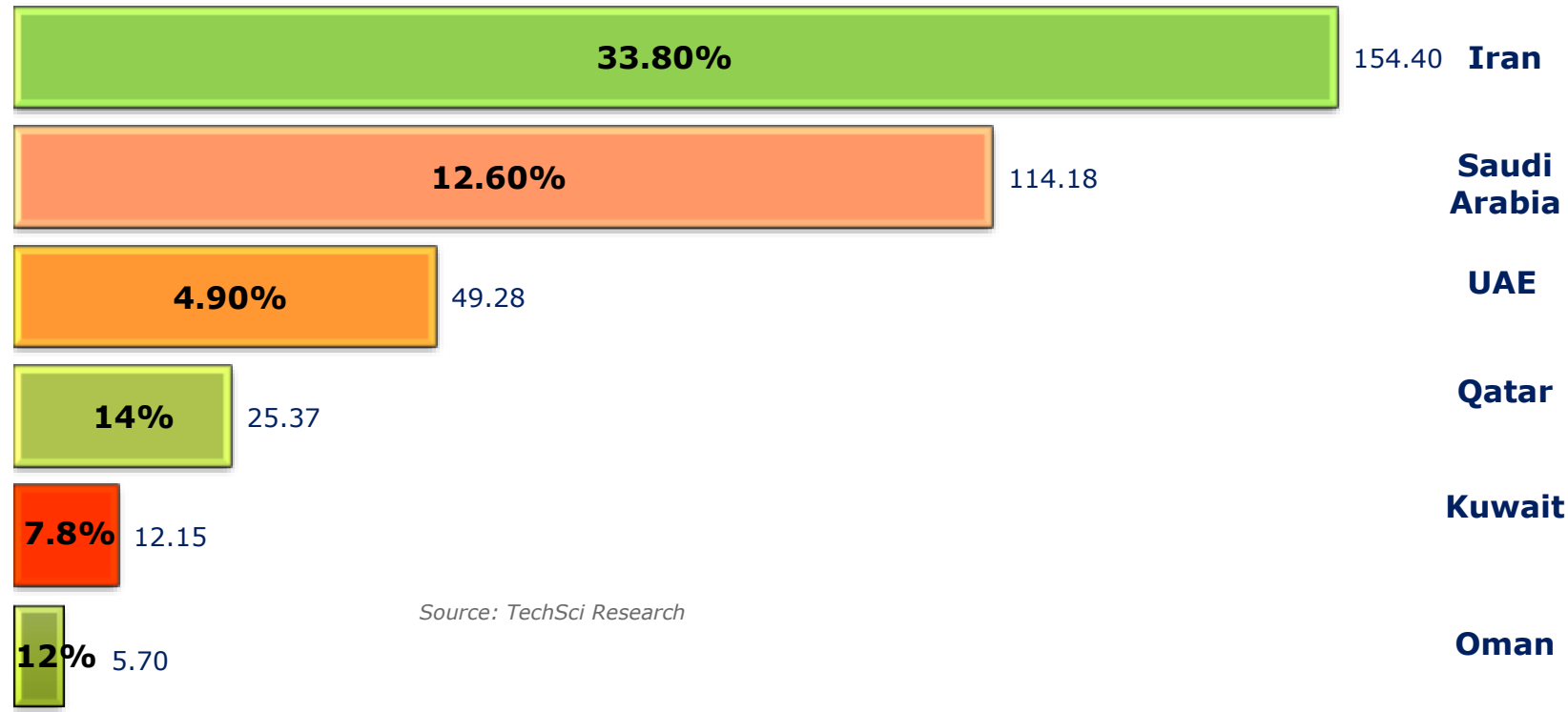
Middle East Construction Sector Overview

TechSci Research

Middle East Construction Sector Overview

Anticipated increase in the crude oil prices through 2018 coupled with upcoming mega events such as Dubai's Expo, 2020 in the UAE and FIFA World Cup, 2022 in Qatar, is anticipated to boost the region's economy, thereby aiding the recovery of construction market in the coming years.

Middle East Construction Sector Market Size 2016E (USD Billion) & CAGR 2008-2015 (%)



Source: TechSci Research

Middle East Construction Sector Overview

GCC Planned and Underway Projects in Various Sectors, By Value, 2015 (USD Million)

KSA (USD Million)

Chemical	64,916
Construction	475,218
Gas	25,402
Industrial	28,717
Oil	23,409
Power	332,305
Transport	217,569
Water	36,035

Source: TechSci Research

UAE (USD Million)

Chemical	24,809
Construction	539,793
Gas	21,083
Industrial	8,996
Oil	50,899
Power	35,055
Transport	99,226
Water	6,253

Source: TechSci Research

Qatar (USD Million)

Chemical	1,484
Construction	139,843
Gas	12,889
Industrial	970
Oil	16,559
Power	8,785
Transport	103,083
Water	16,098

Source: TechSci Research

Middle East Construction Sector Overview

GCC Planned and Underway Projects in Various Sectors, By Value, 2015 (USD Million) Contd.

Kuwait (USD Million)

Chemical	565
Construction	80,080
Gas	11,848
Industrial	250
Oil	55,188
Power	29,019
Transport	46,876
Water	8,732

Oman (USD Million)

Chemical	15,450
Construction	43,160
Gas	25,712
Industrial	12,179
Oil	14,659
Power	9,039
Transport	36,506
Water	6,860

Bahrain (USD Million)

Chemical	5,000
Construction	30,967
Gas	1,258
Industrial	4,656
Oil	5,025
Power	6,148
Transport	11,050
Water	1,778

Source: TechSci Research

Source: TechSci Research

Middle East Construction Sector Overview

GCC Construction Projects Awarded during 2008-2015, By Value (USD Million)

Source: TechSci Research

- ✓ During 2011-2014, the construction sector in the major Middle Eastern economies accounted for around 5% of their national GDPs, with the exception of Kuwait, where construction sector accounts for about 2% of the country's GDP.
- ✓ Within MENA, the construction sector in Iran witnessed the fastest growth of more than 33% during 2008-2015.
- ✓ Despite the high costs and extensive construction permit procedure in the country, Iranian construction sector exhibited a remarkable double-digit growth between 2011 and 2014, exhibiting a CAGR of 39% during the same period.

- Increasing number of public private partnership (PPP) projects is expected to boost investments in the construction sector in the coming years.
- For instance, Saudi Arabia has awarded Ta'if International Airport construction project, with a capacity to handle 5 million passengers per annum in 2016 under the PPP model.
- The construction sector in Saudi Arabia has been growing at a robust pace over the last few years. The country allocated USD43.8 billion for strengthening its transport, telecommunications, water, agriculture and other related infrastructure.
- The country's government has announced various mega construction investments that are expected to come up in the coming years and are valued at an estimated USD800 billion.

Contribution of Construction Sector to GDPs of Major Middle East Countries

Country	Percentage Share of Construction Sector in GDP				
	2011	2012	2013	2014	2021F
Bahrain	6.1%	6.0%	5.9%	6.3%	6.7%
Iran	7.6%	7.9%	9.8%	9.2%	10.1%
Kuwait	2.3%	1.7%	1.8%	2.1%	2.2%
Oman	5.2%	5.7%	5.2%	6.2%	6.6%
Qatar	4.6%	4.4%	5.2%	5.7%	6.1%
Saudi Arabia	4.3%	4.3%	4.8%	5.5%	6.1%
United Arab Emirates	9.5%	8.8%	8.8%	9.0%	9.8%

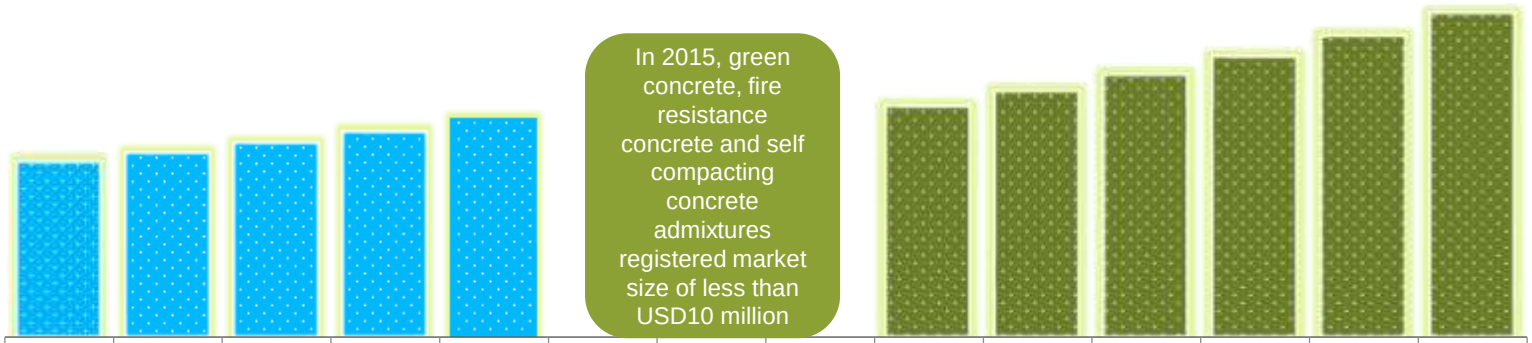
Source: TechSci Research

Middle East Concrete Market Overview

TechSci Research

Middle East Concrete Admixtures Market Overview

Middle East Concrete Admixtures Market Size, By Value, 2011-2021F (USD Million)



In 2015, green concrete, fire resistance concrete and self compacting concrete admixtures registered market size of less than USD10 million

By 2021, the market size of green concrete, fire resistance concrete and self compacting concrete admixtures is expected to surpass USD25 million mark

	2011	2012	2013	2014	2015				2016E	2017F	2018F	2019F	2020F	2021F
Value	754.38	795.09	838.23	883.53	935.95				993.26	1057.06	1128.11	1207.32	1295.71	1394.45

Source: TechSci Research

- Large investments towards construction of residential set-ups and infrastructure projects across the Middle East region, both by the government and private sector, is boosting consumption of construction chemicals.

- Active participation of the private sector in conjugation with advancing economic diversification in the Middle East is expected to steer the growth of construction industry in the coming years, thereby driving the demand for construction chemicals.

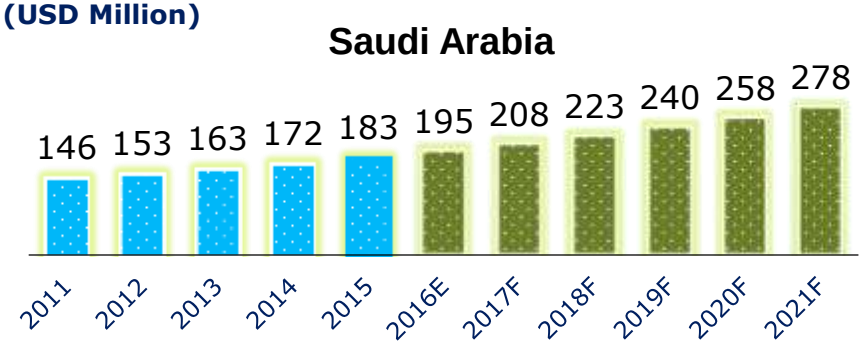
- Various Middle Eastern countries such as Saudi Arabia are focusing on privatization of government services, in order to attract FDI and increase private sector participation for construction projects in healthcare, housing, finance and energy sectors.

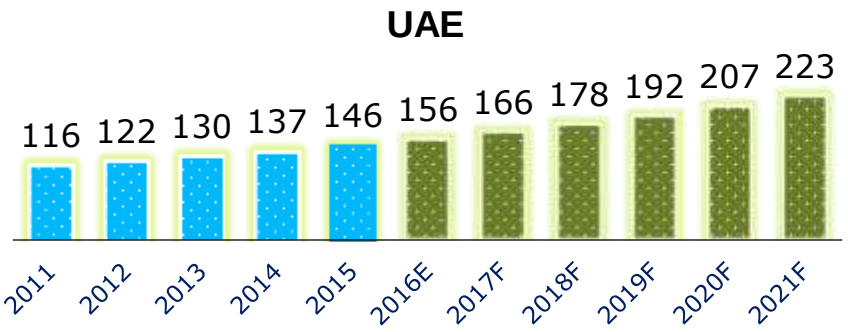
- UAE, the most diversified economy in the GCC region, has made most of its investments in Dubai. Expansion of Atlantis Hotel on the Palm Jumeirah and the Creek Harbour development are the two largest projects in Dubai awarded in 2016.

Middle East Concrete Admixtures Market Overview

Middle East Concrete Admixtures Market Size, By Major Countries, By Value, 2011-2021F

(USD Million)





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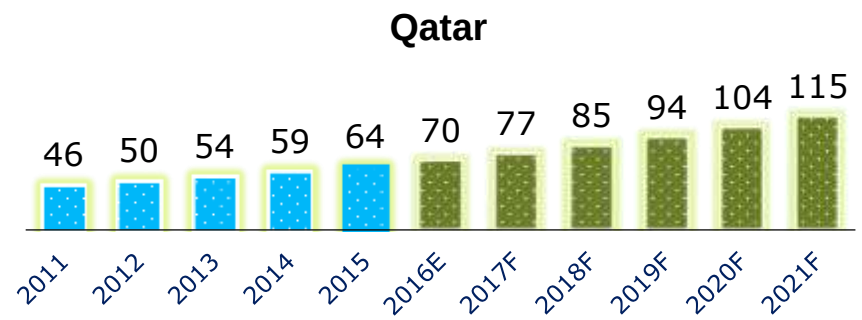
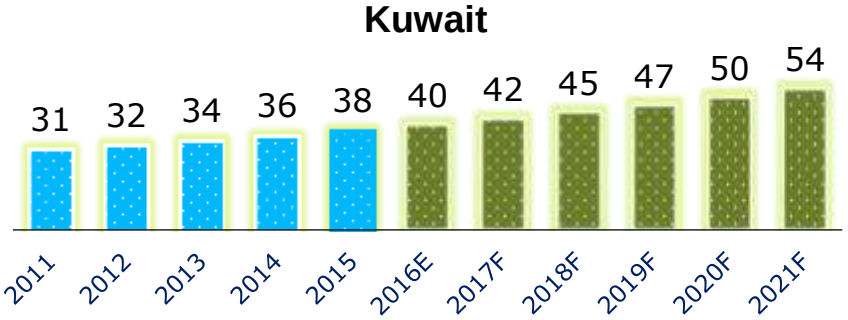
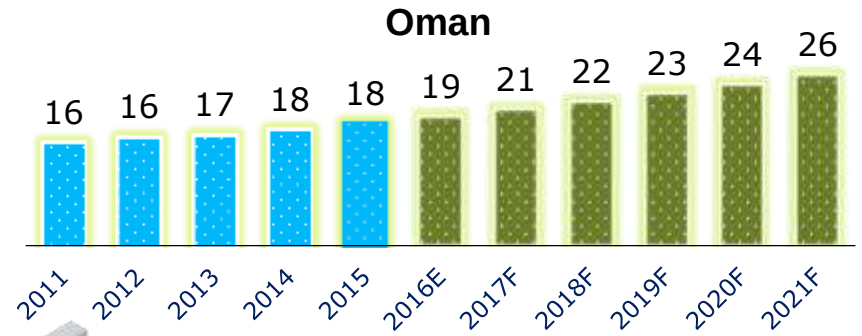
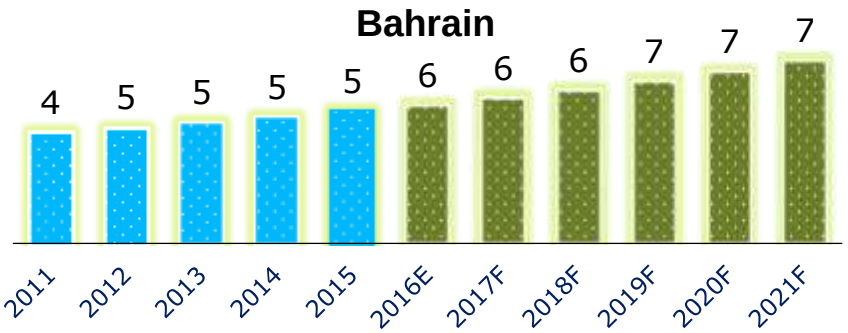




Source: TechSci Research





Source: TechSci Research

Green Compacting Concrete Potential and Application in Middle East Market

TechSci Research

1. Green Concrete - Product Overview
2. Green Concrete - Raw Materials
3. Green Concrete – Raw Material Pricing Analysis
4. Green Concrete Advantages
5. Green Concrete End Users
6. Industry Trends

Source: TechSci Research

Green Concrete- Product Overview

Concrete which is made from **concrete** wastes that are eco-friendly is called as "**Green concrete**"

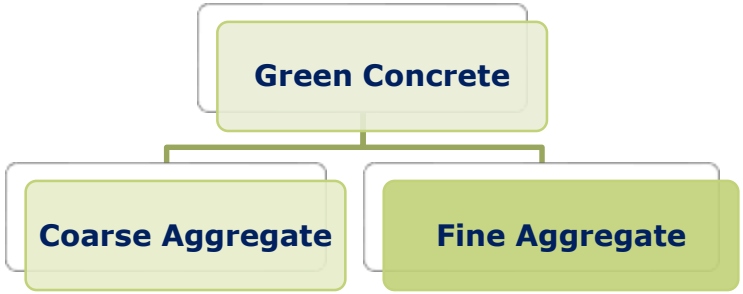
"Green concrete is a partial or complete replacement for cement manufactured from eco-friendly waste or residual products."

Driving Demand for Green Concrete

- Shifting inclination from synthetic based chemicals towards eco friendly products in construction industry is anticipated to augment the region's green concrete market
- The ability of green concrete to protect the buildings from pollution and acid rain is driving the demand for green concrete in the region
- Increasing focus towards sustainable development is creating lucrative market opportunities for green building materials
- The governments in Middle East region is focussing towards long-lasting and cost-effective construction

Source: TechSci Research

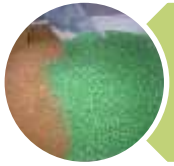
Green Concrete- Raw Materials



Fresh Local Aggregate

Manufactured Sand

Recycled Demolition Waste Aggregate



Recycled Glass Aggregate

Recycled Concrete Material

Fine Blast Furnace Slag

Blast Furnace Slag

Fly Ash

Advantages of Raw Materials

- ✓ *All the raw materials are recyclable and reusable*
- ✓ *Low production cost is attributed to economical prices of raw materials*
- ✓ *Easy accessibility to the raw material reduces the logistics cost*

Source: TechSci Research

Green Concrete- Raw Materials of Cement

Ground Granulated Blast Slag (GGBS)	Fly Ash	Silica Fume	Fiber Glass
• By-product of Steel Industry • Partial Substitute of Portland Cement • Can replace 80% cement	• By-product of coal based power plants • Able to replace 25% to 55% cement in concrete mix	• By-product of silicon alloy production • Can substitute 10% Portland cement in concrete mix	• Composed of fine fibers of glass • Fiber glass is mixed in small proportion (0.1% to 3%) to concrete mix
			

Source: TechSci Research

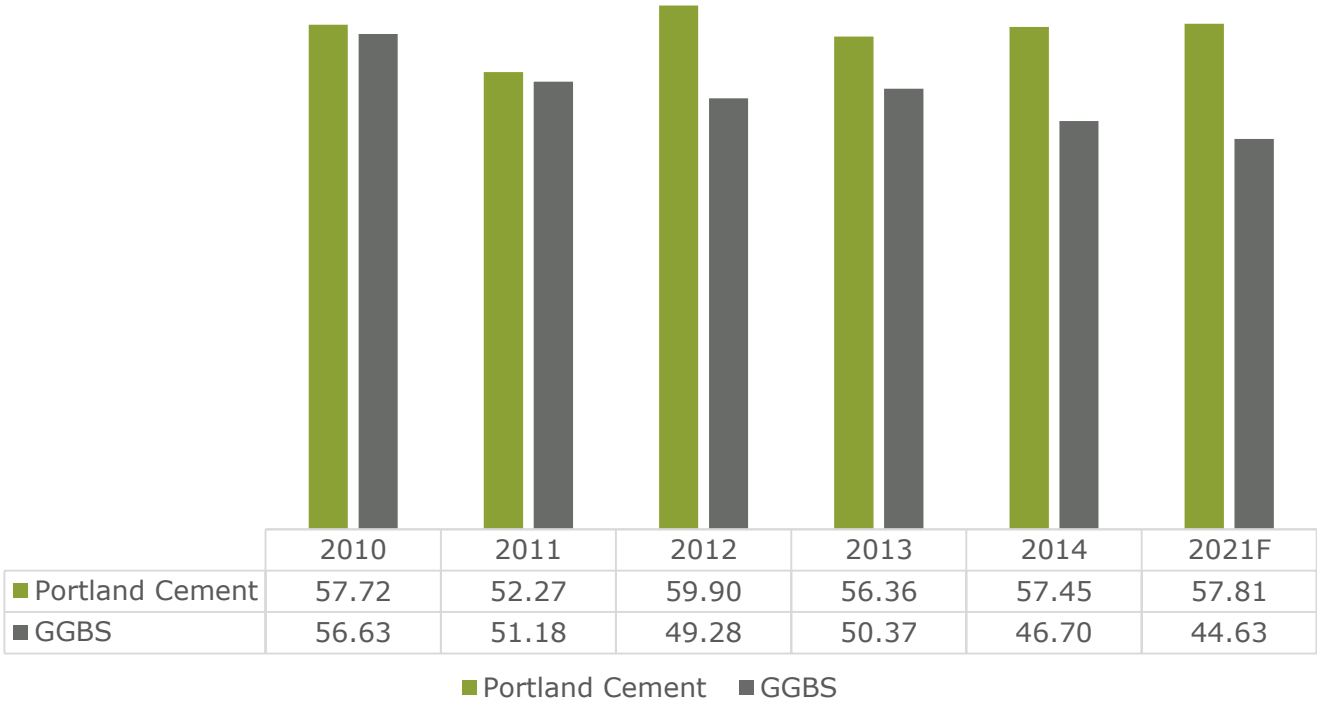
Green Concrete- Raw Materials Pricing Analysis

GGBS price **USD10.75** lower than OPC

2014

GGBS price **18%** lower than OPC

Price Comparison between Ground Granulated Blast Slag (GGBS) and Portland Cement (OPC), 2010-2013, (USD Per Ton)

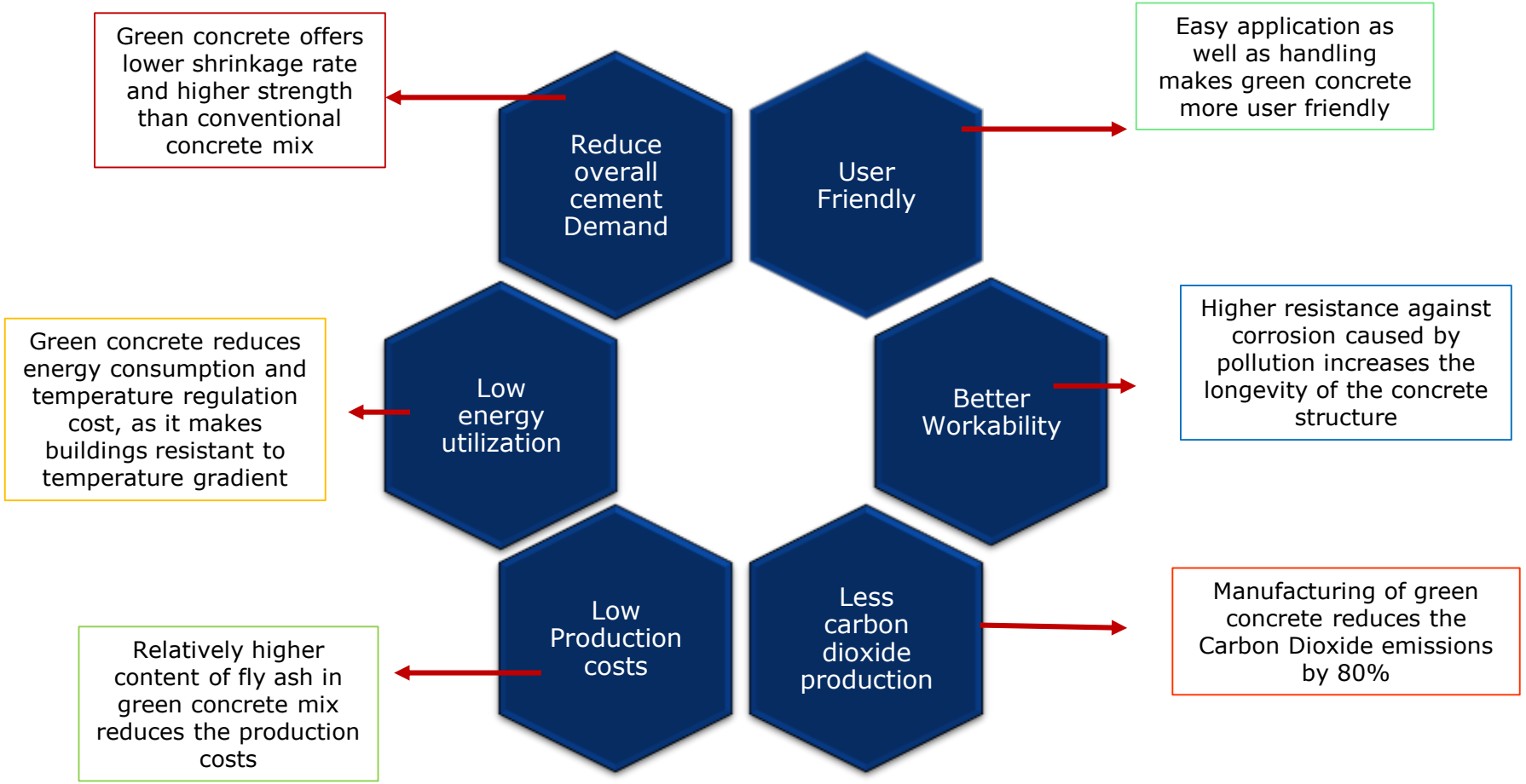


	2010	2011	2012	2013	2014	2021F
Portland Cement	57.72	52.27	59.90	56.36	57.45	57.81
GGBS	56.63	51.18	49.28	50.37	46.70	44.63

Source: UAE Building Researches and Studies unit

- Lower prices, eco-friendly properties and ability to substitute cement is projected to drive demand for Ground Granulated Blast Slag in the Middle East in the coming years.

Green Concrete- Advantages



Source: TechSci Research

Green Concrete- End Users

GCC Hotel revenues are expected to reach USD 24.92 billion in 2016

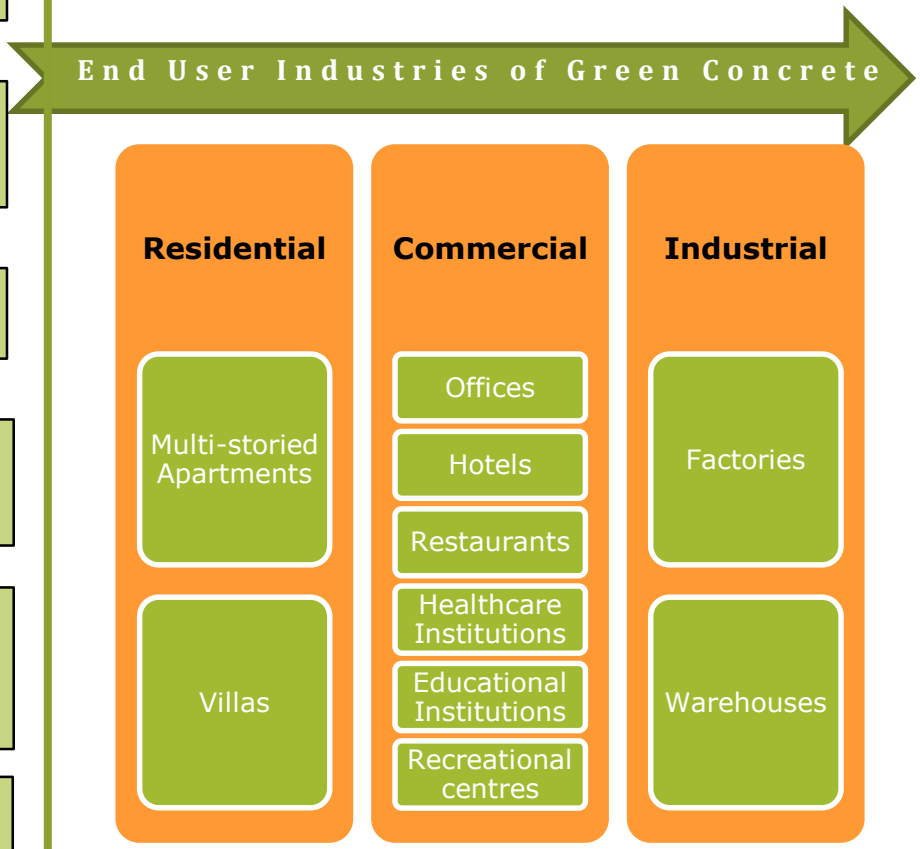
Abraj Kudai, the USD3.5 billion project, expected to become the world's largest hotel (by room count) in Mecca, Saudi Arabia

By 2020, the number of schools in GCC is anticipated to reach 4 million

Saudi Arabia has attracted large investments for the construction of educational set-ups and upgradation of healthcare facilities

In order to improve connectivity in the Emirates, the government has planned to develop 1,200 km Etihad Rail network, valued at USD11 billion, across the country

To support Dubai World Central (DWC) development, the government announced an investment of USD32 billion in 2015, for expansion of Al Maktoum International Airport in the UAE, to accommodate 200 million passengers per year



Source: TechSci Research

Green Concrete- Industry Trends

- ✓ Leading cement manufacturers in the UAE such as Al Futtaim, Arabian Construction Company, Al-Habtoor Group, etc. are planning expansion of their green building material production capacities, especially green concrete admixtures

1

- ✓ The capacity of leading cement companies in the UAE is 39 million tonnes, while the actual production is 19 million tonnes. Therefore, the companies are attempting to counter the under capacity utilization problem

2

- ✓ The potential of green concrete to reduce pollution levels and enhance thermal insulation of the buildings to augment their utilization at extreme temperatures

3

- ✓ Increasing number of infrastructure projects along with growing preference for eco-compatible construction in GCC is propelling demand for green concrete

4

- ➢ ***In April 2015, Dubai Municipality Corporation initiated a movement mandating the application of green concrete for all new projects.***
- ➢ ***Abu Dhabi Municipality also initiated numerous projects mandating the application of green concrete.***

Source: TechSci Research

Fire Resistant Concrete Potential and Application in Middle East Market

TechSci Research

1. Fire Resistant Concrete- Product Overview
2. Fire Resistant Concrete- Composition
3. Fire Resistant Concrete- Major Applications and Economic Benefits
4. Fire Resistant Concrete- Advantages
5. Fire Resistant Concrete –Price Analysis
6. Fire Resistant Concrete- Market Trends & Developments
7. Fire Resistant Concrete –Recent Developments

Source: TechSci Research

Fire Resistant Concrete- Product Overview

"Fire resistant or heat resistant concrete is a special grade concrete which is engineered to perform advanced fire resistive functions."

Driving Demand for Fire Resistant Concrete

- High durability during high thermal cycles and temperatures
- Low operating and maintenance cost along with lowest life-cycle cost
- Ability to withstand intermittent temperatures as high as 1000°C (1850°F) and sustained temperatures up to 300°C (570°F) without significant loss of strength
- Growing preference for fire proof buildings, road and railway tunnels, subways, power plants, etc.

Source: TechSci Research

Fire Resistant Concrete- Composition

- Fire resistant concrete is composed of carbonate aggregates (including limestone and dolomite) and lightweight aggregates (either naturally occurring or manufactured by expanding shale, clay or slag) that retain most of their compressive strength up to 1200 degrees Fahrenheit.
- As a result, calcium aluminate or refractory cement combined with carbonate & light-weight aggregates are best fit for production of fire resistant concrete.
- Polymer or polypropylene monofilament fibers can significantly contribute to the reduction of explosive spalling, and thus, improve the fire resistance of the concrete.

Fire Resistance of Singular Layer Concrete Walls, Floors And Roofs

Aggregate Type	Minimum Equivalent Thickness for Fire Resistance Rating, Inch				
	1 hour	1.5 hour	2 hour	3 hour	4 hour
Siliceous	3.5	4.3	5.0	6.2	7.0
Carbonate	3.2	4.0	4.6	5.7	6.6
Semi-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

Source: TechSci Research

Fire Resistant Concrete- Major Applications and Economic Benefits

Fire resistance properties of specialized heat resistant concrete provides several significant economic benefits such as:

- Repair work to fire resistant concrete buildings affected by fire is usually minor and inexpensive owing to the property of fire resistant concrete to restrict the fire to small areas and compartments. This eventually helps in significantly reducing the repair cost.

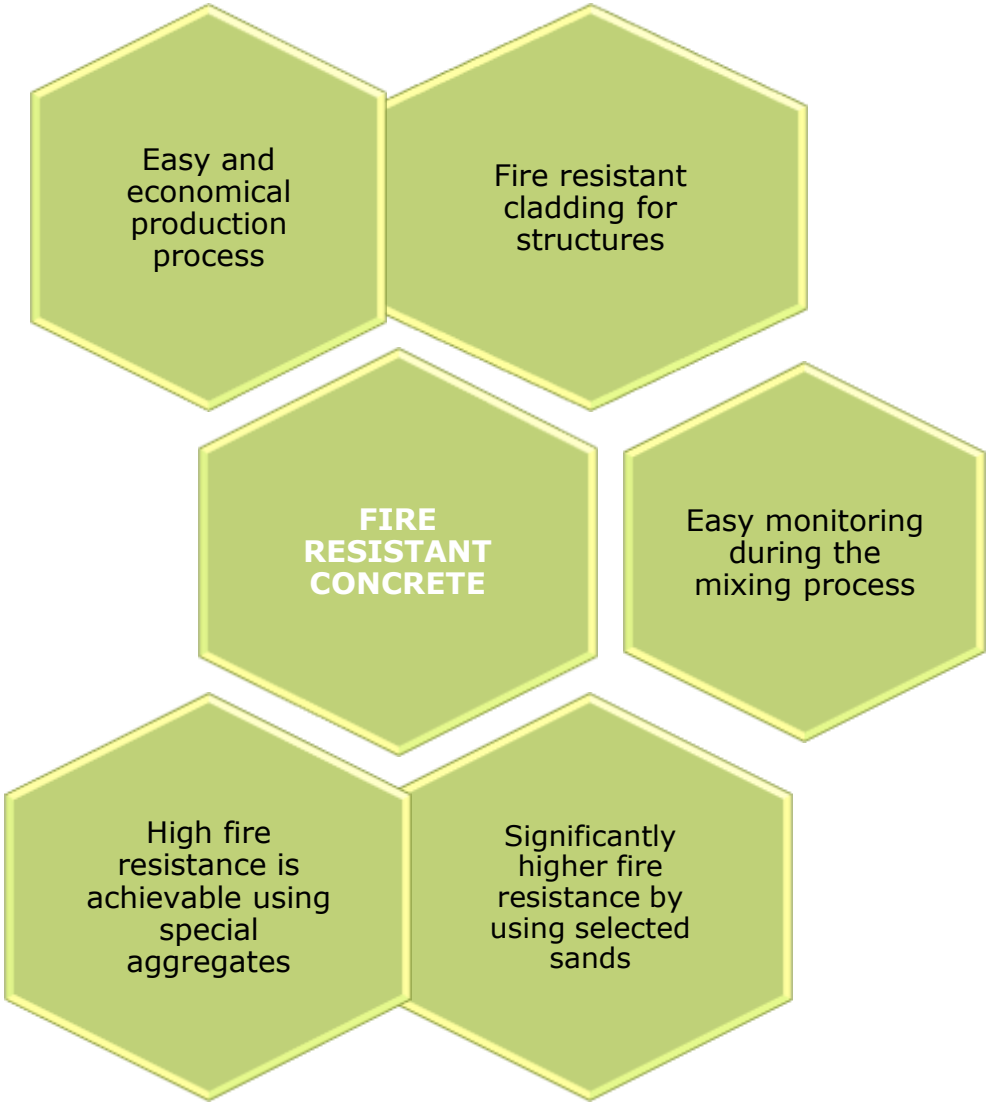
- The walls, floors and ceilings, etc., made of fire resistant concrete prevent fire spread. As a result, adjacently located rooms or compartments in a factory, warehouse, office, hospital, or flats within a residential apartment building, remain relatively unaffected and continue functioning as normal, regardless of the state of fire affected area.

- In industrial, commercial and business settings, the walls made up of fire resistant concrete prevent loss of valuable possessions including machinery or equipment, thereby reducing the impact on the business and lowering the insurance claim to be made.

End User Applications of Fire Resistant Concrete	
Metal Foundries	Military Aviation & Parking areas
Molten Mineral processing plants	Thermal Food Processing Areas
Annealing oven bases	Glass Manufacturing
Vertical Take-off & Landing Pads	Steam Coil Lines

Source: TechSci Research

Fire Resistant Concrete- Advantages



Source: TechSci Research

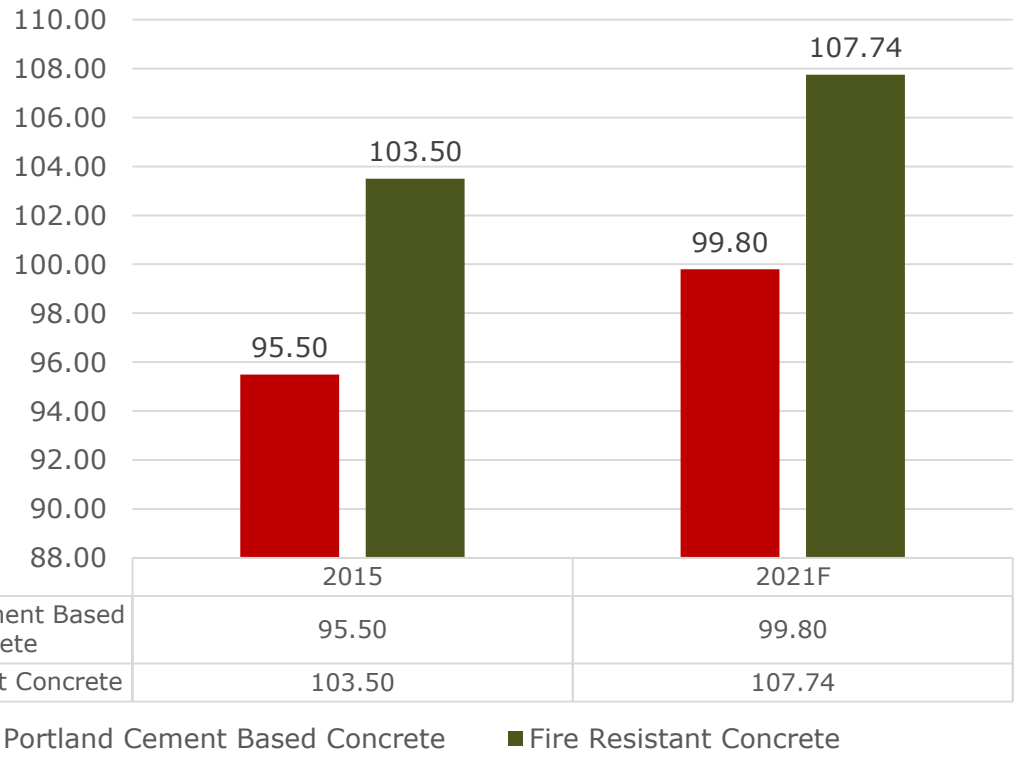
Fire Resistant Concrete –Price Analysis

Fire Resistant concrete price **USD8** higher than Portland Cement based Concrete

2015

Fire Resistant concrete price **8%** higher than OPC

Price Comparison between Fire Resistant Concrete and Portland Cement Based Concrete, 2015 & 2021 (USD Per Cubic Meter)



	2015	2021F
Portland Cement Based Concrete	95.50	99.80
Fire Resistant Concrete	103.50	107.74

Source: TechSci Research

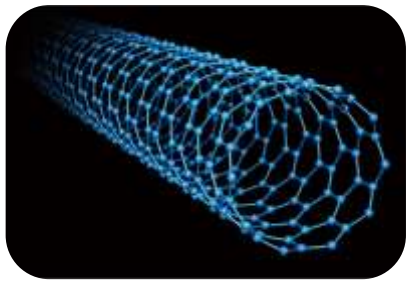
Higher prices of fire resistant concrete are due to the involvement and usage of special raw materials and extra products such as foaming admixtures and polypropylene fiber to make the final concrete tolerant to temperatures up to 450 degrees.

Fire Resistant Concrete- Market Trends & Developments

Fire-Resistant Self-Compacting Concrete

- Scientists from the Swiss Federal Laboratories for Materials Science and Technology (EMPA) have come up with a method of manufacturing fire-resistant self-compacting high-performance concrete (SCHPC) that maintains its mechanical integrity when exposed to fire.
- SCHPC manufacturing involves a low proportion of polymer fibers to induce self compacting property to the fire resistant concrete.
- A series of thin-walled concrete slabs that are pre-stressed with cables made of carbon fiber-reinforced polymer are utilized in order to develop SCHPC.
- In addition to this, a super-absorbing polymer (SAP) that is a synthetic material capable of absorbing water and moisture is added to increase the efficiency and functionality of the resulting concrete.

Fire-Resistant Self-Compacting Concrete



Nanotechnology in concrete

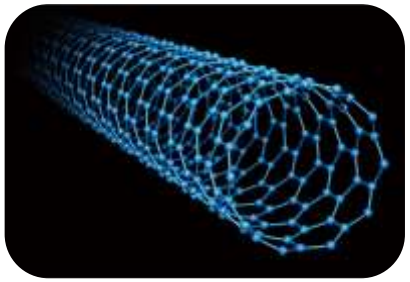
Source: TechSci Research

Fire Resistant Concrete- Market Trends & Developments

Nanotechnology in Concrete

- Nanotechnology can be utilized for imparting fire resistance to the concrete by means of adding or mixing small amount of carbon nanotubes to the cement mixture.
- Addition of carbon nanotubes (CNT) in cementious material results in fabrication of the fiber composites, which impart very high fire resistance and strength to the resulting concrete.
- Apart from imparting fire resisting property to the resulting concrete, the carbon nano tubes also increase mechanical durability of the cement and prevent crack formation.

Fire-Resistant Self-Compacting Concrete



Nanotechnology in concrete

Source: TechSci Research

Fire Resistant Concrete –Recent Developments

CEMEX

In May, 2016, Cemex developed a fire resistant and explosion proof concrete designed specifically to safeguard facilities from fire hazards. The new fire resistant and explosion proof variety of concrete possess the ability to withstand a temperature of 1150˚C for more than 60 minutes.

Sika Group is long involved in the manufacturing of different types of concretes including fire resistant concrete by means of utilizing super plasticizers, Polypropylene fibers and steel fibers.

Sika

Source: TechSci Research

Self-Compacting Concrete Potential and Application in Middle East Market

TechSci Research

1. Self-Compacting Concrete Product Overview
2. Self-Compacting Concrete Composition
3. Self-Compacting Concrete Advantages
4. Self-Compacting Concrete Market Dynamics
5. Self-Compacting Concrete Pricing Analysis
6. Self-Compacting Concrete Companies

Source: TechSci Research

Self-Compacting Concrete- Product Overview

Definition

A self-compacting concrete (SCC) is a type of concrete that can consolidate on its own weight.

"One of the major advantages of this method is that SCC technology offers the opportunity to minimize or eliminate concrete placement problems in difficult conditions."

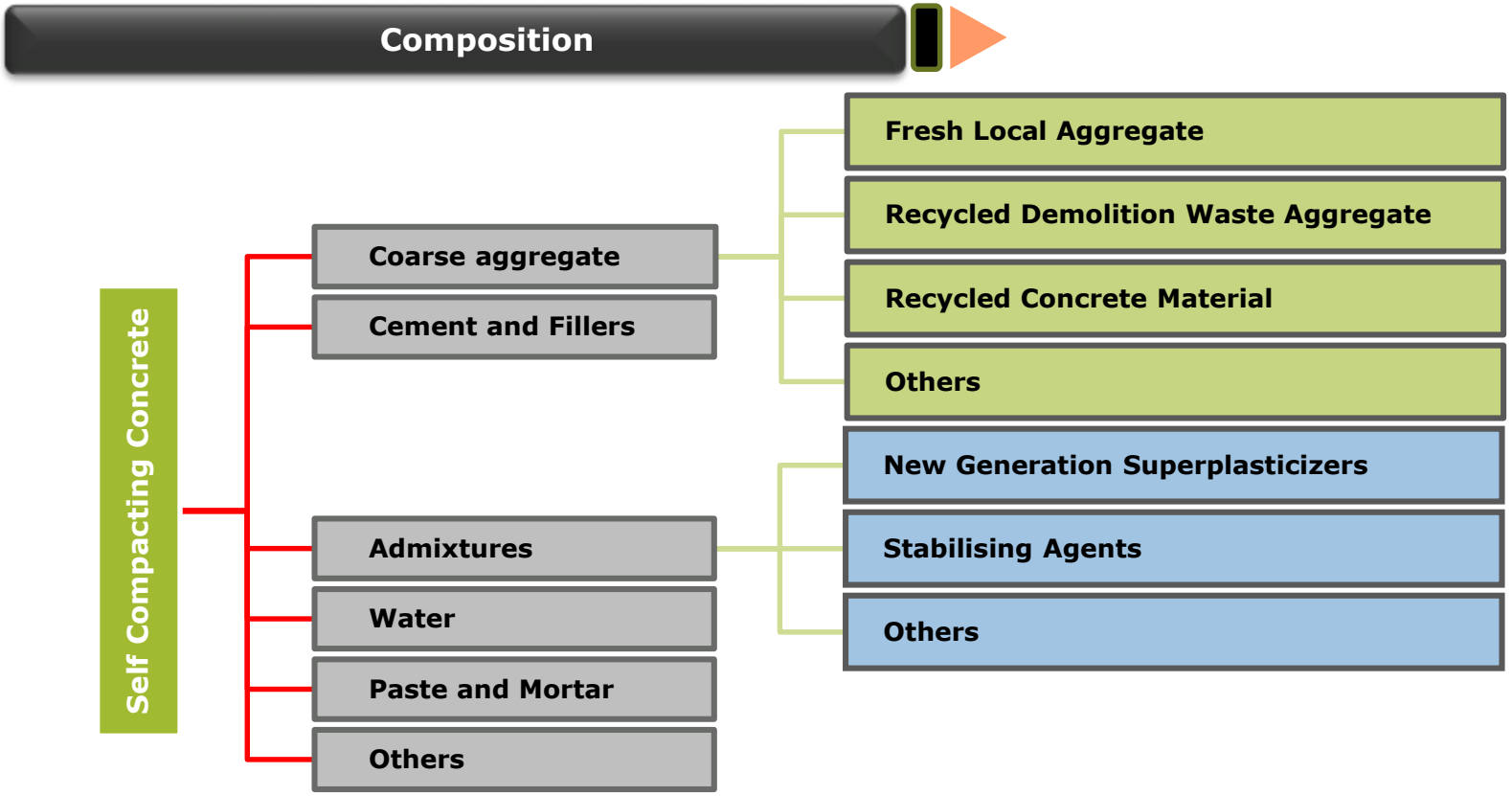
Driving Demand for Self-Compacting Concrete

- Does not need to be checked for quality as it is prepared and laid down by automated parts
- Construction and placing becomes faster & easier
- The product removes the need for vibration as the it settles down on its own due to its high flexibility
- It improves the filling capacity of highly congested structural members.

In Middle East, demand for self-compacting concrete is still very low, however, it is expected to gain momentum in the coming years, backed by rising construction of high rise buildings.

Source: TechSci Research

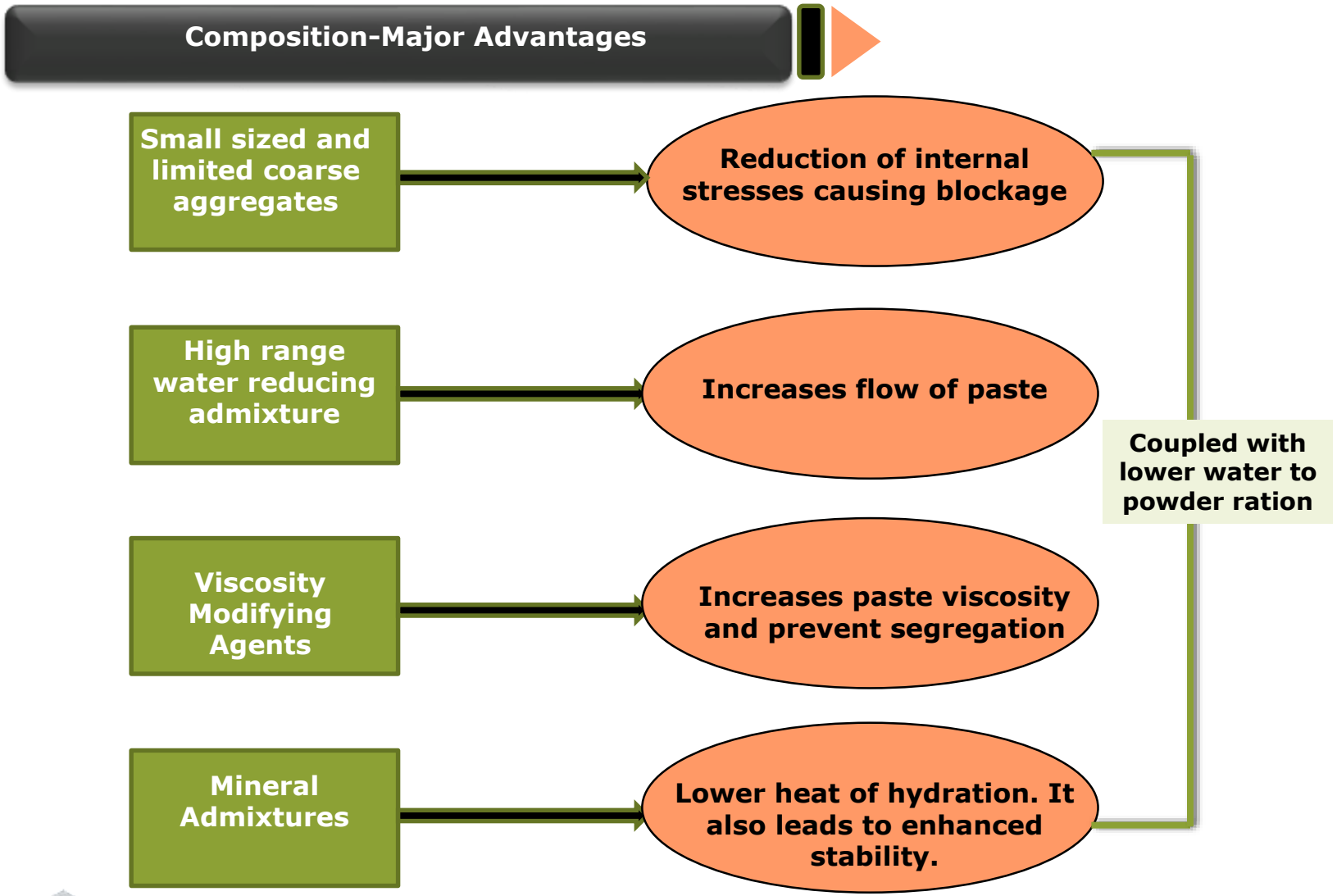
Self-Compacting Concrete- Composition



- ✓ **Coarse Aggregates:** Size range – 9.5mm to 37.5mm in diameter.
- ✓ **Cement and Fillers:** The fillers are used to enhance the properties of cement such as particles binding, water absorption, lesser voids, among others. The typically used fillers in the Self-Compacting Concrete are silica fumes, metakaolin, limestone powder, granite dust and marble dust.
- ✓ **Admixtures:** Superplasticizer is necessary for producing a highly fluid concrete mix, while the powder materials or stabilizing agents are required to maintain sufficient stability/cohesion of the mixture, thereby reducing bleeding, segregation and settlement

Source: TechSci Research

Self-Compacting Concrete- Composition



Source: TechSci Research

Self-Compacting Concrete- Advantages

Advantages	
Adequate compaction and placement of concrete	The concrete gets compacted under its own weight and is compacted and placed with high accuracy
Ease of Handling	Construction of high rise buildings, extremely complex and elevated structures can be done easily by self compacting concrete
Fill the framework without vibration	No vibration is required in the case of self compacting concrete
Requirement of less labor	It decreases the requirement of skilled labor by a significant amount and makes the process a lot easier to handle.
Saves Time	The production, processing and application of the self compacting concrete takes a lot lesser time as compared to usual concrete
Provides Structural Strength	The usage of high quality admixtures, fillers and other chemicals in self compacting concrete provide great strength to the structure

Source: TechSci Research

Self-Compacting Concrete- Market Dynamics

Demand Drivers

- The product offers high quality and its highly fluid structure leads to self settling ability
- The concrete is able to fix itself as per the reinforcements, which results in lower manual labor
- Surging foreign investments in the Middle East hospitality sector, especially in Saudi Arabia and the UAE, can significantly proliferate the sales of self compacting concrete in the coming years.

Market Challenges

- Higher cost of self-compacting concrete restricts its usage to premium buildings and high value projects, with very limited usage being witnessed in construction of residential and industrial buildings
- The product has the property of consolidating and compacting on its own, which sometimes may pose a challenge during the transit process.
- High wastage and harm to the equipment if the compact solidifies.

Source: TechSci Research

Self-Compacting Concrete- Pricing Analysis

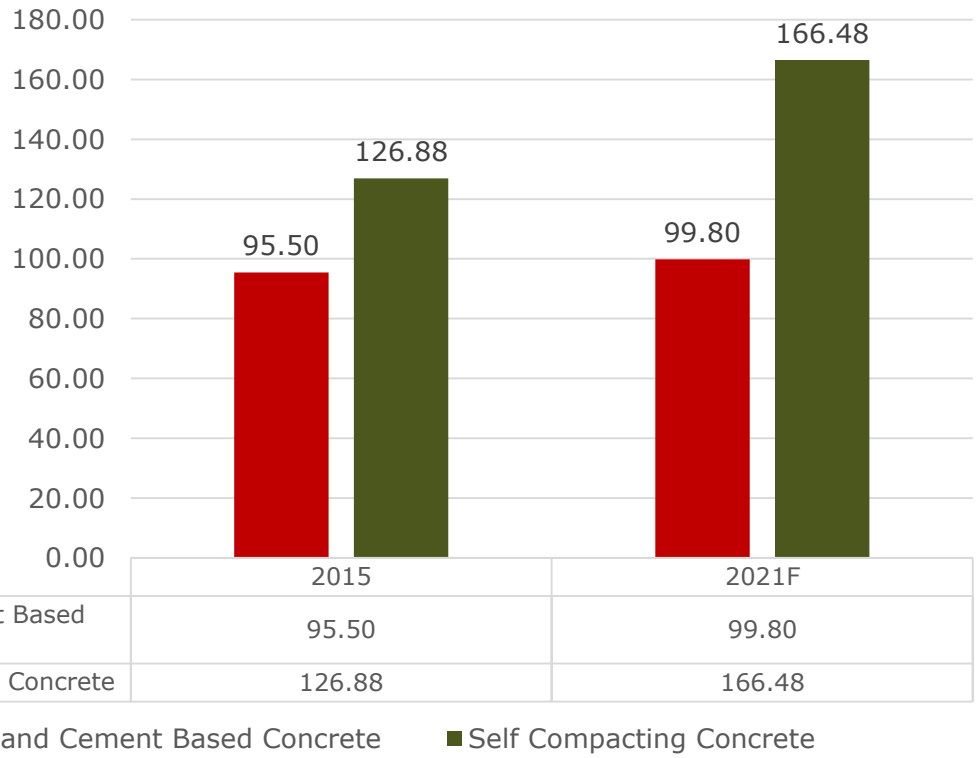
Pricing Analysis

Self Compacting Concrete Price were **USD31.38** higher than Portland Cement based Concrete

2015

Self Compacting Concrete prices to grow at **4.6% CAGR** during 2015-2021

Self Compacting Concrete Prices, 2015 & 2021, (USD Per Cubic Metres)



Source: Techsci Research

The price per cubic metres has been observing an average growth rate of 6% annually and is expected to maintain similar trend in coming years as well.

Thank You for Attending

Presentations will be available on
www.middleeastconcrete.com/presentation

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