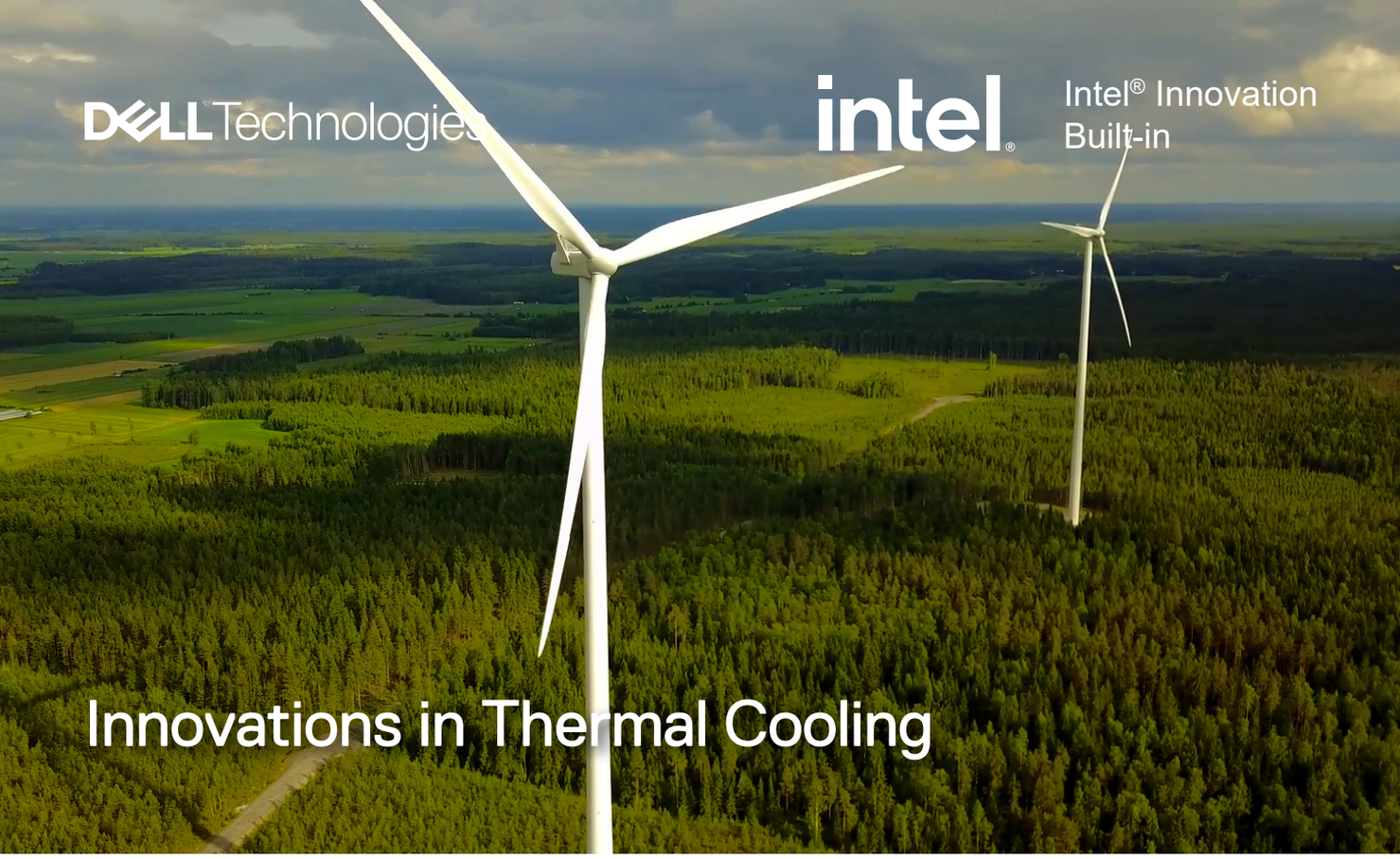

Innovations in Thermal Cooling

Reducing the energy and cooling needs of datacenters plays a huge role in facilitating a company's carbon footprint. We are constantly innovating to reduce the carbon footprint that comes from cooling in any environment where our servers are deployed.

Our multi vector cooling, liquid cooling, and thermal design capabilities are cutting-edge solutions to one of the biggest challenges in IT today. We introduced Fresh Air and Multi Vector Cooling, VM power mapping, granular control at the component level, and accurate power use monitoring.

Multi Vector Cooling (MVC) 2.0

Multi Vector Cooling (MVC) is not any specific feature – rather it is a term that captures all of the thermal innovations implemented onto PowerEdge platforms. MVC 2.0 for next-generation PowerEdge servers builds upon existing innovations with additional support in hardware design, improved system layout, and cutting-edge thermal controls. These improvements address the needs of an ever-changing compute landscape, demanding a 'green performance', low carbon footprint, as well adding customization levers to optimize not only at the server level, but also at the data center level, generally with airflow handling and power delivery.

- Intelligent thermal algorithms minimize fan and system power consumption while maintaining component reliability
- Enables custom cooling options that can be managed via iDRAC GUI (temp limits, fan speed limits, acoustic levels)
- Realtime sensor data can be integrated into OME & Power Manager plugin to track and control air flow at the rack & data center level

Learn more about Multi Vector Cooling.

Dell Liquid Cooling (DLC)

The new PowerEdge platforms will offer CPUs with higher power than ever before. Dell is introducing new Direct Liquid Cooling (DLC) solutions to effectively manage these growing thermal challenges. Dell DLC solutions cool the CPU with warm liquid which has much greater (~4x) heat capacity versus air. Thus, DLC is a higher performance cooling solution for managing the CPU temperature while also enabling higher performance and better reliability. Because DLC solutions are more efficient at extracting heat, this reduces the burden on server system fans as well as the data center's cooling infrastructure, improving sustainability and saving customers money.

- **Increased** System Cooling Capacity
- **Improved** Energy Efficiency (PUE)[1]
- **Higher** Compute Density
- **3.1x ROI Within 4 Years**[2]
- **Swift** Serviceability

The Dell Technologies DLC solution enables PowerEdge server components to take on dense workloads while staying within their required thermal limits. Customers can maximize the utilization of their datacenters with confidence knowing they have the best efficiency, ROI and flexibility that a thermal design has to offer. Learn more about this cooling technology.

Finally, Dell Leak Sense detection capability protects liquid cooled servers and is fully managed by the integrated Dell Remote Access controller (iDRAC).

What you can expect from Dell Technologies:

We are committed to manufacturing our PowerEdge servers with the future in mind: Server technology and innovation can continue to advance and provide high performance in data centres, while simultaneously helping preserve our environment.

We introduced Fresh Air and Multi Vector Cooling, VM power mapping, granular control at the component level, and accurate power use monitoring.

1. Based on Dell EMC internal analysis, March 2021, comparing hypothetical air-cooled data center with a cooling PUE of 0.62 to a hybrid data center with a cooling PUE of 0.34. A PUE of 0.21 was assigned to all overhead not attributed to cooling. Operating costs and other factors will cause results to vary. RS Means industry standards cost basis was used to measure typical cooling infrastructure costs and determine projected savings.
2. Based on Dell EMC internal analysis, March 2021 comparing a hypothetical air-cooled data center to a hybrid data center. Assuming 1244 nodes, the air cooled data center uses 1825 kW whereas the hybrid uses 1544 kW. Individual operating costs and other factors will vary the results. RS Means industry standards cost basis was used to measure typical cooling infrastructure costs and determine projected savings. Based on Dell EMC internal analysis, calculating the capital cost of DLC minus the amount of CRAH, pumps, chiller, and tower to equal the net cost of DLC, and examining the operational costs of a hypothetical air-cooled data center and a hybrid data center to determine ROI. Assumes a high wattage CPU. Schneider Electric developed an analytical model that ascribes operating costs to the various types of facility infrastructure equipment. Electricity costs and other factors will vary the results. RS Means industry standards cost basis was used to estimate cooling infrastructure costs and determine projected savings.