



Sustainable Data Center Cooling

In many data centers, water-cooled chillers are paired with an open or closed-circuit cooling tower for heat rejection. Other options include dry coolers, hybrid fluid coolers and adiabatic fluid coolers. It is beneficial to evaluate all heat rejection options to optimize energy and water consumption.

PROJECT DETAILS

BAC was approached by a high-performance computing customer with 160MW operating power to provide a more sustainable cooling solution. They had previously used open cooling towers with water-cooled chillers. BAC worked with the customer to understand their major challenges and needs. The following were identified as critical priorities:

- *Minimize water usage while balancing energy consumption to support customer sustainability efforts*
- *Provide cooling for an increasing heat load in a smaller footprint*
- *Meet system water temperature requirements without chillers at high loads and varying outside conditions*



THE SOLUTION

BAC analyzed the IT capacity, space requirements, operating power, and location weather data, and then evaluated fully evaporative, hybrid, and adiabatic solutions. Based on the analysis, BAC recommended a chillerless system utilizing the HXV hybrid cooler. The HXV's packaged evaporative and dry cooling features offered the water saving and energy efficient solution the customer desired.

The factory assembled unit also allowed for easier maintenance and serviceability for the operations team. They were able to easily access the cold-water basin, prime surface coil and drive system due to the crossflow design, large doors, and internal access platforms. Additionally, the customer could perform faster inspections of the spray distribution system while the unit was in operation.

The HXV hybrid cooler not only addressed all the customer's challenges and needs, but it also reduced annual energy costs and improved system efficiency. The HXV helped achieve an estimated power usage effectiveness (PUE) of 1.136.





HXV HYBRID COOLER

The HXV incorporates three modes of operation. It has the benefits of evaporative, adiabatic, and dry cooling in a water saving and energy efficient solution. It maintains peak system performance for a variety of applications where water is scarce, water costs are high, uptime is critical, or plume is a concern. Further, it is an ideal solution where space is limited. The HXV hybrid cooler offers the following benefits:

- ***Up to 70% water savings compared to an open cooling tower due to a high dry switch point and more dry operating hours***
- ***Year-round sensible cooling with the dry coil to maximize water savings***
- ***On average, 25% water savings even on a design day through sensible cooling***
- ***Up to 60% lower energy costs compared to air cooled systems due to evaporative cooling and BAC's innovative combined flow design***
- ***Increased operational and layout flexibility with balanced water and energy savings***
- ***Highest reliability, and water saver mode eliminates plume abatement***
- ***Up to 25% less maintenance than traditional fluid coolers due to dry operation and crossflow design***
- ***Up to 70% chemical savings due to dry operation***

CONCLUSION

In this installation, the HXV hybrid cooler met the customer's need for a reasonable first cost while significantly reducing both water consumption and operating costs. The HXV heat rejection benefits compared to open cooling towers with water-cooled chillers are:

- ***71% reduction in annual WUE***
- ***86% reduction in installed peak power***
- ***52% reduction in annual operating cost (energy and water)***

The chillerless system utilizing the HXV hybrid cooler delivered water temperatures that met the customer's specifications and supported the IT infrastructure. The smaller unit footprint and crossflow design also helped with easier accessibility, improved serviceability, reduced maintenance, and lowered operating costs.

ABOUT BAC

BAC designs and manufactures customized cooling solutions that maximize energy and water efficiency for the HVAC, Industrial and Refrigeration marketplaces. BAC also provides liquid cooling solutions for data centers to meet customer needs and site-specific requirements.

Learn more

