MINIMIZE ENERGY CONSUMPTION

CPP WIND ENGINEERING CONSULTANTS

Minimize energy usage and save with free cooling

Data Centers of the future need to be efficient and resilient while also being adaptive and sustainable. Meeting green goals by reducing data center power consumption, carbon emissions, and electronic waste while providing excellent service to customers is the paradigm.

Significant efforts have been made in evaluating the methods that increase the cooling efficiencies within the data halls. However, the thermal environment surrounding the rooftop equipment that provides the cooling capacity is often ignored.

Measuring and monitoring the energy usage inside - from rack and floor PDUs, RPPs, branch circuits to busways and UPSs - is easy. Predicting the thermal environment of outdoor equipment is more complicated. The efficiency and capacity of cooling systems are at the mercy of weather conditions. However, improper placement of equipment and intakes adversely impacts the thermal environment. When a significant portion of hot exhaust air from neighboring equipment re-enters cooling towers, condenser units, or the data hall air intakes, the cooling capacity is reduced, cooling demands increase, and energy consumption can increase drastically.

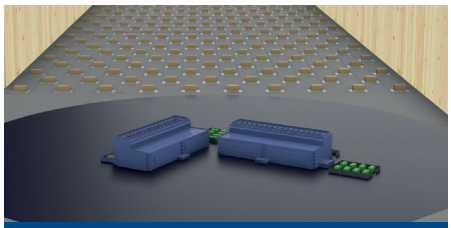
WIND TUNNEL MODELING DURING DESIGN

Accurate modeling of the interplay between hot exhaust sources provides critical design information.

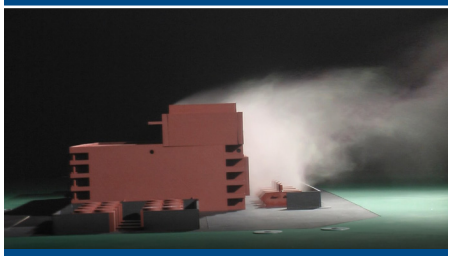
Using an atmospheric boundary layer wind tunnel, we can measure the impact at each equipment intake location based on a physical site model. This testing records intake concentrations over a wide range of wind speeds and directions and is then combined with site-specific meteorological data to predict the temperature distributions at each intake location.

The cooling equipment layout can be optimized through quick changes in the model, ensuring the potential energy consumption is well understood before breaking ground for a new data center. Remove operational headaches before building a data center by optimizing the mechanical layout to increase cooling equipment efficiency and reduce the potential for re-entrainment of hot exhaust air.

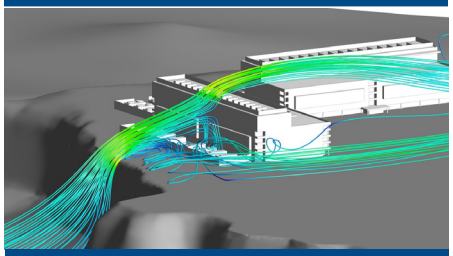
CPP Wind's dispersion modeling assessment, custom-made to replicate your design, is the only reliable and cost-effective way to evaluate the intricate interactions of ambient temperatures and heated exhaust plumes to fully define the thermal environment surrounding each piece of external equipment.



Hyperscale data center in the wind tunnel - the model is placed on a turntable, so all possible wind directions can be evaluated.



Hot building exhaust can impact sensitive equipment intakes.



A 3D analysis illustrates the complexity of airflow fields around structures.

We can help you design a more efficient system, reduce your carbon footprint, and achieve significant cost savings.

7365 Greendale Rd, Windsor, CO 80550, USA | +1 970 221 3371

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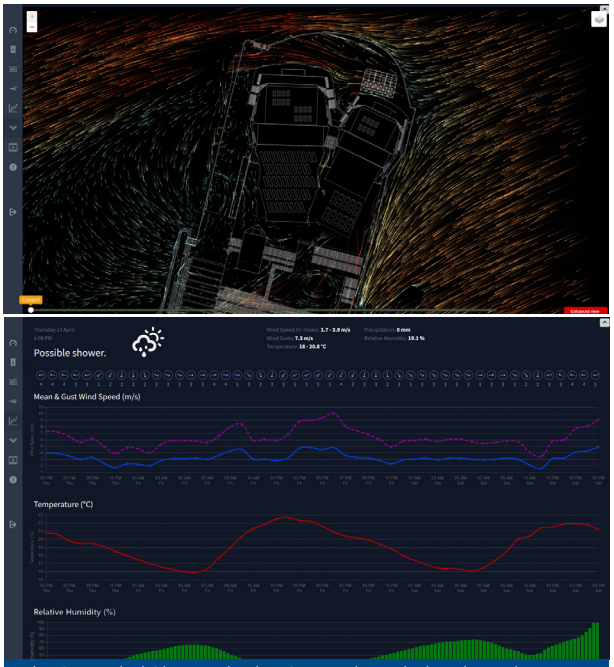
SAVE ENERGY WITH FREE COOLING

Depending on the site location, ambient temperatures and local humidity may allow for outside air usage directly in the data hall cooling system for most of the year. This "Free Cooling" can drastically reduce energy consumption.

The backbone of a smart, energy-saving control system involves an accurate dispersion modeling assessment. The impact of ambient wind conditions and the interaction of neighboring hot exhaust sources are mapped out based on a physical model in the wind tunnel. The measured impact and flow behavior around the data center are combined with real-time on-site data and regional weather forecasting. This information provides operators with all the tools needed to make critical decisions to increase cooling system efficiency, reduce carbon footprint, and achieve significant savings.distributions at each intake location.

CPP Wind's Site Monitoring System (patent pending) is a wind and weather management tool that creates a predictive real-time and prospective environmental analysis of a target site's microclimate. The specific data models created through state-of-the-art wind tunnel testing are integrated with world leading weather forecast models for any location on the globe to forecast ambient conditions that consider the specific site wind flows, temperatures, and potential hot exhaust re-entrainment in far greater detail than any traditional forecast model can provide.



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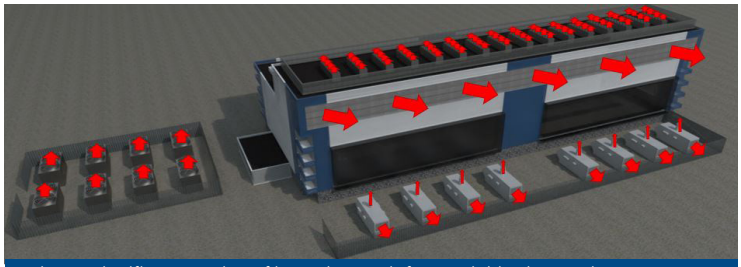

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Simulating exhaust dispersion in the wind tunnel ensures that all relevant building features are included.

CPP Wind can help forecast the ambient thermal conditions to optimize opportunities for free cooling of your data center.

Contact CPP today to ensure that the effects of wind and airflow are incorporated in your design.