

Data centers should feel the power not the heat

It's not the power, but elevated temperatures that threaten data centers during an emergency outage. Hyperscale data centers need a lot to keep their cool, even under normal conditions. But what happens when running on emergency power from onsite generators?

The exhaust plumes from diesel generators and cooling towers can be swept into critical air intakes, causing equipment failure when most critical. If a significant portion of exhaust air enters one or more cooling towers, or condenser units, the cooling capacity is likely to be reduced. This may cause heat in the data center to build up, potentially leading to server shut down.

Heat build-up can even threaten the generators. If the radiator intake air temperature exceeds design limits, the generators may reduce their power output or shut down completely during a grid outage, when they are needed most. Hot exhaust from neighboring generators only exacerbates this condition.

The increasing frequency of heatwaves brings the likelihood of shutdowns into sharp relief, making it essential to properly understand the risks through careful modeling.

WIND TUNNEL MODELING

Accurate modeling of the hot exhaust provides critical design information that ensures when the power is cut, the servers stay cool.

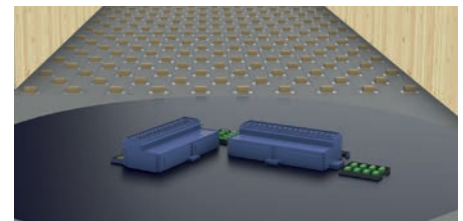
Using an atmospheric boundary layer wind tunnel, we can measure the risk to each intake location based on a physical site model. Intake concentrations can be recorded over a wide range of wind speeds and directions, then combined with site specific meteorological data to predict the temperature distributions at each intake location, with and without operating generators, cooling towers or chillers.

COOL, CALM, AND COLLECTED

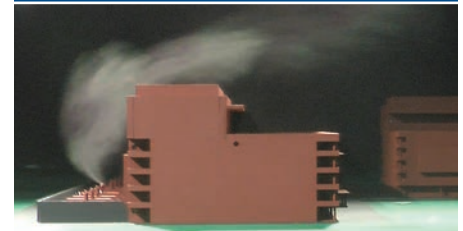
CPP's expertise creates an accurate picture of the interaction between the hot exhaust plumes and nearby intake locations.

With confirmed results, mitigation schemes can be designed and evaluated to guard against excessive temperatures at critical locations. The results can also be used to be sure of adequate cooling capacity during worst-case ambient conditions.

CPP's dispersion modeling assessment, custom made to replicate your installation, is the only reliable way to ensure that when the grid power goes out, your data center does not overheat or even worse, shut down.



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



Hot generator combustion exhaust can impact sensitive air intakes.



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

Power outages are most likely to happen at the hottest times of year when cooling loads are already maxed out.

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