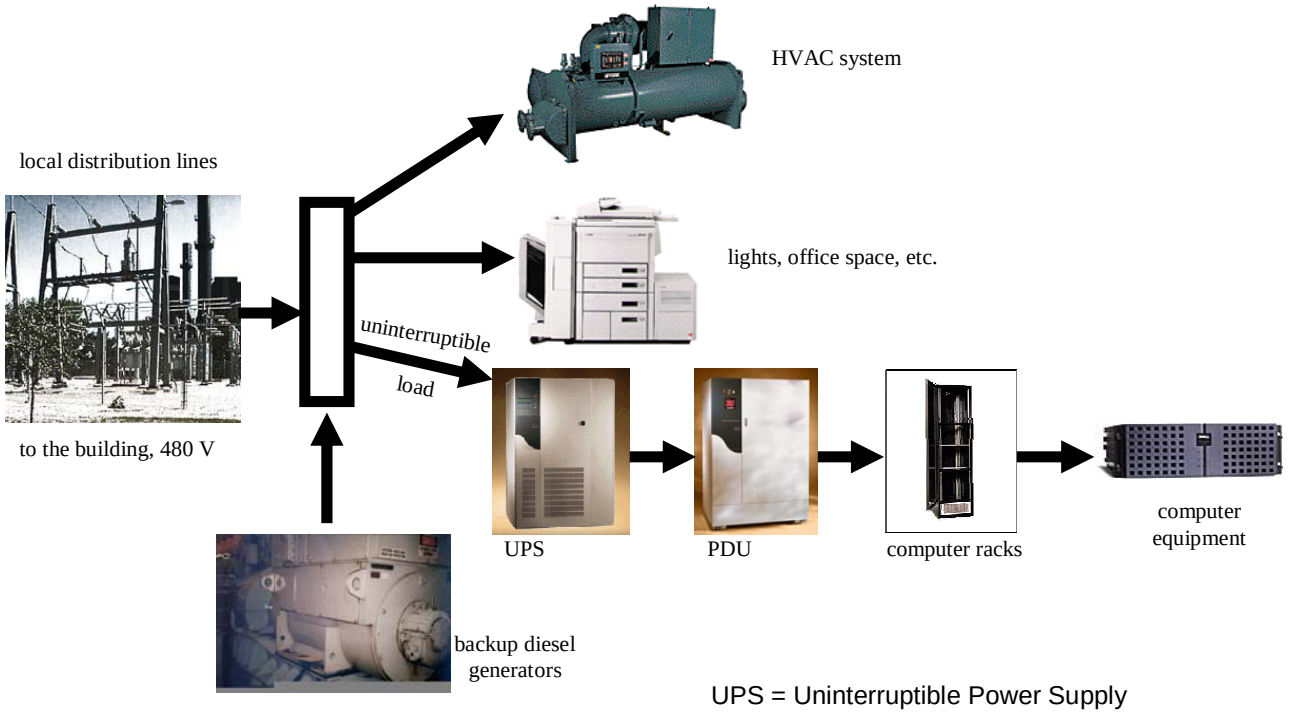
- Low pressure drop design
- Document best practices
- Commissioning strategies

IT equipment load density



Benchmarking energy end use

Electricity Flows in Data Centers

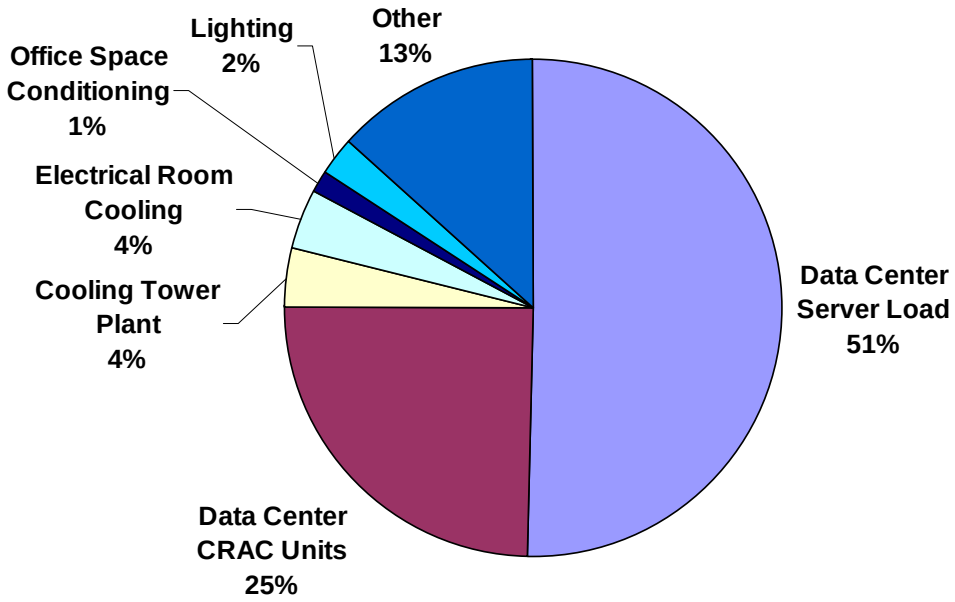


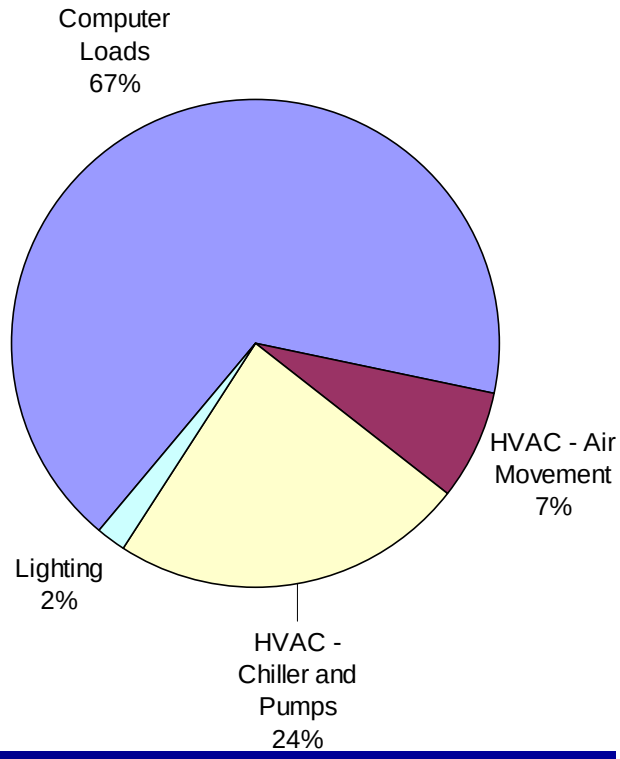
UPS = Uninterruptible Power Supply

PDU = Power Distribution Unit;

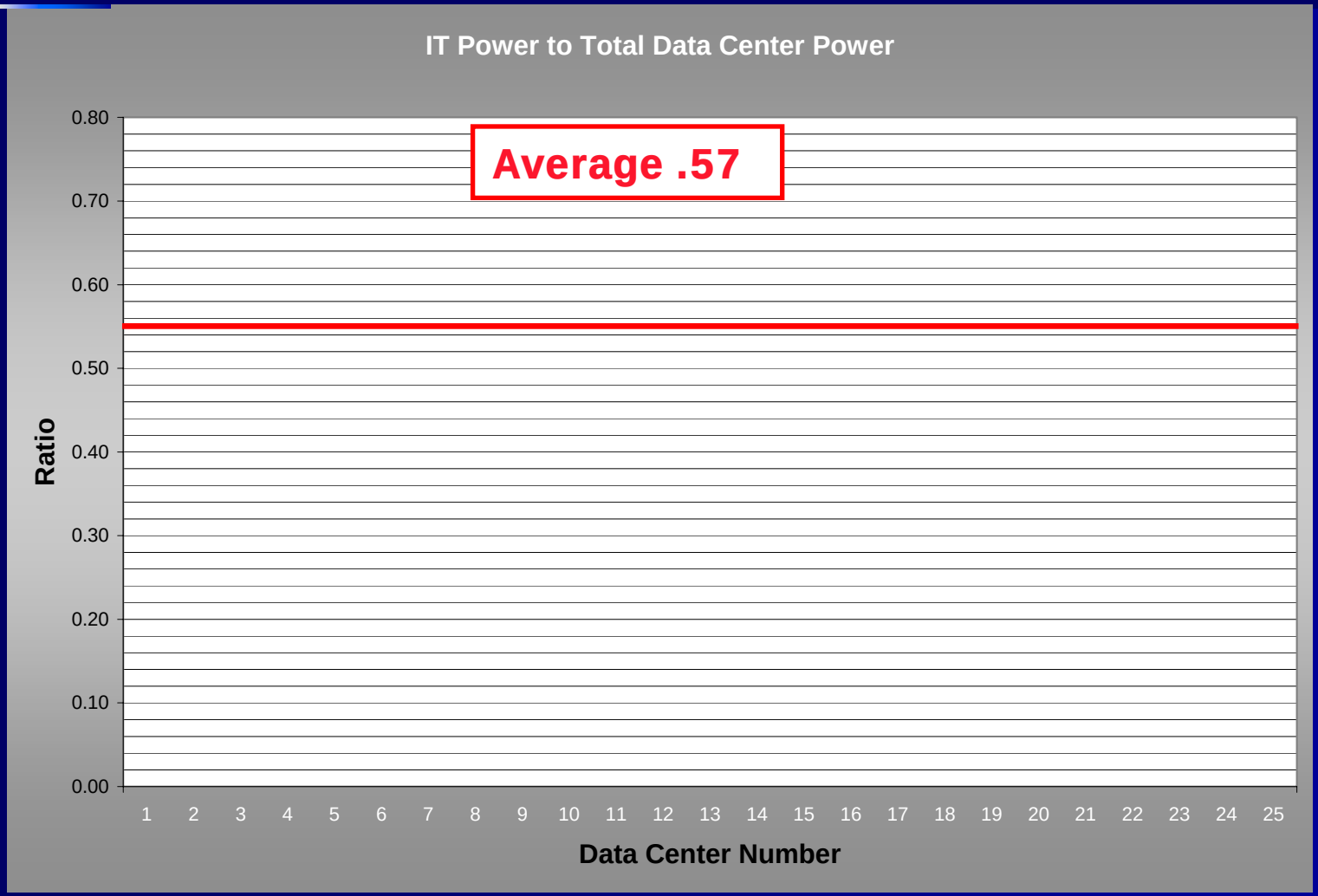
Performance varies

The relative percentages of the energy actually doing computing varied considerably.



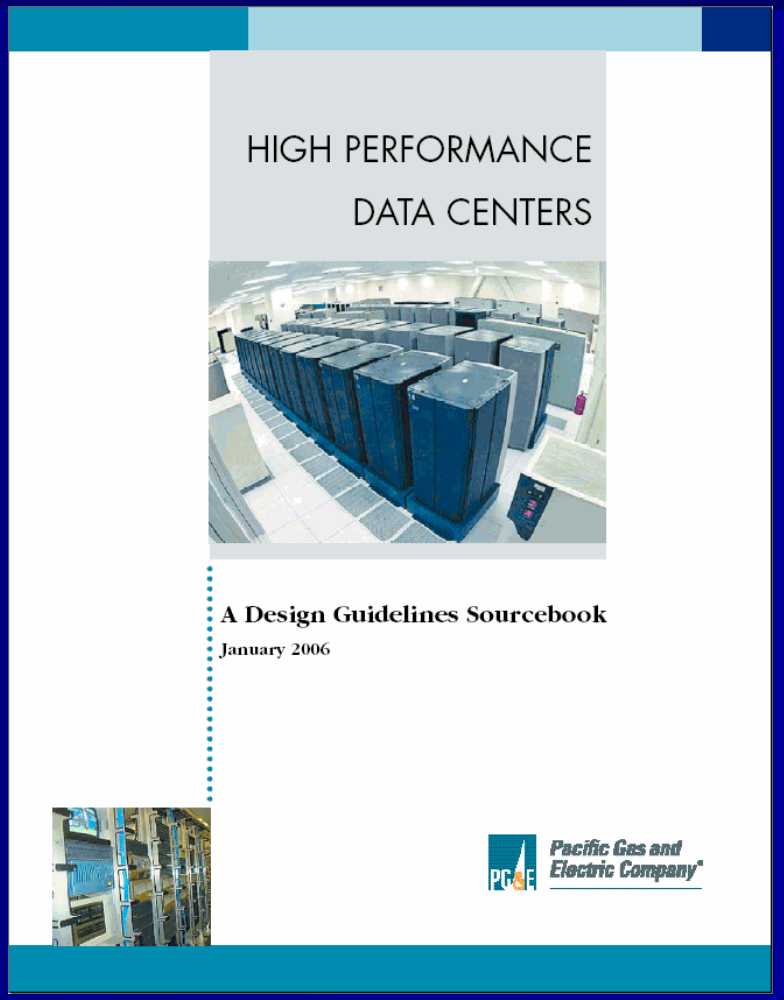


Percentage of power delivered to IT equipment

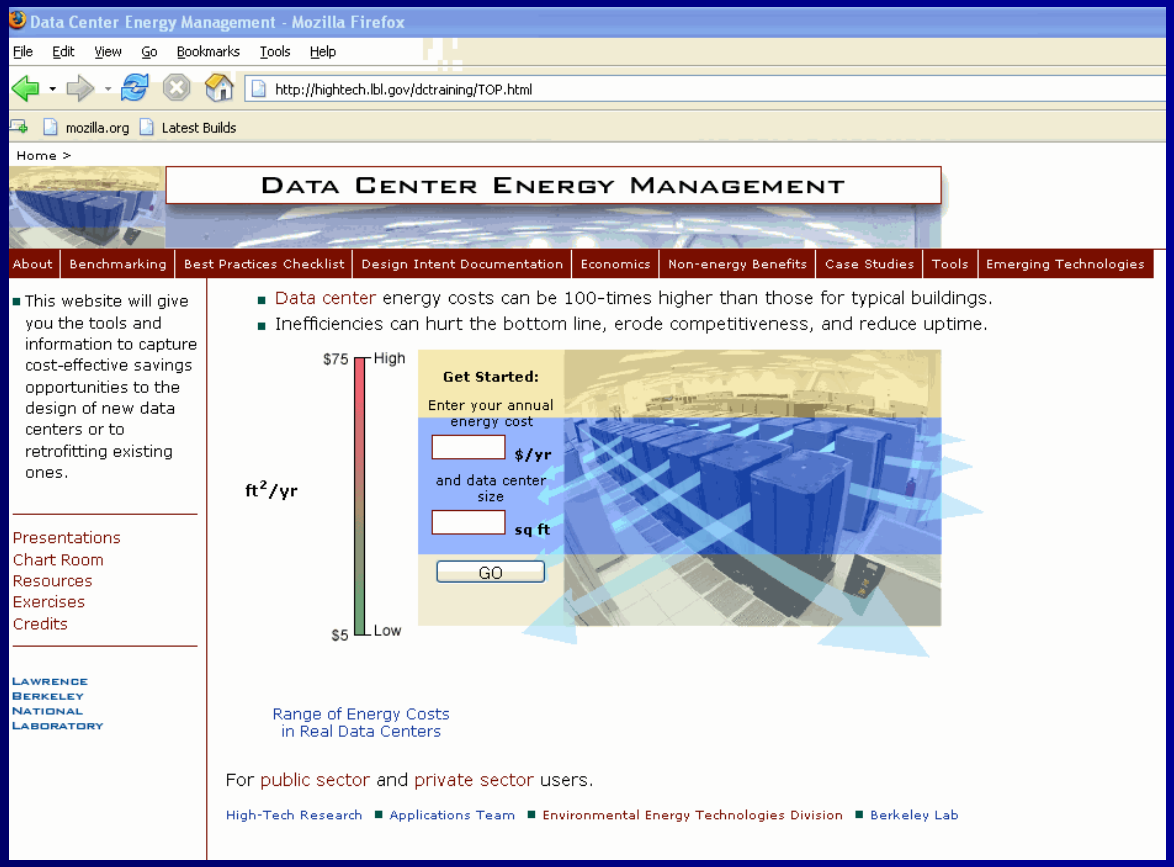


Design guidelines were developed in collaboration with PG&E

Guides available through PG&E's Energy Design Resources Website



Design guidance is summarized in a web based training resource



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

LBNL Data Center demonstration projects

- Outside air economizer demonstration (PG&E)
  - Contamination concerns
  - Humidity control concerns
- DC powering demonstrations (CEC-PIER)
  - Facility level
  - Rack level
- “Air management” demonstration (PG&E)

website: http://hightech.lbl.gov/