

HIGH ON HVAC



Heating, ventilation, and air conditioning or HVAC systems are seeing new age developments as they integrate seamlessly within various spaces.

By Bindu Gopal Rao

In recent years people have become highly conscious about the health repercussions arising from poor indoor air quality. Consequently, to address the issue, there is a growing emphasis on indoor air quality (IAQ) with a focus on achieving the comfort of the occupants. This has invariably contributed to the rising demand for HVAC solutions that accomplish the dual purpose of regulating temperature along with removing pollutants and allergens from indoor spaces.

GREEN VISTAS

The HVAC industry is at a very interesting cusp of development. Driven by the growing importance of net-zero solutions in the segment, the industry is adopting energy-efficient solutions with alacrity to reduce the carbon footprint significantly. "To achieve this goal, the HVAC space is embracing Variable Refrigerant Flow (VRF) systems to ensure precise temperature control and zoning capabilities aimed at curtailing energy consumption with efficient operation as compared to traditional HVAC systems. To further strengthen the prospects of providing energy-efficient solutions, the industry is focusing on reducing the cooling or heating load by resorting to natural methods of ventilation. By ensuring ingress of fresh air, ventilation plays a pivotal role in removing the contaminants from the space while maintaining comfortable temperature and humidity levels for the occupants. Here, by minimizing the dependence on heating and cooling systems, it contributes to reducing the consumption of electricity," says Varun Pahwa,

President, Desiccant Rotors International.

DO THE NEW

Conventionally, the air conditioning of an indoor space requires the usage of materials such as refrigerant gas, compressors, heat exchangers, copper/aluminium coils, and fans. However, new innovations using magnetic refrigeration and thermoelectric refrigeration systems eliminate the need for these parts, and as a result, create more durable air conditioning systems. "Both magnetic refrigeration and thermoelectric refrigeration systems are highly environment-friendly and cost effective since they do not use refrigerant gas, compressors, or copper tubes. These technologies are yet to become more efficient than conventional systems in terms of power

consumption. But, ongoing research in these fields have made them more efficient than their initial days," says Vinod T. Oommen, Director, Evergreen Systems, Kochi.

DEMAND DRIVERS

Boost in the Cooling industry is directly linked to the economic growth of the country. India is a developing country, and its cooling needs are ever-increasing. The government has taken a visionary step of drafting the India Cooling Action Plan (ICAP), which assesses the growing need for cooling across various industries while also realising the need for providing sustainable cooling. "ICAP provides 20 years of perspective of refrigerant-based cooling from 2017-18 to 2037-38. Nearly 70 percent of emissions is



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estimated to be from air conditioning and cooling. ICAP advocates strategies phasing out of Ozone Depletion Substances. To this effect, firstly, the HVAC industry has actively transitioned away from refrigerants that cause Ozone depletion and adopted refrigerants with low Global Warming Potential. The industry has also seen improvement in manufacturing practices that prevent refrigerant leaks, minimize the use of groundwater, and reduce e-waste. Multinational players in this space have brought in improved awareness about Scope 1 and Scope 2 emissions. At a product level, several technologies that facilitate energy monitoring and control through smart connectivity are being introduced. Altogether the industry has become sensitive towards the future impact of cooling and reducing negative ecological impact," says Sanjay Sudhakaran, Managing Director, India & South Asia region, Johnson Controls-Hitachi Air Conditioning India Ltd.



Varun Pahwa, President, Desiccant Rotors International

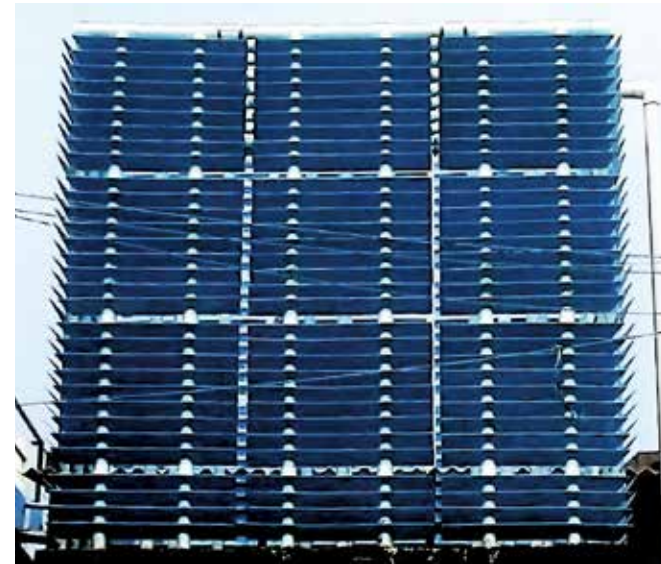


Vinod T. Oommen, Director, Evergreen Systems, Kochi



Rajesh Sachdev, CEO, Blutherm

Hence the introduction of multiple energy source heat pumps that can not only use the power of the heat pump compressor, but also supplement the heating process with solar energy as well as gas and electric enables the system to get the most energy efficient way of producing hot water in a reliable manner in all conditions," says Rajesh Sachdev, CEO, Blutherm. In addition to this, the integration of advanced technologies such as IoT, AI, is enabling remote monitoring of the systems that come with the ability to control machines from any part of the world



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TECH TALK

Electronically controlled tankless water heaters that are systems that do not store any water, and heat water instantly on demand at the precise temperature, thereby maximising comfort and reducing water wastage are gaining traction. These water heating systems are electronically controlled where the power required to heat water is adjusted based on the flow rate and differential temperature of water, thus making these systems extremely energy efficient vis a vis traditional water heating system. "Traditional Air to Water heat pumps use only the power of the heat pump compressor to heat the water. Although heat pump water heaters are environmentally friendly, the time taken to heat water in varied weather conditions make them un-reliable.



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by transcending geographical barriers. "The advanced technologies are also contributing to the enhanced automation of the systems for precise control of temperature, humidity, and other factors of the environment. Apart from this, the HVAC industry is progressing at a phenomenal rate by harnessing the benefits of collated data to practice predictive maintenance of the systems to troubleshoot and calibrate the systems to eliminate faults effectively that too in advance," adds Pahwa.

ENERGY EFFICIENCY

Smart controls, using Variable Frequency Drives (VFD), now have a crucial role in optimizing the performance of motors, including AC fan motors and compressors, in the HVAC industry. "Traditional motors available options typically jump from 3 HP to 5 HP. This means that for a load between 3.1 and 5 HP, the only available choice is a 5 HP motor. However, with a VFD, it becomes possible to precisely operate the motor at any required power level. We are also seeing low voltage DC motors and compressors being increasingly utilized to harness available DC solar power. Although this technology is not yet prevalent in our country, it holds great potential benefits, not just in the HVAC industry but in other sectors like the automobile industry as well,"

explains Oommen.

INDOOR AIR QUALITY

Working towards improving the indoor air quality and hygiene of the space, HVAC systems are continuously innovating to curtail the proliferation of microorganisms in a closed space. As a result, the industry is scaling its offering with the incorporation of advanced filtration systems to capture a wide gamut of airborne contaminants entailing bacteria, viruses, and allergens. "Additionally, the industry is further fortifying the antibacterial and antifungal measures with the integration of UV-light technology into the systems aimed at sterilizing air and surfaces for neutralizing harmful microorganisms. Along with this, the systems are proficient at inhibiting the growth of bacteria and fungi with the antimicrobial coatings on the components contributing to the elevation of indoor air quality of the space. Going a step ahead, the industry is equipping the coolers with highly efficient and reliable antibacterial cooling pads that inhibit the formation of bacteria on the surface to provide the necessary protection against the diseases arising from microorganisms," says Pahwa.

GOVERNMENT IMPETUS

The Indian government's substantial allocation of



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Rs 11.1 lakh crore for infrastructure in the 2024-25 budget has created a conducive environment for the HVAC sector's growth. HVAC plays a significant role in all infrastructure projects like Airports, Hospitals, Industrial premises, Warehousing, and the like. "The current government norms require all infrastructure designs to incorporate appropriate HVAC measures for a hygienic and comfortable environment. With modern infrastructural structures being built to be insulated and air tight to maximise energy efficiency, the provision of Ventilation and Air Conditioning plays a vital role to keep the space sustainable and hygienic," says Sachdev. A recent United Nations mandate advocates raising the set temperature of all air conditioning systems to 26 degrees Celsius in a concerted effort to mitigate power consumption. Authorities will provide devices to monitor adherence to the directive, and any failure to comply will attract penalties in the future. **AI**