The Future of Data Center Cooling

Given the recent comment by NVIDIA's CEO on the future of cooling data centers using the Rubin Vera chip, here are some key points showing why Tecogen's technologies are relevant, however the data center design changes:

1. There are multiple cooling loads in a data center in addition to liquid cooling

a. These include cooling the data halls that operate at chilled water temperatures of 12C to 15 C (55 to 60F) which will continue to need chillers.

b. As more data centers uses on-site power plants, cooling the intake to gas turbines allows a data center power plant to increase its output by 15% to 25% without wasting valuable electricity to do so.

c. Even if a 250MW data center only used our chillers for the data hall cooling and turbine inlet cooling, it would still need 50 to 75 Tecogen chillers.

2. Most data centers will continue to use chillers

The current generation of NVIDIA chips can already operate at water temperatures >105F (40C) and some data centers in cooler climates operate without chillers. However, most data centers continue to design their liquid/chip cooling loops for 65F to 78F (18 to 25C) because of other key design factors including:

a. Space constraints – a data center designed around chillers needs less space overall and significantly less water especially in hot climates.

b. Extra safety margin – given how expensive the latest chips are, operating at cooler chilled water temperatures means there is a bigger safety margin in the event of a power failure or equipment failure.

3. Tecogen's Hybrid Drive Technology can also be used in a chiller-free data center

If a future data center uses no chillers, Tecogen's patented hybrid drive technology can power any motor load, including large fans that would be used in a potential chiller-free data center to reject the heat.

a. As utilities force data centers to shed load during peak time, our hybrid drive can be used to switch to gas seamlessly, whether it is powering a chiller or a fan. The more acute the peak becomes, the less reason a data center has to reduce their available capacity for AI loads by allocating it to electrical equipment.

b. Although a 250MW chiller-free data center needs less total power allocated to chillers, it would still need 100+ of our hybrid drive power packages to power the cooling fans.

Therefore, irrespective of how the market evolves, we know certain things are not going to change. The power needed is going to increase and the power available is going to decrease. The effect of peak time is going to be more acute, making it increasingly likely that data centers will want to find ways to reduce their peak power usage. Our technology is perfectly poised to solve this problem.