GREENTECH COLLABORATION SERIES

HALSTON GROUP X GRC COOLING

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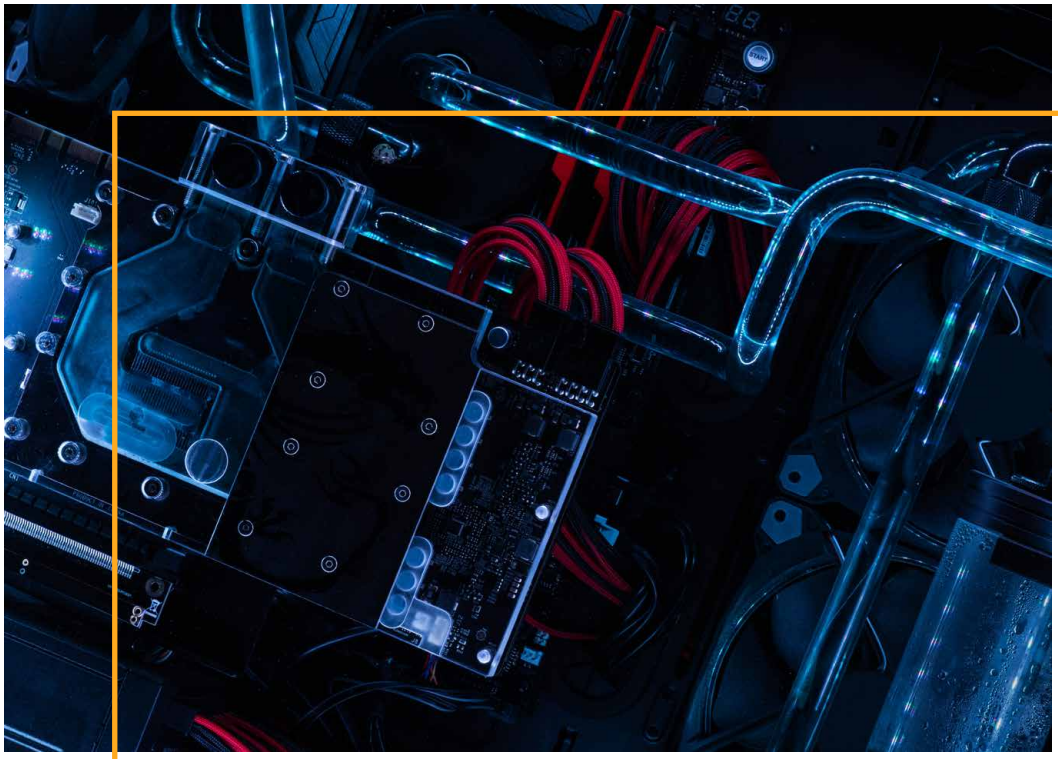
GRC
THE IMMERSION COOLING AUTHORITY®

Entering the GreenTech Era:

DECARBONISING DATA CENTRES



H B2B

REGTECHTALKS
Starting The Conversation

MERCURY

SUSTAINABILITY PARTNERSHIPS

HG The world has been in the midst of the digital era for a while now and our dependence on computing power and cloud storage is only growing. The modern world relies on an ever-increasing network of dedicated data centres to store and stream information across the globe. Cloud data centres process around 94% of all workload and it is predicted that by 2025 there will be over 100 zettabytes (1 zettabyte equals a billion terabytes) stored in the cloud.

Whilst our movement towards cloud-based operations has had incredible efficiency, automation and waste benefits, it's no secret that data centres have their own environmental implications to consider. In 2019, it was estimated that data centres worldwide used more than 2% of the worlds electricity and generated the same volume of carbon emissions as the global airline industry.

With the reliance on cloud-based data storage growing, action must be taken to minimise their carbon footprint. We spoke to Gregg Primm, Vice President of Marketing at GRC Cooling to understand how they are doing just that.

GRC Cooling has developed a revolutionary liquid immersion cooling system that is redefining the sustainability of data centre cooling.

THE CARBON FOOTPRINT OF DATA CENTRES

GRC *In regards to carbon footprint, data centers are under tremendous scrutiny for both their power usage and the carbon emissions associated with that power consumption. While the availability of renewable energy is growing, the unfortunate fact remains that over 60% of the world's electricity is still produced using fossil fuels. So the bottom line is that data centers are consuming an enormous amount of power *and* producing an enormous amount of carbon in the process.*

The single biggest factor contributing to the total power used by a typical air-cooled data center is the cost of chilling the air itself. The air chilling infrastructure – computer room air chillers (CRACs), air handlers, humidity controls, filtration systems and plenums, plus the ancillary systems that ensure the air chilling system is continuously available like backup generators, UPSs, and batteries – accounts for as much as 55% of all the power consumed by the data center. By comparison, a single-phase liquid immersion cooling solution from GRC eliminates the need for nearly ALL of their air cooling infrastructure -- and the power it consumes as well -- dramatically reducing both the power consumed by the data center and the associated carbon footprint.

Pretty much every business or vertical has a data center, so a horizontal marketplace, this is a universal concern. That said, clearly the larger the data center, the bigger the impact. Without question hyperscale data centers, massive colocation providers, and the vast but highly distributed networks like those typical in the telecommunications and financial sectors face the loudest demands for improvement and change. The cryptocurrency sector also is under tremendous scrutiny and calls for sustainability improvements.

HG This isn't restricted to those that own their own database either, it is very common practice for companies to outsource their data management but the impact of these centres need to be considered as part of a business's overall carbon footprint.

GRC *It's well understood that simply handing off your organization's compute needs to a third party -- colocation providers, SAAS platforms, and so forth -- in no way absolves you of the responsibility for how those processes are carried out, or the impact on the environment that results. Accepting that responsibility and accountability with transparency and honesty delivers tremendous goodwill from customers and investors, and also acts as a terrific way to differentiate against competitors.*

WATER WASTE

HG Environmental impact isn't solely restricted to carbon emissions either, it encompasses all aspects of excessive waste and usage of natural resources. Greater attention is now being paid to water resource management.

GRC *In the US alone, data centers use well over a billion liters of water per day. The overwhelming majority of that water consumption is associated with power generation and air cooling infrastructure components that rely on evaporative cooling like CRACs. By eliminating the need for these components in the data center single-phase liquid immersion cooling from GRC enables data centers to reduce annual water use by as much as 8 million gallons per MW per year.*

AVOIDING ELECTRONIC WASTE

HG The materials that compose electronics are becoming scarer and with components often difficult to recycle/re-use many parts are filling up landfills at a fast pace. The proportion of electronic waste in landfills is now so high that the Royal Society of Chemistry says it would be more effective to mine landfills than the Earth. One study estimated that the world's mountain of discarded electronics in 2021 alone weighed 57 million tonnes. If we continue to waste at our current pace and continue or increase our level of demand we could run out of gallium, silver and indium and many other elements in the next century.

GRC *While data centers obviously drive tremendous value, ultimately the equipment that makes up the data center has a finite lifespan and what cannot be recycled will ultimately end up in a landfill. This includes not just the servers but all of the data center infrastructure. By eliminating the air chilling infrastructure the amount of equipment that will ultimately become electronic waste plummets. Also, CRACs and similar air chilling components incorporate refrigerants that typically have very high global warming potential, so eliminating those components also eliminates another source of environmental concern altogether.*

*In a nutshell, a data center that is designed to utilize single-phase liquid immersion cooling requires *far* less equipment and infrastructure while also delivering the same computer capabilities (and also allowing for far higher compute density compared with air cooling, reducing the overall data center footprint). Less equipment means less capital expense, less resource drain, and ultimately less waste over time.*

REDISTRIBUTING HEAT

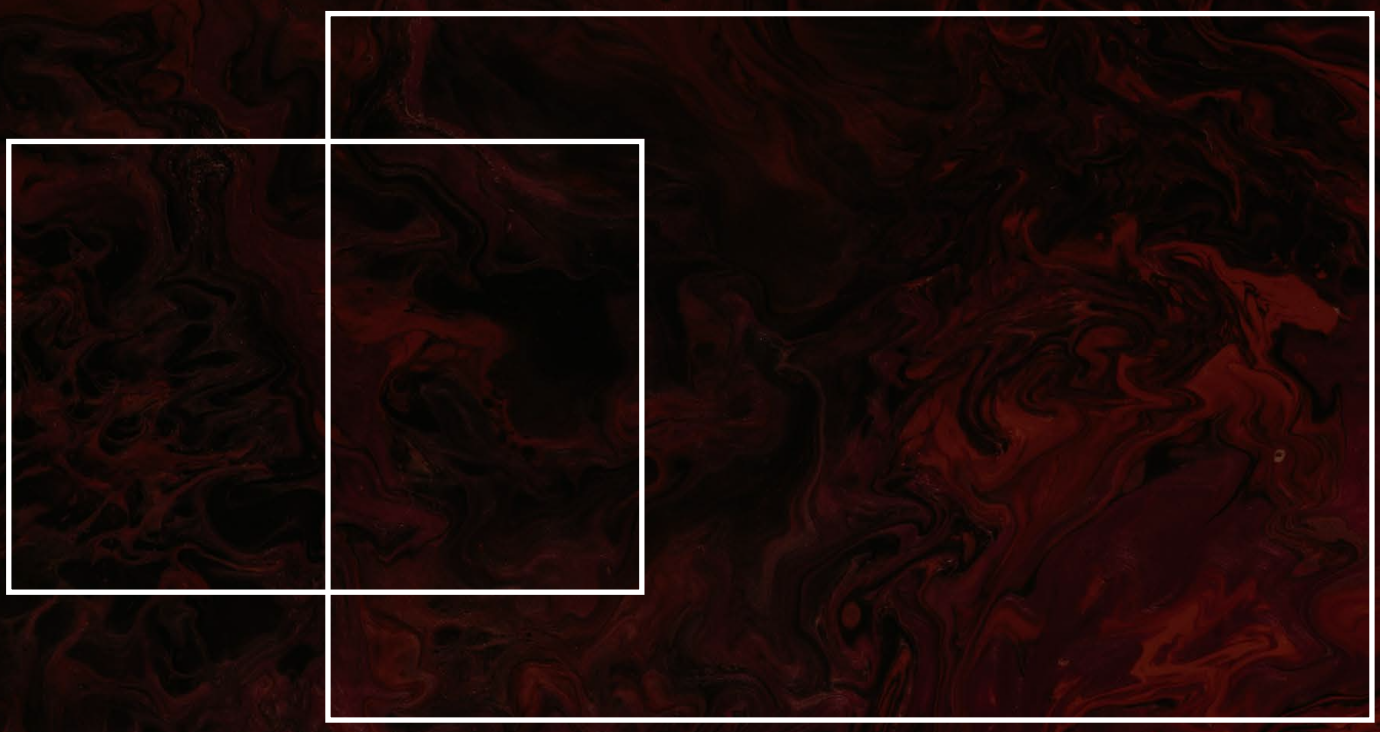
HG Heat waste cannot always be avoided, but what it can be is redistributed.

GRC *While there have certainly been examples of data centers making use of the heat they generate, the vast majority of data centers have been designed to simply reject/eject the heat into the surrounding environment by whatever means is possible given their location.*

A data center consumes power to run its servers, the server compute process converts that power to heat, the data center heat removal infrastructure collects that heat and must remove it from the data center. Typically, that heat is simply rejected into the environment around the data center (into the air surrounding the data center through evaporative or dry coolers, into a nearby cool water source, etc.). But heat is still energy, so it makes sense to try to utilize it for purposes where you'd otherwise have to consume more energy to generate heat. Reducing power and water use and e-waste are all well understood aspects of sustainability, finding ways to reuse that excess heat rather than wasting it is rapidly becoming a big topic of interest throughout the industry. One thing to note is that if you want to capture and reuse the heat from a data center there's really no better way to do it than by liquid immersion cooling. Capturing the heat from hot air is a very "lossy" process, typically only reclaiming half or less of the energy from the heated air. But with liquid immersion cooling all of the heat is captured by the liquid and circulated to a high-efficiency heat exchanger, providing access to nearly 100% of that energy for reuse.

*Heat reuse opportunities are *very* location specific, largely dictated by the temperature of the air outside of the data center. But some examples are circulating the heated water through buildings to provide municipal heat, or directing the water through high efficiency heat pumps to increase its temperature for use as hot water that would otherwise have been much more costly to heat. There are also examples of data centers partnering with industrial or agricultural customers or sewage firms which use heat to dry and process sludge. Other uses for waste heat include drying wood pellets or warming water for fish farms. Just yesterday I heard about Green Mountain, a data center in Norway that partnered with a land-based lobster farm to use their excess heat to warm the lobster's environment to the perfect temperature for the lobsters to grow quickly – growing in 8 months to a size that it would typically take 5 years in the wild. I think we can all agree more lobster is definitely a good idea.*

I think for a very long time data centers didn't have to worry about the heat they were releasing into the environment because it wasn't "that much" heat. But as power use, scale, and density continued to grow, what previously was no big deal is now quite a serious amount of heat and energy. If a data center is located in a hot dry climate that might not matter too much, but if that heat is continually being released into, say, a local waterway, it could warm the average temperature enough over time to impact the ecosystem locally. As we all know, it only takes an increase of a few degrees over time to start to cause some serious ecological problems. It's important we take the environmental impact of that waste heat into consideration, rather than just thinking of it as a harmless end stage of the data center compute process. And if it appears to have the potential to harm the local environment, then heat reuse as a way to mitigate environmental impact needs to be part of the data center design.



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