



## Impact Report

# Excool launches a prefabricated strategy for its hyperefficient cooling technology

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In November 2014, UK-based cooling specialist Excool announced its entry into the market for prefabricated modular (PFM) datacenters. The company is building on the success of its indirect cooling technology, which has already won some high-profile customers for its energy efficiency – Digital Realty is a prime example. Excool is now making the technology more readily accessible to small and midsized operators via its PFM offering, called Excool Space, in hopes of speeding up adoption.

### The 451 Take

With its indirect cooling technology, Excool has already managed to establish a business with operators of some large datacenters, in spite of strong competition. This is promising for the company's PFM datacenter push, which is all about making the cooling technology more widely available. Many operators will welcome greater choice in cooling options in their pursuit of less energy waste – Excool claims a level of efficiency comparable to direct fresh technologies. Customers that will find Excool Space attractive are most likely to be medium-sized operators (with sites smaller than 2MW) with highly standardized IT. However, Excool is not a known supplier of complete datacenter infrastructures, and it might find that partnering with technology-agnostic PFM vendors with already established market presences to be a faster track to higher sales of its cooling products. Launching its own PFM offering might make it more difficult to pursue such avenues.

### Context

Although Excool is still a young company (it was incorporated only in 2010), the team behind it is by no means a newcomer to cooling. The firm is a fully owned division of UK-based Integrated Eco Technologies (IET), which has been in the business of developing, manufacturing and servicing industrial and commercial climatic systems since 1983. The parent company decided to investigate a potential entry into the datacenter market when, in 2008, ASHRAE revised its guidelines for datacenter operations, opening up the doors for a considerably wider operational range of ICT equipment – between 18 and 27 degrees Celsius.

Before the change, ASHRAE guidelines recommended 20-25 degrees (60-77 degrees Fahrenheit), while relative humidity was also to be kept between 40% and 55%. Many datacenters operated at even lower temperatures to minimize thermal stress and, as a consequence, the failure rates of IT hardware. This was a habit from the days when servers and disks were expensive and high-availability techniques limited to top-end, mission-critical systems. This shift in ASHRAE guidelines suddenly put Excool, just like other cooling-technology vendors, in a position to develop a product that radically lowers the energy and cost overhead of datacenter cooling by minimizing compressor operation. The new recommendations meant that, in most geographies, it would be feasible and economic to employ a cooling system – even for large and relatively high-density datacenters – that uses little or no mechanically aided cooling.

Having identified the market in datacenters, Excool spent more than two years honing its indirect evaporative cooling product. At its site near Birmingham in the UK, it built a full-scale model and test chamber to be sure the system could handle the workload and its service-level promises could be met. This has proven critical in persuading firms building large Tier III datacenters that the technology is up to the task. The company delivered its first installations in 2011, and then made the product generally available in 2012. After reaching cumulative sales of over 20MW of rated cooling capacity on the back of deals with large operators such as Digital Realty, PEER 1 and VIRTUS, Excool (and its parent company IET) decided to make its technology easier to access via a PFM datacenter design.

It was natural step for IET because it has considerable expertise in, and sizeable manufacturing capacity for, prefabricated packaging of mechanical and electrical plants at its IPT subsidiary. Although Excool Space is scalable enough to address large datacenter sites, it is primarily targeted at

small and medium-sized facilities where either the project size cannot absorb lengthy and expensive design cycles, or requirements are rather standard. Excool and IET have their engineering and manufacturing in the UK, which makes the British Isles and Western Europe the foremost target for Excool Space. The company is in the process of establishing itself in Germany. Expansion into North America is also likely in the next 12 months, 451 Research believes.

Excool counts on partners that offer design-and-build services to take Excool Space and create complete datacenter infrastructures. It is therefore not a full provider of PFM datacenters, but a provider of a core into which other components (such as power) must be added. If the operator prefers to have a fully PFM facility, the electric room can be built out as part of Excool Space and then fit-out with power systems. This approach lets Excool focus on what it does best, while also allowing room for design and build partners to differentiate and add value – identifying the right partners will be critical to its success.

## Technology

The name Excool Space is telling: it integrates the company's indirect cooling units with a data hall. As such, it is not a complete datacenter infrastructure because critical power equipment is not part of the base package. Excool's indirect cooling technology, core to Excool Space's proposition, can achieve a partial PUE of around 1.07 or better (meaning that facility cooling is about 7% of the IT load on average), according to data from the company. In fact, the firm claims that at key European and North American datacenter markets, such as London, Paris, Frankfurt, Amsterdam and New York, the overhead is lower than 5% when using ASHRAE-recommended set points, assuming that average utilization is in the 60-80% range. Efficiency will slightly degrade at low utilization levels (as well as very high loads), but the company claims a near flat PUE curve across the load range above 20%.

Because outside air never mixes with the air in the data hall, and the adiabatic and evaporative cooling technique is effective in all but the most extreme climatic conditions, the optional DX unit is typically sized only to assist the operation, rather than acting as a full backup. This saves capital cost across the whole upstream power infrastructure too, or allows operators to drive higher IT loads from the same power envelope. The background of the cooling technology is discussed in more detail in [our previous report](#).

Excool Space has the cooling units mounted on the side (at one end to be precise) of the data hall (some existing customers for the cooling product have rooftop installations). This should reduce the loading on the structure, which makes it lower cost, and also lends itself to derivative multi-story designs in the future. Cooling units share an air plenum and operate in concert for the data hall. The white space has raised floor and employs hot-aisle containment to regulate airflow. Uncontained racks (for freestanding and not front-back cooled systems) can also be accommodated in limited numbers without substantial loss of cooling efficiency. The electric room can be added at the far end of the data hall if required.

Currently, available reference designs start from 300kW and scale up to 2MW in a single integrated facility in increments of about 200kW. Average rack densities can range from as low as 2.5kW to over 15kW, which will determine the number and capacity of the cooling units supporting a single data hall. The size of the hall (and total power/cooling capacity) can be scaled by replicating the building blocks. Neither the total cooling capacity nor the thermal density needs to be locked in at the design stage. Further cooling units can be added later to the facility if planned for (there are free mounting positions) to cover for the growth of IT load – be it the addition of extra racks in an existing space, racks getting more powerful, or unused space getting populated.

The company claims that, by using its indirect cooling technology, Excool Space can achieve annualized PUE of 1.2 or better in most locations, including hot desert and humid subtropical climates – assuming the operator applies the latest ASHRAE recommendations for datacenters. If the 'allowable' envelope is used, compressor operation is virtually eliminated in all but very hot and humid (tropical) weather conditions.

## Competition

The market for PFM datacenters is expanding, and already includes numerous vendors with various backgrounds. Europe is particularly rich in suppliers vying to establish themselves as leaders. BladeRoom, a UK-based PFM datacenter startup, already has some traction in the market, and is probably the closest comparison in its strategy: bringing a highly efficient cooling technology to market using prefabrication. BladeRoom developed a direct fresh-air-cooled (aided by evaporative cooling and fully backed up by direct expansion coils) datacenter design that is essentially a facility-scale pressurized containment system. BladeRoom technology is highly efficient in temperate and cool climates, with mechanical overhead as low as 5% of the IT load, and a proven record of total annual site PUE of 1.2 or below in such locations.

Cannon Technologies, another UK-based vendor, has a versatile and fine-grained PFM architecture to accommodate virtually any use case, from freestanding legacy equipment to high-density containment systems that are strictly laid out. When its narrow-profile, in-row chilled water cooling units are used, Cannon can add cooling capacity online to the operation, to cover for expansion or to handle higher-power racks. When paired with efficient chillers with air-side economization mode, this strategy helps operators achieve high levels of energy efficiency through the whole lifecycle of the facility.

Schneider Electric, the Paris-based energy management giant and datacenter equipment vendor, is also pushing hard to advance its PFM datacenter business. It acquired AST Modular in late 2013, and completed that integration during 2014 to gain valuable insights through the eyes of a pioneer that had already operated in the market with its containerized and multi-module datacenters for more than a decade. Schneider appears keen to find the fast track into selling its cooling and power equipment as part of PFM datacenter projects to find pockets of growth where its traditional datacenter UPS and cooling-systems businesses are flat at best. Its EcoBreeze family of modular indirect evaporative cooling units is similar in its concept and design objectives to Excool's.

Emerson Network Power is another datacenter equipment heavyweight that Excool will likely face regularly, since it is seeking growth with PFM datacenter projects in all geographies and verticals, and of all sizes. It has an appetite for full-custom projects or even supplying PFM components under OEM engagements with third-party vendors.

## SWOT Analysis

### Strengths

Excool has an energy-efficient cooling system that is proven in high-availability datacenters. Indirect heat exchange, as opposed to direct fresh products, appeals to conservative operators. Excool Space makes it more readily accessible by leveraging IET's engineering and manufacturing resources.

### Weaknesses

Excool is still a small company with limited resources and sales bandwidth compared with some of the big vendors. Excool Space introduces some layout rules that some operators may not find flexible enough for their mixed needs.

### Opportunities

There is increasing focus on the energy efficiency and cost profile of datacenters. Consensus is growing that elevated temperatures in data halls are acceptable because it has marginal impact on hardware failure rates, and that compressor-free operation is desirable in most locations.

### Threats

The culture of full customization is still ripe in the datacenter industry, which might prevent Excool Space from making it to the short lists of many. The PFM market is highly contested by dozens of vendors, many of which have considerable marketing clout, while actual sales of PFM datacenters are still sporadic. By competing against them with Excool Space, it might be politically harder to strike partnerships with third-party PFM vendors for its core cooling products.

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