

## **SABEY DATA CENTERS: HOT AISLE CONTAINMENT AND ENERGY EFFICIENCY IN MULTI-TENANT DATA CENTERS**

### **SOLUTION OVERVIEW**

Sabey Data Centers manages over 3 million square feet of data center space across the country. A majority of the data center locations operated and maintained by Sabey are multi-tenant colocation facilities, where each customer may have varied needs, including different server enclosures and non-standard IT equipment, which is problematic for the implementation of facility-wide energy-efficient designs and technologies. Despite these challenges, Sabey has been successful in offering extremely energy-efficient data center solutions.

As a part of their focus on energy efficiency, Sabey has implemented hot aisle containment technology at the *Intergate Quincy – Building C* facility in Quincy, Washington. In addition to more efficient use of fan energy, this technology reduces overall building energy use by increasing economizer hours. Hot aisle containment creates a physical barrier around the hot server exhaust air. These physical barriers prevent the server exhaust air from mixing with the conditioned air intended for server inlets. While there is a perception that deploying and maintaining hot aisle containment in a colocation facility can be impractical and expensive, Sabey combined contract requirements and energy efficiency-focused marketing with a custom commissioning tool to successfully incorporate hot aisle containment into the design for this facility.

### **ORGANIZATION TYPE**

Data Center Operator

### **BARRIER**

At multi-tenant colocation data centers, customers have varied needs and at times non-standard IT equipment, making the implementation of hot aisle containment complicated and potentially more expensive.

### **SOLUTION**

Sabey designed the *Intergate Quincy – Building C* facility to require hot aisle containment from all customers, while ensuring Sabey maintains ample flexibility in deploying the containment.

### **OUTCOME**

Sabey anticipates an overall annual saving in excess of 8 million kWh, due to the focus on efficiency, and expects to pass these cost savings on to customers. Customers also benefit from

an environment that has more consistent server inlet temperatures (reduced hot spots) and accommodates greater cabinet densities, resulting in a marked increase in energy efficiency.

## **POLICIES**

Sabey built hot aisle containment into the contract structure for new customers wishing to use this facility. Sabey provides a ceiling return plenum (a separate space above the ceiling for the return air), and customers connect their hot aisle containment structure to the plenum. Customers have flexibility to use different types of containment. Costs of containment vary, depending on the size of the deployment and type of solution chosen, but in all cases, those costs are offset by energy costs savings. Some customers were initially skeptical, and implementation often required coaching by Sabey. However, the results of containment have been universally positive.

## **PROCESS**

### **Internal Buy-In**

In order to incorporate hot aisle containment into Sabey's overall energy savings approach, the design team sought the support of company senior management by demonstrating the substantial benefits of this technology to the data center operator and to the customer. With the agreement of senior management, the energy team then focused on ensuring smooth implementation of containment, at the lowest cost and with minimal loss of utility to customers.

### **Pilot**

Sabey first used a form of containment – partial cold aisle containment – in a facility in Seattle in 2006. The containment achieved its intended goal, while ensuring the installed capacity met the company's cooling goals, but there remained many opportunities for improvement. Based on lessons learned from that pilot, Sabey altered its strategy and has used hot aisle containment in all its managed data centers constructed since then, including Intergate Quincy, Building C.

### **Employee Training**

Sabey conducted training for technical staff and facilities management, as well as for sales and marketing teams, which covered the best practices for installation, solutions to common challenges, and overall benefits of hot aisle containment, e.g. lower energy costs (which directly benefits customers), more consistent server inlet temperatures, and the ability to accommodate higher cabinet densities.

### **Marketing & Contract Requirements**

Sabey incorporated hot aisle containment into marketing materials and contractual documents to ensure that it was not a surprise for customers. Customers using this facility were contractually required to implement hot aisle containment. As per the customer deployment contract, Sabey

passes on to the customer both the costs of deploying the containment and the resultant energy and cost savings.

## **Design & Implementation**

The design for this facility is fully dependent upon the use of hot aisle containment. Sabey did not allow customers any choice regarding deployment of containment with server cabinets, but rather ensured that rooms were designed for maximum flexibility in how the customer chose to implement the containment. For example, customers can use individual chimney cabinets, pod containment with flexible or rigid plastic curtains, or pods constructed of sheet metal. During operations, technicians monitor the environment, providing advice and guidance on containment methods to customers. Often, Sabey also implements the containment solutions on behalf of their customers.



## **Mobile Commissioning Assistant**

Sabey invented and patented a custom commissioning tool to help test the airflow in its data centers, ensuring the data center met its design intent. Data centers with air-cooled IT equipment must have cooling systems with sufficient airflow to properly cool that equipment. For contained data centers, the airflow capacity in the air handling units must at least be equal to that in the IT equipment. For non-contained data centers, the airflow must be even greater. Sabey's patented mobile commissioning assistants ensure that the air handling units meet design capacity, which reduces the possibility of difficult retrofits while in operation.

## **OUTREACH**

Sabey included information on hot aisle containment in marketing material, to better explain the benefits of this technology to its customers. The sales team was also trained on this technology to equip them to better articulate the advantages of containment to prospective customers.

## **MEASURING SUCCESS**

Sabey measures the success of this project on the Power Usage Effectiveness (PUE) for the data center facility. The Intergate Quincy – Building C facility is one of the most efficient data centers operated by Sabey.

## **OUTCOMES**

The implementation of hot aisle containment at this facility – made possible by contractual agreements and supported by Sabey’s tools and technical expertise – has been successful, with the entire facility, serving more than 30 customers, utilizing hot aisle containment. The estimated energy savings as a result of this implementation are in excess of 8 million kWh, with an estimated 0.2 improvement in PUE across the data center (or approximately 50 reduction in facility energy consumption), representing a massive improvement in energy efficiency and one of the most efficient data centers operated by Sabey.

