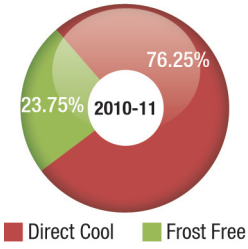
The refrigerator is the third heaviest guzzler of power amongst household appliances.

Refrigerators

Indian Refrigerator Market Category-wise



Refrigerators have increasingly been finding their way into Indian homes. The Indian refrigerator market registered an annual growth of 15 percent for the FY 2010-11.

The total Indian market was at 8.4 million units in 2010-11, a 15 percent increase from 7.3 million units in 2009-10. The contribution of frost-free segment has been gradually increasing, with a 23.75 percent share in 2010-11. Direct-cool segment, albeit on a gradual decline, continues to dominate with a 76.25 percent share.

The 165–225 L continues to be the preferred capacity, with a 91-percent grip on the market in the direct-cool segment. Its premium counterpart, the frost-free, as expected registered higher sales in the larger size bracket, the 226–270 L capacity range contributing to 61 percent of the market.

The consumers in North India being more price-conscious contributed higher sales in direct-cool segment, followed by the southern states. In the frost-free segment, South India commands a 35 percent market share, followed by North and West India with about 25 percent each.

In the total sales of 8.4 million refrigerators in 2010-11, LG had a 29.3 percent market share. Samsung, Godrej, Videocon (all brands), and Whirlpool were neck-to-neck with 15–18 percent market share each. The top five brands together accounted for 95 percent of the total market.

In the frost-free segment, LG and Samsung were leading with 31.5 percent and 28.4 percent market shares, respectively. In the direct-cool segment, LG dominated with a 28.6 percent market share, while Godrej and Videocon commanded 20 percent and 17 percent share. Whirlpool and Samsung had market shares of 15 percent each.

Other aggressive brands include Haier, Hitachi, Panasonic, Toshiba, Sharp, and Gem.

The refrigerator is perhaps the third heaviest guzzler of power amongst household appliances. It is one of the few appliances, which runs 365 days a year, increasing the importance, whenever possible, of

having an eco-friendly refrigerator in the household.

The famous Albert Einstein actually came up with the idea of an eco-friendly refrigerator and patented one back in the 1930s with his colleague Leo Szilard. Scientists at the Oxford University have dusted off Sir Einstein's old plans and are exploring a refrigerator that requires no electricity, has no moving parts, and uses only pressurized gases to keep items cold in the fridge.

Another interesting trend with environment-friendly refrigerators is the use of multiple-cooling compartments. The theory is that by being able to slide out small compartments one at a time, energy will not be wasted by letting out excess cold air out of the refrigerator.

Industrial designer Tez Patel has received critical acclaim for his eco-friendly refrigerator with a multi-drawer design. The fridge is split into sections that are powered using thermoelectric modules that minimize energy consumption. The fridge has a fruit and vegetable drawer cooled by a water reservoir that consumes significantly less power than a standard refrigerator.

Energy-efficient refrigerators are made with inverter compressors, which are environment-friendly and energy-saving. The Inverter control system and technology for electric motors and compressors have started to appear in various markets recently in response to increasing environment-friendly issues, and demand for energy saving, small size, and lower noise. The new inverter helps the system reach the ideal temperature quicker by running at a higher RPM (rotations per minute) for a shorter time and then ramping down to maintain temperature. Thus energy consumption is decreased due to the increased cycling efficiency and its main power turning on/off frequency could be trimmed accordingly. The technology allows the system to detect subtle fluctuations in the temperature and adjust automatically.

By using only as much power as is needed, the inverter cuts energy consumption by approximately 20 percent. The energy-efficient refrigerator runs 24 hours a day, seven days a week, that makes it a great investment overall. Energy-saving, highly efficient, and cost-saving commercial refrigeration technology has been continuously developed and applied. The advantage of inverter-controlled refrigerators is that if hot food placed in the refrigerator raises the temperature, the compressor starts processing immediately to lower the temperature in order to keep the food fresh. Once the temperature goes down, the inverter acts smoothly to maintain its temperature in lower frequency; thus, the compressor is quieter and the food stays fresh.

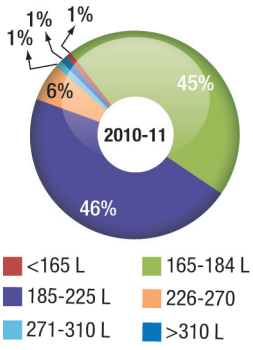
In addition, to provide bigger storage space, motors are expected to be smaller and more efficient. Motors also need to be quieter to ensure a comfortable living environment. Sensor-less control is required as the motor is located inside the compressor. Therefore, a sensor-less brushless motor with inverter control is commonly used in refrigeration applications.

The Indian Society of Heating, Refrigerating, and Air-Conditioning Engineers (ISHRAE) and the Refrigeration and Air-Conditioning Manufacturers Association (RAMA) have signed a tripartite agreement with Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and established the basis for cooperation on the development and harmonization of standards and laying the groundwork for cooperation on performance certification programs in the future.

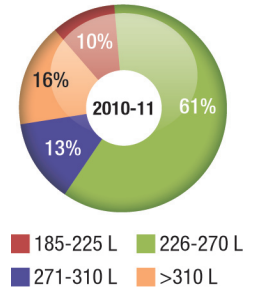
The agreement grants Indian parties non-exclusive, irrevocable licenses to use both current and future AHRI standards, in whole or in part, for the development and use of Indian Air-Conditioning, Heating, and Refrigeration Equipment Testing and Rating Standards (IAS) in India for a couple of years. Standards developed, adopted, or modified under this agreement will be adopted by the Bureau of Indian Standards and referenced by the Indian Bureau of Energy Efficiency, both of which will ensure widespread use of the standards throughout India.

Since that agreement in March 2010 was signed, 15 standards have been harmonized, and an additional 25 are under process.

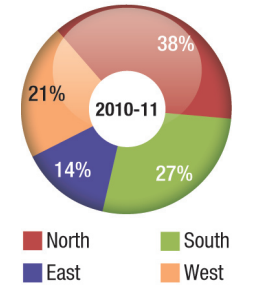
Capacity-wise Sales Direct Cool



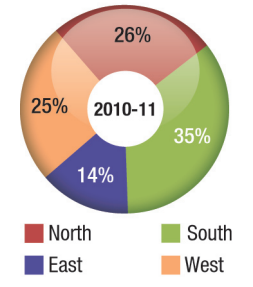
Capacity-Wise Sales Frost Free



Region-Wise Sales Direct Cool



Region-Wise Sales Frost Free



Advancement in **technology** has stimulated customers asking for more and the **refrigerator** is no longer a boring, utility **appliance standing** in a corner of the modern home.

The Indian roadmap for phasing out by 2030 hydrochlorofluorocarbons (HCFC), in line with the Montreal Protocol on substances that deplete the ozone layer is on track. Globally, the shortage of refrigerant experienced in the spring looked set to worsen as the summer of 2011 progressed. The second quarter is traditionally the time of highest demand. R134a was short and that added to the global shortage of R125 that put real pressure on the R400 blends. R134a was expected to be scarce all through 2011 and probably beyond. What might make demand start to relax is when the HFOs come on stream in volume, but that is unlikely to be for a couple of years at least. Refrigerant producers had posted price increases consistently since the beginning of the year. Some R400 blends had risen by over 50 percent since January 2011.

2011 was the year of introduction of smart refrigerators. At CES 2011, held in Las Vegas, most of the big appliance companies displayed smart prototypes running at the show – LG, Whirlpool, GE, Kenmore, Samsung, among others. Most expected their smart refrigerators to be ready by mid-to-late 2011. A number of manufacturers have also planned for Internet-assisted troubleshooting when the appliances have issues.

Most refrigerators will have an LCD touchscreen – from 2 to 7 inch. Various features include Wi-Fi access, alerting home owners when the door is left ajar, keep tabs on the number of times the door is opened, report on electricity consumption, access to the Google calendar, ability to play YouTube videos and Pandora radio stations, writing notes for family members, checking the weather or latest news, and connection to the Smart Grid.

One of the features sought is inventory management. It would be handy to know when the salad dressing or chicken will expire.

Some very interesting innovative models have been developed.

The mini fridge developed by Gusto features a soccer-shaped design for added attractiveness. ABS construction promises high durability.

A bottom freezer refrigerator designed by GE reduces bending and stooping. The armoire-style design requires minimal space for door opening, making it ideal for small kitchens.

With a 2-m-high beautiful black exterior, the model by Gorenje features 26,000 anthracite crystallized Swarovski elements in two vertical lines, which is the ultimate luxury refrigeration.

This mini thermal electric refrigerator, showcased by Qingdao Haier Refrigerator Co. Ltd. adopts thermal electric chilling technology for a constant temperature with no fluorine, low noise, and environment protection. The interior features an integrated design with a perfectly matched control unit and fan.

This fridge by Panasonic has been designed to look sleek, sophisticated, and contemporary, and succeeds on all three counts.

A model developed by Nicolas Hubert for Electrolux is based on the concept that mounts on an exterior wall and slides out toward a window for easy access. In cold weather, the fridge would take advantage of the ambient temperature while in summer months it would cool itself through solar energy, captured through photovoltaic cells mounted on the side.

A 30-inch *Complete Compact Kitchen* conceived by Avanti is a 2.4 cu. ft. refrigerator, with two electric coil elements, a stainless steel sink, a chrome faucet, two drawers, integrated backsplash, and a stainless steel countertop.

Advancement in technology has stimulated customers asking for more and the refrigerator is no longer a boring, utility appliance standing in a corner of the modern home. It is evolving in more than one ways. Appliance manufacturers are relying on aesthetics and design, healthy food preservation and hygiene, more energy efficiency methods, and above all on *green* technology, and many more advanced features to increase refrigerator shipments in coming years. ■

Based on research conducted by TVJ in May 2011