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HVAC-R

Heating- Ventilation, Air Conditioning & Refrigeration Market in Saudi Arabia

2018

A TECHSCI RESEARCH
EXCLUSIVE KNOWLEDGE PAPER FOR

HVAC R EXPO SAUDI

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Foreword

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Saudi Arabia is one of the leading countries in the Gulf Cooperation Council (GCC) region. In 2016, the Kingdom had one of the highest GDPs (USD646.4 billion) in the region and a per capita income, Purchasing Power Parity (PPP) of USD53,430.9. Geographically, a large part of the country is an arid desert region. The Kingdom witnesses extreme heat with temperatures reaching to around 50 degrees Celsius for much part of the year.

The economy of Saudi Arabia is largely dependent on the exports of oil that constitutes about 75% of budget revenues and 90% of export earnings. The Government of Saudi Arabia wants to make the Saudi economy less dependent on oil in the future. Presently, the private sector in Saudi Arabia accounts for around 40% of the Nominal GDP. In order to diversify its economy, the Government is planning to build new economic zones and speed up infrastructure development in the country. Along with that, growing residential and commercial construction sectors and expanding hospitality industry is fueling the construction industry. Also, Saudi Arabia imports a large part of its food requirement, which emphasizes the need for the establishment of extensive cold chain infrastructure in the country to maintain efficient storage and transportation of food.

All the above-mentioned factors lead to a growing demand for Heating, Ventilation, Air conditioning and Refrigeration (HVAC-R) systems across the country. Moreover, the Government of Saudi Arabia has implemented new rules to promote energy efficiency in the country, especially for HVAC-R systems which consume the largest share of electricity in the country. Thus, there is growing demand for more efficient cooling solutions from residential and commercial construction industry along with surging demand for the replacement of old cooling systems in the country. As a result, Saudi Arabia has emerged as one of the largest markets for indoor cooling and refrigeration.

The total market for HVAC-R systems in Saudi Arabia, which is estimated at USD2.98 billion in 2016, exhibited a **CAGR of 10.03% during 2012-2016**, and is forecast to grow at a **CAGR of 13.11% between 2017 and 2022**. The total HVAC-R market in Saudi Arabia represents close to 2% of the global HVAC-R market. Saudi Arabia is experiencing a growing demand for more efficient cooling systems as utilities represent close to one-third of per capita expenditure in the country.

Therefore, the lucrative market for cooling solutions in Saudi Arabia has attracted many of the top companies from across the globe to expand their operations in the Kingdom. The leading companies in the country are LG Shaker, Zamil, Samsung, Gree, Daikin among others. The central region of the country including the territories of Ha'il, Qasim and Riyadh represents more than a third of the HVAC-R market in Saudi Arabia, while the sparsely populated northern region (Jawf and Northern borders) represents approximately a tenth of the market in the country.

Thus, the Saudi market for HVAC-R systems is poised for strong growth in the future.

Thanks and Regards
Karan Chechi

Executive Summary

Executive Summary

Heating, Ventilation and Air Conditioning (HVAC) is an important industry across the globe, primarily led by growing construction and infrastructure industries in developing countries and growth of the tourism industry, globally. With shrinking fossil fuel reserves, increasing pollution in several developing economies and global accords such as the Paris Convention, numerous countries across the world are implementing energy efficiency measures which are further fueling growth in the HVAC market. The global HVAC market is estimated to be over USD146 billion in 2017, and is projected to cross USD200 billion by 2022 with a CAGR of 7.24%.

The market is segmented into direct expansion systems and centralized air conditioning systems. The direct expansion market, which constituted 75.68% of the total HVAC market in 2016 is forecast to hold a 75.53% share by 2022. This is primarily due to the, relatively, faster growth rate of centralized air conditioning systems, led by expanding commercial and industrial sector in emerging large economies such as India and China. The market is led by Daikin Systems, which accounted for a revenue share of over 10% in 2016, followed by UTC at around 8%.

The market for HVAC-R systems in Saudi Arabia is estimated to reach USD3.33 billion in 2017, backed by infrastructure and construction industry, though with sluggish growth, in the Kingdom. Other contributing factors include the country's hot and arid climate and the Government's efforts towards efficient use of energy. Growth in the commercial sector is being fueled by innovations such as district cooling technology and solar air conditioning systems, etc.

1.

Global HVAC Market

The global market for HVAC systems is estimated to be USD146.64 billion in 2017, and is projected to surpass USD200 Billion by 2022. Strong growth in the hospitality sector, emergence of new hotels and cafes across the world, product innovation and regulatory measures mandating the replacement of conventional cooling systems, global climate change accords such as the Paris Convention and increasing demand for cold chain infrastructure for storing and transporting perishable food items are some of the factors aiding global HVAC market

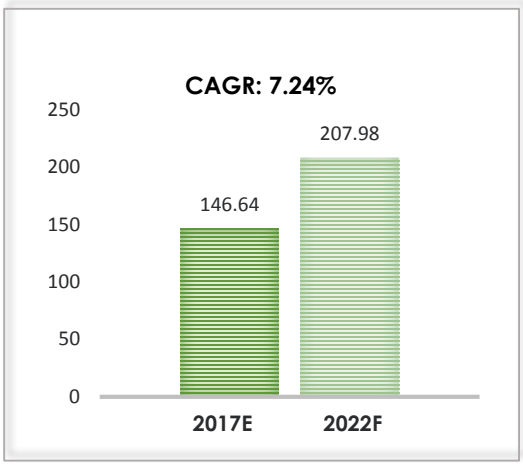


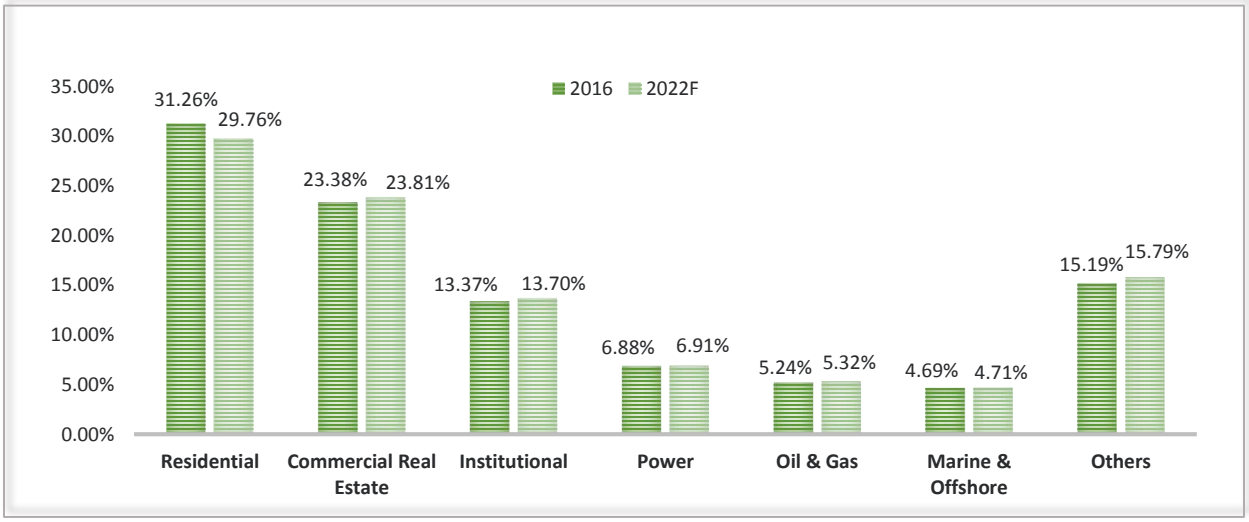
Figure 01:

Global HVAC Market Size
By Value, 2017E & 2022F (USD Billion)

Source: TechSci Research

Figure 02:

Global HVAC Market Share
By End Use Sector, By Value, 2016 & 2022F



Others include Automotive, Data centres, Cold Storages etc.
Source: TechSci Research

The expanding end-use industry of HVAC and refrigeration (HVAC-R) systems such as the construction industry and oil & gas industry, etc., coupled with increasing availability of energy efficient and smart technologies is also generating high demand for HVAC and refrigeration (HVAC-R) systems on a global level. Some of the other factors supporting growth include rising standard of living in developing economies and growing disposable income, thereby, making HVAC systems accessible to a larger chunk of the population. Also, commercial institutions such as schools and hospitals are rapidly adopting cooling technologies in developing nations across the globe. Moreover, the presence of cooling systems in these institutions has become important for attracting new admissions, thus further boosting demand for these systems.

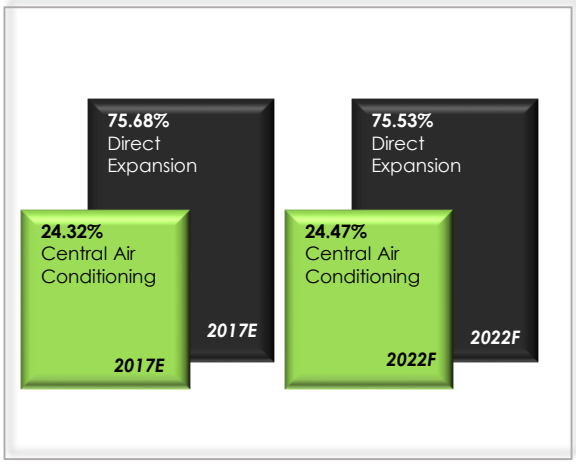


Figure 03:

Global HVAC Market Share,

By Product Type, By Value, 2017E & 2022F

Source: TechSci Research

In 2016, refrigeration accounted for close to 15% of the global HVAC-R market. Demand for regulating temperature has expanded from industries, large commercial buildings, and households. HVAC systems are gradually becoming more of a necessity rather than mere luxury products in countries across the Middle East & Africa (MEA) and Asia. Countries such as Saudi Arabia and the United Arab Emirates account for the major share of HVAC market in the MEA region, primarily due to perennial hot climates, growing population, developing infrastructure, urban development, etc. Moreover, Saudi Arabia is one of the world's largest markets for Indoor climate and refrigeration. Direct expansion systems constitute more than three fourths of the global HVAC market. These systems offer various advantages such as energy efficiency, lower running cost, easy availability and integration of latest technologies. Demand for direct expansion systems is supported by rising urban population, especially middle-class population and increasing construction activities, which are anticipated to contribute to the segment's market dominance during the forecast period. Growth in central air conditioning segment through 2022 is expected to be primarily led by strong industrial growth in developing economies. Daikin dominated the global HVAC market followed by UTC in global HVAC market during the same period. These companies offer a wide range of products, which are easily available due to their robust distribution network. The share of Daikin and UTC in the global HVAC market is projected to grow during the forecast period.

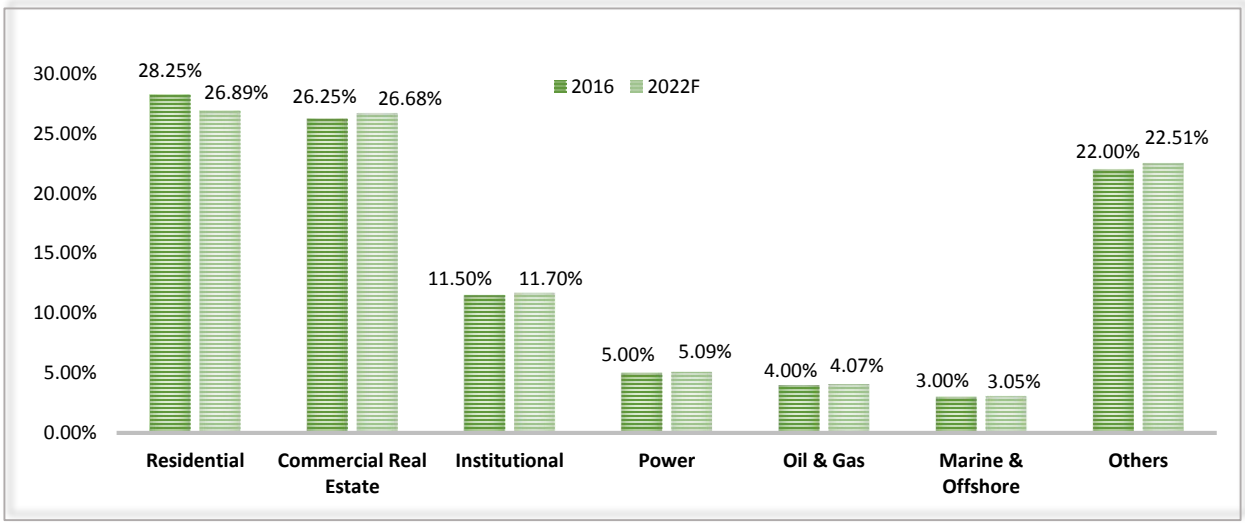
1.1 HVAC in Construction & Building

Construction sector is expanding across the world, especially in developing countries, due to increasing need for housing led by growing population in emerging economies. The global construction output is set to expand 85% to USD15.5 trillion by 2030, primarily led by the US and emerging economies such as China and India which are expected to account for 57% of the construction output. The construction output in India is set to grow twice as fast as China among developing countries till 2030. Globally, while there is a slowdown in Brazil and Russia, other markets like Indonesia are witnessing significant growth.

Meanwhile, in the GCC region, Saudi Arabia is emerging as a strong construction market due to the growing hospitality industry and religious tourism in the country. In a bid to diversify its economy, the government has initiated many construction projects, valued at around USD80 billion, which are set to be completed in the coming years. The projects include the construction of economic zones, metro rail projects, etc. These mega projects with huge investments are anticipated to increase the demand for HVAC systems in both commercial as well as residential sector in the next few years

Figure 04:

Saudi Arabia HVAC Market Share
By End Use Sector, By Value, 2016 & 2022F



Others: Automotive, Data centres, Cold Storage etc.
Source: TechSci Research

Saudi Arabia's King Abdullah Economic City (KAEC) is one of the most ambitious construction projects in the world. The plan is to create a city of two million people and one of the world's biggest deep-water ports.

Growth of Saudi HVAC market in commercial sector is mainly due to the technological upgradation and innovation such as district cooling technology, solar air conditioning systems and HVAC usage with new innovative techniques which is expected to fuel demand for commercial HVAC in Saudi Arabia. Companies such as Hitachi, Daikin and TVP Solar SA are launching new products and technologies supported by Saudi Standards, Meteorology and Quality Organization (SASO) regulation. **Some of the major commercial projects in Saudi Arabia are as follows:**

Project	Location	Project Status	Completion Date
Al-Diriyah Festival City	Riyadh	Approval Stage	Not Yet Decided
Jazan Economic City (JEC)	Jazan	Under Construction	2019
Pilgrim City (Dar Al-Hijrah)	Madinah	Under Construction	2018
5 Star Hotel – Al Shatea Al Gharbi	Dammam	Under Construction	2017
Commercial Buildings – Government Agencies Compound – North Riyadh (GAC Commercial Buildings)	Riyadh	Under Construction	2017
Courtyard Marriot Hotel – King Abdullah Road	Jeddah	Under Construction	2016

Source: TechSci Research

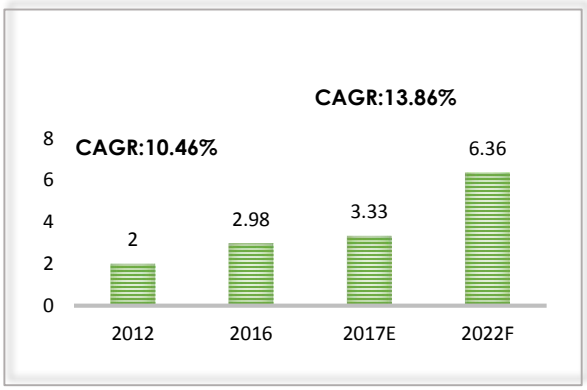
2.

Saudi Arabia HVAC-R Market

Saudi Arabia HVAC-R market is set to double from USD3.33 billion in 2017 to USD6.36 billion by 2022. There are many factors supporting this growth including rising population, upcoming residential and commercial projects in the country and new technological advancements in energy efficient air conditioning systems Meanwhile, the Saudi commercial sector is also expanding, owing to the Saudi Government's drive to diversify its economy. Around 80% of the urban population lives in three main cities in Saudi Arabia - Riyadh, Jeddah and Dammam. Due to this, demand for HVAC-R equipment is increasing at a robust pace, as more commercial and residential units are being set up to meet the demand for housing. Overall, Saudi Arabia contributes close to 2% of the global HVAC-R market.

Figure 05:

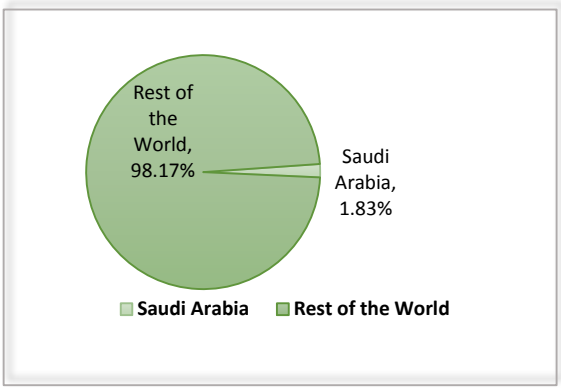
Saudi Arabia HVAC-R Market
By Value, 2012, 2016, 2017E & 2022F



Source: TechSci Research

Figure 06:

Figure 6: HVAC-R Market Share
By Global Vs. Saudi Arabia, By Value, 2016



Source: TechSci Research

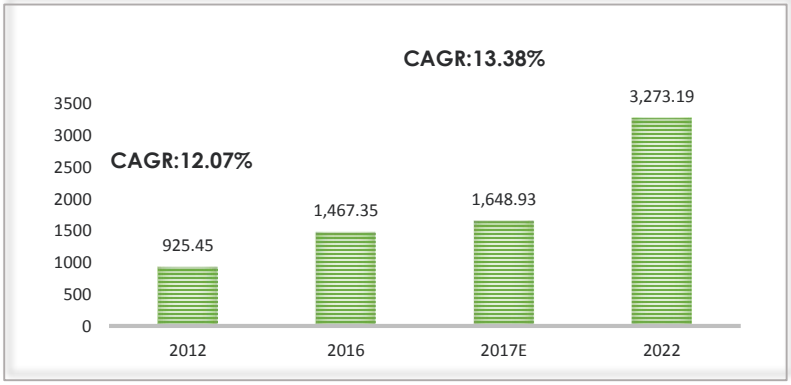
Other sectors such as travel & tourism have also been a major driving factor for the country's HVAC-R market. The latest figures released by World Travel and Tourism Council, indicate that the tourism sector contributed USD65.2 billion, which is 10.2% of total GDP in 2016, and this share is expected to increase by 2017. During religious holidays of Ramadan and Hajj, over 3 million pilgrims gather in Mecca and Medina to perform Hajj and Umrah pilgrimages.

With upcoming commercial projects such as airports, economic zones, high rise buildings etc., new developments such as luxury homes and villas in residential sector, there seems to be substantial opportunities for HVAC-R industry to grow significantly in Saudi Arabia.

Besides this, Saudi Arabia experiences extreme climatic conditions, with temperatures often shooting up to 50˚C during peak summer. Hence, the operation of HVAC-R equipment plays a major role in maintaining comforts of daily life. Moreover, the Saudi government has implemented new rules and regulations for using energy efficient HVAC systems. Consequently, the Saudi HVAC-R market is forecast to grow at a CAGR of around 13% during the forecast period.

Figure 07:

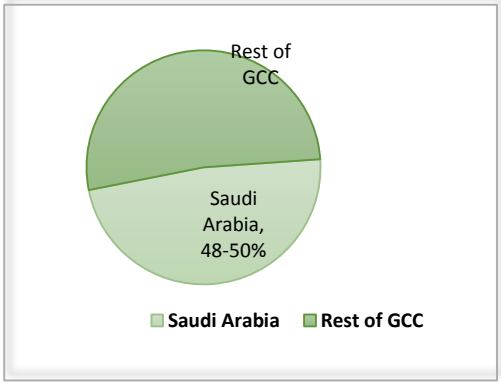
Saudi Arabia Refrigeration Market Size
By Value, 2012, 2016, 2017E & 2022F (USD Million)



Source: TechSci Research

Figure 08:

Saud Arabia HVAC-R Market Share
in Total GCC Market, By Value, 2016



Source: TechSci Research

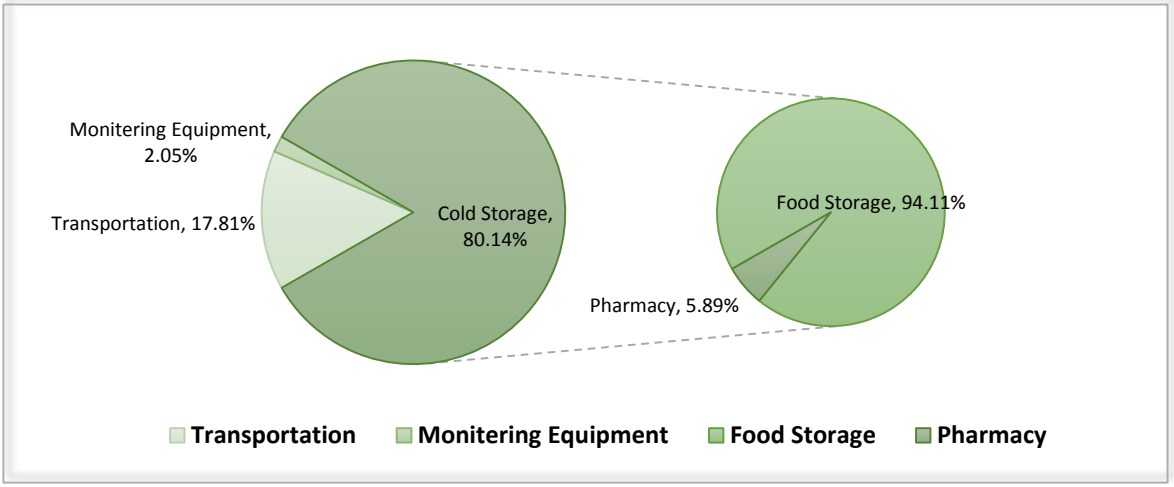
Saudi Arabia accounts for almost half the GCC HVAC-R market in 2016. This can be attributed to the facts like: Among all the GCC Countries, Saudi Arabia has the highest urban population and number of households which grew at around 2.5% during last year. Increase in tourist footfall during Hajj & Umrah and growth in construction of establishments to accommodate the tourists. Moreover, moderately growing retail selling space with entry of international brands coupled with increasing Commercial construction activities in the kingdom. Along with that, Saudi Arabia has embarked on aggressive infrastructure expansion to diversify its economy. This is having a strong effect for HVACR economy from the construction and infrastructure sector.

Riyadh, Jeddah, Dammam, and Mecca have emerged as the major demand generators in Saudi Arabia which have witnessed the highest adoption of HVAC-R systems across the country. This was primarily due to increasing demand for more energy efficient systems which can help in saving electricity and input costs.

Figure 09:

Saudi Arabia HVAC-R Market Share

By Refrigeration Industry & Cold Storage Applications, By Value, 2016



Source: TechSci Research

The cold storage application in the HVAC-R market of Saudi Arabia is largely segmented into cold storage and cold transportation. Both are part of maintaining the cold chain. The cold storage market of Saudi Arabia is dominated by food storage, which accounted for a value share of 94.11% in 2016, while the remaining share of 5.89% was constituted by pharmaceutical cold storage.

The food storage application majorly includes storage of food products such as milk, meat, vegetables, fruits, etc., in warehouses, major food stores, grocery stores, etc. As the country largely depends on the import of food products from other countries, these food items are required to be stored at a proper temperature for keeping them safe and consumable for a longer period. Furthermore, the demand for healthy and hygienic food products is also gaining momentum across Saudi Arabia. HVAC-R systems provide a suitable temperature for the prolonged sustenance of food products.

On the other hand, demand for cold transportation in the country has also fueled the HVAC-R market in recent years. As the need for the transportation of food products, pharmaceuticals, etc., is growing, demand for cold transportation in the country is also increasing, as the products need to be transported through heat waves and extreme temperature conditions. Medicines, meats, fruits, and several other products need transportation under maintained temperature and restricted environment, thereby aiding demand for cold transportation in the country.

3.

Regulatory & Policy Framework

The energy efficiency rating (EER) is used for labelling products. The cooling capacity for air conditioners at different test conditions should be less than or equal to 70000 BTU/h (20000W).

Saudi Arabia EER and Star Ratings for Air Conditioners, 2015

EER Limits (Tested Value) (Btu/h)/w at T1	Star Rating
EER ≥ 18.1	10
18.1 > EER ≥ 16.8	9.5
16.8 > EER ≥ 15.6	9
15.6 > EER ≥ 14.5	8.5
14.5 > EER ≥ 13.4	8
13.4 > EER ≥ 12.4	7.5
12.4 > EER ≥ 11.5	7
11.5 > EER ≥ 10	6
10 > EER ≥ 9.7	5

Source: Saudi Standards, Metrology and Quality Organization

*star Rating must be applied starting from 3 stars and above.

Energy Efficiency Ratio (EER) defines the application of the Minimum Energy Performance Standard (MEPS) value for air conditioners as this value must be equal to or greater than the former while calculating the cooling capacity under test conditions. The latest energy efficiency standards set up by the Saudi Standards, Metrology and Quality organization in May 2014 under the regulation SASO 2663/2012 standard.

Saudi Arabia Mandatory Energy Efficiency Ratio, 2015

Air Conditioner Appliance Type	Cooling Capacity Limit (CC) (Btu/h)	Mandatory EER (Btu/h)/watt Phase 1: 7 September 2014		Mandatory EER (Btu/h)/watt Phase 2: 1 January 2015	
	At testing conditions T1 (35°C)	T1 (35°C)	T3 (46°C)	T1 (35°C)	T3 (46°C)
Window Type	CC<=18,000	8.5	6.12	9.8	7.06
	18,000 <CC<= 24,000	8.5	6.12	9.7	6.98
	24,000 <CC<=70000	8.5	6.12	8.5	6.12
Split Type and Other Types	CC<=70000	9.5	6.84	11.5	8.28

Source: Saudi Standards, Metrology and Quality Organization

Rules that Companies should follow for EER Labelling:

- ✓ The companies that have not been issued certificates as per the new standard were allowed to use their EER labels till 6th September, 2013.
- ✓ Companies that had been issued the new EER certificates could use their EER Labels as per the expiry date mentioned in the certificate at no additional charge.
- ✓ The validity for EER Labels certificates/license was decreased from a period of 2 years to 1 year.
- ✓ The testing reports were mandated to be issued from an accredited laboratory according to ISO 17025 within the scope of EER testing.
- ✓ A safety test report must be part of the application documents for EER label approval.
- ✓ There were 13 insulation standards issued by SASO which covered 10 insulation products in 2015 which are as follows: Extruded Polystyrene, Expanded Rigid Polystyrene, Spray-applied polyurethane foam, Rigid polyisocyanurate (PIR), Polyurethane (PUR), Mineral wool, Rock wool, Cellular glass (CG), Perlite Loose Fill Insulation and Vermiculite Loose Fill Insulation.
- ✓ Recently SASO is in the process of developing standards for some secondary insulation products.
- ✓ ISO 14001 standard addresses various aspects of environmental management. The standard provides tools for organizations, including air conditioner manufacturers to identify and control their operational impact on the environment.

List of Approved SASO Insulation Standards, 2015

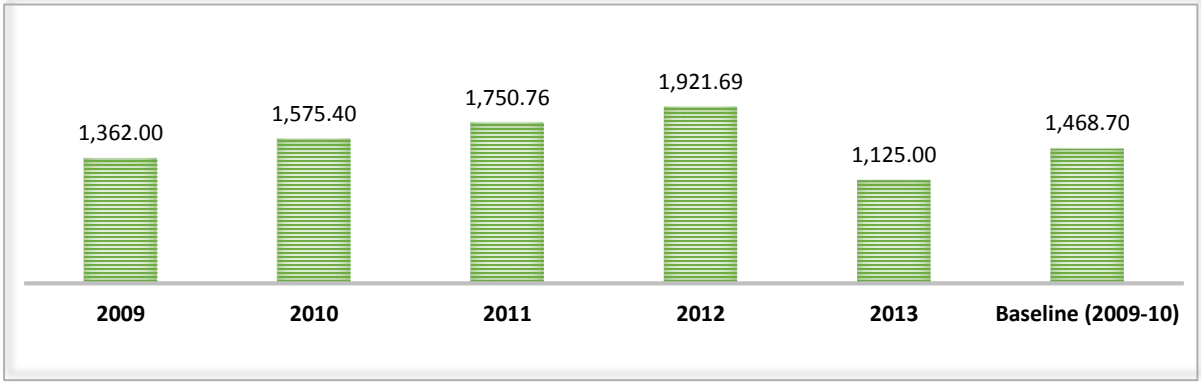
SASO Standards	Insulation Materials
SASO ASTM C-578:2014	Rigid, Cellular Polystyrene
SASO-GSO-ISO-8873-1/2:2009	Spray-applied polyurethane foam
SASO-GSO-BS-4841-1/2/3/4/5/6:2010	Rigid polyisocyanurate (PIR) Polyurethane (PUR)
SASO-GSO-EN-13162:2012	Mineral wool
SASO- EN-13167:2012	Cellular glass (CG)
SASO-ASTM C-549 :2007	Perlite Loose Fill Insulation
SASO-ASTM C-516 :2007	Vermiculite Loose Fill Insulation

Source: Saudi Standards, Metrology and Quality Organization

- ✓ ISO 18001 is an international occupational health and safety management system specification. The standard is intended to help organizations in addressing and controlling occupational, health and safety risks.
- ✓ SASO is on its way to obtain an international accreditation in ISO 14001 Environmental Management Systems certification.

Figure 10:

Saudi Arabia HCFC Consumption, 2009-2013 (ODP Tones)



Source: United Nations Environment Programme

4.

HVAC-R Market Dynamics

4.1 Market Drivers

1. Growing Building Automation & Control Systems Market

Building automation systems, also referred to as smart building or intelligent building, is a distributed control system which is specially designed to control and monitor the security, mechanical, HVAC, and humidity control systems in a building. The complete control of the building and the entire facility is autonomous which is the major purpose of building automation systems.

Growing trend of implementing stringent rules and regulations by the Government across Saudi Arabia to increase energy efficiency in construction industry is anticipated to boost the HVAC-R market during the forecast period. Also, increasing awareness about the safety and security at workplaces, and growing consumer interest towards smart & green buildings is fueling the growth of building automation system market, which in turn is contributing to increasing demand for HVAC-R systems in smart buildings.

For instance, Zamil ITG initiated a pilot project in 2016 to make Zamil Industrial's HVAC products "Smart" by connecting chillers to the internet using an "Internet of Things" platform that enables the prediction of situations from accumulated data and provides automated alarms for service and maintenance, over time and facilitate new services. In addition, Smart Mobile App development has become part of the Zamil ITG portfolio and new initiatives have been taken for Apps that will facilitate real-time engagement.

2. Extreme Climatic Conditions

Saudi Arabia experiences extreme climatic conditions, i.e. very high temperature during the day and a sudden fall in temperature during the night. Moreover, annual rainfall in Saudi Arabia is very less and humidity levels are very high. In summers, temperature reaches 53°C, while in winters maximum daytime temperature is around 20°C.

As a result, climatic conditions are driving the market for HVAC-R systems in the country. Thus, the demand for commercial refrigeration systems, especially, from the cold chain and industrial sector is booming. Saudi Arabia is one of the world's largest markets in terms of imports volume. Moreover, growing demand for refrigeration systems with eco-friendly technologies, particularly Hydro Chloro Flouro Carbon (HCFC) - free refrigerants such as R134A and R410A, which are energy efficient as well as eco-friendly, is a major trend being witnessed in the refrigeration market of Saudi Arabia.

The replacement market of HCFC - free refrigerants is further contributing towards growing refrigeration market in the country.

Saudi Arabia Average Monthly Temperature, 2012-2015 (Degree Celsius)

Month	Temperature	Month	Temperature
January	15.92	July	33.42
February	18.28	August	33.79
March	21.10	September	31.38
April	25.76	October	26.84
May	30.49	November	21.78
June	32.85	December	17.30

Source: World Bank

3. Rising Demand for Replacement and Retrofitting Activities from Construction Industry

Over the years, Saudi Arabia has been focusing on the construction and service sectors. According to MEED projects, total value of construction projects across the GCC was USD2.7 trillion in 2016, with Saudi Arabia leading the lot with USD1.1 trillion worth of construction projects.

Growing focus on sustainability across the country has resulted in the adoption of various energy consumption trends to suit the high levels of power demand resulting from extremely high temperatures.

Saudi Arabia's GDP stood at around USD646.4 billion in 2016, making the country one of the largest economies in the Middle East and North Africa (MENA) region. Over the last 5-10 years, the country hopes to implement various regulations, as well as financial and tax incentives in order to attract investors from across the globe. Factors such as huge oil reserves and low energy prices make Saudi Arabia an ideal location for projects that depend on high energy consumption.

Saudi Arabia Ongoing Prominent Projects, By Location, By Year of Completion and Project Value

S.No.	Name of the Project	Location	Expected Year of Completion	Project Value (USD Billion)
1.	Sudair City Development	Sudair	2029	40
2.	Jazan Economic City (JEC)	Jazan	2036	27
3.	Prince Abdulaziz Bin Mousaed Economic City	Hail	2025	8
4.	Abraj Kudai Towers	Makkah	2019	3.5
5.	Jabal Omar Development	Makkah	2020	2.7
6.	Jeddah Gate Development	Jaddah	2020	1.6
7.	Waad Al Shamaal Phosphate City Development	Shamaal	2022	7.5
8.	Shuqaiq Steam Power Plant	Shuqaiq	2018	3.3
9.	King Abdullah bin Abdulaziz Medical City	Riyadh	2020	6.8
10.	National Railway Network	Riyadh and Dammam	2040	97
11.	Jeddah Public Transportation Program	Jeddah	2033	35
12.	King Abdulaziz International Airport (KAIA) Expansion	Jeddah	2035	28

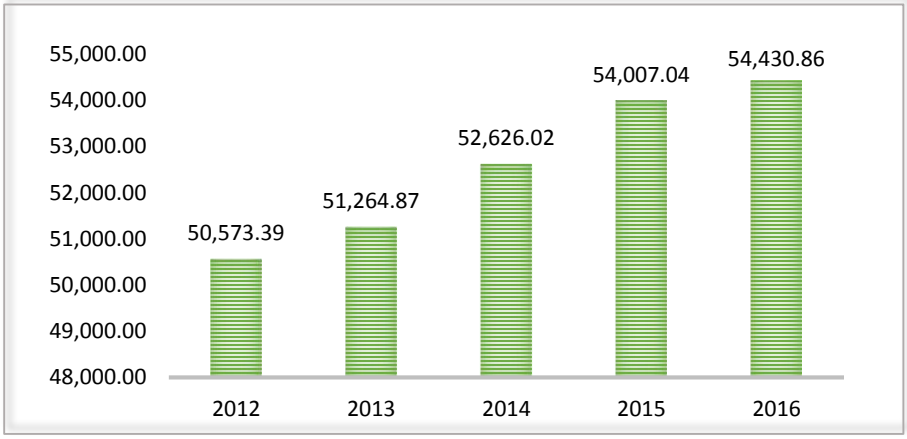
Source: TechSci Research

4. Increasing Demand for Frozen Food

High dependency on import of food items coupled with growing population in Saudi Arabia is increasing the demand for frozen food products keeping in mind convenience and time-saving aspects associated with these food items. As a result, demand for HVAC-R for the cold storage of food products such as frozen meat & poultry, snacks products, fruits & vegetables, etc., would also grow in the coming years.

Figure 11:

Saudi Arabia GDP Per Capita, PPP, 2012-2016 (USD)



Source: World Bank

4.2 Market Challenges

1. Challenge: Rising Health Concerns associated with Frozen Foods

Although frozen foods offer a convenient food option, excessive consumption of frozen food, especially frozen snacks, leads to various problems such as high blood pressure and heart and kidney disorders. Increasing dependence of people, especially youngsters and working couples on such food items may prove to be harmful to their health in the long run. Added preservatives also make food unfit for intake, specifically for those suffering from obesity, diabetes and heart diseases.

Added colors and preservatives are responsible for kidney failures, especially in younger people. Further, frozen vegetables and fruits are deficient in Vitamin B and C, and levels of polyphenolic substances are lower in frozen food items in comparison to fresh food products. Polyphenolic substance serves as antioxidants, protect cells from damage.

Frozen foods contain high levels of Sodium. which can increase the risk of high blood pressure and heart disease. As per dietary guidelines, a human body should not consume more than 2,300 mg of sodium daily and people who are more than 40 years old should not consume more than 1,500 mg daily. Rising awareness about the disadvantages of additives and preservatives present in frozen food items are challenging the growth of Saudi Arabia frozen food market, thereby directly affecting the HVAC-R market in the country.

2. Challenge: Energy Efficiency Regulations

HVAC-R systems are the biggest feeders of energy, and the biggest contributors to global warming. Hence, it comes as no surprise that the local governments of the Middle East and North Africa region are regulating the power usage by built structures.

As is prevalent throughout the Globe these days, Saudi Arabia is also working to decrease its electricity requirements by the introduction of new energy efficiency standards and labels. It aims.

to reduce its energy consumption over the next 20 years. Institutions such as the Saudi Energy Efficiency center which are developing new standards for air conditioners which have been enforced since 2014. Energy consumption is growing faster than GDP in Saudi Arabia, leading to an increase in the total energy requirement. The reason for this development is that the country's development is completely based on energy-intensive industries, as well as on electricity-intensive lifestyles.

5.

Emerging Trends & Developments

5.1 Adoption of Green Technology

Technology is changing in every field, and HVAC-R systems are no different. HVAC-R systems are power hungry, so there are cutting-edge and innovative green technologies that are coming to the fore to change the future of HVAC-R.

Shift towards green technology is one of the key trends upcoming in the Saudi Arabia HVAC-R market. With the advent of hybrid systems and non-polluting refrigerants, end users and HVAC-R vendors are shifting towards green technology. HVAC-R manufacturers are developing new cooling equipment, which is compatible with eco-friendly refrigerants such as R32.

The generalization of Green Technologies throughout the commercial ecosystem will bring the maintenance at par with the latest systems which will build consumer confidence in installing green technology based HVAC-R equipment. The newer Buildings designed using green technologies are bound to be resource-efficient throughout their lifecycle, covering design, operation, renovation, maintenance, and demolition. Generally the cost of running a green building is comparatively higher ng its construction, the long-term cost benefits associated with it and its contribution to the rise in the overall value of the building is the factor bolstering its adoption in the commercial construction market.

5.2 Rising Demand for Ready-to-eat Food

Consumption preferences in Saudi Arabia are primarily shaped by the young population in the country, as young people are more inclined towards western culture and trying to incorporate that in their everyday lives, including food and drink habits. Young housewives in Saudi and expatriate families in urban areas are increasingly incorporating Mexican, Chinese, American, South Asian, Turkish and Lebanese cuisine into their cooking to provide a variety for their children.

Growth in quick-service restaurants and retail chains, increasing population of working women, millennial population, and busy work schedules are the key factors increasing awareness about the ready-to-eat products among consumers. In Saudi Arabia food market, meat/poultry segment is anticipated to account for the largest value share, which is further expected to boost demand for HVAC-R systems in the country's cold storage industry.

5.3 Increasing Adoption of Inorganic Refrigerants

Given the high temperatures in Saudi Arabia, it becomes pertinent that cold chain must be maintained while transportation and storage of food. Besides this it plays a significant role in many other industries such as pharmaceutical, natural gas production and chemicals.

Inorganic refrigerants consist of inorganic compounds which do not contain a carbon-hydrogen bond and are used primarily as refrigerants such as R718, 717, and 744. Majority of these refrigerants are non-toxic, environment friendly, inexpensive and non-flammable.

Demand for major applications of inorganic refrigerants such as commercial refrigerants, transportation refrigerants, industrial refrigerants, chillers & hydronic heat pumps, etc., is increasing due to high demand for cooling products such as refrigerators.

5.4 Technological Advancements in VRF

VRF is a technology that offers lower lifecycle costs and minimizes efficiency losses compared to traditional cooling systems. It could provide a sustainable solution to increasing concerns about growing demand for electricity and energy efficiency.

VRF is growing more popular as the everyday technology. It boasts of many advantages such as higher energy efficiency, better comfort levels Recent advances in VRF technology deliver ever-increasing efficiency, comfort levels, versatile usage and quieter operation. Along with this they have lower lifecycle costs and their advanced yet simple design enables improved energy efficiency by matching cooling loads independently in different zones.

The benefits of VRF technology will naturally open the door for the move into “everyday” spaces and buildings. This technology is becoming more prevalent through all levels of building sophistication. It gains in terms of inverter driven energy savings, flexibility in design and installation, and individual-zoned comfort are certainly some of the factors that will be driving the mainstream adoption of this technology.

A popular trend in eastern markets, variable refrigerant flow (VRF) is the future of the HVAC industry. VRF systems are establishing their place as in-demand items for housing and commercial cooling needs. The result is reduced energy consumption and more consistent temperature control. As the HVAC industry evolves, demand for VRF systems grows, ushering in a new technological standard. The shift will stimulate HVAC-R sector that will continue well into the coming years.

6.

Case Study

Case Study 1

The King Abdulaziz Centre for World Culture is a bold new initiative funded by oil company Saudi Aramco to promote cultural development within the Kingdom of Saudi Arabia. The structure located in Dhahran in the Eastern Province will provide for a wide range of cultural activities and include facilities such as a document archive, library, learning center, art and history museum, and performing arts facility. Air Enterprises, which had the responsibility of developing the engineering and design for the HVAC system, also received the opportunity to provide HVAC solutions. The company had to come up with a solution which would cater to the HVAC requirements of the different sections of the structure, keeping energy efficiency and product lifespan in mind while considering the extreme climatic conditions in the country.

The company utilized the thermal energy recovery wheel to treat the air, which utilizes rotating honeycomb-shaped air pockets to absorb and dissipate heat from the outside air, cooling it and reducing the humidity before introducing it to the air conditioning system, where it undergoes final cooling and conditioning before entering the building's occupied space. This addresses the problem of maintaining air quality in the structure while conserving energy. Air Enterprises further addressed the problem by fabricating its components in aluminum, which does not rust and corrode. However, constant maintenance and care will be required for the parts installed as the vigorous temperature and humidity shift can warp the metal, leading to leakage and building control issues.

Air Enterprises finished the shipment of the final material to the country in September 2013 and began the supervision of on-site construction in October 2013. The final results are expected to yield a harmonized result as all the factors have been taken into consideration while designing and installing the HVAC systems. The structure is expected to be opened in 2018.

Case Study 2

Saudi Arabia is majorly an oil & natural gas economy, with more than 50% of its economy being driven by oil, catering to the energy requirements as well. The HVAC systems account for 70% of the energy expenditure in Saudi Arabia, which has led to the requirement of energy efficient technology solutions which can operate in the harsh climatic conditions of Kingdom of Saudi Arabia.

In 2010, Al Salem Johnson Controls bagged a project for installing air conditioning systems in the holy mosques of Makkah and Madinah. The contract included the purchase of 27 centrifugal air conditioners with a total cooling capacity of 135,000 tons of refrigeration using R134A refrigerant, making it one of the biggest HVAC projects in the world. The company had to be quite sustainable and efficient in implementing the project as air conditioning industry is one of the largest energy consumers in Saudi Arabia. The peak electricity demand of Saudi Arabia in 2016 was around 55GW and is projected to cross 120 GW by 2032. To curb this problem, the company also proposed the implementation of E-Coated Microchannel Condensers on chiller systems to help increase the efficiency and save energy in the high ambient conditions of the country.

Energy sustainability played a key role in the project as it also includes the installation of the largest chiller set-up in the Kingdom. Moreover, Al Salem is focusing to cooperate with the Government on Vision 2030, which will create avenues for new energy-saving technologies in Saudi Arabia HVAC-R industry.

7.

Way Forward

Way Forward

In many countries in the GCC region including Saudi Arabia, the residential, commercial, hospitality and retail sectors will continue to generate demand for HVAC-R. Moreover, with the Government of Saudi Arabia focusing on diversifying the economy away from oil, its focus on services and industry is growing. This is expected to spur demand in the construction industry, thereby strengthening the Saudi HVAC-R industry. Also, the country has one of the highest population growth rate (2.2%) among the GCC countries, and the urban population is concentrated in the three key cities of Riyadh, Jeddah and Dammam. These centers are anticipated to generate huge demand for HVAC-R systems in the coming years. Also, with modern day phenomena like Global Warming and global accords like the Paris Convention on sustainability of environment, focus on energy efficient HVAC-R is set to expand, which would encourage the HVAC-R companies to focus on the research & development of new technologies.

This is expected to have a role over effect on the economy and further spur demand from retail customers. A case in point is that of LG appliances, which has developed innovations like its 'Multi-V' line of ACs which can operate in temperatures up to 54 degrees Celsius, making it ideal for the Gulf region. For the coastal areas, the company has developed a corrosion free line which can cope with high salinity ocean air. Besides this, there are ambitious plans from the Government of KSA to build a mega city called 'NEOM' connecting Jordan and Egypt with an area of 10,230 square miles being entirely run on renewable energy. There are many other mega projects underway in KSA. This will continue to sustain a higher growth rate for the HVAC-R industry in the future years. Also, as Saudi Government diversifies its revenue sources, pressure on HVAC-R companies to come up with energy efficient new technologies will grow as they try to remain competitive. Thus, the companies should invest in becoming future ready and set up strong R&D bases. The companies are also recommended to increase their manufacturing capacities in the country, with the centers of production situated close to the main population centers.

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HVACR Expo Saudi is Saudi Arabia's largest dedicated indoor climate and refrigeration event. An unmissable platform for HVAC&R industry professionals to network, do business and discover new technologies and trends, HVACR Expo Saudi brings together the most innovative HVAC&R solutions and equipment from local and international manufacturers. More than just an exhibition, the event offers a broad education agenda featuring free to attend and CPD-certified workshops curated by trusted regional experts sharing their insight into some of the industry's most pressing issues.

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