FROST & SULLIVAN

VERTIV™

2017 EMEA Data Centre Cooling Solution Product Leadership Award

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2017 BEST PRACTICES AWARD

EMEA DATA CENTRE COOLING SOLUTION PRODUCT LEADERSHIP AWARD

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Background and Company Performance

Industry Challenges

The data center cooling solutions industry is a highly competitive environment, where market participants need to focus on product innovation in order to gain a competitive edge. This would directly reflect in both their top line as well as bottom line growth. There are proven cooling technologies in the market such as air cooling solutions, which have been highly successful and well received by data center operators and owners. However, the current scenario demands innovative and technically advanced cooling solutions that not only cool the data centers, but also do so in a highly efficient and effective manner. The key challenge in this respect is the end user perception to adopt the new technology. The only way to overcome this challenge is to demonstrate the effectiveness of the product and display its tangibility; companies that have been successful in achieving this goal are expected to emerge as the growth leaders.

As the servers are being expanded to include blades, twins, and other modular dense form factors, cooling them effectively has become laborious and challenging. Data center operators are becoming increasingly concerned about both CAPEX and OPEX involved with cooling solutions as a lower "total cost of ownership" is one of the key driving factors for purchases. The effectiveness of cooling achieved and the amount of energy required to achieve it are two critical aspects of data centre cooling. It has become essential for manufacturers to come up with innovative ideas to reduce the total cost of ownership and ultimately enhance the overall value to the end user.

Product Family Attributes and Business Impact

Match to Needs

Vertiv's excellence in addressing customers' unmet and underserved needs is the result of its tremendous focus on product development and innovation based on customer feedback. Its product design and position is directly inspired and influenced by customer needs. The company makes meticulous efforts to identify industry pain points by leveraging its outreach programs and dedicated industry surveys. The key aspect here is that the company's efforts are equally targeted at both customers and consultants. With these efforts, Vertiv has been highly successful in identifying not only the current customer needs but, most importantly, the future needs and technology trends.

By leveraging its technological know-how and incorporating valuable industry feedback, Vertiv successfully launched 10 products over a period of 18 months (between February 2015 and July 2016). All these products were designed and developed to address customer's underserved needs pertaining to two key aspects; 1) technical performance - especially on efficiency, energy savings, power capacity and density; and 2) ease of use. This is a remarkable feat and is a testament to its unwavering dedication to develop

products aimed at customer value enhancement. It is Frost and Sullivan's finding that Vertiv is uniquely placed in the industry to guarantee customer satisfaction throughout the product lifecycle.

Product	Launch Month
Liebert® HPC Multi-Scroll Chiller	Feb-15
Liebert® EFC300	Apr-15
Liebert® PDX with EconoPhase™	May-15
Liebert® CRV 300 mm CW	Jul-15
Liebert® HPF R410A	Dec-15
Liebert® FCM – 6kW	Dec-15
Liebert® HPC-S-ADIABATIC	Dec-15
Liebert® EFC220	Dec-15
Liebert® DCL	Apr-16
Liebert® AFC-SCREW	Jul-16

Its remote diagnostics and preventive monitoring service called Vertiv LIFE™ Services delivers increased uptime and operational efficiency by enabling continuous monitoring of customers' equipment, combined with expert data analysis and field engineering expertise. Its innovative Vertiv ICOM™ Control solution exploits the function of a single cooling unit as well as multiple units working together (teamwork mode). This is extremely important to maximize energy efficiency within a data center environment. In addition to teamwork, on Liebert AFC and Liebert EFC, the user-friendly ICOM Control also exploits the management of energy and water. The system collects information from the different units' key parameters and operating modes while taking into account water and electricity costs. The control predictively calculates and then implements the combination which optimizes operating costs.

Breadth and Scalability of Product Line

Vertiv's product development ability is second to none. It offers a comprehensive range of data center cooling products encompassing multiple technologies. More importantly, it offers a wide range of product categories in each technology type, which specifically cater to the unique needs of the end user applications. Vertiv's extensive and industry-leading

product portfolio includes Direct Expansion (DX) systems, Chilled Water (CW) systems, Adiabatic Chilled Water Systems, and Evaporative Free Cooling. Its DX systems such as the Liebert® PDX floor mount range, the Liebert EconoPhase pumped refrigerant economizer and the Liebert CRV in-row cooling units combined with Liebert MC outdoor micro-channel condensers have the ability to operate at high return-air temperatures, suitable for the increased temperatures within which the IT equipment works.

The company's CW systems such as Liebert PCW, which is a high efficiency chilled water floor-mount range together with its free cooling chillers, maximize the free cooling operation all year round. Furthermore, the company is also about to launch a 20/32°C version of its Liebert PCW to ensure enhanced free cooling mode with chilled water. This unit is designed to be compatible with its free cooling chillers (Liebert HPC) and its patented adiabatic free cooling chiller solution (Liebert AFC), to maximize operation all year round and guarantee 100% cooling availability. The other interesting aspect is the extension of its Liebert AFC product range to include screw compressors and this range is expected to further extended in 2017. Its indirect evaporative free cooling solution (Liebert EFC) includes the indirect air-to-air heat exchanger and evaporative cooling technologies in a single footprint. In 2015, the company did not only extend the range of its Liebert EFC units in terms of capacity, but also incorporated design changes in order to adapt the evaporative technology to different weather profiles and different data center air temperature needs. Frost & Sullivan firmly believes that this will prove to be a boon to the end users.

Excellent Product Positioning

The company has gained a unique competitive advantage in the market as a direct result of its frequent product upgrades and range extensions. It continuously enriches its product portfolio by developing new products or enhancing the features of its existing products in order to keep up with the rapidly evolving customer needs. It is Frost & Sullivan's finding that Vertiv possesses the widest and most comprehensive range of data center cooling products in the EMEA region, where each product is embedded with value added features and functionalities in its own unique fashion. Vertiv's products address unique, unmet customer needs that competitors cannot easily replicate or replace. Its wide array of product launches over the past year and a half is a perfect testament of its excellence in product positioning. The launch of its Liebert EconoPhase, has further strengthened its DX portfolio. It is the first ever pumped refrigerant economizer system in the market, designed to offer enhanced energy savings. It also has a unique ability to provide 3 different free-cooling methods (air, water, and refrigerant). In December, 2015, the company enhanced its CW offering by launching the new Liebert HPC-S range, which implements adiabatic cooling and offered capacities of 250 kW – 450 kW and 170 kW – 320 kW. Furthermore, Vertiv also launched three new products over the past year to specifically address individual applications. Some key examples include the Liebert FCM (direct free-cooling module) to address shelter applications, Liebert DCL to address rack

cooling applications and Liebert EFC220 to further extend its indirect evaporative freecooling range.

Industry Leading Design

Vertiv has a tremendous focus on product design, which forms the foundation of its success. Its products feature innovative designs, enhancing both visual appeal as well as ease of use. Its technology expertise, combined with its unmatched dedication in enhancing customer value, has resulted in its industry-leading product designs that address any customer need independently of the data center pre-requisites and building constraints. Frost & Sullivan finds Vertiv's R&D efforts highly commendable. It has 42 patents for technology innovation among which 7 were filed in 2016. The company places high emphasis on designing products based on the needs of specific application segments and end user types; the Liebert AFC and EFC units are perfect examples of this. The Liebert AFC, adiabatic free-cooling chiller, is designed for data centers requiring 100% cooling availability even under the most critical conditions such as fluctuating power supplies, water shortages, extreme external air temperatures and so on. On the other hand the Liebert EFC, which also uses evaporative cooling technology, is aimed at data centers requiring high energy efficiency, while minimizing operating costs. Moreover, the company's design excellence provides end users with a high degree of configuration flexibility. Vertiv is able to seamlessly configure and customize its products with multiple features and functionalities, thus, providing its customers with a right product that adapts to their specific applications. This also enables the company to offer its cooling solutions at a variety of price points.

For its evaporative and adiabatic technologies, it is focused heavily on the following product design elements: software, water usage, water treatment, and diagnostic and preventive maintenance. It has leveraged the software element to manage the operation of the units and ensure high reliability in all conditions, optimizing overall system performance. The water usage element plays a vital environmental role by adopting multiple water sources such as rainwater, etc. The water treatment element was leveraged to prevent Legionella and other bacterial proliferation, to increase cooling availability, and at the same time to minimize running costs along with the investment on the water system. Finally, the diagnostic and preventive maintenance element was incorporated to continuously monitor all relevant parameters, thus maximizing unit performance, reducing on-site maintenance, and extending the life of the equipment.

Customer Acquisition

Frost & Sullivan believes that Vertiv's new product launches complemented by its technology excellence will further boost its customer acquisition and retention potential. The company has been able to acquire a large number of new customers (especially in the co-location space) over the past 18 months as a direct result of its new product launches, especially Liebert EFC, Liebert AFC and Liebert EconoPhase. Furthermore, these new

products are specially designed to address any ASHRAE thermal envelope (within both recommended and allowable ranges) and provide maximized availability, reduced TCO, higher efficiency, lower installation costs and unit modularity.

High Growth Potential

Vertiv has demonstrated impressive growth over the past two years, especially with its new products. For instance, its adiabatic free cooling technology applied to its patented adiabatic free cooling chillers witnessed an installation of 60 MW in cooling capacity since its launch in May 2014. Its technology expertise and know how on adiabatic chillers enabled it to design its innovative indirect evaporative cooling unit, for which the company has secured a total of 56 MW in projects since its launch. Furthermore, its Liebert PDX with EconoPhase launched in December 2015 has secured the company a total of 15 MW worth of projects and this is expected to double by the end of 2017. It is also noteworthy to mention that the company's revenues from free cooling chillers and evaporative units have more than doubled in the past two years. Frost & Sullivan firmly believes that Vertiv's excellence in innovation and its ability to develop technically advanced cooling products and solutions will further elevate its leadership position in the EMEA market. Vertiv's commitment to its customers combined with its excellent product portfolio will be a key driver for its growth over the coming years.

Conclusion

Vertiv continues to exert its leadership position by yet again proving its excellence in innovation and product positioning, resulting in a positive customer impact. Frost & Sullivan's independent analysis clearly shows that the company has firmly secured its place as a front runner and as a product leader in the EMEA cooling industry. Its strong R&D culture combined with extensive intellectual property has enabled Vertiv to demonstrate product differentiation, ultimately providing it with a unique edge in a highly competitive market.

For its strong overall performance, Vertiv has earned Frost & Sullivan's 2017 Product Leadership Award.

Significance of Product Leadership

Ultimately, growth in any organization depends upon customers purchasing from a company and then making the decision to return time and again. A comprehensive product line, filled with high-quality, value-driven options, is the key to building an engaged customer base. To achieve and maintain product excellence, an organization must strive to be best-in-class in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

Understanding Product Leadership

Demand forecasting, branding, and differentiating all play a critical role in finding growth opportunities for your product line. This three-fold focus, however, must be complemented by an equally rigorous focus on pursuing those opportunities to a best-in-class standard. Customer communications, customer feedback, pricing, and competitor actions must all be managed and monitored for ongoing success. If an organization can successfully parlay

product excellence into positive business impact, increased market share will inevitably follow over time.

Key Benchmarking Criteria

For the Product Leadership Award, Frost & Sullivan analysts independently evaluated two key factors—Product Family Attributes and Business Impact—according to the criteria identified below.

Product Family Attributes

Criterion 1: Match to Needs
Criterion 2: Reliability and Quality
Criterion 3: Product/Service Value
Criterion 4: Positioning
Criterion 5: Design

Business Impact

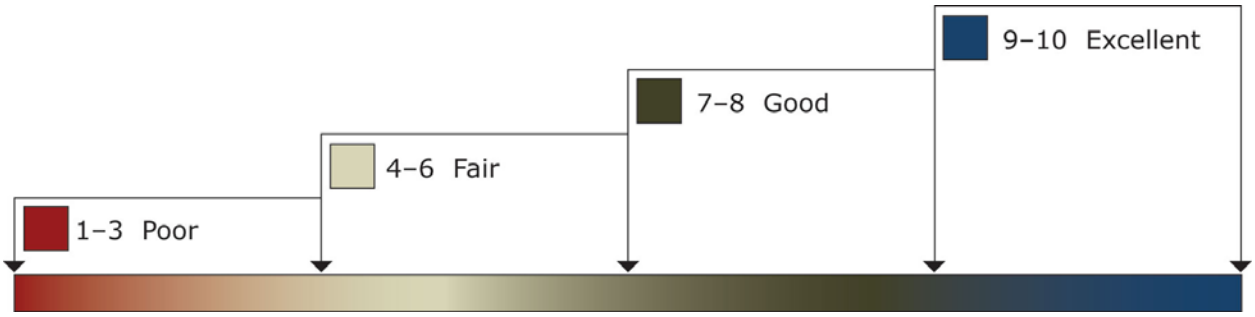
Criterion 1: Financial Performance
Criterion 2: Customer Acquisition
Criterion 3: Operational Efficiency
Criterion 4: Growth Potential
Criterion 5: Human Capital

Best Practices Award Analysis for Vertiv

Decision Support Scorecard

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation. Ratings guidelines are illustrated below.

RATINGS GUIDELINES



The Decision Support Scorecard is organized by Product Family Attributes and Business Impact (i.e., These are the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard.). The research team

confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, Frost & Sullivan chooses to refer to the other key participants as Competitor 2 and Competitor 3.

Measurement of 1–10 (1 = poor; 10 = excellent)			
Product Leadership	Product Family Attributes	Business Impact	**Average Rating**
Vertiv	**9**	**9**	**9.0**
Competitor 2	7	6	6.5
Competitor 3	5	5	5.0

Product Family Attributes

Criterion 1: Match to Needs

Requirement: Customer needs directly influence and inspire the design and positioning of the product family.

Criterion 2: Reliability and Quality

Requirement: Products consistently meet or exceed customer expectations for performance and length of service.

Criterion 3: Product/Service Value

Requirement: Products or services offer the best value for the price, compared to similar offerings in the market.

Criterion 4: Positioning

Requirement: Products or services address unique, unmet need that competitors cannot easily replicate or replace.

Criterion 5: Design

Requirement: The product features an innovative design, enhancing both visual appeal and ease of use.

Business Impact

Criterion 1: Financial Performance

Requirement: Overall financial performance is strong in terms of revenues, revenue growth, operating margin, and other key financial metrics.

Criterion 2: Customer Acquisition

Requirement: Product strength enables acquisition of new customers, even as it enhances retention of current customers.

Criterion 3: Operational Efficiency

Requirement: Staff is able to perform assigned tasks productively, quickly, and to a high quality standard.

Criterion 4: Growth Potential

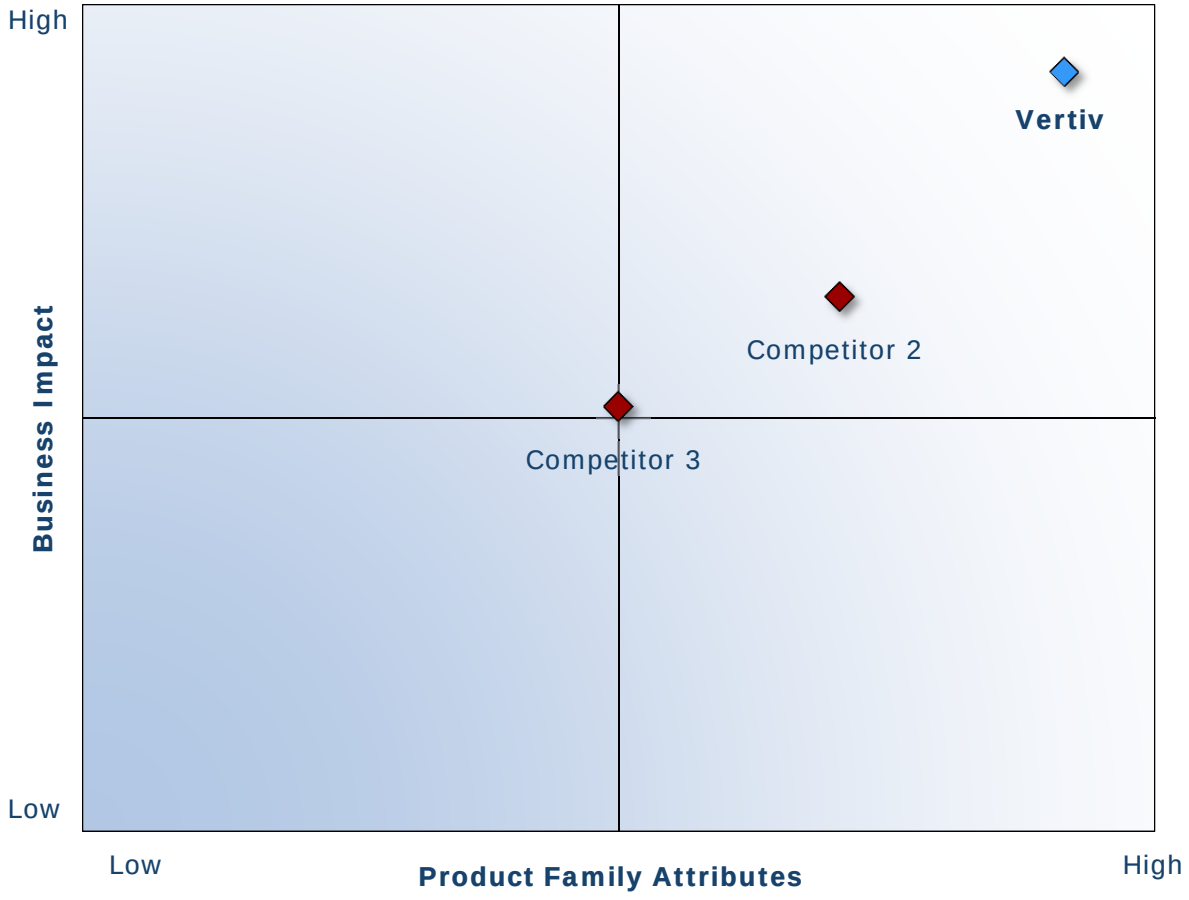
Requirements: Product quality strengthens brand, reinforces customer loyalty, and enhances growth potential.

Criterion 5: Human Capital

Requirement: Company culture is characterized by a strong commitment to product quality and customer impact, which in turn enhances employee morale and retention.

Decision Support Matrix

Once all companies have been evaluated according to the Decision Support Scorecard, analysts then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.



The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan's 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry participants and for identifying those performing at best-in-class levels.

360-DEGREE RESEARCH: SEEING ORDER IN THE CHAOS

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages more than 50 years of experience in partnering with Global 1000 companies, emerging businesses, and the investment community from 45 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.