

Excool grows rapidly as datacenter operators seek greener, cheaper cooling

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The move toward environmentally friendly and energy-efficient datacenters is a threat to some and an opportunity for others. Excool, a UK specialist in free cooling, is growing rapidly as demand for its precision-engineered indirect air economizer picks up. The company has won contracts with major datacenter operators and moved into expanded new manufacturing facilities; it is currently planning its move into the US market, most likely through a close partnership. The company also has undisclosed plans to significantly expand its datacenter product line.

The 451 Take

There is no de facto standard cooling system or technology for the datacenter of today and tomorrow, and there almost certainly won't be. But indirect free air economizers are being increasingly used, especially in mission-critical datacenters where there is some caution around using direct air. With its carefully engineered technology, Excool has carved out a strong position in spite of competition. The company's big strengths are its knowhow and proven capability, rather than any technology breakthrough. Through fine-tuning and experience, it has driven up the efficiency of its heat exchanger and identified which materials are the most resilient, and which sizes and formats most suit the needs of datacenter operators. Its biggest challenge now is execution – exploiting the strong, global demand over the next decade. Competition can only intensify.

Context

Excool is not yet a well-known name in datacenter cooling, but its rapid expansion, high-profile customers and likely move into the US in the next year are likely to change that. Excool is the fastest-growing of four divisions in the IET group, Integrated Eco Technologies; the others are IPT, EcoAir Box, and Mercury Climatic Controls. The company, founded in 1983, is privately held and controlled by founder Duncan Williams. It has grown rapidly over the past two years as sales in the datacenter sector have taken off.

The move into the datacenter industry was triggered by an apparently arcane decision made by technical experts on the other side of the Atlantic – and which it initially missed. In 2008, the ASHRAE TC.9.9 committee widened the recommended temperature range for server inlet temperatures to 18-27 degrees Celsius (64 F and 81 F). It later introduced yet wider 'allowable' ranges of 15-32 degrees (59-90 F).

Excool's engineers later realized that this had big implications for datacenters and opened up new opportunities for the company. The company had already been readying an energy-efficient cooling system for cellular base stations when the specifications changed and rendered its research and development effort irrelevant. The ASHRAE decision, however, changed that. It meant that, in most geographies, it would be feasible and economic to use a cooling system, even for large and relatively high-density datacenters, that uses little or no mechanically aided cooling (almost all datacenters today use expensive and energy-hungry compressors to drive the cooling cycle).

Having identified the market in datacenters, Excool spent more than two years honing its product. At its site near Birmingham, in the UK, it built a full-scale model and test chamber so that that it could be sure that the system could handle the workload and its service-level promises could be met. This has proved critical in persuading those building large Tier III datacenters that the technology is up to task.

The Excool system was effectively launched in 2012, after extensive testing. The company, now in its third year of sales, does not disclose revenue, but 451 Research estimates this to be in the £15m-25m (\$25m-42m) range. This represents rapid growth when compared with other cooling product suppliers, we believe.

Like others, Excool is wary of mentioning customer names, although it has shipped more than 21MW of cooling capacity. Among Excool's publicly disclosed customers are Virtus Data Centres, PEER 1, Rackspace/Digital Realty in the UK and ITB in the Netherlands.

The company currently provides its cooling systems to datacenter operators in Northern Europe, but is seeking a partner in the US. It is considering a range of options, which could include forming a partly owned US company with an investment company or a company in the datacenter industry.

Technology

Excool's technology is based on the well-established principles of adiabatic and evaporative cooling – techniques used in industry since the 19th century. By a combination of spraying atomized water into air as it is sucked into a datacenter, lowering its temperature, and the loss of temperature associated with evaporation, outside air can be cooled sufficiently to then reduce the temperature of the warm air from the IT equipment in the datacenter.

While some free air cooling systems use filtered outside air and circulate it within the datacenter, Excool uses indirect cooling. This means the outside air and the internal datacenter air never mix. The key to this technology, and a critical component in Excool's recent success, is the efficiency of the heat exchanger. Excool claims its heat exchanger – an apparently low-tech PVC device consisting of separated air passages that cross each other (exchanging heat) – is more efficient than any other available, and is longer-lasting, more resilient and requires no maintenance. As an example of that efficiency, if the return air from the datacenter equipment is 36 C, and the outside air is 16 C, Excool says it can transfer 80% of that heat outside the datacenter. That means the air inside the datacenter is recirculated back the IT equipment at 20 C. Other systems on the market may only achieve 60% efficiency, which means the supply air would be at 24 C. When equipment is operating near the limits of the ASHRAE ranges, or of service-level agreements, these efficiencies can be critical, and could make the difference between the need to ever use a mechanical compressor.

Excool's units are about the size of a shipping container, and are available in modular units of 140kW-400kW. Some of Excool's customers are Tier III certified. Availability is achieved through an N+1 configuration – all the units are used at energy-efficient low fan speeds, but if one breaks down, the remaining units can be sped up.

Business benefits

The benefits of using Excool depend on how much cooling can be achieved without mechanical cooling, on the risk appetite of the operator and on the service-level agreements that datacenters offer (many operators agree to keep in the middle or low end of the ASHRAE range, so that equipment reliability is not compromised). But even relatively risk-averse datacenters can save

significantly on mechanical cooling equipment (those less risk-averse can eliminate it altogether), in addition to reducing their overall energy consumption. Excool argues that diesel generator size can be reduced by 60% and transformer size by 70% - figures that are impressive, but will depend on the situation.

In cost comparisons with other datacenter cooling methods, Excool claims that its systems cost 15% less than an equivalent chilled water system, but the operational cost is 90% less - adding up to a 75% reduction over the total life. Cost comparisons with direct outside air systems are less straightforward, depending on how much mechanical cooling is installed as a backup (direct air systems may need to close down if there is an air-quality issue, so backup cooling systems may need to be in place).

The Excool system (like some others) is under software control so that it can automatically select the cheapest method of cooling - air only (winter); with evaporative (summer); or, in extreme situations, with mechanical cooling. Those operators electing not to install any mechanical cooling will save significantly - but even those that want some safety margin are able to install just enough to bring the temperature back within ASHRAE limits - the free cooling will still do a lot of the work.

Competition

A variety of competing products have appeared on the market from 2009 through to today, using greater or lesser degrees of free economization. Not all the products, however, are the same, and relatively small differences in capacity or efficiency can make a significant difference in economics and viability, especially in situations where the datacenter is operating on the margins, since they often are in hot weather.

One German-based supplier, Munters, competes head-on with similar technology, and has been enjoying similar success. Datacenter equipment giant Schneider Electric supplies an indirect evaporative cooling product, EcoBreeze, that is delivered as an external container (it has used some of Munters' technology in this product). Another supplier, KyotoCooling International, acquired in 2013 by Cloudsite Intelligent Data Centers, has a somewhat different approach - it has enjoyed some success using a large circulating wheel as a heat exchanger. Emerson, owner of the Liebert line of cooling products, tends to offer mechanical cooling with free air options to reduce operational costs.

There are also various other smaller suppliers, including some self-designed products. Some of the modular datacenter providers have developed or at least commissioned their own free cooling

systems – BladeRoom Group, for example, has a direct cooling system, while AST Modular, now part of Schneider, has an indirect cooling system. Some larger colocation and Internet-scale operators have developed their own – one example is the large Switch NAP datacenter in Las Vegas, which uses a large-scale evaporative cooling system.

SWOT Analysis

Strengths

Excool has an efficient, resilient and cost-effective cooling system that is proven in high-availability datacenters. It is (currently) focused on cooling.

Opportunities

There is a growing consensus that indirect free cooling, with adiabatic and evaporative cooling, is the most efficient way to cool a large proportion of new commercial datacenters. The market is large and growing.

Weaknesses

Excool is still a small company with limited resources compared with some of the big equipment operators. Its cooling systems may only be suited to a part of the datacenter market (albeit large and growing). It does not yet have operations in the largest market (US) or the one with the most potential (China).

Threats

The datacenter market is changing. Power densities are not growing (reducing the need for so much cooling) and datacenters are likely to be increasingly operated below peak, reducing the cooling capacity required. While this may benefit free cooling in some situations, new designs may have lower cooling needs or different requirements.

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