

Data Center Emerging Technology Energy Efficiency Demonstration Scoping and Feasibility Study

In support of promoting sustainable energy efficiency practice in California, PG&E conducted a market study and identified the clean-room and data center industries as one of the top growth industries in its service territory. Data centers are typically critical facilities and a high value is placed on reliability. Despite the preference for proven technology, the high annual electricity cost of operating data centers does provide motivation for owners to consider more efficient technologies when they are clearly identified and presented. In 2004, PG&E performed a **Data Center Emerging Technology Energy Efficiency Demonstration Scoping and Feasibility Study (Scoping Study)** to identify emerging technologies and provide definition for future demonstration projects.

Reduction in the size of Information Technology (IT) equipment and advances in processing power have dramatically increased the heat densities in data centers. Recent studies projected the watts per equipment square foot to increase 40% in five years' time.

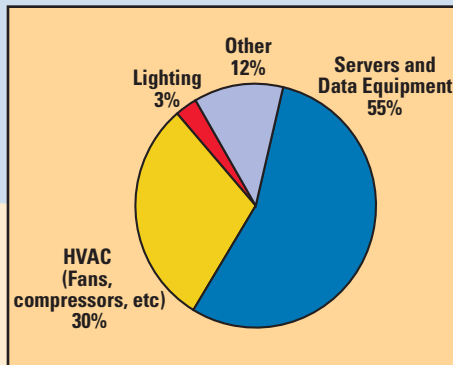
METHODOLOGY:

By cross-referencing the findings in Data Center Integrated Design Charrette in 2003, the Scoping Study began with a brainstorming session with 27 data center professionals. This group came up with and voted on 39 energy efficiency emerging technologies. The top 12 technologies from the votes were then included in a survey that was distributed to data center owners, operators and designers. Based on the survey results, PG&E then selected the top two emerging technologies most suitable for future demonstration projects under the PG&E Emerging Technologies program.

RESULTS: The top two emerging technologies were found to be (1) Air management system design, and (2) Air-side HVAC economization. Based on various market studies, it is estimated that the potential energy savings in California could reach 14 MW for air management improvement and 3 MW for utilizing air-side HVAC economization.



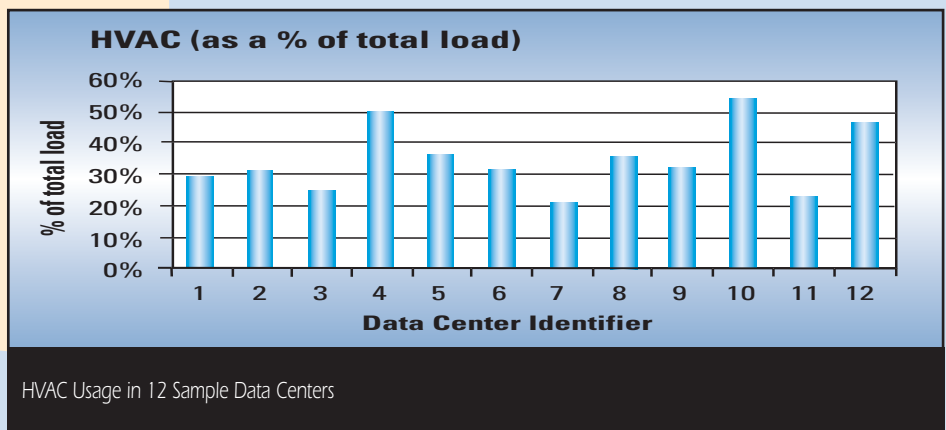
Typical Data Center Layout



Energy Consumption in Typical Data Center

Air management system design involves altering the way air flows through a data center. Examples of emerging technologies in air management system design for future demonstration include optimizing hot and cold aisle air flow, installing strip curtains, covering floor tile or cable openings, and blanking empty spaces in racks.

Air-side HVAC economization calls for changing the standard data center design. Most data centers utilize a less efficient, stand-alone Computer Room Air Conditioner (CRAC). These units have no direct access to air from the outside. Future emerging technologies demonstrations in HVAC economization could be conducted in most temperate climates and include modifying the traditional CRAC unit or adopting a more efficient air handler based HVAC system.



HVAC Usage in 12 Sample Data Centers