Scan to read online

# Who's the Coolest of Them All?

**CW** identifies the types of HVAC systems developers prefer for different applications.


*Photo: For representational purpose*

First things first: What do developers look for in an HVAC system?

Air-conditioning accounts for the biggest portion of energy consumed by a building – 55-65 per cent, reckons **Bishnu Swaroop, President - Technical, Ambuja Neotia**. Thus, he identifies energy-efficiency or lifetime cost as the most important criterion when choosing a system, followed by ease of maintenance, capex (as this defines the payback period), ease of installation, cooling capacity and interior design needs.

"Our HVAC system designs depend on the end utilisation of the building (whether residential or commercial), expected load, available earthing arrangement, need for air-conditioning in individual residences, the type of electrical supply the building requires (such as single-phase for normal split unit and three-phase for variable refrigerant flow, or VRF), and ease of maintenance," shares **Devaraja TH, Executive Vice President & HOD, M&E-Electrical & HVAC, Sobha**. "Further, we consider the climatic conditions that may adversely affect the electrical installation and thus increase the operational and maintenance cost. Finally, the HVAC design considers the reliability of power supply and redundancy of sources, and distribution paths to cater to the need for emergency and standby power for continued operation of systems, as well as the integration of alternate sources of energy, such as diesel generation, solar energy, wind power, and more."

"We choose a type of air-conditioning for various segments of residential properties depending on various factors contributing to the heat load of those dwellings," explains **V Gopal, Executive Director, Projects & Planning, Prestige Constructions**. "Typically, the heat load is impacted

not just by the active occupancy but also by passive contributions from building materials, predominantly those that radiate heat."

So, regardless of the segment of property, Gopal points out that a complete concrete and masonry structure could still make do with high wall splits, whereas a similar-sized unit in glass may entail a more effective centralised air-conditioning solution, that is, variable refrigerant volume (VRV) or chillers.

That said, the HVAC preferences for different classes of real estate are fairly well defined.

### Chilled water units

In the commercial segment, until about a decade ago, the only option was chiller packages with ductable, fan coil unit (FCU), air-handling unit (AHU) indoor units, says **Chandrasekar Narayanan Srikantan, National President, ISHRAE, and Consultant & Certified Energy Auditor, Genex Consultants**. "With the advent of VRF outdoor units, which work in combination with different types of indoor units, the options have increased."

Larger commercial properties opt for chilled water units, preferably water-cooled type systems offering better energy-efficiency despite being a little more expensive to maintain and needing more manpower, explains Chandrasekar.

From the perspective of energy efficiency, water, having the best latent heat capacity, is the best medium for the transfer of heat from inside to outside (for cooling) and hence underlies the most efficient system, opines Swaroop of Ambuja Neotia. "Accordingly, for large commercial spaces such as retail malls (in Kolkata, Patna, Raipur) and office spaces (Ecospace and Ecocentre), we have opted for water-cooled large chillers of varying tonnage from 100 tr to 1,500 tr."

**"Typically, the heat load is impacted not just by the active occupancy but also by passive contributions from building materials."**

**- V Gopal,** Executive Director, Projects & Planning, Prestige Constructions

"In the Sobha Corporate Office, we have installed a conventional chiller system HVAC," shares Devaraja.

"Our commercial, retail and hospitality developments like Prestige Minsk Square, Forum Mall (Kanakapura Road), Conrad (Bengaluru) and Sheraton (Bengaluru) are mostly fitted with centralised air-conditioning with chillers and in a few cases with VRVs," shares Gopal.

## QUICK BYTES

- Air-conditioning accounts for the biggest portion of energy consumed by a building – 55-65 per cent.
- Commercial applications of less than 10,000 sq m use VRF ACs.
- Where water quality or availability is an issue, air-cooled chillers are preferred.

"Within chilled water systems, the preference is for scroll compressors for up to 60 tr capacity, screw chillers from 100 tr to 500 tr and centrifugal chillers beyond this capacity," continues Chandrasekar. "In all these systems, variable speed compressors are preferred, although installations with multiple chillers prefer a combination of constant speed and variable speed compressors to save costs. Currently, controls and monitoring systems exist to get the benefit of energy conservation as well as in pumping systems."

Disadvantages associated with water-cooled cooling machines are their copious water consumption and intricate network of chilled water piping, pumps, and cooling towers, which makes such systems a bit complicated to design, install and maintain, points out Swaroop. So, for small offices, residences or hospitality requirements and in locations where the availability of water is an issue, even in case of large cooling capacity requirement, Ambuja Neotia opts for air-cooled chillers or compressors.

Where water quality or availability is an issue, air-cooled chillers are preferred," agrees Chandrasekar.

### Commercial VRF applications

Commercial applications of less than 10,000 sq m of air-conditioned area generally use VRF air-conditioners, according to Chandrasekar.

Standalone multiplexes use large-capacity packaged units or VRF systems, opines **Ashutosh Joshi, Sr Consultant, Vision Electro Mechanical Consultants**.

A VRF system has been installed in Ambuja Neotia's restaurants Afraa and AltAir, in small office spaces like Ecostation, and Ecospace Business Towers, and in

60-100 room hotels and resorts such as Taj Chia Kutir, Taj GurasKutir, Ecopark Banquet, RaajKutir IHCL Seleqtions and the premium residency Utalika. The VRF system's added advantage of distribution of functionality, a single outdoor machine (holding the compressor) serving multiple indoor units (ceiling-suspended cassette, wall-hung units or FCUs concealed above the false ceiling) placed inconspicuously as per the architectural need has served Ambuja Neotia well. Such VRF systems have been installed in hotel and resort projects with dwelling units distributed in a large complex.

Hospitality establishments and hospitals have similar needs as commercial properties with additional filtration and other inclusions for indoor air quality to maintain the IEQ levels, points out Chandrasekar.

**"Within chilled water systems, the preference is for scroll compressors (<60 TR capacity), screw chillers (100-500 TR) and centrifugal chillers (>500 TR)."**

**- Chandrasekar Narayanan Srikantan,** National President, ISHRAE, and Consultant & Certified Energy Auditor, Genex Consultants

"Like commercial spaces, hospitality spaces choose an air-conditioning system depending on the scale of operations and areas to be covered, with some opting for centralised air-conditioning systems or VRF systems depending on their location and availability of water," adds Joshi.

*Photo courtesy: Sobha*

HVAC design considers the reliability of power supply and redundancy of sources, and distribution paths to cater to emergency and standby power.

## Residential preferences

In the residential segment, air-conditioning principally involves ensuring independent controls for every zone/room, says Chandrasekar.

To achieve this, he points out that the preference in mid-segment residences, where mostly only the bedrooms are air-conditioned, is for split air-conditioners (hi-wall type or cassette type). In contrast, in the West and Middle East, the preference is for rooftop packaged units.

"Most residences use single-phase normal split units," agrees Devaraja. "We have provided a single-phase normal split unit HVAC system in Sobha HRC Pristine, and are in the process of installing single-phase normal split units in SobhaCity Gurugram."

"For mass housing, we have window units where the compressor and indoor machine with a recirculating fan are built in one single unit and installed in the windows, says Swaroop "For lower-end mid-segment projects like Udvita and Uddipa-The Condoville, our choice is DX machines with wall-hung indoor units with traditional scroll or rotary compressors to achieve the energy efficiency of 5*."

"For our standard (Prestige Kew Gardens) and premium (Prestige Misty Waters) developments, we have been making provisions for occupants to install hi-wall splits in the building architecture," shares Gopal.

It's vital to buy the right kind of window or split air-conditioner. "Window air-conditioners and split air-conditioners generally used in small residences are star-rated for energy efficiency by BEE (Bureau of Energy Efficiency) India and the split AC models with both fixed speed and inverter-based