

Nominee: Liquid cooling system by Iceotope

Nomination title: Iceotope halves datacentre energy usage and delivers 24/7 free liquid IT cooling

The costs of operating a datacentre, and the associated energy usage are rising at an incredible rate. Cooling has emerged as a major contributor to the problem and has been highlighted by numerous industry analysts as an area for improvement. As such, UK-based technology firm Iceotope sought to engineer a liquid cooling system capable of providing free IT cooling anywhere on the planet, dramatically cutting the energy usage, running costs and total emissions of these facilities.

Iceotope understands that liquids are much more effective at removing heat than air, and as a result, the technology has been used extensively in IT cooling equipment in the past. However, no commercial liquid cooling system has been widely adopted in the HPC/datacentre space to date – until now.

Unlike other solutions, Iceotope started from an engineering, rather than IT, standpoint. The result is a revolutionary modular liquid cooling system which provides free cooling irrespective of location, makes use of the waste heat which comes as a result of the process and cools compute at a fraction of the cost of traditional air systems. The solution also removes the need for complex and expensive supplementary cooling systems, including fans and Computer Room Air Conditioning (CRAC) units, allowing for much greater flexibility within these facilities.

While there are indeed many liquid cooling solutions on the market, most technologies are not suitable for use in the datacentre environment – dunking individual servers or racks in large liquid containers is inefficient in terms of space and time, not to mention potentially hazardous. Iceotope addresses these concerns head on by sealing the electronics inside a “hot swap” module filled with an inert, non-conducting hyper-convecting fire extinguishant that is around a thousand times more effective at moving heat than air. This solution harvests heat from all components, thus improving reliability and performance.

Furthermore, using the virtually silent Iceotope system compared to traditional server set-ups means the immediate working environment is also improved, with no impact on air quality and virtually no noise pollution.

As an added efficiency benefit, Iceotope’s liquid cooling solution allows for hot water reuse in other applications such as central heating, both within the facility and outside. Not only does this reduce the carbon footprint of a datacentre itself, but also that of surrounding buildings which could make use of the hot water.

In Iceotope's design, the only required power comes in the form of a small water pump designed to remove the waste heat, which uses minimal energy resources. To put this all into context, the Iceotope solution uses just 107Watts of power to cool 20kW of ICT. This equates to an overall reduction in energy consumption of 50 percent. This performance is made possible because the system is able to take input water temperatures of up to 45°C. With an input temperature this high, the need for either chiller equipment within the datacentre or for chilled water going into the facility is completely removed. As such, the Iceotope solution can be located anywhere, including industrial spaces or populated areas or even equatorial or other hostile environments. What's more, by removing the need for specialised datacentre design and build, Iceotope's system slashes CAPEX and OPEX in equal measure. The solution is completely clean in operation, dust and humidity safe, meaning that servers can be located in environments that were previously considered unsuitable for datacentre use. Furthermore, using the virtually silent system compared to traditional server set-ups means the immediate working environment is also improved, with virtually no noise pollution.

Impact on the data centre industry

The UK is believed to have the greatest concentration of datacentres on the planet at over 7m sqft, consuming more than 6.4 GW of power per year (equivalent to 6,000,000 households). Not only does this demonstrate the massive scale of the datacentre industry, but it also highlights the market opportunity for technologies that decrease such figures through improved efficiency and performance. Although the Iceotope system is relatively new to the UK market, it is already showing signs of great market success.

The company secured \$10m in funding in January 2014 and, since selling its first production system to the University of Leeds in Q1 2013, now has several customers operating its servers throughout Europe. Most recently, Iceotope equipped the 3,200 sqft Poznan Supercomputing and Networking Centre (PSNC) in Poland where it achieved industry leading environmental figures – including a 1.08 PUE (Power Usage Effectiveness) figure, which is on a par with Facebook and Google's industry leading datacentre facilities. If it were to take the approach used by many other vendors, only measuring the PUE for the system itself and not including power systems etc., Iceotope's figure would be a near-perfect 1.018. The company's recent success has not gone unnoticed within the green IT industry either and the company has won numerous industry awards and accolades in recognition of its technology and its ability to lower IT energy usage.

All in all, Iceotope's patented liquid cooling system is the only one of its kind in the world. Its technology is not just innovative, it could prove extremely disruptive, forcing the market to rethink data centres all together and create a much more environmentally friendly IT model.

Why nominee should win

- Iceotope enables greater flexibility within datacentres, and can substantially reduce energy bills and running costs.
- Iceotope replicates the operating environment of most datacentres – using rack-mounted “hot swappable” electronics with full redundancy – without using air as the cooling mechanism.
- Iceotope reuses waste heat, revolutionising the way that datacentres are designed, thus improving energy efficiency and environmental friendliness
- Iceotope allows datacentres to run neutral in terms of heat, resulting in a reduction of cooling power costs of approximately 97%
- Iceotope sought to reduce the environmental impact of the datacentre industry – and has successfully introduced a system that cuts energy consumption in half.