SIEMENS

Airflow management

Energy Efficiency for your data center – Application Sheet. Data center solutions from Siemens for the factories of the 21st century.

Siemens analyzes data center energy efficiency and develops a site-specific airflow management approach. Pre/post performance is evaluated with Siemens' Navigator.

Customer challenge

You are operating a mature data center and like to check its energy efficiency and opportunities to achieve best-in-class levels. Increasing density in data centers and the pressure to save operating costs drive awareness for efficiency improvements such as airflow management. The most fundamental aspect in that regard is bypass airflow. While airflow management best practices are becoming better known and understood, bypass airflow and how to reduce it is less understood. To address that challenge, Siemens provides two applications which can be combined: air flow management and hot/cold aisle measures (see the application sheet on hot aisle cold aisle layout).

Siemens solution

An energy audit evaluates the current operation of the infrastructure, especially electrical, ventilation and air conditioning systems. Bypass airflow is any conditioned air that does not pass through IT equipment before returning to the cooling equipment. Hence Siemens uses data center airflow management to reduce the airflow that does not pass through the IT equipment. Data center airflow management consists of separating supply and return airflow, controlling air volumes, and controlling air temperature and humidity. The tools to achieve the desired results include:

- Blanking panels; floor grommets; air dams, ducts and diverters within cabinets
- Temperature measurement and feedback
- Humidity measurement and feedback
- Air pressure measurement and feedback
- Control of fan delivery systems
- Aisle containment structures and accessories, cabinet chimneys and airflow paths
- Use of raised floor pressure-controlled airflow

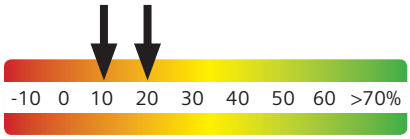
The pressure below the raised floor, called external static pressure (ESP), is a key parameter for energy-efficient airflow through the data center. By focusing on the ESP, only the amount of air that is actually required will be moved through the data center. This saves fan power in the CRAC units.

Traditional data centers are designed for an ESP of approximately 20 Pa to ensure even air supply in any area of the room. The reality is different: Because of leakages, ESP values typically fall below the critical pressure of 10 Pa, resulting in uneven air distribution.

For this reason, a lack of airflow management leads to a lower ESP and subsequently a waste of available airflow. The latest designs use raised floor pressure-controlled airflow.

Monitoring of white floor key variables is essential to identify energy saving potential and efficiency measures. Data includes electrical demand and consumption, temperature, pressure, humidity, airflow, water usage and operating schedules. Siemens building management systems collect and store that data and handle alarms. The information is consolidated in Navigator, a robust platform for long-term

Estimated Savings Potential



These values are guidelines only based on data from actual Siemens projects. The energy savings potential must be calculated individually for each project.

data storage, to analyze pre-/post-measure system performance. Data visualization and analysis is performed using pre-configured reports. Navigator is a cloud-based data management platform designed to help you optimize the overall performance of your data center so you can create awareness, define goals and achieve your energy, sustainability and system performance targets. The decision as to which data points to monitor should start with the IT equipment, followed by any critical subsystems which use energy (CRAC/CRAH cooling units, chillers, UPS, generators, switchgear).

Customer benefits

The results of deploying these tools include lower fan energy costs and improved protection against hot spots and overheated ICT equipment. In general, these benefits of airflow management are well accepted but are not always executed to warrant best practices in data centers. The tasks of filling up unused rack spaces and closing back doors of chimney cabinets seem to be rather simple but are quite effective and a first step toward increasing energy efficiency in data centers. Hence airflow management is the basis for a second step to increase energy efficiency. If not implemented already, hot/cold aisle separation, compatible with airflow management, is the next step to increase efficiency. Combining the Siemens Desigo CC building management systems and Navigator for monitoring purposes will allow you to assess the total IT and infrastructure energy consumption and benchmark key DC metrics such as PUE or WUE. This will result in optimized energy controlling of the actual and future measures taken to reduce energy consumption in data centers.

Highlights

- 10% to 50% chiller plant energy savings
- Reduced maintenance and operating costs associated with maintaining existing old chillers
- Improved redundancy and availability
- Equipment life is extended relative to the replaced systems
- Additional savings in UPS and battery systems due to reduced electrical demand of chillller plant and reduced load/number of air handling units

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