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# Publisher's Letter

## Battling The Corona Scare!

Today, the world is troubled by the new or novel strain of coronavirus (COVID-19). The disease which has also been labelled as a pandemic has indeed created a wave of fear world-over. How do we combat the on-set of something so grave? The disease so far has affected over 132,000 people across 123 countries. According to the World Health Organisation (WHO) estimates 5,000 people have already lost their lives. Tedros Adhanom Ghebreyesus, Director General, WHO says that he expects the number of cases and deaths and those affected to climb.

Though much awareness has been raised to mitigate risks, and avert tragedy, we as professionals need to analyse the issue from an industry perspective. This brings us to the aspect of maintaining good Indoor Air Quality (IAQ) and Indoor Environment Quality (IEQ). Not contaminating an indoor space is as crucial as personal hygiene. In an effort to address the implications, in the coming April issue - 'Healthcare HVAC & R' we cover the subject in-depth. We humbly urge you to participate.

Till then, stay safe, stay connected and stay healthy!

Please write to me with your feedback at [pravita@charypublications.in](mailto:pravita@charypublications.in)

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## ASHRAE resources available to address COVID-19 concerns

ASHRAE has developed proactive guidance to help address coronavirus concerns with respect to the operation and maintenance of HVAC systems.

ASHRAE's COVID-19 Preparedness Resources webpage, [ashrae.org/COVID19](http://ashrae.org/COVID19), provides easily accessible resources for building industry professionals. These include ASHRAE's recently approved position document on airborne infectious diseases and links to the latest practical standards and guidelines.

"The recent escalation in the spread of coronavirus disease 2019 is alarming on a global scale," said 2019-20 ASHRAE President Darryl K Boyce. "While ASHRAE supports expanded research to fully understand how coronavirus is transmitted, we know that healthy buildings are a part of the solution. ASHRAE's COVID-19 Preparedness Resources are available as guidance to building owners, operators and engineers on how to best protect occupants from exposure to the virus, in particular in relation to airborne particles that might be circulated by HVAC systems."

The position document advises that new and existing healthcare intake and waiting areas, crowded shelters, and similar facilities should go beyond the minimum requirements, using techniques covered in ASHRAE's Indoor Air Quality Guide to be even better prepared to control airborne infectious disease (including a pandemic caused by a new infectious agent). ASHRAE maintains that because small particles remain airborne for some period of time, the design and operation of HVAC systems that move air can affect disease transmission in several ways.

ASHRAE recommends the following strategies of interest to address disease transmission: dilution ventilation, laminar and other in-room flow regimes, differential room pressurisation, personalised ventilation, source capture ventilation, filtration (central or unitary), and UVGI (upper room, in-room, and in the airstream). ■

## Ministry of food processing sanctions 32 projects

Meetings of the Inter-Ministerial Approval Committee (IMAC) were held under the Chairpersonship of Union Minister of Food Processing Industries Harsimrat Kaur Badal at New Delhi. Total of 32 projects were sanctioned in these meetings under the unit scheme of PMKSY of Ministry of Food Processing Industries. The projects are spread across almost 17 states, leveraging an investment worth Rs 406 crore.

These projects envisage the creation of direct and indirect employment for approximately fifteen thousand persons along with employment opportunities in rural areas to be the focus area. The introduction of modern processing techniques for food results in improved shelf-life of the agricultural produce and ensure steady revenue to farmers. Food processing has an important role to play in linking Indian farmers to consumers in the domestic and international markets. The Food processing industry can work as link between farmers, government and unemployed youth for better contribution towards economy. The Government of India through the Ministry of Food Processing Industries (MoFPI) is making all efforts to encourage investments in the business. It



has approved proposals for joint ventures (JV), foreign collaborations, industrial licenses, and 100 per cent export-oriented units. The main objective of this scheme is creation of processing and preservation capacities and modernisation or expansion of existing food processing units with a view to increasing the level of processing, value addition leading to reduction of wastage. The processing activities undertaken by the individual units cover a wide range of post-harvest processes resulting in value addition or enhancing shelf life with specialised facilities required for preservation of perishables.

The food sector has emerged as a high-growth and high-profit sector due to its immense potential for value addition, particularly, within the food processing industry as it is said to have Compound Annual Growth Rate (CAGR) of approximately 8 per cent over the last five years. ■

## Carel sales up 16.8%

Refrigeration controls and humidification company Carel has reported a 16.8 per cent sales increase in 2019 to €327.4m. Excluding the contribution from the Hygromatik and Recuperator, the two companies that Carel acquired at the end of 2018, growth increased by 5.1 per cent, with revenues of €292.3m.

Consolidated EBITDA was €63.1m (19.3% of revenues), up 34.4 per cent compared to 2018. Group CEO Francesco Nalini described the results as being even more significant in light of the "unfavourable macroeconomic scenario" characterised by the slowdown in the European economy and trade tensions between the US and China. He described the performance as "particularly positive and reflect the

continuous implementation of our multi-year strategic guidelines." This included completing the plan to expand the Group's production capacity, with a two-year investment of approximately €20m, the integration of Hygromatik and Recuperator, which allowed them to achieve a cumulative growth in revenues of around 10 per cent as compared to the previous year and the signing of the first multi-year contracts for the supply of digital services to important international supermarket chains.

In addition, 2019 saw an investment of €18m in R&D – an increase of 12.6% compared to 2018.

Revenue from its HVAC business was up 25% at €215.3m. Refrigeration revenue was €107.6m, up 5% on 2018. ■



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## Carrier to provide METRO with natural-refrigeration systems

Carrier Commercial Refrigeration (CCR) has an agreement with wholesale center operator, METRO AG, to provide natural refrigerant carbon dioxide (CO<sub>2</sub>) systems to the majority of its European stores. METRO will begin remodeling stores in Europe over the next three years, under METRO's F-gas Exit Program (FEP), which aims to convert over 760 cash & carry stores to natural refrigerant systems and reduce its CO<sub>2</sub> footprint in half by 2030. Carrier Commercial Refrigeration is a part of Carrier, a global provider of innovative heating, ventilating and air conditioning (HVAC), refrigeration, fire, security and building automation technologies.

Under the agreement, CCR will install high-efficiency remote cabinets and cold-room equipment using CO<sub>2</sub>. To ensure the greatest energy efficiency and reduce CO<sub>2</sub> emissions, METRO stores will use Carrier's CO<sub>2</sub>Ltec Evo system with ejector technology and CO<sub>2</sub> pumps. In recent months, METRO AG and CCR have jointly developed a standardised concept for cabinets and refrigeration systems focused on total cost of ownership to drive cost and operational savings.

"The close cooperation between Carrier and METRO will accelerate METRO's F-Gas Exit program, resulting in a strong refrigerant losses reduction, lower electricity demand and substantial carbon footprint reductions for METRO's customers, our climate and our society. METRO's commitment is a 50 per cent carbon reduction from 2011 until 2030," said Olaf Schulze, Director Energy Management Investments and Technical Solutions, METRO AG.

The agreement between METRO and CCR includes regular inspection, maintenance and service for the remodelled stores as well as connection to Carrier's Remote Monitoring Centre. The 24/7 service will help ensure METRO's high-quality requirements for chilled and frozen products maintain Hazard Analysis and Critical Control Points (HACCP) standards, track products and optimise energy performance. ■

## BEE launches star rating programme for Deep Freezer & Light Commercial Air Conditioners (LCAC)

To commemorate its 19th foundation day, Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India organised a Stakeholder Consultation to develop a vision towards building an energy efficient India. Launching the programme, Sanjeev Nandan Sahai, Power Secretary said, "I appreciate the hard work of BEE for contributing towards an energy efficient economy and at the same time, I also expect BEE to come up with more such programs in future. Such interaction would pave a way forward for initiatives to be taken by BEE in the sphere of energy efficiency. Deep freezer and LCAC are major energy guzzlers in commercial space, therefore, it is imperative that these two appliances shall be included in the program to save energy and reduce CO<sub>2</sub> emission. With these two products only, a total savings of around 9 billion units of electricity is expected to be saved for the country by FY 2030."

While welcoming the stakeholders during the programme, Abhay Bakre, DG

BEE, appreciated the support and guidance extended by the partners from public and private sector as well as multilateral agencies in taking forward key BEE programmes or initiatives.

The Star Labeling Programme has been formulated by Bureau of Energy Efficiency, as part of its mandate, under the Energy Conservation Act, 2001. Under this Programme, BEE has covered 24 appliances till date wherein 10 appliances are under mandatory regime. On the occasion of 19th foundation day, BEE has expanded the coverage by including Energy Efficient 'Deep Freezers' and 'Light Commercial Air Conditioners (LCAC)'. Through launch of these two new appliances under voluntary regime, 26 appliances would now be covered under this programme. During the event, Urja Dakshata Information Tool (UDIT) ([www.udit.beeindia.gov.in](http://www.udit.beeindia.gov.in)), a first ever initiative taken by BEE with World Resources Institute (WRI), to facilitate a database on energy efficiency was launched. ■

## BITZER offers digitalisation for refrigeration & air conditioning

The BITZER Digital Network (BDN) offers users digital services for refrigeration and air conditioning technology. In the future, BITZER will also make these services available to large IoT platforms.

The BITZER Digital Network (BDN) is a cloud-based online platform with which BITZER helps its customers to master the challenges of digitalisation. It offers comprehensive compressor information and analyses based on real-time data and BITZER's refrigeration know-how earned in decades. With the first-time integration into the cloud of a major provider, BITZER proves the cloud-to-cloud capability of its BDN. This solution is precisely tailored to the requirements of large supermarket chains with integrated systems. Using the BDN, they can monitor refrigeration systems as a whole as well as individual

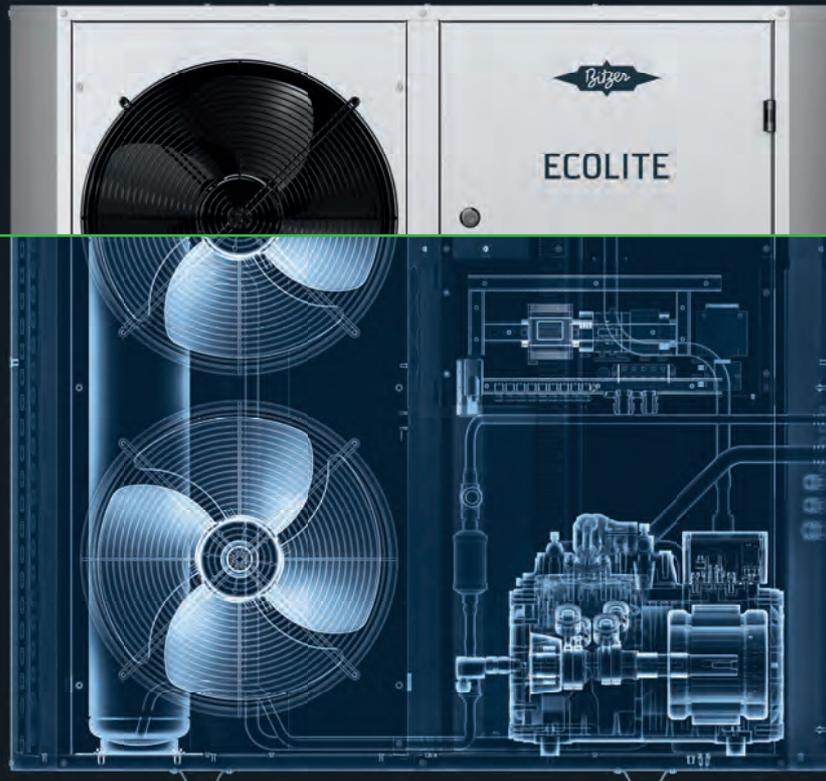
components. This makes it much easier and faster to find errors.

A new feature is the integration of the BDN in a large retail platform. The provider has developed the cloud specifically for the retail industry. The aim is to exploit the full potential of the Internet of Things in retail and avoid silo solutions. The provider is one of the leading providers of solutions around the Internet of Things.

BITZER customers will find valuable digital services such as online monitoring, compressor operation report and immediate help with troubleshooting in the BDN. The basis for this is the IT infrastructure, the know-how and the IQ products of BITZER. In combination with targeted data analysis, this results in a solution that is new on the market and makes it easier for BITZER customers and partners to set up their own digital service infrastructure. ■



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## USGBC's 2020 Green Apple Day of Service Awards

**T**oday, the Center for Green Schools at the US Green Building Council (USGBC) announced the recipients of its Green Apple Day of Service Awards, which recognises outstanding K-12 sustainability service-learning projects and leaders. This year's projects included the electrification of a school bus fleet in China, a convening of students in Qatar to discuss and propose environmental solutions, and a fashion show in Virginia featuring re-used and recycled materials. Awards were presented across three categories: depth of student and community transformation (Deep Impact); creativity in application (Creative Approach); and scale of community engagement (Broad Engagement). This year's three recipients are:

Net Impact ISB Living Labs | Bus Fleet Electrification (Beijing, China) – Deep Impact Project: Three students from the International School of Beijing's (ISB) Net Impact club explored the impacts of the school's diesel-powered bus fleet, conducting research and developing a case for cleaner emissions standards for school buses.

Garbage to Glam: Connecting the Dots (Virginia Beach, Virginia) – Creative Approach: Colonial High School's first 'Garbage to Glam' project challenged students to think about consumption, recycling, waste and reuse differently, given the recent shifts in how waste can be recycled in the US.

Qatar Eco-Schools Congress (Doha, Qatar) – Broad Engagement Project: Qatar Eco-Schools Congress 2019 is the first event in Doha to engage students from different schools to exchange ideas and experiences, promote sustainability and discuss lessons learned for future improvement. The Congress offered a platform for students to propose solutions for vital environmental issues that impact them, as well as a practical exercise packaging leftover waste for composting for a Zero Food Waste Event. ■

## Trane Technologies creates 100% HVACR focus

**U**S air conditioning and heating manufacturer Trane and transport refrigeration brand Thermo King are once again stand-alone businesses after separation from Ingersoll-Rand. Under a Reverse Morris Trust transaction with Gardner Denver Holdings, the Industrial segment of the former Ingersoll-Rand plc has been separated and combined with Gardner Denver. The Climate segment, with its Trane and Thermo King brands, now operates as Trane Technologies, and begins trading today on the New York Stock Exchange.

To commemorate this milestone, employees worldwide are engaging in local celebrations, and members of Trane Technologies' leadership team will ring the NYSE opening bell on March 17.

"Trane Technologies begins its journey today as a pure-play climate innovation company, partnering with our customers to address their sustainability challenges through heating, cooling and transport refrigeration solutions," said Michael W

Lamach, chairman and CEO of Trane Technologies.

"Today, 15 per cent of the world's carbon emissions come from heating and cooling buildings, and another 10 per cent comes from global food loss. And these numbers are growing," Lamach added. "We excel where these global megatrends intersect with our innovation and advanced technologies for reducing carbon emissions from buildings, minimising waste of food and other perishable goods, and generating productivity for our customers. By challenging what's possible for a more sustainable future, Trane Technologies will deliver differentiated performance and create value for our employees, customers and shareholders."

Trane Technologies says it has created a simpler organisational model and business segment structure "to enhance its regional go-to-market capabilities". This model, it says, is designed to create deep customer focus and relevance in markets around the world. ■

## Daikin launches research project 'Natural HVACR 4 Life'

**O**n 20th January 2020, Daikin officially launched the Natural HVACR 4 LIFE research project. Co-funded by the European Union's LIFE programme, the project is coordinated by Daikin Europe NV in partnership with Daikin Air Conditioning Germany GmbH and Daikin AC Spain. The project is embedded in the company-wide initiative to reduce carbon emissions to net zero by 2050, including the emissions generated throughout the life cycle of Daikin products.

The research project will demonstrate and evaluate 'Conveni-Pack', a combined refrigeration, comfort cooling and heating solution which is preassembled and easy to install. The unit recovers heat from the refrigeration display cabinets and evaporators and reuses it to heat other areas of the building at no extra cost. Current Conveni-Pack uses refrigerant R-410A, an HFC refrigerant that allows for high energy efficiency and a compact

design, ideally suited for locations with limited outdoor space.

Using a diverse range of refrigerants and continuously exploring ways to provide the best balance between refrigerant GWP, safety, energy efficiency, affordability and total environmental impact is an integral part of Daikin's refrigerant policy. Through the Life project, Daikin will demonstrate a Conveni-Pack which uses a non-HFC refrigerant, R744 (CO<sub>2</sub>), and research further mitigation options to ensure safety and enhance energy performance, typical challenges of using CO<sub>2</sub> as a refrigerant, especially in warm climates.

At the Daikin Europe Ostend plant in Belgium, the first prototype will be tested in a simulated convenience store, followed by the demonstration and monitoring of prototypes in actual supermarkets in Germany and Spain. The total project duration is expected to be 3 years. ■

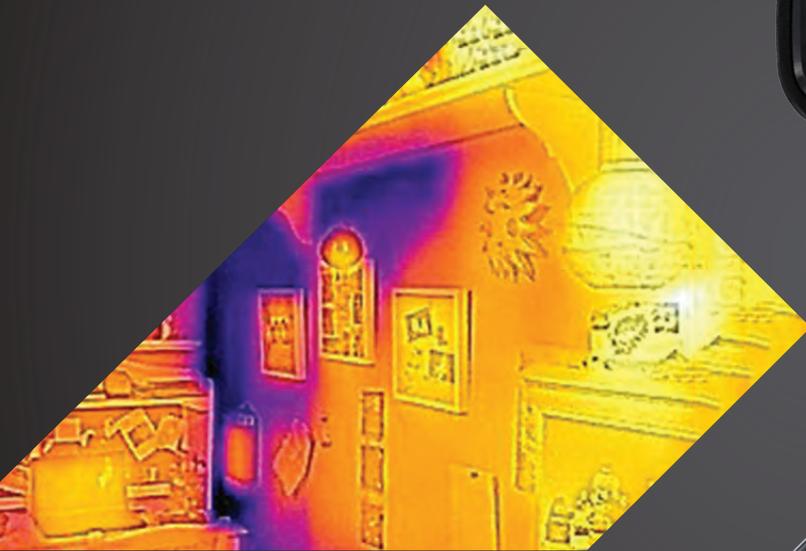


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## HANNOVER MESSE 2020

### postponed

**H**ANNOVER MESSE 2020 has been postponed to the week of 13 to 17 July. Deutsche Messe AG is, thus, responding to global developments related to the Coronavirus. Hannover Deutsche Messe made the decision to postpone HANNOVER MESSE 2020 to July 2020 in cooperation with the Hannover Region Health Authority, the HANNOVER MESSE Exhibitors' Council and the partner associations VDMA (German Engineering Federation) and ZVEI (German Electrical and Electronic Manufacturers' Association).

The Hannover Region Health Authority had strongly recommended that Deutsche Messe follow the advice of the Robert Koch Institute, which includes comprehensive measures to safeguard health when hosting major events. For instance, fever measuring stations at all entrances and not allowing people from risk areas or those who have had contact with people from risk areas to enter the exhibition center. This would have entailed a comprehensive evaluation of all trade fair participants – from exhibitors and visitors to service providers, exhibit builders and catering companies.

Deutsche Messe is unable to implement the proposed measures. In addition, their implementation would impair the staging of the event to such an extent that the event would not fulfil its purpose or would do so only with considerable restrictions for exhibitors and visitors.

Since the health of exhibitors, visitors, employees, and the public is the top priority for Deutsche Messe, the decision was made in consultation with HANNOVER MESSE's exhibitor advisory councils to switch to the July date.

"With the July date, we offer our exhibitors the earliest possible time slot to present their innovations to a global audience and to initiate business," says Dr Jochen Köckler, Chairman of the Board of Management of Deutsche Messe AG. ■

## USGBC expands its LEED for cities and communities program

**T**he US Green Building Council (USGBC) announced that Bank of America has provided an additional \$500,000 grant to the LEED for Cities and Communities program, which helps local governments pursue LEED certification and provides access to educational resources and technical support. This is Bank of America's third grant supporting the program. The new funding will assist 20 additional city and county recipients as they pursue LEED certification to address climate change, resilience and social equity challenges in their region.

"Local governments see the on-the-ground effects of a changing climate and how it impacts people, businesses and communities. They also understand that taking action can lead to a stronger economy and better quality of life for their residents," said Mahesh Ramanujam, president and CEO, USGBC. "More than 160 cities and communities around the world are participating in LEED for Cities

and Communities outside of the grant program and thanks to our partners at Bank of America, we are able to welcome even more into the LEED family. These cities and communities are committed to finding solutions that improve our living standard and are using LEED to ensure they are on a path of continuous improvement."

Cities and counties selected for the 2020 program represent more than 10 million Americans in urban and rural areas around the country. Since 2018, Bank of America has provided USD 1.25 million to this program, supporting a total of 41 US cities and communities to date as they pursue certification.

"USGBC is a leader in driving positive change through its LEED certification program, helping to create more sustainable solutions for cities, communities and businesses," said Alex Liftman, Global Environmental executive at Bank of America. ■

## Chemours inaugurates new world-class innovation centre

**C**hemours CC has inaugurated its new innovation centre, The Chemours Discovery Hub, on the University of Delaware's Science, Technology and Advanced Research (STAR) Campus.

The facility now houses more than 300 of the company's top researchers and scientists, consolidating most of the company's US innovation efforts into one location to maximise collaboration and efficiency. The Chemours Discovery Hub is 312,000 square feet, contains more than 130 individual laboratories and was built over the course of 24 months without a single lost-time safety incident.

At the Discovery Hub, Chemours will deepen its research partnership with the University of Delaware and perform experiments alongside professors and students to develop new applications for its products. Additionally, the company will use its facility to attract and recruit potential interns, co-ops and employees.



"It's about our company's investment in young minds who will be introduced to chemistry at the Discovery Hub, our continued investment in Delaware, and our investment in an innovation pipeline that will empower our customers," said Mark Vergnano, president and chief executive officer of Chemours. "When we broke ground on the Chemours Discovery Hub here on the STAR Campus two years ago, we expressed our shared vision of a state-of-the-art research partnership that would expand the boundaries of scientific knowledge, inspire the important work of our talented people, and fuel our economy for years to come," said UD President Dennis Assanis. ■

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## ISB Mohali inducted into the ACREX Hall of Fame 2020

ISB Mohali, Punjab has been recognised as the newest inductee to the ACREX Hall of Fame 2020 for their commitment to energy efficient and sustainable infrastructure. ACREX Hall of Fame, is an extremely prestigious and sought-after recognition jointly instituted by ISHRAE and Danfoss India in 2015 as an effort to recognise the best practices and to encourage innovation in technology, design and systems to promote the highest standards of energy efficient HVAC systems in commercial buildings. The announcement was made on the sidelines of the ACREX Expo. This year, the aim of this initiative was to encourage and promote sustainable technologies across all commercial buildings, ranging from universities to large corporate offices. The goal is to give impetus to all commercial buildings to push the envelope in innovative technologies to incorporate energy efficiency and sustainability through the length and breadth of their operations. The other top finalists for ACREX Hall of Fame 2020 were Adobe Systems, Noida; ITC Kohenu, Hyderabad and Vestas Wind Technology, Ahmedabad.

ISB Mohali, an IGBC Platinum-rated campus is spread across 70-acres, of which 14.6 acres has green cover. They have instituted several sustainability and energy efficient practices across their campus which includes a one-of-a-kind



Geothermal HVAC System with zero water discharge.

Sanjay Bajpai, Head, Department of Science and Technology, Gol, said, "Over the last five years, the government has been doubling its efforts to address the issue of climate change. There is however, greater need to accelerate the cycle of

innovation and the approaches to achieve this may be manifold. Public private partnerships are at the core of this. The industry should be on the driver's seat, with the unflinching support of the government, to lead the way forward."

Ravichandran Purushothaman, President, Danfoss India said, "Our cities are the main drivers of the world's economic output, but they are also massive consumers and account for 60-80 per cent of energy consumption and 75 per cent of carbon emissions. Cities need to set ambitious targets for energy efficiency to reach the goals of the Paris Agreement. Buildings today account for 40 per cent of the global energy use and half of a city's emissions, and instituting energy efficiency and sustainability in buildings can cut energy consumption by nearly 30-45 per cent. It is time that more buildings across all cities proactively invest in smart and energy efficient technologies. The ACREX Hall of Fame was instituted in this very spirit." ■

## Whirlpool recognised as 'SUPERBRAND 2019' for its refrigerators

Whirlpool of India, a subsidiary of Whirlpool Corporation has been recognised under 'Superbrands 2019-20', world's largest independent arbiter of branding, for their refrigerators. In a recent survey by Superbrands Council, Whirlpool emerged as a winner in both these categories after a rigorous assessment by the consumers and industry professionals.

Carving a way for Whirlpool in its journey to be a Superbrand, the company recently also announced the expansion of its Pune plant facility for its refrigeration line. Whirlpool has made an investment of Rs 450 crore in India over the past three years of which was further leveraged to increase the production capacity. The Pune plant boasts of a production capacity of 900K per annum. Spread over 1.75 lakh square feet, the unique column less facility, follows Whirlpool's global manufacturing standards powered by advanced robotics. Whirlpool manufacturers 90 per cent of its India product line-up across its three state-of-the-art

manufacturing plants in Faridabad, Pune and Pondicherry. The Faridabad plant is the biggest and oldest factory which manufactures single door and direct cool refrigerators while the Pondicherry plant manufactures semi-automatic and fully automatic washing machines.

K G Singh, Vice President, Marketing, Whirlpool of India, said, "Whirlpool is honoured to be a part of Superbrands 2019. We take immense pride to be chosen as a Superbrand as it validates the strength of our products and our commitment towards the consumers. Our refrigerators and washing machines are our crowning glory and the most sought-after products of our portfolio. At Whirlpool, we are always consistent in developing innovative technologies that benefit our consumers. Our new plant at Pune, stands testimony to Whirlpool's strong commitment to its people, stakeholders, consumers and the nation. We have grand plans for 2020 and the award further strengthens our resolution to upgrade our products and improve our services." ■



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# HVAC System Market worth \$277 bn by 2025

Growing construction activities are driving the demand for HVAC systems to remove pollutants, maintain air quality, and control the temperature and humidity in buildings.



According to a Marketsandmarkets report, global Heating, ventilation, and air conditioning (HVAC) system market is projected to reach USD 277 billion by 2025 from USD 202 billion in 2020, at a CAGR of 6.5 per cent during the forecast period.

HVAC is a mechanical system that provides thermal comfort and improves air quality in an enclosed space. A complete system controls air temperature and humidity, allows fresh air intake, and maintains the quality of air in residential, commercial, or industrial buildings. Heating equipment is an important part of HVAC systems. These types of equipment are used to heat buildings to a particular temperature. The ventilation process removes the unpleasant smell and excessive moisture from the air in an indoor space and introduces fresh air. Cooling systems are used to lower the temperature and enable the proper distribution of air and the control of humidification in a space.

The heating equipment market is expected to grow at the highest CAGR during the forecast period. Heating equipment is an important part of HVAC systems. These types of equipment are used to heat buildings to a particular temperature. The rapid climate changes and increasing need for renewable energy sources, along with the extensive government support in the form of subsidies and other monetary benefits, have increased the demand for heating equipment globally.

## ***New constructions to hold the largest share of the global HVAC system market from 2020 to 2025***

The governments of various countries are making heavy investments in infrastructure development, such as expansion projects of hotels, retail stores, airports, and educational buildings. Growing construction activities are driving the demand for HVAC systems to remove pollutants, maintain air quality, and control the temperature and humidity in buildings. Moreover, government regulations for smart homes and incentives for the installation of the energy-efficient HVAC system in new construction projects are expected to propel the market growth.

## ***APAC to be fastest-growing market for HVAC system during the forecast period***

The HVAC system market in APAC is expected to grow at the highest CAGR during 2020–2025. The growing construction activities and rising population are some of the factors boosting the growth of HVAC systems in the region. There is a considerable demand for smart homes in countries such as Japan, South Korea, and China. The rapid urbanization and industrialization are increasing demand for HVAC systems in the region.

Major players involved in the global HVAC system market include Daikin (Japan), Ingersoll Rand (Ireland), Johnson Controls (US), LG Electronics (South Korea), United Technologies (US), Electrolux (Sweden), Emerson (US), Honeywell (US), Lennox (US), Mitsubishi Electric (Japan), Nortek (US), and Samsung Electronics (Korea). ■

### Frans Van Neikerk appointed as Managing Director of Atlas Copco India

**A**tlas Copco India has appointed Frans Van Neikerk as the new Managing Director and Vice President India Holding, effective January 2020. He will be responsible for the company's operations in India and Bangladesh.

Frans van Niekerk, a South African citizen, has more than 20 years of experience within the Atlas Copco Group, most recently as Vice President of Southern Africa Holding. Before that he has held a variety of business control functions for the Mining and Rock Excavation Technique business area in South Africa, as well as in Southeast Asia, Chile and Sweden.

"With his long and international experience, he is very suitable to contribute to our presence and development in the



Frans Van Neikerk

important Indian market," said Hans Ola Meyer, Senior Vice President Controlling and Finance and CFO. Frans' education includes studies in accounting and economics from Lyceum correspondence college in South Africa. He succeeds Giovanni Valent who is retiring after 25 years in the Atlas Group.

Frans said, "I am delighted to be appointed as Managing Director for Atlas Copco India and look forward to working with the team to grow the India market even further. We will continue serving our impressive portfolio of clients with the robust approach that Atlas Copco is known for, assuring a seamless delivery of our services." ■

### A P Moller - Maersk appoints Patrick Jany as new Chief Financial Officer

**P**atrick Jany who is a German citizen comes from a successful career within finance and business process optimization as CFO and member of the Executive Committee of Clariant AG, Switzerland. He will assume responsibility as CFO of A P Moller - Maersk from 1st of May 2020.

"I am pleased to welcome Patrick Jany to A P Moller - Maersk where he will play a key role in the acceleration of our strategic transformation. Patrick brings solid financial experience and a proven record of managing cost discipline as well as profitable growth through M&A and innovation. I look forward to our cooperation," says Søren Skou, CEO, A P Moller - Maersk.



Patrick Jany

"I am excited to join A P Moller - Maersk," Patrick Jany says and continues: "Not only is A P Moller - Maersk a global leader in shipping, ports and logistics, it is also a company which builds on a strong foundation while leading the transformation of an entire industry through digital innovation and continuous optimisation. The values, customer focus and high ambition level of the company are absolutely thrilling, and I am looking forward to joining the team."

Prior to his role as CFO, Patrick Jany held several leadership positions within finance, general management and corporate development in Clariant in Germany, Mexico, Singapore, Indonesia and Spain. ■

### Greg Alcorn proposed for Beijer Ref Board

**B**eijer Ref seeks to re-elect its current board of directors at its upcoming AGM, minus Chris Nelson, recently appointed President of Carrier's global HVAC products and services business. Representing Beijer Ref's largest shareholder, Gregory Alcorn, Carrier's Vice President of global partnerships, has been proposed as his replacement.



Greg Alcorn

The Beijer Ref election committee proposes the re-election of Bernt Ingman, Joen Magnusson, Peter Jessen Jürgensen, Monica Gimre, Frida Norrbom Sams and William Striebe. Alcorn has been chosen for his broad industry experience within HVAC and experience of sales and leadership. He has been with Carrier's parent company UTC for 25 years, and with Carrier for the last 19 years. ■



# HOW TO IMPROVE HVAC EFFICIENCY

The industry stalwarts suggest measures for enhancing efficiency of an HVAC system.

- *Supriya A Oundhakar,*  
*Associate Editor*

According to a market report research, the Indian HVAC market is expected to reach USD 5.9 billion by 2024, progressing at a CAGR of 7 per cent during the forecast period (2019-2024) against the backdrop of surging infrastructure spending in India.

One of the key trends in the Indian HVAC market is the adoption of energy-efficient HVAC systems. As a result, energy efficiency in HVAC has gained prominence as it enables 40-50 per cent of energy reduction in energy consumption in any building or infrastructure be it commercial or residential. So, it is essential that an HVAC system operates as efficiently as possible in order to reduce the carbon footprint and depletion of natural resources. This reduces the greenhouse gas emission by lowering the overall demand for electricity. While relating efficiency of HVACR systems with its performance, Vimal Chavda, Manager – HVACR, Testo India says, “An efficient system means improved Indoor Air Quality (IAQ), environmental comfort and optimised power utilisation.”



A more efficient HVAC system will use less electricity to cool a house or building, and will also use less electricity to generate heat.

**Daniel Chen, CAREL - APAC Marketing Manager (HVAC)**

“A more efficient HVAC system will use less electricity to cool a house or building, and will also use less electricity to generate heat. Less power consumption means less operating costs and better environmental protection,” informs Daniel Chen, CAREL - APAC Marketing Manager (HVAC).

### Enhancing Efficiency

It is pertinent to reduce energy consumption and increase energy efficiency of an HVAC system while delivering a comfortable environment. Efficiency of an HVAC system significantly depends on its installation, maintenance and finally use of the system.

Chavda says, “The installation of HVAC system is very precise so that air and temperature regulation in the building is uniform and of the highest degree.” While talking about maintenance, he elaborates, “Maintenance includes regular inspections of the appliances along with the auxiliary equipment such as ducts and air filters. Proper cleaning, energy audits and replacement of non-performing components becomes a mandatory process. Thermal inspections can also be carried out to ensure proper insulation and avoid leakages in the buildings.”

The utilisation of HVAC systems becomes vital in maintaining the efficiency, and promotes the building managers need to take proactive measures in order to decrease the energy consumption. Any office building lacking proper ventilation and

temperature regulation systems can lead to decreased fresh air levels. Further, excess number of people working in the office results in excess CO<sub>2</sub> which can be a factor of air contamination, humidity and moisture levels along with the presence of dust particles in the surrounding that can degrade the air quality in the office premises. All these factors can consequently lead to overloading and over usage of the HVAC systems which can upset the overall efficiency. “There is a need to have efficient Building Management System (BMS) and responsible usage of the systems,” states Chavda. Installation of smart control software can bring efficiency in BMS, thus, leading to optimum operating conditions for the entire HVAC system.

Elaborating on this, Chen informs, “A smart controller can manage the speed, capacity or running time of HVAC system components such as fans, coolers or compressor motors and can also control the entire system according to the specific situation, so as to deliver the appropriate amount of heating or cooling.” He further adds that accurate and reliable measurements enable efficient HVAC operation. When troubleshooting more complex HVAC applications, it is useful to have sophisticated electronic control and protection systems that can interpret alerts and provide diagnostic information.

Optimal selection of the system helps to enhance energy efficiency of an HVAC

system as with the proper selection the user can control heating or cooling requirements as per his or her needs that helps to reduce overall energy consumption. Emphasising on selection of the system for elevating efficiency, Chen says, “Select the HVAC unit that is right for the system based on the temperature needed throughout the year. Make sure that the system/unit works at its optimal operating point.”

Energy consumption of the HVAC system also depends on the cooling load that can be reduced by insulating the cooled space and minimising use of appliances and lighting. These can help to reduce the cooling load.

### Energy Efficiency Ratio

According to Chavda from Testo India, a simple method of analysing the energy efficiency is called as Energy Efficiency Ratio (EER) which is the ratio of cooling output divided by electricity usage in kilowatt hours. The higher the number, the more HVAC energy efficiency it has.

Chen further lists out the following methods used to measure system efficiency.

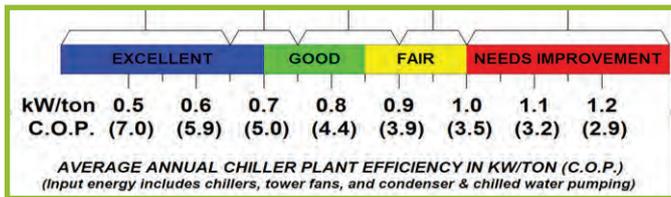
**Coefficient of Performance (COP):** It refers to the ratio of useful heating or cooling provided to the work required. A higher COP means lower operating costs.

**Energy Efficiency Ratio (EER):** It is the ratio of output cooling energy in BTU/hr to

Typically, the efficiency level achievable in a chilled water plant room that uses high efficiency chillers with a conventional system design is close to 0.60 KW/TR for mild weather and 0.65KW/TR for a tropical coastal climate.

**Seemant Sharma, Director, Product and Distribution, Chillers, Asia at Johnson Controls**





input power in watts at a given operating point. COP is a more general measure of efficiency, and is unit-less, while EER has a unit of measure (BTU/kWh).

**Seasonal Energy Efficiency Ratio (SEER):** It is also the COP (or EER) expressed in BTU/hr/W, but it is not evaluated in a single operating condition, rather it represents the expected overall performance based on the weather in a typical year at a given location.

### Green Refrigerants

Moreover, use of eco-friendly refrigerants also play a key role in reduction of energy consumption in HVAC system in buildings. The choice of the refrigerant has a direct impact on depletion of ozone and also on global warming. Hence, it is imperative to use eco-friendly refrigerants such as R-134a which has zero ozone depletion potential and lower global warming potential. Chen from CAREL suggests, "Effects of traditional refrigerants on the environment and their banning in some geographical areas have made it fundamental for CAREL to use natural refrigerants with a low environmental impact, such as propane (R290), carbon dioxide (R744) and ammonia (R717), at times in tandem with variable-speed compressor technologies."

### Advancements in Technology

Advancements in HVAC technology like introduction of DC technology and VSD (Variable Speed Drives) has brought a tectonic shift in the HVAC market. VSD technology can be implemented in fans, electric motors and other components to elevate energy efficiency in the buildings. "To use the example of variable-speed compressors as these do not always operate at maximum rated capacity, their energy consumption is considerably lower. Technological progress makes it possible to improve efficiency and reduce waste. Variable-speed units can operate at different capacities according to the required load, while a fixed-speed compressor can only be on or off. That makes variable-speed air conditioners more economical to run," suggests Chen from CAREL.

### Chiller Plant Energy Performance

Johnson Controls drives innovation and employs the latest

technology and design to enhance HVAC system efficiency. These innovations include a variable speed drive in all the moving components of a plant room. "Coupled with advanced control strategies, this has greatly improved plant room efficiency," observes Seemant Sharma, Director, Product and Distribution, Chillers, Asia at Johnson Controls.

Elaborating on chiller efficiency, Sharma explains, "Typically, the efficiency level achievable in a chilled water plant room that uses high efficiency chillers with a conventional system design is close to 0.60 KW/TR for mild weather and 0.65KW/TR for a tropical coastal climate." He further adds that to drive efficiency, designers have traditionally focused on using more and more efficient chillers, pumps, and cooling towers. But with rising energy costs and increasingly demanding Minimum Energy Performance (MEP) and green building standards, we need to look at more unconventional ways of achieving a breakthrough in efficiency levels.

A chilled water plant's energy consumption depends on the work done by the compressor and pump. Sharma states that reducing work done reduces energy consumption. For a building in a tropical climate, with little or no respite from high wet bulb temperature, a plant room efficiency level of 0.55KW/TR seems out of reach because an efficient chiller alone would consume more power than that. He adds, "But we can go back to the basics and look at the building load. Building load has two components: sensible and latent load. We can reduce power consumption substantially with higher chilled water temperature to address the sensible load and lower chilled water temperature to address the latent load."

To further optimise efficiency, Sharma suggests the following measures:

- Ensure a higher delta T in the chilled water system to reduce pump energy consumption
- Arrange the chillers in series counter system to reduce compressor head
- Select a cooling tower with the lowest possible approach

Using this strategy, Johnson Controls achieved 0.53KW/TR plant room efficiency at a site in Singapore, exceeding the Green-Mark Platinum requirement. The site consistently consumes 15 per cent less energy than other green buildings and 30 per cent less than a good plant room in a tropical climate.

### Initiatives taken by the industry

Testo is one of the market leaders in testing and measuring instruments providing a wide range of instruments that assist in

An efficient system means improved Indoor Air Quality (IAQ), environmental comfort and optimised power utilisation.

Vimal Chavda, Manager – HVACR, Testo India



maintaining efficient system in the building and also ensure the desired IAQ level. Testo primarily provides measuring instruments for all HVACR applications.

Vimal Chavda says, "The testo 160 wireless LAN data logger measures, monitors and documents temperature, humidity, light intensity, UV radiation and CO2 concentration in rooms, offices and malls – automatically and without interruption – hence all indoor climate monitoring parameters are covered in one."

Testo in its recent upgrade, combines everything that makes the air velocity and IAQ measurement technology successful – intuitive operation, precise measurement values and an extensive probe range which can even work wirelessly via Bluetooth. The new testo 440 and testo 400 constitute of a compact handheld measuring instrument with user-friendly measurement menus and wireless probes – for the versatile and convenient measurement of all air conditioning and ventilation parameters. The probes are available for air velocity, temperature, humidity, degree of turbulence, CO2, CO and light intensity.

Daniel Chen from CAREL informs, "CAREL pays close attention to the source of power. The transition from traditional gas or fossil fuel heating systems to electric pump solutions will allow for better use of renewable sources." He adds that the main new designs and innovations in HVACR technologies in recent years have led to:

- Optimisation of refrigeration systems and circuits,
- Introduction of variable-speed compressors using BLDC technology, facilitating greater efficiency in applications such as heat pumps,
- Specific devices for CO2 refrigerant applications, making the systems more efficient and extending the use of these applications to warmer geographical areas.

The ongoing development of these activities has also allowed CAREL to maintain its competitive in the global market for the introduction of new technologies in the HVAC sector.

In the humidification sector, CAREL focuses on adiabatic humidification, which allows the production of humidity using less energy compared to isothermal humidification. One related application is evaporative cooling, with more efficient temperature control, especially in air handling applications.

The new IoT division has allowed CAREL to concentrate on solutions that allow more advanced system optimisation solutions, along with the traditional monitoring of systems and alarm management. System operating data provides energy managers with additional information about system output. It also allows the assessment of any drops in performance, essential for implementing scheduled maintenance programs. ■



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# ESTIMATING GROWTH: FM AND BUILDING AUTOMATION



Industry representatives assess the Facilities Management (FM) and the Building Automation sector in India, while also discussing market worth and growth trajectory

- By Ranjana Konatt, Editor - (Brand Positioning)

India is an emerging and complex market in terms of real estate, and the sector can be further accelerated by the progress of Facilities Management (FM) and Building Automation. Abhilekh Verma, Senior Business Development Executive, Ideabytes Software India, says: “The FM and Building Automation sector contributes to nearly 3.2 per cent of the GDP. It is worth INR 5 lakh crore and the annual growth rate can be estimated to 20-25 per cent CAGR annually.” On the other hand, Prabhu Ramachandran, Founder and CEO, Facilio, estimates the FM market in India to be valued between INR 50,000 to 55,000 crore, and he says that the Building Automation segment is witnessing a 12 per cent growth by the year 2024. Ramachandran asserts that there is a global consensus forming regarding the convergence of

profitability, sustainability and delightful occupant experiences. He says: “Building owners and managers are realising that adopting the system-wide centralisation and control that digital solutions deliver can make their business models far more competitive. The industry has witnessed an annual growth rate of 15 per cent to 18 per cent and is expected to grow at a compound annual growth rate (CAGR) of 20 per cent to 25 per cent.”

## Growth and drivers within an evolving industry

However, even though industry representatives suggest the market is steady, the sheer scale of urbanisation underway will demand both energy and resource inputs that create a fiscal drain, unless buildings are optimally efficient.

Ramachandran adds: “As the India FM and Building Automation sector responds to challenges, data-driven and digitally optimised operations are being recognised as the effective solutions to address concerns.” He believes that an expansion in building stock and urban regeneration is expected in the next two decades within the Indian market. “FM solutions play a major role. On the other hand, for existing infrastructures to retain relevance in a changing market, upgrades and retrofits that modern FM delivers can add value,” he said. The steady increase in demand for FM services in the Indian market can help speed up the process in the next few years will lead to growth in the future.

## Applications and use

To cite an example of how IoT is leveraged



**FM and building automation industry can progress with the quick inclusion of technology and its know-how with vendors who have advanced technology.**

**Abhilekh Verma,  
Senior Business Development  
Executive, Ideabytes Software  
India**

across industries for the sake of automation, Verma says: “We are into the Internet of Things (IoT), where we cater to multiple industries that look for temperature and energy monitoring solutions. Our solutions are to help a customer reduce food wastage. Predictive maintenance also helps in HVACR, where if efficiently carried out, it can help equipment survive for a long period of time.” With the right mix of hardware sensors and software, we can take care of end-to-end automation inclusive of hardware procurement from vendors who help assemble things in our dedicated IoT labs, adds Verma. Ramachandran also highlights the scope of application by Facilio. He says: “Facilio offers a Data-driven Operations and Maintenance software platform that delivers portfolio-scale real-estate optimisation.” The platform offers applications that optimise workforce, energy and sustainability management.” The focus on R&D has always been our strength and we enhance our technology to leverage the data available in existing building systems more effectively to achieve predictive

building management in optimal operations.

### **Challenges with retrofit and customisations**

Sighting a few challenges, Verma says: “There are a lot of challenges when it comes to retrofit and customisations in FM & Building Automation. While Machine to Machine (M2M) or IoT makes sure that there is minimal use of humans, enabling downtime to be reduced to zero, logically speaking at present, we don’t depend on machines more for automation, we still prefer doing things manually.” Also, he says that other important issues include understanding the fact that machines don’t monitor human activities, rather it helps in making better decisions, so machines are not meant for checking the accuracy, rather it eliminates issues and works on making better authentic decisions in a minimum period. On the other hand, Ramachandran says: “The sheer volume of existing building stock in the Indian market will naturally need a retrofitted solution for it to be upgraded to achieve ‘smart’ performance. While the options were once limited to cost-prohibitive hardware retrofits, the arrival of digital retrofitting has enabled system enhancement at much more affordable cost, while also achieving unprecedented efficiencies and outcomes.” Downtime, he adds, is certainly one aspect of inefficiency that negatively impacts all stakeholders, from building owners to occupants. However, the benefits extend to the complete reimagining of the efficiencies that can be achieved in operations, even when all assets are ostensibly online and functional.

### **Food for thought**

Verma suggests that the FM and building automation industry can progress with the quick inclusion of technology and its know-how with vendors who have advanced technology. Having trained & qualified technical teams to help industry adapt to global engineering standards & best prices also contributes to the scope of things. Ramachandran says: “Trends

in the commercial real estate industry, whether in India or other major markets also have a heavy tech bias currently, with PropTech leading the charge in innovation as well as entrepreneurship.” He adds that the real opportunity is to deliver on outstanding services while optimising profitability and also ensuring that operations are sustainable. He says: “In the past, these priorities were often at loggerheads, competing for the attention of decision-makers, who were then forced to strategize around some of these priorities, while trying their best to not let the rest suffer too much.” The latest generation of digital technologies is enabling the entire array of outcomes to be addressed and at the same time, this is the reason why they emerge as the solution of choice. “Within the Indian context, the massive scale of urbanization, as well as urban regeneration, makes the tech and data-driven approach the ideal solution. The larger, more complex and diversified, the market in which these solutions are being deployed, the greater the benefits on offer,” he says. ■



**The real opportunity is to deliver on outstanding services while optimising profitability and also ensuring that operations are sustainable.**

**Prabhu Ramachandran,  
Founder and CEO,  
Facilio**

# INDIA IS WELL-POSITIONED TO CONDUCT A TECHNOLOGICAL LEAP TO DISTRICT COOLING: **THERMAFROST**



While providing an in-depth assessment of the District Energy market in India and abroad, **Steve Donaldson**, President and CEO, Thermalfrost Intl. speaks to **Ranjana Konatt**, Editor (Brand Positioning), on the scope for growth, bottlenecks, the role of schemes, and the many opportunities to invest in India

**Tell us about Thermalfrost, the company's contribution to the District Cooling space; What are the shifts in terms of the solutions being offered by the company, how are the solutions likely to shape the market in India?**

District Cooling solutions are popular in Canada and North America as we see an increasing demand for efficiency and sustainability. However, District Cooling solutions have markedly more opportunity for growth in a country like India, and this can be due to several factors. First, India has not invested substantive resources on interconnecting grid infrastructures between major cities, rural towns and smaller communities (as we have in Canada). This means that India is well-positioned to conduct a technological leap to District Cooling, as they do not need to rely on existing (and expensive) interconnecting grid infrastructure as we do in Canada. This phenomenon is similar to cell phones in developing countries in Asia. Rather than investing substantive resources in telecommunications infrastructure, many countries were able to transition directly to wireless solutions. In this respect, India is a huge market opportunity for adopting District Cooling solutions in the near term. As

such, Thermalfrost District Cooling technology is well-suited for immediate adoption throughout India as we enter the market in 2020.

**Elaborate on the importance of government policy and regulation within the scope of District Cooling?**

Private industry is naturally guided by public policy. Activities in the private sector can be qualitatively enabled by sound public policy. Canadian public institutions and policy makers have been key enablers for private sector companies offering District Cooling solutions, as Canada strives to adopt reduced Greenhouse Gas Emissions standards as delineated in the Paris Agreement 2016. The important work on climate change and the resultant technological changes must be shared by both public and private stakeholders. Public policy must set the conditions within which private industry can offer technological solutions, and private industry must conduct the research and development necessary to generate and commercialize those technological solutions. It is a shared responsibility, which is working very well in Canada. Based on our analysis and in-country

engagement in India over the last several years, India is indeed well-positioned to rapidly adopt emergent technological solutions offering District Cooling. It is incumbent on private entities such as Thermalfrost to continue to directly engage India government policy makers to ensure they are informed of the latest technological solutions that are available on the market. This is a symbiotic relationship in India between companies like Thermalfrost and India policy makers, and a relationship that is working very well. Thermalfrost has established and will continue to nurture our relationships within the Government of India, both at the Federal and State levels.

**Talk about absorption chiller technology by Thermalfrost, the aspect of it using zero green-house gas in the compressors you operate; Elaborate on the refrigerant being used...**

The primary difference between conventional chillers and absorption chillers is that conventional chillers are electro-mechanical (and use large amounts of grid electricity) whereas absorption chillers use a chemical process and require only a nominal amount of electricity (for a circulation pump). As such, conventional chillers produce harmful greenhouse gases (GHGs) whereas absorption chillers such as the chillers offered by Thermalfrost produce zero GHG emissions. Further, as Thermalfrost chillers do not require large amounts of electricity that conventional chillers require, the operating cost of a Thermalfrost chiller is 1/10th that of a conventional chiller. The savings in electricity are substantial – as is the reduction in GHGs. The refrigerant used by absorption chillers (including Thermalfrost) is ammonia. Ammonia is rapidly replacing existing chemicals used in conventional chillers (R22 for example) which emit GHGs and are very harmful for the environment. India is set to drive the global ammonia industry growth from planned and announced plants between 2019 and 2030, contributing around 20% of the total ammonia capacity additions in the world. In effect, ammonia is a safer alternative to existing refrigerants used in India, and further has the benefit of emitting zero GHGs.

**Do you foresee India as a market wherein District Cooling could be effectively used in the future? Even though it is not a need per-say, what are the corresponding adjustments that will have to be made to the technology you offer to suit the climate and other environmental conditions.**

India presents opportunities for District Cooling applications. India has not invested heavily in electrical grid infrastructure

compared to other countries, which presents India an advantage as they adopt District Cooling applications. This is because India does not have to incorporate future cooling applications to an existing, expensive grid infrastructure – in effect, India can choose to adopt District Cooling applications here and when it wants throughout the country. India has flexibility during this process. Further, the Government of India is very progressive and a fast adopter of new technologies and innovative solutions. Finally, India is actively seeking out cooling solutions further and further away from city centres (in district applications). One such district application is Thermal Energy Storage (TES) which can be in the form of ice. TES can be used for many applications, including residential cooling, manufacturing cooling as cold chain storage for agriculture, food, and pharmaceuticals. In essence, India has a verified need for district cooling solutions, and Thermalfrost is excited to fulfil some of this requirement with our district cooling applications. As is normal with any new market, Thermalfrost technology will need to be adapted to the India marketplace. This is why we rely on our channel partners – specifically India-based system integrators to provide the technical expertise to customise Thermalfrost chillers to the specific market demands and requirements of India consumers.

**In terms of installation capacity, the design of conventional mechanical cooling systems, does district cooling demand more in terms of urban planning? How crucial is stakeholder engagement, especially among the public and private sector, developers, consultants, contractors and technology providers to ensure efficient plant design and operations that are in place?**

Conventional electro-mechanical (compressor) cooling systems require large amounts of grid electricity to operate. As such, conventional mechanical cooling systems need to be planned around access to the electrical grid. They also emit GHGs, are noisy during operation, and contribute to climate change. As you can imagine, the installation of a conventional mechanical cooling system in district cooling requires stakeholder engagement and approval, both from the public and private sector. In contrast, Thermalfrost absorption chillers require very little electricity to operate (only enough electricity for a small circulation pump). The operating expenses of Thermalfrost chillers is 1/10th that of conventional chillers, as we require only a fraction of the electricity. As such, Thermalfrost chillers can easily be installed off the grid, and do not need to be planned around grid access. Of course, any district cooling application requires some level of stakeholder engagement, however as

Thermalfrost chillers do not emit any GHGs, are very quiet during operation, and do not contribute to climate change. Our applications are much more readily accepted into urban planning designs.

**Talk to us on the projects you are involved within India; what are the environmental stressors, the nature of challenges that have presented itself, and how have you dealt with it?**

Thermalfrost has several planned demonstrations in India in 2020. These demonstration sites will address various sectors, including District Cooling, Agriculture and the Food Cold Chain. Waste heat sources of these demonstration sites will include biomass, solar and boiler waste heat applications. The primary environmental stressor in India is the hot climate that is experienced nearly year-round. Establishing and maintain a cold chain for fruits and vegetables, for example, requires detailed preparation and planning and the Thermalfrost technical solution is only one part of the equation. As such, Thermalfrost is teaming up with several channel partners in India, including system integrators, market representatives, distributors, dealers and consultants. Another key stakeholder for Thermalfrost is the Government of India. India government policies and programs for the cold chain are key enablers for companies like Thermalfrost, and we will continue to foster close relationships with federal and state representatives.

**What makes the District Energy schemes in Denmark so successful? Could you elaborate on the structure and mechanism that paved the way for their high penetration?**

The success story of district energy in Denmark is the result of several factors. The first, overarching factor is a unified goal to move to cleaner energy solutions and a reduction on the reliance on fossil fuels. This future vision is shared between the public and private sector, and in the shared values of the Denmark population. Commonality of a future vision is critical in order to change our energy behaviour. Next, Denmark made substantial investments in District Energy infrastructure – this work began as far back as 1979 when Denmark adopted its first Heat Supply Act. The lesson for us here is that reduced reliance on fossil fuels and a shift towards cleaner energy takes time, and the collective will of all sectors of the country. Rapid adoption of District Energy (heating and cooling) leads to more efficient energy production, and savings can be reinvested into other sectors of the economy, including health care and education. The benefits of District Energy are not solely financial, but they can have a meaningful

impact of other important sectors of society. Denmark is an excellent example of this innovation.

**Broadly speaking, are you satisfied with the compliance of signatories on the reduction of HFCs specified in the Kigali Amendment to the Montreal Protocol, especially in light of many countries have set their respective national targets? Where would you say there is more room for improvement?**

The Kigali Amendment to the Montreal Protocol is a powerful addition to the Montreal Protocol, with a goal to achieve over 80% reduction in HFC consumption by 2047. The impact of the amendment will avoid up to 0.5 °C increase in global temperature by the end of the century. The compliance of signatories is yet to be fully witnessed however, as the Kigali Amendment only came into effect on January 1st, 2019. Until we achieve zero GHG emissions, and all countries both sign on to, and adhere to the Montreal Protocol, there is of course always room for improvement. However, the Kigali Amendment and the Montreal Protocol overall are indeed positive steps that signatories have adopted in moving towards reducing GHGs and combatting climate change.

**What, if any, do you foresee as the main bottleneck concerning the penetration of District Energy? Could you comment on the work being done on thermal storage? How do you view its progress?**

Barriers to adoption of District Energy generally depend on which country is being discussed. The barrier to District Energy in many developed countries is the existence of an extensive electrical grid. These countries (such as Canada) have invested millions of dollars in an electrical grid, and thus are under internal pressure to continue to utilize the grid, rather than to adopt District Energy applications that do not require a grid. The most prevalent barrier to District Energy in countries that do not have grid infrastructure is a lack of technology available to provide District Energy affordably. These countries are looking for small, efficient, clean District Energy technology that can be rapidly established and entails minimal operating costs. This is the space where Thermalfrost technology comes to the fore. Another application of Thermalfrost chillers is Thermal Energy Storage (TES) – where Thermalfrost chillers can make ice from waste heat sources, the ice can be stored, and then the cooling from the ice (TES) can be consumed by the end-user during peak electricity cost hours. Rather than relying on expensive electrical energy for cooling, TES customers can use ice to provide District Cooling. District Energy, District Cooling and TES have huge potential in India. Thermalfrost will be installing demonstration projects in these three areas in 2020. ■

## New Room Sensors from BELIMO

**B**elimo Group, a global manufacturer of innovative actuator, valve and sensor solutions for HVAC, has unveiled room sensors and room operating units to complement the existing sensor range. Their simple, clear aesthetics are ideal for installation in visible areas, featuring an elegant design and shallow depth that perfectly blends with the surroundings.

### Timeless Design

Belimo strives to offer products of the highest quality and reliability standards, while still offering a user-friendly design. That's why Belimo room sensors have the slimmest profile of any active sensor on the market – even the multi-parameter temperature, humidity and CO2 sensor has a depth of just 22 mm– while still providing reliable operation. This simple, unobtrusive design ensures they fit seamlessly into any room, for ultimate room comfort without compromise.



### Ease of Installation

Belimo room sensors and room operating units have been designed to be easily installed by avoiding mounting and wiring errors. They combine innovative technology with simple installation for trouble-free long-term operation. The sensors feature removable spring-loaded terminal blocks with push-in terminals enabling simple, time-saving and secure connections. The versatile mounting plate fits all commonly used wall boxes around the world.

### Fast Commissioning and Troubleshooting

Commissioning and troubleshooting are further simplified by the Belimo Assistant App, which uses Near Field Communication (NFC) to enable straightforward setting of critical parameters via a smartphone. It has been developed to put the settings and operating data for all our active Belimo room devices at your fingertips. Using your smartphone's NFC function, it provides wireless, efficient configuration, control and on-site operation of room sensors, even if the sensor is not connected to a power supply. ■

For more information, write at [info.india@belimo.ch](mailto:info.india@belimo.ch)



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## Careers in HVAC INDUSTRY

The article states that with advancement in technology and the changing face of HVAC industry, apart from students of mechanical engineering, other streams students are exploring the potential in HVAC industry.

**W**e all need a good environment around us to make us comfortable, effective, more productive etc. Just 100 – 150 years ago, workplaces were simple structures, with maybe 3 – 4 stories at the maximum and the management of the environment within the spaces was easy – if it was hot, have people use manual fans and if it was too cold, put on a fire. With the advent of the elevator in a 5-story departmental store in New York in 1857, everything changed and now workspaces could be built not horizontally but vertically as well. This is where the modern skyscrapers originated, and workspaces have never been the same ever since.

Occurs, one could not put a fire inside a room in a 20-story building to heat the workspace, nor

could the windows be opinioned at that height. This is where the HVAC industry came in and solved a very critical problem – how to keep the workspaces in these high-rise buildings comfortable for the occupants to work safely and effectively in. Thus, the growth of the modern workspaces has gone hand in hand, or one may even say has been due to the advancements in the HVAC sector. It would thus not be out of place to say that HVAC is an important industry or sector in our modern world and there are correspondingly many opportunities for people to make careers in this sector. This article gives an overview of the various career options that students entering the workforce have in this industry.

### **What is the HVAC Industry?**

Almost every sector of the economy needs HVAC

– process industries, manufacturing, automobiles, the building sector, hospitality, hospitals – the list is endless. Air conditioning is essentially about providing air at the right temperature and humidity and flow rate for a requirement. There are many ways to provide the desired air qualities – it could be natural ventilation, or it could be by use of air conditioners like we have at our homes. Refrigeration is another branch of HVAC and this industry is as large as the air conditioning sector itself covering cold storage facilities, process refrigeration, food storage systems etc.

The HVAC industry is a large industry too – its size globally is approximately USD 108 billion as on date, with projections to reach nearly USD 157 billion. The Indian HVAC market is relatively small, about USD 2 billion which will expand to nearly double to USD 4 billion by 2024. The average growth of the industry is between 7 – 8 per cent. The industry employs a wide variety of people, both in the informal and formal sector and with the growing demand for air conditioning, the number of people that the HVAC industry employs will only keep on increasing.

### Careers in the HVAC Industry

The HVAC sector traditionally has students from the mechanical engineering stream joining the industry as air conditioning is a core subject in the curriculum. However, with advances in technology and the changing face of the industry, students from other streams too have opportunity to be part of the HVAC industry. The key roles that students interested in the HVAC sector can look at exploring are shown in figure 1.

**Design & Manufacturing:** This sector is where the industry cycle really begins. All the large HVAC companies have manufacturing in India as this is a growing market. In addition, since this is a highly competitive market, these companies invest heavily on Research and Development (R&D) and there are thus careers in core HVAC design that students can take up. Since the HVAC systems cover a range of sub systems such as the main chiller, the pumping systems, cooling towers, controls, air handling units, ducting etc., there are

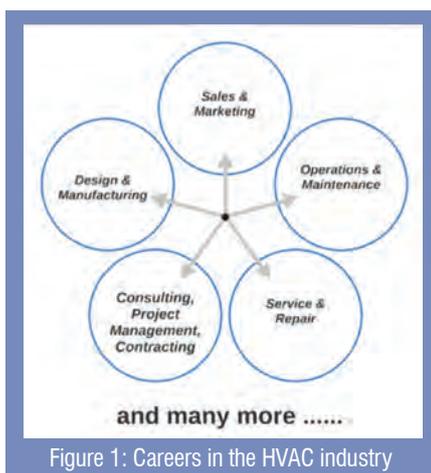


Figure 1: Careers in the HVAC industry

many areas that one can get into.

**Sales & Marketing:** Since HVAC is a highly technical area, the sales and marketing of the equipment and systems are usually handled by technically qualified sales staff unlike many industries where a general underrating of the sector is sufficient to run the sales. Typically, companies hire students for core manufacturing and system design roles and then once they have understood the technicalities of the industry sector they work in, they move to a sales role. The same is the case in marketing roles where it is essential to have a deep understanding of the technology and then develop the solutions.

**Operations & Maintenance:** When one walks into a mall or a hotel, the air conditioning is taken for granted and the customers do not even notice that the indoor air is at the temperature that is best suited for their comfort. This is possible because there is a dedicated and capable team that is operating as well as maintaining the air conditioning system of the mall or hotel. With multiple components like pumps, chillers, cooling towers etc, the HVAC system is a complex one and needs trained staff to operate it at the optimal design points. HVAC systems are also the largest consumers of energy in a building and hence, the staff who run these systems can contribute to the bottom-line as well as topline of the organisation. The O&M sector employs a large number of people across the range of roles and is only growing due to the larger penetration of HVAC systems across the country.

**Service & Repair:** Since there are a large number of components and systems in a HVAC installation, there will be chances of breakdowns and malfunctioning of systems. Typically, organisations that buy the HVAC products enter into Annual Maintenance Contracts (AMC) with the Original Equipment Manufacturer (OEM) for repairs as well as regular service to the system. These OEMs employ engineers and technicians in their service teams to service the AMCs as well as attend to breakdowns.

**Consulting, Project Management & Contracting:** There are a large number of firms that carry out the design of the HVAC system for a particular requirement such as a mall, building, school, hospital, airport etc. These firms are specialised consulting firms and hire engineering graduates to help them in the manage the design workload. There are also many firms that specialize in the execution of the design and these firms employ HVAC engineers to oversee the installation, commission and testing of the HVAC systems and components.

### Conclusion

The HVAC industry is growing at a good pace in India as there is a large amount of untapped potential and a very large market. This sector is also witnessing new technology interventions that are changing the whole landscape of HVAC. The industry has always tapped into the engineering base of the country and there will thus be many more career opportunities for students coming out of the colleges in the times to come. While the industry typically takes in mechanical engineers, the modern HVAC systems need engineers from all streams of engineering – electrical, electronics, instrumentation, AI etc. and hence, there are many opportunities for the young engineering graduates in this industry. ■





# STRATEGIES FOR AMELIORATING ENERGY EFFICIENCY IN HVAC

The article gives a glimpse of a combination of existing air conditioning technologies that can offer effective solutions for energy conservation and thermal comfort. Furthermore, it also reviews the different technologies and approaches, and demonstrates their ability to improve the performance of HVAC systems in order to reduce energy consumption.

**I**ncreased standards of living coupled with dwindling supplies of fossil fuels, have forced investigators to focus on the issue of energy use in buildings while maintaining necessary thermal comfort. The HVAC systems, which play an important role in ensuring occupant comfort, are among the largest energy consumers in buildings. Performance enhancements to traditional HVAC systems, therefore, offer an exciting opportunity for substantial drops in the building energy consumption. Almost around 41 per cent of the total building energy demand is used to support indoor thermal comfort conditions in commercial buildings. Furthermore, as most people spend more than 80 per cent of their time inside building, the development of energy efficient HVAC systems that do not rely on fossil fuels will play a key role in reducing energy consumption. A closer look at worldwide energy consumption by HVAC equipment shows noticeable values as shown in Figure 1.

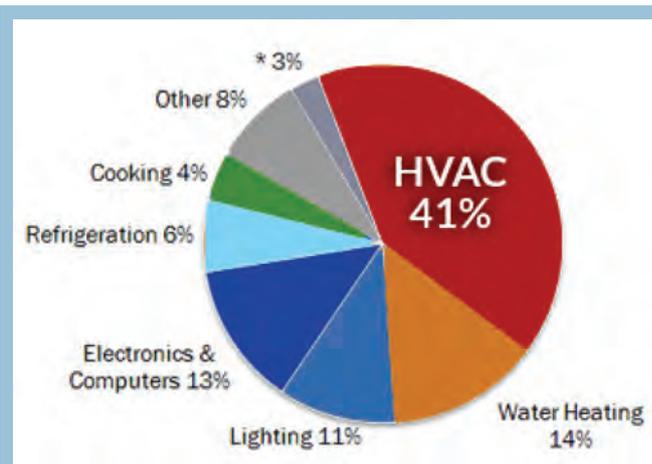


Figure 1. Energy consumption by various sources in typical commercial building

The growing reliance on HVAC systems in residential, commercial and industrial environments has resulted in huge increase in energy usage, particularly, in the summer months when ambient conditions were severe. Developing energy efficient HVAC systems is essential, both to protect consumers from surging power costs and to protect the environment from the adverse impacts of greenhouse gas emissions caused by the use of energy inefficient electrical appliances. With rapid changes in science and technology today, there are several methods that can be used to achieve energy efficient HVAC systems which can proved to be energy efficient over conventional standard systems as shown in Figure 2.

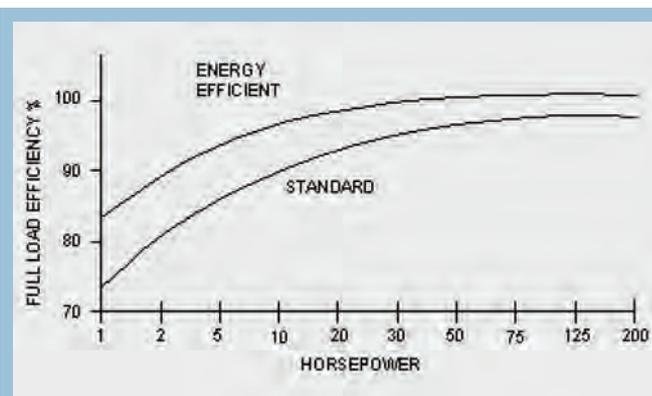


Figure 2. Difference between energy efficient and conventional standard system

In order to develop efficient systems, however, a clear understanding of building comfort conditions is necessary. Thermal comfort is all about human satisfaction with their thermal environment. The design and calculation of air conditioning systems to control the thermal environment in a way that also achieves an acceptable standard of air quality inside a building should comply with the ASHRAE standard 55-2004. According to this standard, thermal comfort conditions are acceptable when 78 per cent of the building's occupants are satisfied. In order to predict appropriate thermal comfort conditions an index called a

predicted mean vote (PMV), which indicates mean the thermal sensation vote on a standard scale for a large group of people, is used. PMV is defined by six thermal variables for an indoor environment, subject to human comfort: air temperature, air humidity, air velocity, mean radiant temperature, clothing insulation and human activity.

### Energy saving strategies in HVAC

Different techniques need to be implemented on HVAC systems to improve their energy efficiency and reduce their environmental impact. In recent years, different automatic control and optimisation strategies have been used to improve the energy consumption rates of these systems.

### Energy efficient HVAC installations

Substantial energy savings can be achieved by optimising heating, ventilation and air-conditioning (HVAC) system and by upgrading it with energy efficient technology while improving the safety of a building. HVAC systems are subjected to more misuse than any other type of equipment in both residential and commercial sector. Poor maintenance, lack of knowledge on how to use them efficiently, overuse, and the large number of old and inefficient systems at work in the sector make HVACs a significant contributor to the demand for energy for built environment within buildings.

### Cooling load

The important step in energy savings on HVAC systems is to reduce the cooling load. The amount of electricity air conditioning systems use also depends on the cooling load – the amount of heat the system has to remove. There are several steps for reducing cooling load.

#### **Insulate the cooled space**

This involves implementing various measures such as ceiling insulation, window glazing, blinds, awnings and door sweeps. All will contribute to creating a thermally efficient shell that can dramatically reduce the cooling load on HVAC systems while ensuring that comfortable internal temperatures are maintained. Reduce warm air filtration into the cooled space by keeping windows and doors closed when HVAC systems are in use.

#### **Minimise the use of appliances and lighting**

All lights emit heat, so lights and equipment that are not required at any particular time should be switched off to help to reduce the cooling load. Replacing conventional boilers with condensing boilers reduces the heat load, and replacing standard motors with high-efficiency motors results in lower losses and less emitted heat. Investing in variable speed drives (VSDs) for motors to match speed with output demand results in lower energy usage and heat load.

#### **Ensure that controls are in place and HVAC operation reflects demand**

HVAC loads vary at different times and in different parts of a building throughout the day. Well set time and occupancy controls should ensure that systems only operate when and where required

during core business hours. It is also crucial to check settings regularly – many systems are set incorrectly because of forgotten short-term adjustments. Installing a building energy management system (BMS or BEMS) which offers close control and monitoring of building services performance, including HVAC, allows automatic control of the HVAC system. BEMS can reduce energy costs by allowing system performance to be monitored and settings to be changed.

**Variable speed drives on HVAC fans and pumps**

This allows motor-driven loads such as fans and pumps to operate in response to varying load requirements instead of simply operating in on/off mode can save 30 per cent annual energy approximately as shown in Figure 3. In addition, the VSD will include soft start and possibly soft stop algorithms which save energy and reduce the stress on components.

Energy saving on fans is much greater than on other equipment. On fan loads, the power requirement varies as the cube of the speed, so the slower the fan speed, the less energy required. A fan running at 80 per cent speed will consume 50 per cent of the energy at 100 per cent speed. Modern fan controls consist of much more than just speed controls and variable speed drives.

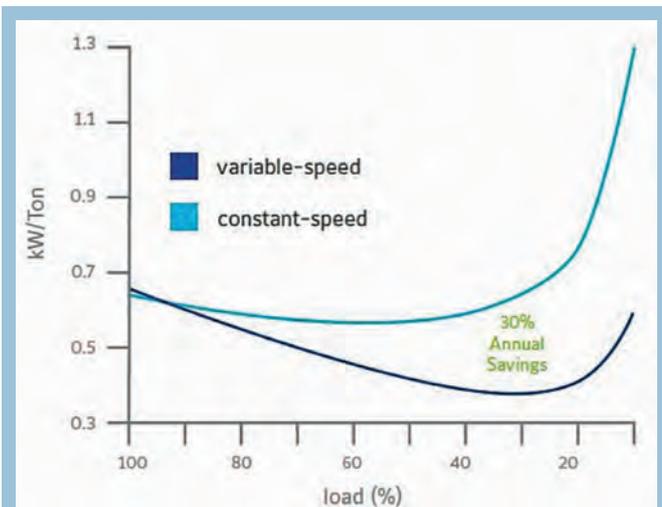


Figure 3. Comparison among constant drive and variable speed drive for energy saving.

Key to identifying the energy savings opportunities of VSDs in HVAC systems is an understanding of the operating cycle of the system versus the heating and cooling needs actually required. Most HVAC systems are designed to keep the building cool on the hottest days and warm on the coldest days. Therefore, the HVAC system only needs to work at full capacity on those days. For the rest of the year, the HVAC system can operate at reduced capacity. This is where a variable air volume system with variable speed drives (also-called variable frequency drives, or VFDs) can be used to match air flow to actual heating and cooling demands. The VSD can reduce the motor speed when full flow is not required, thereby, reducing the power and the electrical energy used.

**Variable volume air system**

The variable air volume system has advantages over the constant air volume system, but in the basic version has several drawbacks. In a variable air volume system, the air temperature is kept constant and the flow is varied to meet the heat load requirements. The basic method of control is to use a constant speed fan and a damper to regulate air flow. This provides the fan motor with a constant load irrespective of the air flow rate. Using a variable speed drive varies the load on the fan motor with variations in air speed and achieves energy savings as a result as shown in Figure 4.

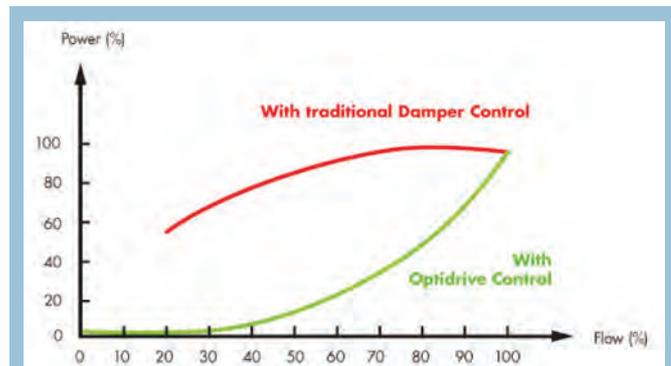


Figure 4. Saving in power consumption by optidrive control.

**Central plant optimisation and energy efficient operation**

HVAC systems consist of a complex arrangement of different components, all of which must be controlled to work together. In a manually controlled system, each of the systems is set to its optimum condition, which might not be optimum for the system as a whole. Take, for instance, the air handling unit. There are two flows that can be controlled, the rate of air flow and the rate of water flow. The water temperature will depend on the evaporator settings, which also depend on the compressor and condenser settings. Optimisation will require adjustment of the operation of all these units to achieve the best efficiency. Optimising energy usage in the HVAC system involves optimising every element and the system as a whole. The operation of the system as a whole can be optimised to ensure further energy savings even once the individual items have been set for maximum economy. Central plant optimisation can achieve further gains after equipment and motor drive upgrades. Up to 60 per cent saving are claimed versus the existing plant before equipment and VSD retrofits. Some 15 – 20 per cent savings are claimed to be possible compared to performance with upgrades only.

Comfort Point Open (CPO) systems can work with any brand of equipment or plant that can interoperate with building management protocols. Most work on well-established proprietary algorithms and practices. CPO is essential in larger buildings where there is more than one chiller plant running, and the heat load in different sections of the building follows a unique pattern with no correlation with the pattern in other parts of the building.

**Use of evaporative cooling integrated hybrid cooling system**

The evaporative cooling (EC) systems integrated hybrid cooling system have low set-up and running costs, and have been proven

to significantly improve a building's cooling and ventilation capacity with minimal energy use. Using water as the working fluid, one can avoid the use of ozone-destroying chlorofluorocarbons and hydro chlorofluorocarbons. Other benefits from this system include easy maintenance, easy installation and operation as well as obviating CO<sub>2</sub> and other emissions. Evaporative cooling integrated hybrid air conditioning systems can provide thermal comfort via the conversion of sensible heat to latent heat (desiccant cooling system); however, the lowest temperature DEC systems can reach is the wet-bulb temperature of the outside air. Therefore, the temperature of the supply air after cooling would be just on the edge of comfort and could rise a few degrees in passing through space, taking the temperature beyond the comfort zone. Therefore, the idea is to investigate both the possibility of increasing the utilisation potential of the evaporative cooling system by combination of different components with this system and the capability of improving the performance of other HVAC systems when integrating with evaporative cooling system.

#### **Variable Refrigerant Units**

In conventional systems, one condensing unit is connected to one evaporator, providing conditioned air to one area of a building. If the system is to supply air to more than one area, ductwork must be added, along with zone controls. While this configuration works, it is not the most flexible or energy efficient, and often results in complaints from building occupants.

VRF systems offer an alternative. In these systems, a single outdoor condensing unit is piped to multiple indoor fan coil units. Refrigerant is circulated in the system through either a two or three-pipe system. In two pipe systems, all fan coil units or zones must be in either heating or cooling mode. Three-pipe systems have the ability to simultaneously heat some zones while cooling others. Because the load on the system's compressor constantly varies based on the sum of zone loads, an inverter driven motor is used to power the compressor. As zone loads decrease, the inverter decreases the frequency of power to the motor, decreasing the compressor's speed and the flow of refrigerant. As the speed of the compressor decreases, there is a significant decrease in energy use. Each fan coil unit connected to the system has its own refrigerant metering device, which is regulated by the fan coil's control system. As the load within that space changes, the metering device regulates the flow of refrigerant needed to meet that individual load. Reduced energy use is not the only advantage of VRF systems. With the ability to provide individual zone temperature control as well as simultaneous heating and cooling, better climate control is provided to all areas. With a single outdoor condensing unit, these systems require less installation space than conventional constant flow systems.

#### **Use of ground-coupled HVAC systems**

Ground-coupled cooling or heating technology relies on the fact that, at depth, the Earth has a relatively constant temperature that is colder than the air temperature in summer and warmer than the air temperature in winter. In this system, under cooling mode, operation heat is discharged to a ground loop that provides a lower

temperature heat sink than ambient outdoor air temperature. During winter heating operations, heat is extracted from a source that is at a higher temperature than ambient outdoor air. This system has been used on a different residential and commercial scale.

#### **Use of thermal storage systems**

Thermal storage systems (TSS) shift the energy usage of the HVAC systems from on-peak to off-peak periods to avoid peak demand charges. TSS are also able to rate variance between energy supply and energy demand to conserve energy. In this system, energy for cooling is stored at low temperatures normally below 20C for cooling, while energy for heating is stored at temperatures usually above 20C. As compared to conventional HVAC systems, TSS offers various advantages for heating and cooling systems, such as energy and capital cost savings, system operation improvements, system capacity extending and equipment size reduction, resulting in a technology that is widely used.

#### **Effect of building behaviour**

The energy consumption of an HVAC system depends not only on its performance and operational parameters, but also on the characteristics of the heating and cooling demand and the thermodynamic behaviour of a building. The actual load of the HVAC system is less than it is designed in the most operating periods due to building behaviour. Therefore, the most important factor that contributes to HVAC energy usage reduction in a given building is proper control of the heating and cooling demand. Integrated control of building cooling load components, such as solar radiation, lighting and fresh air, can result in significant energy savings in a building's cooling plant. It is estimated that around 70 per cent of energy savings is possible through the use of better design technologies to coordinate the building demand with its HVAC system capacity.

### **Conclusion**

Energy efficient HVAC system designs depend greatly on new configurations of traditional systems that make better use of existing parts. One effective way of achieving energy efficiency has been the design of HVAC system configurations that combine a range of different traditional HVAC system components. Recent research and development has demonstrated that a combination of existing air conditioning technologies can offer effective solutions for energy conservation and thermal comfort. Each HVAC discipline has specific design requirements and each presents opportunities for energy savings. It must be understood, however, that different configurations in one area may augment or diminish savings in another. ■



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# Thermal Battery for Commercial Refrigeration

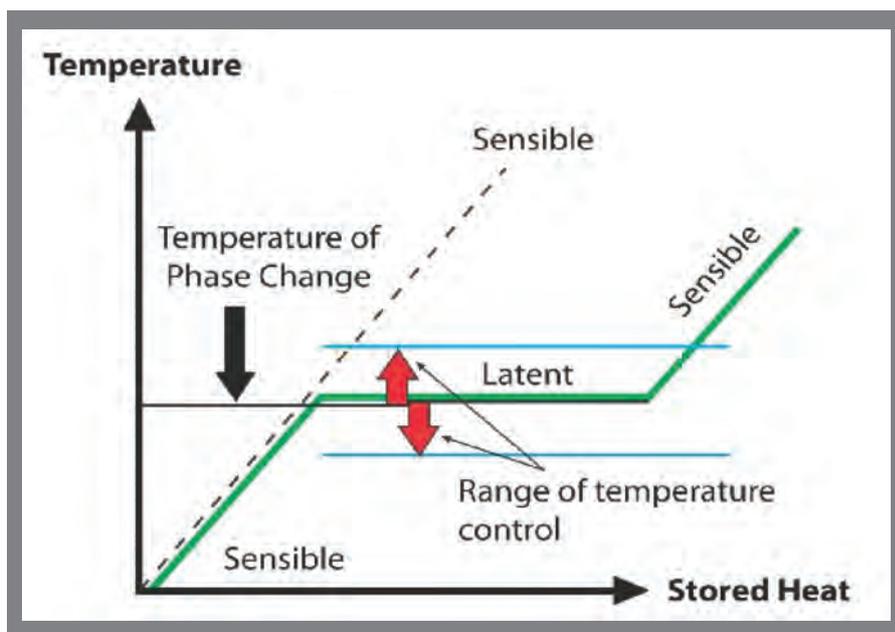


The article attempts to explain the impact of Phase Change Materials also known as 'Thermal Battery' that has the potential to revolutionise the HVAC and refrigeration sector. The focus is on chest freezers or coolers which are commonly referred to as deep freezers or coolers.

One of the roadblocks to the penetration of perishable and dairy products in the rural segment is unavailability of reliable power. There is a large demand for refrigeration equipment that offer additional features to protect the products during uncertainties such as from mechanical failure and power outages. The second challenge is the total cost of energy and energy consumption of refrigeration equipment. The second challenge is perennial in both rural and urban India. The high operating costs is a cause of discouragement for the last mile operators to do away with refrigeration all together. This article attempts to explain the impact of Phase Change Materials also known as 'Thermal Battery' that has the potential to revolutionise the HVAC and refrigeration sector. The focus of this article is on chest freezers or coolers which are commonly referred to as deep freezers or coolers. These are used commonly in in convenient stores, hypermarkets, super markets with an annual demand of 5,00,000 units worth Rs 1,000 crore with a CAGR of 18 per cent.

## Phase Change Materials (PCM)

Phase Change Materials (PCM) fall under the sub category of energy exchanging smart materials. Energy exchanging smart materials are materials that store latent and sensible energy in the form of light, heat, electricity or hydrogen and exhibit reversibility. A PCM has the ability to store and release large amounts of heat or energy while maintaining a constant temperature unlike conventional solutions as shown in the figure 1 below.



### Thermal battery as backup

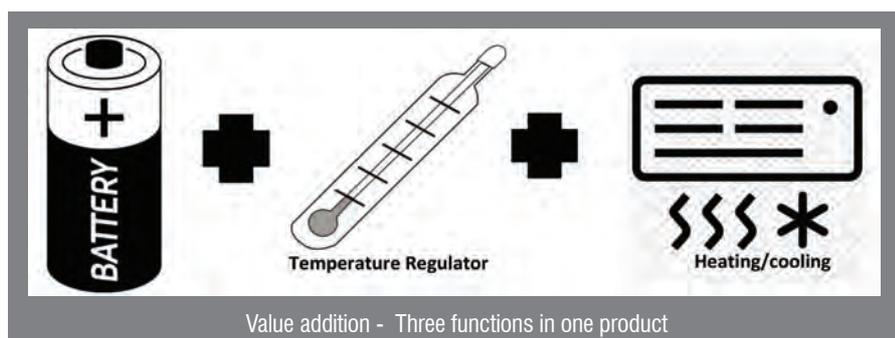
Freezers for ice-creams are designed to maintain a temperature between  $-18^{\circ}\text{C}$  to  $-23^{\circ}\text{C}$  while beverages are maintained between  $2^{\circ}\text{C}$  and  $8^{\circ}\text{C}$  in a cooler. The PCM chosen for both of these applications are different due to the different temperature requirements. Shown below in figure 2 is an illustration of PCM integration within the walls of the ice-cream freezer. The selected PCM charged passively when the power is available within 9 -10 hours.

The selection of the PCM is important as one of the critical factors is the minimum temperature that the refrigeration unit can offer to ensure that the PCM is completely charged. Once fully charged the PCM is in ready state to release the energy in event of a power or equipment failure. The figure 3 shows the graph of the temperature inside an empty freezer compartment monitored by sensors at various locations. This freezer is designed to maintain a temperature of  $-18^{\circ}\text{C}$  to  $-19^{\circ}\text{C}$  at an ambient of  $40^{\circ}\text{C}$  for a minimum of 16 hours and in spite of several opening and closing of the lid.



### Thermal Battery as a power-saver upto 25%

The phase change materials in its charged state acts as concentrated thermal mass which increases the efficiency of the envelope of the freezer. The combined effect of insulation and a lining of PCM causes a significant delay in the change of temperature. For instance, the compressor turns OFF once the temperature in the return line of the refrigerant lowers down below a set threshold eg:  $-28^{\circ}\text{C}$  for a freezer, similarly it turns ON when the temperature increases above  $-23^{\circ}\text{C}$ . The temperature bandwidth of  $5^{\circ}\text{C}$  between compressor turning ON and OFF are few minutes which increases by 35 per cent. This effect is also known as Thermal Inertia wherein the incorporation of a thermal mass such as PCM, the tendency to resist change in temperature. The below figure 4 illustrates the energy consumption between two chest freezers; one without PCMs and the other with it. The effect of thermal inertia is results in a steady



PCMs have tremendous potential to fulfill the growing need of energy for cooling and heating applications across various industries. It finds its application globally in diverse sectors like cold chain,

HVAC, refrigeration, automobile air-conditioning, apparels, waste heat recovery, consumer goods and more; wherever there is a need for thermal energy storage.

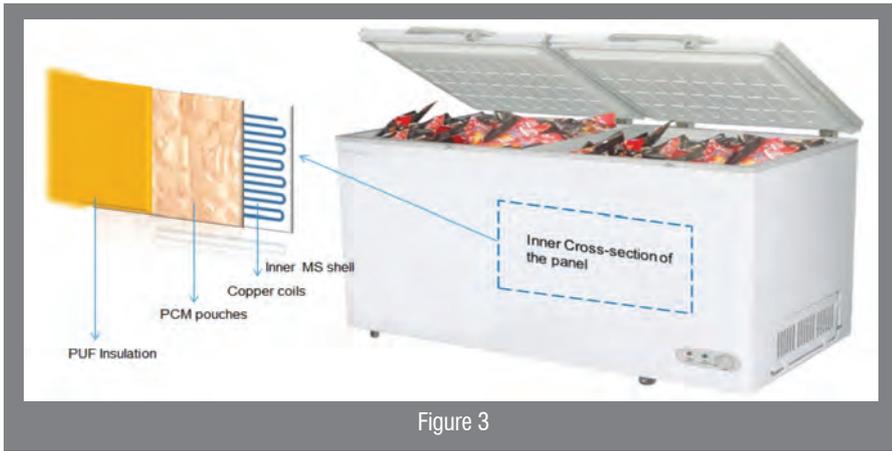


Figure 3

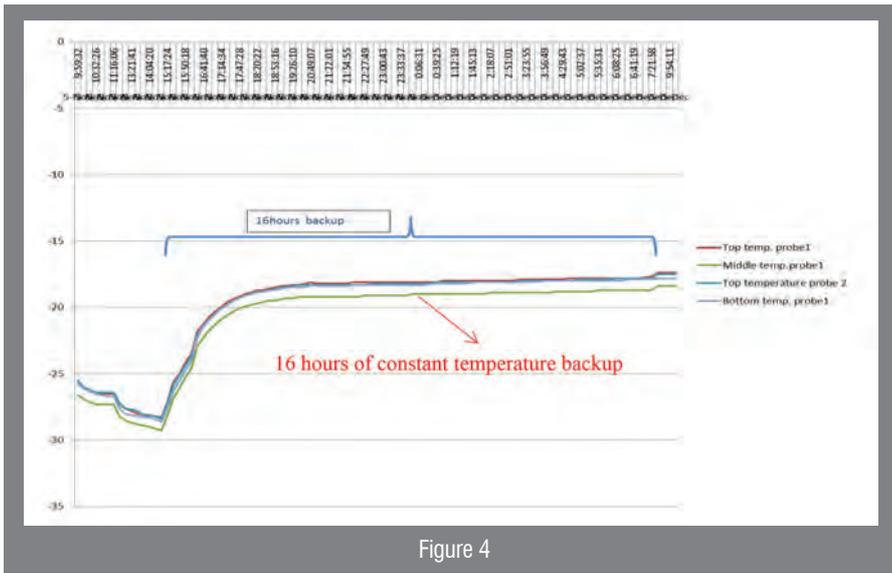


Figure 4

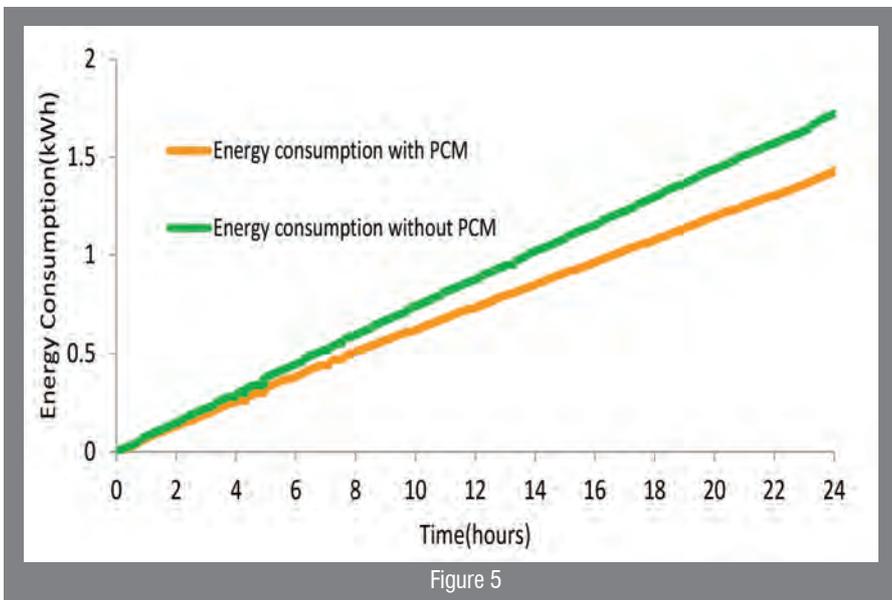


Figure 5

divergence of the energy consumption graph.

There are several refrigeration companies in India and outside which have now introduced chest freezers and

chest coolers incorporated with these PCMs to cater to the market in low and middle-income countries where power availability is an issue. Now with the added advantage of reduction in power

saving, this innovation makes can be implemented across equipment even in urban cities. The variety of PCMs available now allow OEMs to manufacture a range of refrigeration equipment to cater to different temperature requirements. The application could be extended to living spaces, cold storages, household refrigerators, automobiles. The growing demand and addition of over a million refrigeration units added each year the effect of the energy saved per equipment is massive.

Pluss Advanced Technologies Pvt. Ltd (PLUSS) is a venture funded organisation with equity stake being held by Tata Capitals premium innovation fund promoted by the Tata. Founded in 1994, the company has seen tremendous growth in the recent past. With strong roots, the company is now poised to make a global impact with its innovative products. Pluss is engaged in R&D and manufacturing of specialised polymers and Phase Change Materials (PCMs). PCM technology finds its application globally in diverse sectors like cold supply chain, Building HVAC, refrigeration, automobiles, thermal wear, waste heat recovery, consumer goods and more; wherever there is a need to store thermal energy.

Pluss has pioneered in the PCM technology in India and is presently the only company in India with a wide range of indigenously manufactured PCMs with several patents. With its innovative products, the company is making its presence felt across the globe with representatives in USA, Turkey, South East Asia, Russia, Ukraine and South Africa. Pluss intends to be amongst the top innovative companies in the world in the near future. ■



**Vishnu Sasidharan,**  
Vice President-New product Initiatives,  
Pluss Advanced Technologies

## Testo displays versatile HVACR measuring technology at Acrex 2020

Testo India being a silver partner for Acrex 2020, had a stall at India's biggest HVACR show – Acrex India 2020 at India Expo Mart, Greater Noida between 27th to 29th February and displayed the wide product basket catering to the HVACR segment. This time the entire stall was dedicated to the theme of sustainable future and the elements depicting the message of sustainability.

Testo featured several products such as electrical instruments which are very distinct and unique in their features, refrigeration manifolds or analysers, digital vacuum gauges and electronic leakage detectors. Testo Smart Probes were also a major highlight of the show that equips the users with smart and easy measurement techniques using the smartphone interface. Then there was testo 420 air capture hood, for measuring the air volume flow even at the turbulent inlets/outlets. Testo also showcased the revolutionised measurement technology with products like testo 440, and testo 400 intuitive air velocity and IEQ measuring instrument which is the universal measuring instrument for all air flow and IEQ applications. All these products are probably the best suited tool for HVAC consultants, contractors, advisors, building surveyors, facility managers etc.

The exhibition was marked with a special segment of expert presentations where experts from Testo and other organisations from the industry conducted presentation sessions on several relevant topics of HVAC.

Another highlight and probably the most necessary initiative that was implemented on Testo stall was the mounting of Thermal Imager - testo 890 for fever detection. The threat of Corona virus



Scan the QR code to watch the video of fever detection by testo Thermal Imager

and its effect continues to grow, and the primary symptom indicates fever. Testo India, in its high-end Thermal Imager - testo 890, has a special feature of fever detection. If higher body temperature is detected through the camera, then alarm is triggered indicating immediate medical attention required for the person under scan. The instrument was mounted at the stall to conduct live scan of the visitors and ensure safety for all. Prime motto to install this camera was to increase awareness among

people and share knowledge about the precautionary procedure of thermal inspection.

Testo India also had an interesting fun zone for the visitors with the concept of thermography. In the facility management area thermal inspections are used for two main applications i.e. moisture detection and leak detection and that was the concept of the game where visitors were asked to draw images on a white board using ice cubes, while others identified the image using thermal imager. Since the camera works on the principal of thermal profiles hence, it could easily show the drawing that was made. It became an instant hit and people enjoyed participating in the game.

For more information, write at [info@testo.in](mailto:info@testo.in) or visit website [www.testo.com](http://www.testo.com).





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5 YEARS	30	4800.00	6300.00	7300.00	4800.00	7800.00	8800.00



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# Globus places its trust in BITZER quality

## Freshness for eight million visitors per year



The sales area is 12,800 m<sup>2</sup> with an assortment of about 45,000 articles

Since December 2017 there has been another Globus department store near Moscow. Fresh fruit and vegetables, fish and bakery products jostle for position on a total area of 28,000 square metres. The opening was preceded by an organisational masterpiece. In just three months, Kriofrost Engineering had to plan and install the complete refrigeration system, from the refrigerant lines through to a booster system for medium and low temperature refrigeration.

30 compressors in seven refrigeration systems, one satellite and one booster system, an area of 28,000 square meters to be cooled – and only three months to do it in. The order that BITZER’s long-standing customer Kriofrost Engineering received was a tough one. During this time, the engineers were to design and

install the refrigeration system in a Globus department store in Kotelniki, from laying the refrigerant lines in the department store’s underground duct system to designing the machine rooms.

Alexander Kotlyar, General Director of Kriofrost said, “The project at Globus was a very interesting task for us. On the one hand, because of the time, of course, and on the other hand because of the technical side.” After all, some challenges in the design of the refrigeration system had to be mastered. This started with not colliding with other supply lines when installing the pipeline for the refrigerant. And that was not the end of it. For the restaurant areas, for example, the Kriofrost Engineering experts set up a central cooling system for several temperature conditions. This was connected to flash-freezers, as well as

medium-temperature refrigerated shelves and air-conditioning systems.

### The booster system makes it possible

This was made possible by a booster refrigeration system developed by Technofrost, a strategic partner of Kriofrost Engineering, together with BITZER. In this booster system, the specialists from the three companies installed six refrigeration compressors arranged in two levels, which are located one above the other on a common frame. On the lower level, four BITZER reciprocating compressors compress from intermediate pressure range into the high-pressure side. The two compressors mounted on the upper level compress the refrigerant from the low-pressure side into the intermediate pressure range. Both levels have separate discharge gas lines. The special feature is that four compressors for medium and two compressors for low temperature



In the booster system, six refrigeration compressors are arranged in two levels, which are located one above the other on a common frame



In total, Kriofrost has installed seven central refrigeration systems with a total of 30 BITZER reciprocating compressors from the ECOLINE series in the three machine rooms



The sales area is 12,800 m<sup>2</sup> with an assortment of about 45,000 articles



The department store has a total area of 28,000 m<sup>2</sup>

refrigeration work with the refrigerant R404A and are integrated into a common refrigerant circuit. "Compared to conventional solutions with separate cooling stations for different temperature conditions, this refrigeration system saves our customer considerable costs, as well as both investment and operating costs," continued Alexander Kotlyar. The engineers planned the satellite system in a similar way. The difference here, however, is that this system has a common discharge gas line for both levels. However, each level with two reciprocating compressors has its own suction gas line and two different evaporation temperatures. The lower level has an evaporation temperature of (-)10C, the upper one of (-)28C. All four compressors compress the refrigerant to the high-pressure range. The experts from Kriofrost installed seven central refrigeration systems with a total of 30 BITZER reciprocating compressors from the ECOLINE series in the department store's three machine rooms. BITZER VARISTEP provides smooth, mechanical capacity control on five of the refrigeration systems – with the exception of the booster and the satellite system. To condense the refrigerant, Kriofrost installed air condensers made by Güntner on the roof of the department store.

"The general cooling capacity is approximately one MW for medium temperature and air conditioning systems, and is approximately 300 kW for low temperature systems," continued Alexander Kotlyar. One special aspect of the project is the energy saving achieved by the engineers. Thanks to the use of a liquid after-chiller in the low temperature sets, the use of electronic expansion valves for the individual cooling units and the use of a booster system as well as a variable condensing temperature, Kriofrost's solution was a great success. "Thanks to these energy-efficient components and the good cooperation with our partner BITZER, we were able to save energy and thus reduce investment in the supply of refrigeration for users of commercial facilities, ancillary spaces, restaurants, food courts, freezers and refrigeration chambers," said Alexander Kotlyar. And

Refrigeration system 1	
<b>Compressors</b>	<b>1 × 6FE44Y (VARISTEP)</b>
4 × 6FE44Y	
Cooling capacity	364 kW
Evaporation temperature	-10°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C

Refrigeration system 2	
<b>Compressors</b>	<b>1 × 6GE34Y (VARISTEP) 2 × 6GE34Y</b>
Cooling capacity	70* kW
Evaporation temperature	-35°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C
* taking account of the subcooling due to system 1.	

Refrigeration system 3	
<b>Compressors</b>	<b>1 × 6HE28Y (VARISTEP) 3 × 6HE28Y</b>
Cooling capacity	208 kW
Evaporation temperature	-10°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C

Refrigeration system 4	
<b>Compressors</b>	<b>1 × 6FE44Y (VARISTEP) 3 × 6FE44Y</b>
Cooling capacity	150* kW
Evaporation temperature	-30°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C
* taking account of the subcooling due to system 3.	

Kriofrost is already planning for the future. Since the large chains are now interested in refrigeration systems using the natural refrigerant CO2, BITZER customers will soon be active here too.

### Long-standing collaboration with Globus

The cooperation between Globus and

Refrigeration system 5	
<b>Compressors</b>	<b>1 × 4GE30Y (VARISTEP) 3 × 4GE30Y</b>
Cooling capacity	266 kW
Evaporation temperature	2°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C

Booster system	
<b>Compressors</b>	<b>4 × 4HE18Y 2 × 4GE23Y</b>
Cooling capacity	142*/79 kW
Evaporation temperature	-10/-28°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C
* taking account of the heat of condensation from the lower level.	

Satellite system	
<b>Compressors</b>	<b>2 × 4EES4Y 2 × 2DES2Y</b>
Cooling capacity	21.1/4.8 kW
Evaporation temperature	-10/-28°C
Ambient temperature (calculated)	33°C
Condensing temperature	45°C

Kriofrost Engineering started with services for existing refrigeration systems. In the course of the sales type Globus 3.0, which the company based in Saarland, Germany has introduced, the specialists have now been able to carry out several complete projects. Globus has been active on the Russian market for several years and has invested five billion roubles in Kotelniki, which corresponds to almost 70 million euros. A department store with a total area of 28,000 m<sup>2</sup> was built for this. 12,800 m<sup>2</sup> of this is a sales area with an assortment of approx. 45,000 articles, and the area of the produce departments (salad, meat, fish, patisserie) is over 5,000 m<sup>2</sup>. There is a food court and restaurant area with 700 seats on the premises, and there is parking for 1,500 vehicles. Globus hopes that the new department store will attract around eight million visitors per year. ■

# Drawing attention to energy efficiency

## ACREX INDIA 2020



The focus on renewable and solar energy as a key disruptor for the future, the call for cities to set ambitious targets for energy efficiency and the need to develop customised solutions for the Indian market were key discussions at ACREX India 2020 - By the Cooling India Content Team

**A**CREX India 2020 was held in Delhi from the 27th to 29th February. The event revived discussions on the Refrigeration, Air conditioning and Building services sector. With an energetic disposition, representatives from the HVACR sector took keen interest to showcase their best in technology and innovation. The ACREX Hall of Fame is a joint initiative by Danfoss and ISHRAE that seeks to recognise benchmark commercial building projects in India. Ravichandran Purushothaman, President, Danfoss India, said: "India is developing in terms of infrastructure and we see the country leaning towards energy efficiency while bringing about sensitisation among stakeholders." Over the next 33-years, all urban areas will need to provide space for another 2.2 billion people, and this will take a toll on cities and its resources, he said. "Cities need to set ambitious targets for energy efficiency to reach the goals of the Paris Agreement. Buildings today account for 40 per cent of the global energy use and half of a city's emissions, and instituting energy efficiency and sustainability in buildings can cut

energy consumption by nearly 30-45 per cent. It is time that more buildings across all cities proactively invest in smart and energy-efficient technologies to enable their transformation into a sustainable building," added Purushothaman. Danfoss, he said, places focus on renewables and solar energy and this form of renewable energy is likely to become a key disruptor in the future. He added: "Danfoss is coming up with new strategies to be Carbon Neutral by the year 2030." Speaking about the company turn-over, he said: "From the year 2007, our turn over has increased two and a half times and we have achieved 80 per cent success in projects."

Giving us a perspective from the Cooling industry side of things, Anuraga Chandra, Head – Cooling Sales - India, Danfoss India, said: "We have tackled multiple projects, and if we talk of invention, we have come up with air and oil-free compressor which uses a low amount of energy." India, he said, has been facing challenges in



terms of energy, hence we provide customised solutions for the Indian market as per the climatic conditions. Purushothaman added to what Chandra said. “If you take a closer look at the air conditioning and refrigeration industry, penetration on cooling is low in India.” He also pointed to the importance of research and development and said: “Six to seven per cent of our turn over goes to research and development, this is our focus.”

**Excerpts from interviews conducted with representatives at the ACREX Expo 2020:**

**Kshama Jain, Managing Director, KEHEMS Technologies Pvt Ltd**



“KEHEMS Technologies works with screw and scroll chillers, heat pumps and thermal storage systems. Since the year 1992, we have been working towards manufacturing and on increasing the acceptability of technology in the market. Our chillers are fitted with Bitzer compressors, this in addition to hydro processor-based controls. We also manufacture low-temperature chillers that are used in pharmaceutical applications. Variable Frequency Drive (VFD) systems control power consumption by helping soft-start the compressor. Another feature is that our chillers use fewer refrigerants as compared to our competitors; this makes it a green product.”

**Shivaji Darade, Managing Director, HIVER**



“HIVER manufactures nearly fourteen types of chillers that are created for the industrial and commercial segments. We also provide service on a contractual basis. Spare machine parts are supplied to manufacturers. HIVER chillers are Lan-based with net-based control, this makes it easily accessible. These chillers are energy-efficient and have a universal temperature base. The use of soft-starters helps control the stability of air and water-cooled chillers. The pharmaceutical sector widely uses the Internet of Things (IoT), this also increases the demand within the market.”

**Mark Johnson, LEFOO**



“LEFOO is a pressure sensor and a switch manufacturing company that has a wide range of product designs for various markets. The switches are consumer-based ranging from one to ten volts. The company manufactures reliable and high-quality standard Pressure Control, temperature control devices offering innovative solutions and components that can outfit the best machines and production systems while giving a single answer to any requirements in pressure control systems. Within the scope of pneumatics, HAVC, refrigeration, food and beverage processing, packaging systems, hydraulics, the company provides clients with accurate and dependable pressure control devices.”

**Niklas Graberg, Director of Global Sales, Industrias**



“Industrilas produces latching and hinging systems to Sweden, Sri Lanka, and the Indian markets for huge ventilation units. For the past 20-years, we have been specializing in ventilation. We enhance our equipment regularly to stay up to date with the evolving market. We also export to over 60-countries worldwide. The market is presently focused on quality and on raising the standard in an increasing price war.”

**Yatheendar Ramakrishnan, Instrumentation Group, Parker**



“Parker is a 100-year-old company and one of our products is ‘Sporlan’ and we have recently introduced one-of-a-kind flame-free Zoomlock refrigerant fittings which are truly a game-changer for HVACR contractors who are looking to be more efficient. Zoomlock is a brace-free refrigeration block copper fitting that is leak proof. It eliminates the need for bracing, welding, fire spotter, and fire license, as it has an electro-mechanical tool that crimps the fitting in place. Zoomlock can be used in cleanrooms, data centres or application where fire permits are a challenge. Tools and jaws compatible with ZoomLock fittings. These fittings are specially designed to work without brazing, which automatically makes jobs simpler and faster when joining copper tubes. Sporlan Type SSTK Smart Service Tools work with a SMART Service Tool App for smartphones or tablets along with sensors and pressure transducers to assist in diagnostic/service problems. The focus is on exposing the technology globally and on introducing a safe working environment. Refrigerant technology has evolved over the years and Indian is speeding up with most of the European and US manufactures. There is more focus on greener refrigerants; hence Parker has launched products that are flexible towards these changes.”

# Reducing Costs with Gandhi Automations' Dock Seal & Shelter Solutions



Dock House

## Sealing in Value

A dock seal is a system of vinyl covered compressed foam padding which lines the edge of a loading dock door. Dock seals are designed to close and protect the gap between the dock door opening and a truck trailer so that the process of loading and unloading isn't negatively impacted by the elements or other external variables.

Without efficient seal solutions in place, dock operations are at risk for wind and rain penetration, energy loss, invasive insects and rodents, unsafe loading and unloading conditions, and damage to products and equipment. High performing dock seals are especially important in regulated operations such as food and pharmaceuticals where preventing environmental threats is mission critical.

Most commercial and industrial facilities personnel responsible for materials handling recognise the value of installing dock seals to mitigate external environmental threats. But not all are aware of several key factors which can substantially impact dock seal performance, durability, and long-term costs. These factors include the building design, types of trucks coming into and out of the facility, frequency of trucks, types of materials handled, and how the trucks are being loaded and unloaded.

## Low Cost vs Efficiency

When these factors are not properly taken into account, dock seals can easily wear out, often long before their expected service lives. This usually happens as a result of not having enough material in the

right places to prevent the seal from deteriorating prematurely. All dock seals are not created equal. Inexpensive, general contractor grade seals may be appealing in many cases.

But low-cost seals typically have only a 22-ounce vinyl covering over the foam and no wear pleats (extra protection on the face of a seal) or wear face (a protective inner layer between the outer fabric and compressed foam). Seals chosen based on price alone may last one to two years depending on the operational circumstances.

The corners of truck trailers put a beating on dock seals, digging into and tearing them over time. The compressed foam deteriorates once the fabric is torn. Then the seals dry out leaving no compression. This unnecessary, premature wear degrades the performance of the dock seals, shortens their useful life, and increases operating costs with more frequent dock seal replacements and related overhead costs. This defeats the goal of keeping out the elements and puts the dock operation at risk.

## Thinking It Through

To get the most out of their performance and useful life, dock seals should be planned and specified based on an operation's unique requirements. Dock door size is an important factor in effectively determining the style of seal needed for a particular application. For doors that are 9' x 9' or smaller, a fixed header pad seal solution is typically the best approach. For doors taller than 9', a drop curtain style seal solution is usually recommended.

There are a variety of options that can help a seal wear more durability in a high traffic dock area. An experienced commercial and industrial dock solution provider can help guide user to the right



Dock House

selection for situation and applications. The solution provider will analyse user's operation and help look at options including upgraded vinyl fabric, rain shields (installed above a dock seal to prevent water from entering the building), wear pleats, and inside wear faces. A qualified solution provider can help to obtain all the benefits and advantages of efficient dock seal solutions including maintenance and repair cost reduction, maximum up time for dock operation, and a solid return on user's investments.

### Seeking Shelter

Unlike a dock seal, a dock shelter is a structure with a curtain style cover designed to protect the space between a truck trailer and the building from the elements. Dock shelters cannot be used in conjunction with dock seals and vice-versa. Dock shelters are typically installed when dock seals aren't an effective solution or a building must accommodate a variety of truck styles and sizes.

A dock seal can't seal every type of truck trailer. Dock shelters work because they allow trucks of various sizes and shapes to back into the curtain perimeter. This creates a vestibule around the truck trailer and accommodates a variety of trucks while providing basic protection

from the elements. While this protection is not as effective as a dock seal, it still allows for safe, unrestricted loading and unloading. Where the benefits and advantages of dock seals aren't required, a dock shelter is far better than no protection at all.

### Wood vs Foam

Most shelters in production at commercial and industrial dock operations were built with rigid wood frames before foam frame shelters became available. Wood frame shelters can create significant operational problems relating to costs and down time.

The impact of truck contact will damage or break a wood frame even on one occurrence.

Wood frame dock shelters can be a substantial time and cost burden in many cases. A direct hit from a truck can easily damage or break the wood frame, leading to costly maintenance, repairs, and down time.

The average repair cost for a damaged or broken wood frame is around USD 900. All it takes is one truck backing in off center. By contrast, foam frame dock shelters are damage resistant. Foam frame shelters are built with high density foam that does not sag or deteriorate over time and can be impacted repeatedly without damage.

Foam frames bend and bounce back when hit while still providing the same level of protection from the elements as wood frame shelters. Foam frame shelters can help dock operations eliminate costly repairs and down time. In many cases a foam frame shelter can pay for itself after the first truck hit.

Just as with dock seals, a qualified commercial and industrial dock solution provider can help guide user to the right selection for user's foam frame dock shelter needs and optional features which may be beneficial for your operational requirements. ■



Dock Shelters

## NOW NORTH EUROPE CAN TASTE INDIAN GRAPES



### Maersk starts end-to-end cold chain logistics for grapes' export from Nashik and Sangli to North Europe

**M**aersk, a global integrated container logistics company, has recently started end-to-end cold chain logistics solution for its customers exporting grapes from Nashik and Sangli to North Europe. With this new offering, Maersk is enabling the exporters from the region to supply high quality Indian grapes to global market and helping fetch higher returns for the farmer community in and around the Nashik district. Leveraging its variety of services throughout the supply chain, Maersk is improving the overall turnaround time to North Europe by 4 days.

Gearing up for the peak grape season and helping exporters based in Nashik, 'The Grape Capital of India', Maersk's cold chain offerings go all the way from the packhouse of the exporters to the destination in North Europe. Maersk is thus being the one-stop-shop for its customers by offering booking management, transportation including land-based and ocean logistics and customs clearance. The movement of grapes is being done in refrigerated containers (Reefers) with Remote Container Management solution 'Captain Peter' that monitors atmospheric conditions inside the container and provides visibility of the same to the customers. Maersk is also deploying a Reefer technician to overlook contingencies throughout the journey.

Steve Felder, Managing Director, Maersk South Asia, said "Nashik is a priority market for the exports of grapes from India. With our end-to-end cold chain solutions, we aim to enable the exporters to take their grapes from Nashik to North Europe with a fast turn-around time, and with more simplicity. By providing a one-stop-shop solution, we are enabling the farmers to focus on what they do best, leave the logistics to us and not get bothered by any challenges that they might face in the journey of their produce from their farms to their customers."

He added, "Besides grapes, the region also yields other quality agro-produce like onions, tomato, chilli, baby corn, okra and other

vegetables, which has immense trade potential in the global markets. With our cold chain logistics solutions, we aim to further open-up and liberalise the agro-economy of the country enabling farmers and entrepreneurs to be a part of the international trade ecosystem."

By providing end-to-end solutions, Maersk allows the exporters to initiate bookings in the easiest manner possible – even through WhatsApp and emails. From there on, the teams at Maersk take over and ensure that every step in the long journey is taken care of. Ultimately, by consolidating the entire journey, Maersk is not only able to cut down on the total time required for taking the cargo of grapes from Nashik to North Europe but also add reliability in preserving quality of the produce. With the elimination of intermediaries, the effective cost of logistics is brought down making it a win-win situation for Maersk, the exporters and their customers.

Mayank Tandon, Vice-President of FreshTrop, applauded Maersk's cold chain solution saying, "We are extremely excited about the value proposition of Maersk's cold chain solution. As a unique proposition in the industry, it has the potential to add great value by the virtue of visibility it offers us on our cargo. We are looking forward to serving our customers better with the tools that Maersk has placed in our hands through a single window solution for our logistic needs."

Ranjeet Patil, Director Fresh Express, a customer using Maersk's end-to-end solution for exporting grapes out of Nashik, commented, "The cold chain solution for grape shipments from India is an excellent initiative by Maersk. The efforts being made by the Maersk team to visit shippers, train teams on the shippers' side will help smoothen the entire process including booking of the container, inland transport and documentation. This will bring in considerable ease and speed while ensuring complete visibility of cargo temperature and container location. Remote Container Management along with TradeLens will greatly help our customers as well." ■

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## SICCOM's ECOLINE in-line condensate removal pump

**S**ICCOM is a French manufacturer specialised in condensate removal pumps. SICCOM's expertise means customers can benefit from a range of high added-value products that meet installers and users' requirements. Present in more than 50 countries, SICCOM always strives to propose products reliable, silent and easy-to-install at the best price.

Among its new products, the ECO LINE has met with great success all over the world. The ECOLINE is a mini in-line pump for the condensate removal of air conditioners up to 10kW / 36000 BTU. Among all its benefits, one can notice ultra-compact size (possibly smallest in its segment), IP64 protection rating, Plug & Play connectors, removable clear reservoir, hanging bracket.

The size is unequal on the market with dimensions of only 125 x 30 x 30 mm! This makes the pump much more easy-to-install than other pumps. The maintenance is also very facilitated thanks to its quick connector and its easy-to-open reservoir. With a



maximum flowrate of 13.2 l/h and a maximum discharge head of 10 m, the ECO LINE will perfectly find its place into your installation, and will meet installers' expectations as much as users' ones! ■

## Testo launches testo 552 & testo 316-3

### testo 552 - Digital vacuum gauge with Bluetooth

The testo 552 is a high-precision digital vacuum gauge designed to provide the user with reliable readings. It has all the measuring



functions need for evacuating refrigerant systems and heat pumps. It is built to last and tough enough to take the odd knock. It is extremely precise, rugged and practical – with visual alarm and backlit display.

Via a Bluetooth interface, the testo 552 connects with the testo Smart Probes App on user's smartphone or tablet. This allows to monitor the absolute pressure reached during the evacuation conveniently and wirelessly. In addition to this, the measurement results can be quickly documented in the App and sent by e-mail. And because the digital vacuum gauge is IP42 rated (water resistant and dirt proof), it is virtually impervious to moisture and dirt.

### testo 316-3 - Refrigerant leak detector

The testo 316-3 refrigerant leak detector can detect all the most common cooling agents and locate even the smallest leaks in



refrigeration systems. The leak detector complies with all important regulations and norms which makes it an ideal instrument for the kit of a refrigerant technician. Comes with an automatic zero setting that also enables the user to locate leaks in contaminated rooms.

- Can detect all the most common cooling agents: CFCs, HFCs, FCs
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- Highly sensitive (< 4 g/a - 1g/a according to DIN EN14624:2012 standard) – detects even the smallest leaks
- Complies with specifications for F gases regulations, SAE Code J1627 and DIN EN14624:2012 standard
- Visual and audible alarm which are activated when a leak is detected
- Quick and easy sensor change. ■

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