Synthetic Resins

Markets & Technologies

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Middle East Region

- From Dubai to Kuwait, there's an estimated US$2.4 trillion in construction projects either underway or in development in the world's biggest oil patch.

- Surprisingly, US$1.4 trillion of that total is for projects in civil construction. This means spending on residential and commercial construction projects in the Middle East outweighs construction on oil, gas, power, petrochemical, industrial, and water projects combined.

- Infrastructure development is not only crucial in meeting the region’s social challenge, but has an essential contribution to make towards improving business competitiveness in the Middle East.

Infrastructure in Middle East Region

- Infrastructure mean public infrastructure, which can be classified into water, electricity, transport, sewerage, telecommunications, sanitation.

- Given that the region is now characterised by high monetary inflows and a rapidly growing population that has more than doubled to about 270 mln in the past 30 years, could double again in the next 30 years recording an annual growth rate of approx 2.5%), the growth in infrastructure investments will obviously outperform most other areas of the world.

GCC Market for Marble & Stones

- The market for marbles and stones is estimated over US$ 4.87 billion as of 2012, having grown from 2010 at a CAGR of 3.5 percent. With a 51 percent share Saudi Arabia with its largest growing construction market is also the largest market for marbles and stones followed by the UAE with a 25 percent share.

- Qatar with its World Cup 2022 spurred construction activities is the third with a 16 percent share followed by Kuwait, Oman and Bahrain with 6 percent, 4 percent and 1 percent shares respectively.

- These markets closely mirror the movement of the construction industry as they constitute a significant portion of the project costs in construction.

Synthetic Resins

Composites & Cast Polymer Products

The light weight, beautiful cheaper cultured marble has become a competitive alternative for natural marble. Conventionally, resins like acrylate, polyester *etc*. are mixed with fillers, pigments and applied on molds followed by curing to yield artificial marble.

Marble

Cultured Marble Acrylic Modified Polyester Resin

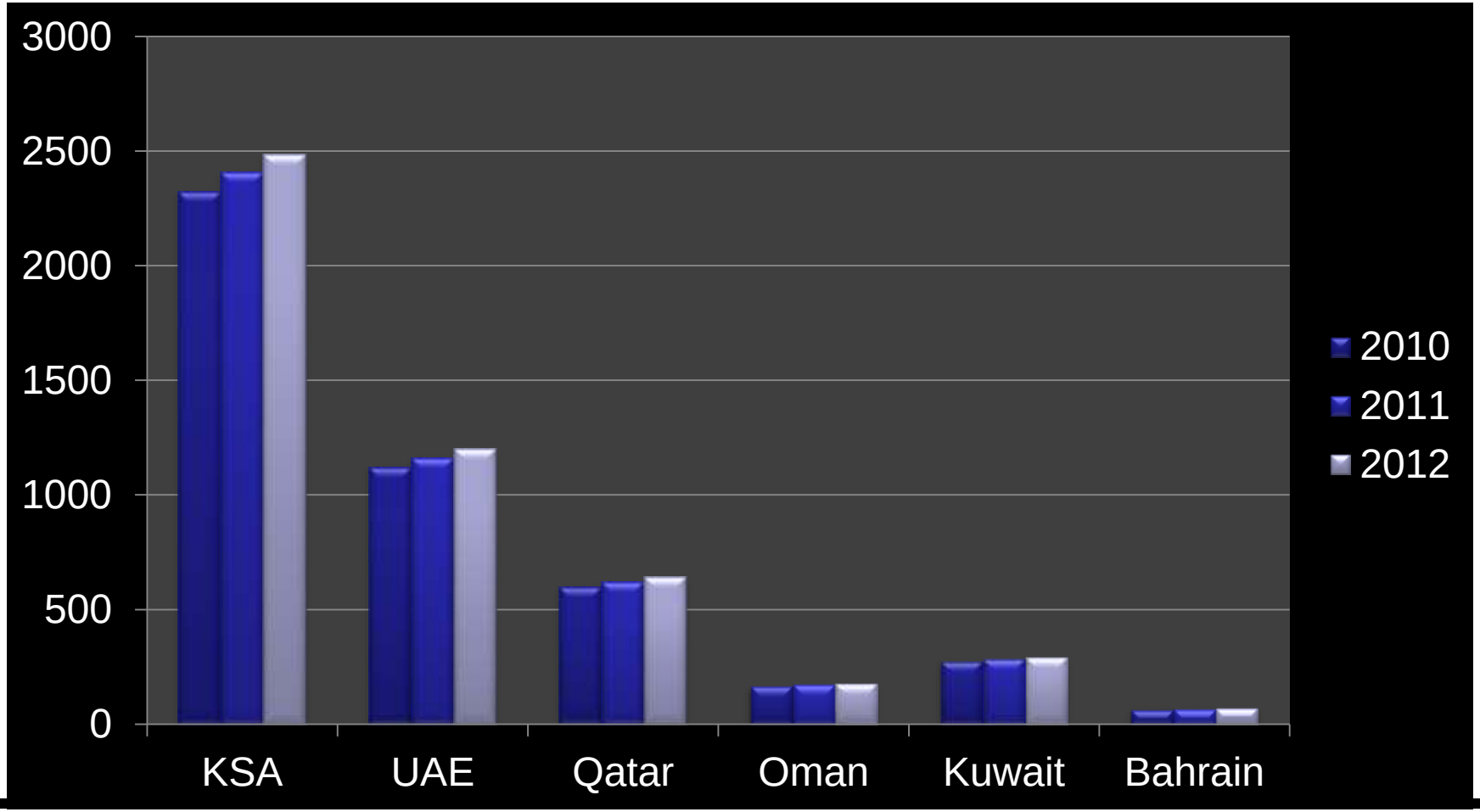
An Isophthalic type unsaturated polyester resin with medium viscosity,medium reactivity, good property of water resisting , fouling resistance and alkali resistance, it is applicable to manufacture artificial marbles, sanitary wares etc.

Corian & Montelli

- DuPont™ Corian is an advanced blend of natural minerals and pure acrylic polymer.

- DuPont Montelli is a product containing a blend of resin combined with aluminium mineral filler and is produced by continuous casting process meeting stricy quality control standards.
- Other brands Cosentino- Silstone from Italy and Cambria from USA.

GCC Marble & Stone Market
US$ Million

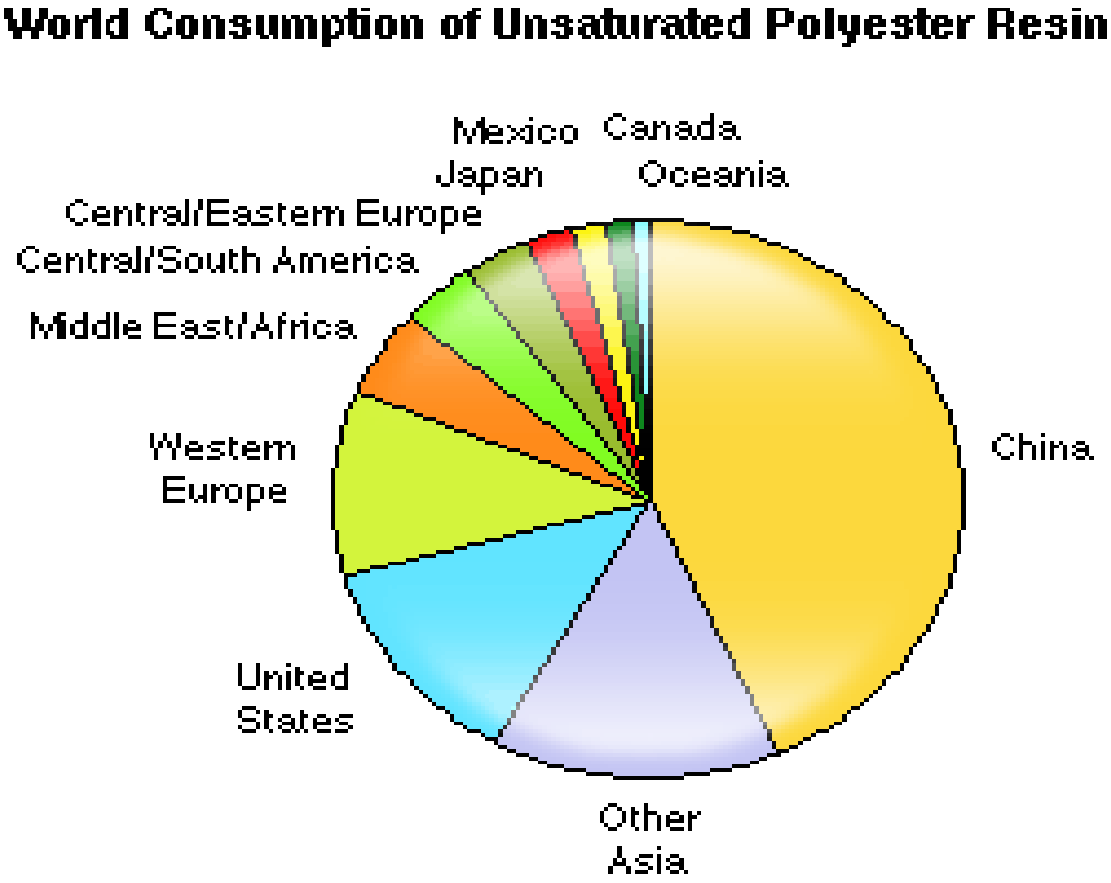


Synthetic Resins

❑ GRP

The global market for Reinforced Plastics is forecast to reach 7.9 million tons by the year 2017, bolstered by renewed demand from major end-use sectors and robust demand from European and Asia Pacific markets. Further, rapidly evolving renewable energy markets such as wind energy are emerging as the most promising growth areas for Reinforced Plastics.

World Consumption of Unsaturated Polyester Resin



Growth Rates across the World

- The unsaturated polyester resin industry is mature and largely dependent on general economic conditions.
- Consumption growth will be highest in China, with an average annual growth rate of just over 5% for 2011–2016.
- Growth in Asia will increase at an average annual rate of almost 5% during that time frame.
- The Middle East and Africa will also have an average annual growth rate of almost 5%.
- Central and Eastern Europe will have an average annual growth rate of about 4.5%, as will Central and South America.
- Consumption will grow in North America at an average annual rate of 3.5%.
- In Japan, unsaturated polyester resin consumption will grow at an average rate of 0.7% per year during the period

WATER - Opportunities in GCC

- The rapid infrastructure development in the Middle East region drives the markets of pipe systems from water and sewage to cooling systems and industrial pipes.

- In addition, existing pipe systems are prone to leaking valuable water resources and need to be upgraded.

- The Middle East region offer challenges including conditions of extreme temperatures, wind and sand erosion which ultimately take its toll on the piping systems.

WATER - Opportunities in GCC

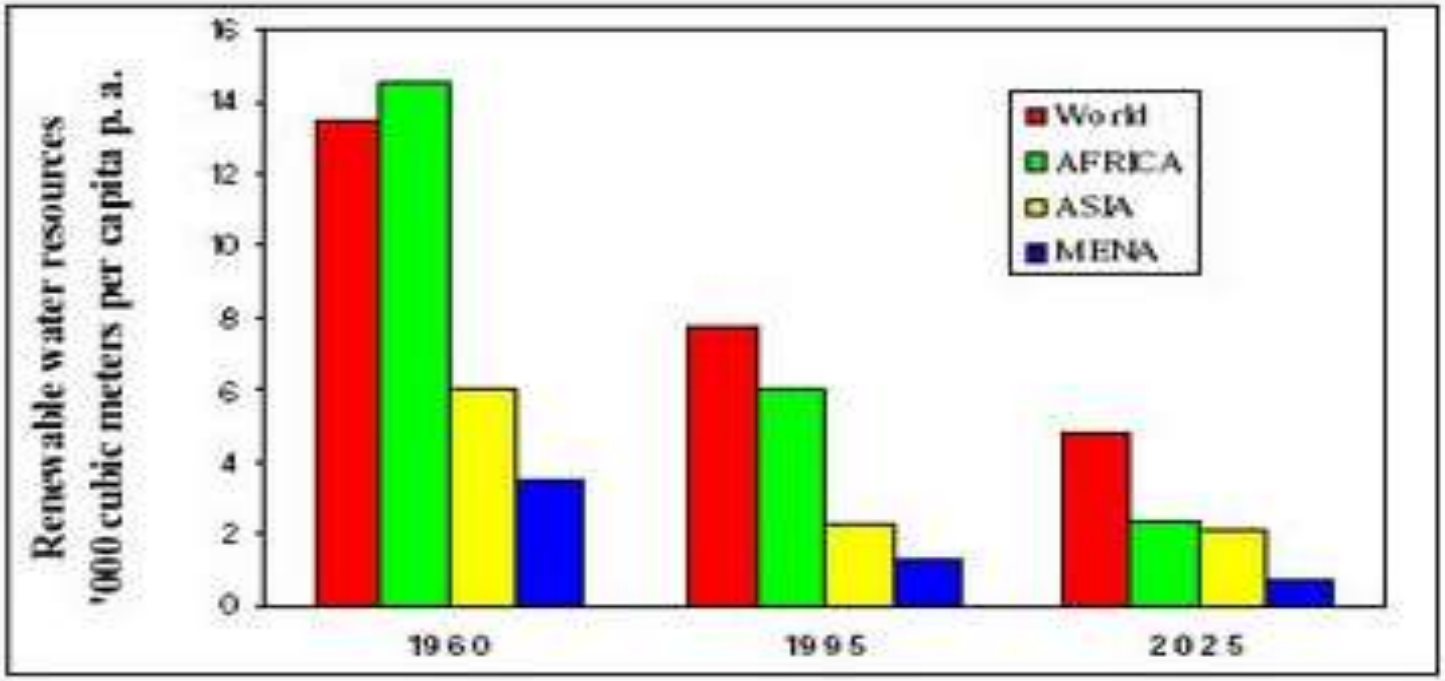
- The water sector is a unique problem to the Middle East more than anywhere else, and it is evident from an examination of demand and supply.

- In terms of supply, the water availability per capita is historically the lowest among all the world's major regions, and this is expected to remain similar in the future.

- GCC’s expanding middle class adopts an increasingly water-intensive lifestyle, featuring private swimming pools, gardens requiring big sprinkler systems, and even a growing interest in golf. Over the next decade, these countries will be among the world’s highest per-capita users of water.

Water Availability

Figure 2. Annual water availability per capita and year



Source: World Bank compilation

Large Diameter GRP Pipes

GRP Water Tanks for Water

Under ground

Open Area

WATER - Opportunities in GCC

- The Middle East nations operate 60% of the world's desalination plants, and it is estimated they will need to invest a $100 billion on desalination over the next decade if demand for water keeps growing at the current pace, especially in the Gulf region.

- To give a perspective, water infrastructure is probably the third most important infrastructural investment in Saudi Arabia for the coming years (US$80B over the next 20 years), after oil & gas and electricity.

GRP Production Volumes

Figure 1: GRP production volumes in Europe - and selected Middle Eastern countries - broken down by country /region. (Source: AVK.)

	2012* kT	2011 kT	2010 kT	2009 kT	2008 kT
UK / Ireland	134	126	130	106	123
Belgium / Netherlands / Luxembourg	43	42	40	31	38
Finland / Norway / Sweden / Denmark	44	52	50	52	69
Spain / Portugal	160	200	217	188	236
Italy	152	165	154	122	183
France	117	122	116	87	115
Germany	182	172	161	118	145
Austria / Switzerland	17	17	16	13	13
Eastern Europe**	161	153	131	98	136
Sum:	1,010	1,049	1,015	815	1,058
Turkey***	195	180			
Saudi Arabia****		250			
Egypt****		60			
Iran****		75			

(kT = kilotonnes / 2012* = estimated / Eastern Europe** = Poland, Czech Republic, Hungary, ... *** = ... the total ... audi

Stagnated but growth in Middle East and Turkey

Path Forward

- New technologies are incubated and existing technologies are improved by the Product Leaders. End-market expertise is complemented by advanced analytical tools and production-quality process equipment.

- In addition to providing superior materials technology, technical service and support and help with proposals, specification writing, and production planning needs to be provided to customers over and above formulation assistance, processing data, and relevant information on long-term chemical exposure and structural integrity.

Path Forward

End Market Expertise along with investment in

- ✓ Production quality process equipment
- ✓ Pilot plants
- ✓ Advance analytical tools
- ✓ **People**

Pilot Plant

From a marketing perspective, by running semi-production with a pilot unit, you can benchmark your production in a particular industry segment or geographical area and determine the viability of selling it on a larger scale.

Chemistries

- Polyester Resins
- Esterimide Resins
- Phenolic Resins
- Amino Resins Furane Resins
- Epoxy Resins
- Polyurethane Resins
- Acrylic Resins
- Binders for Printing Inks
- Emulsions
- Plasticizers

Synthetic Resins

Paints, Coatings

- For many people, the word coatings immediately conjures up images of paint. But paint represents just one aspect of the incredibly diverse world of coatings.

- The coatings market is typically broken down into three major categories: **architectural and decorative coatings; industrial coatings and special purpose coatings.** Within these groupings there is an enormous range and variety, not only in terms of the properties that the coatings themselves possess, but also the particular purposes they serve, the technology behind them and the methods used to apply them.

Resins are the key to innovation in coatings.

Milestones

- **1700s -1800s**

Coatings have been manufactured in the United States since 1700, when Thomas Child operated the first paint mill in Boston. The industry was well established by the 1800s, with numerous small manufacturers producing oil-based alkyds and enamels for their local markets.

- **1940s -1950s**

New resin technologies appeared in the 1940s and 1950s.

Polyurethanes, epoxy, flexible solvent based paints, water based paints. acrylic emulsions, protective inorganic zinc coatings. and powder coatings

- **1960s**

Improvements to many of these technologies were made during the 1960s.

Milestones

- **1970s and 1980s**

Automakers began using electro-deposition primers to reduce body corrosion and moved to a base coat/clear coat system to provide improved coating performance**.**

- **1990s**

Radiation-cured coatings, which typically use ultraviolet (UV) light rather than heat to cure, have been making inroads in the market since their introduction in the 1990s. These formulations require little or no solvent, cure almost instantly and provide superior performance

Today's wide array of paints and coatings serve as evidence that the industry has been devoted to improving its products through the development of advanced technologies.

Formulation and Process Development in the 21st Century

Two drivers have dominated formulation and process technology in the last decade:

- sustainability and
- cost efficiency.

Ever lower limits on VOCs and HAPS, a growing demand by consumers for ‘green’ products, and rising energy and raw material prices have driven formulators to seek multifunctional ingredients with environmentally friendly profiles, and processes with a minimal environmental footprint, all while improving efficiency and performance.

Advanced Technologies for Formulation

- Waterborne, high solids solvent-based, and UV-cured coatings have taken center stage in many applications, with much R&D effort targeted at developing coatings that compete on price and performance when compared to traditional solvent-based paints.

- These coatings meet regulatory and consumer requirements, have low-to-no VOCs, exhibit low-to-no odor, and can be applied over an expanded temperature and humidity range. They also have properties that equal or beat their solvent-based counterparts.

Nanomaterials

From nanoparticles to nano-sized resins — have been shown to enhance performance in a number of ways, imparting improved

- anti-microbial,
- anti-static,
- corrosion and
- scratch resistance,
- mechanical and optical properties,
- modifying surface energies and providing self-cleaning capabilities.

Advanced Process Technologies

- Many producers have refined their production equipment and systems to reduce energy and water consumption and dramatically lower emissions to the environment. Extensive recycling, redesign of polymerization reactors and mixing tanks, and new cleaning procedures are just some examples.
- These advances in technology have not come easily. They have been achieved only with a significant investment in time, money and human resources and reflect the commitment of the paint and coatings industry to continuous improvement.
- Ingredient suppliers, formulators and application equipment manufacturers have worked together to create the most cost efficient and effective products and processes that meet the needs of their customers in all segments of the market.

Major Coating Markets

1.Decorative Coatings

2. Transportation Coatings

3. Wood Finishes

4. Powder Coatings

5. Coil Coatings

6. Packaging Finishes

7. General Industrial FinishesAutomotive Refinish

9. IM & Protective Coatings

10. Marine Coatings

Trends

The green trend

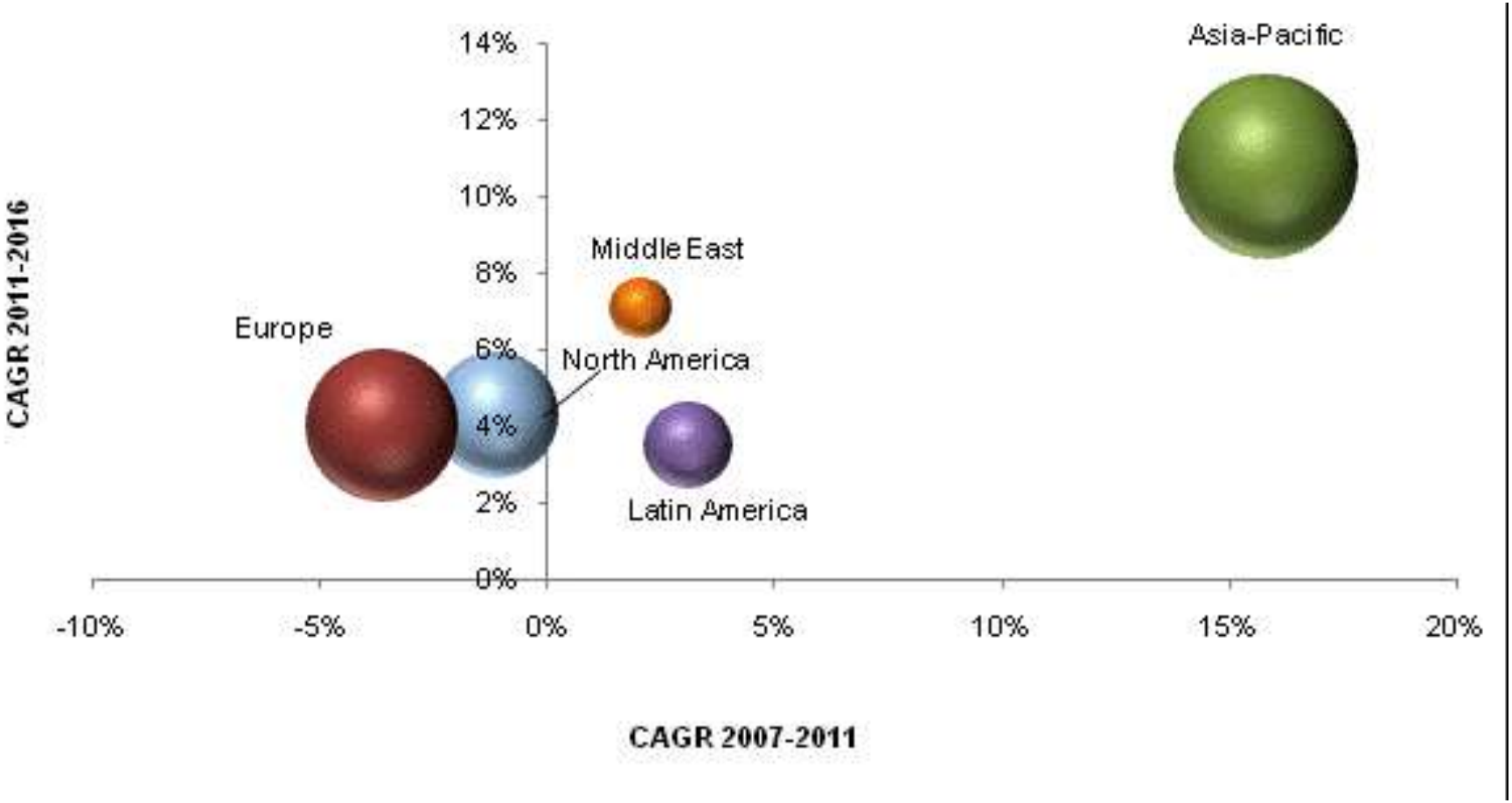
Demand has shifted from solvent-based coatings to environmentally-friendly products, such as water-based

coatings, powder coatings, high solid coatings and UV curable products.

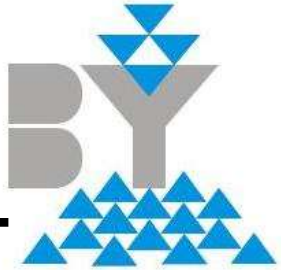
Shift to water-borne resins

- The shift from solvent-based to water-based coatings has been a trend in the coatings industry for over 20 years, and has mostly been seen in the decorative coatings segment.
- Advances in water-borne alkyd technologies have enabled the production of virtually zero-VOC alkyd resins with the same performance as solvent-borne alkyds.

Global Paints and Coatings Market Dynamics by Value (%), 2007–2016

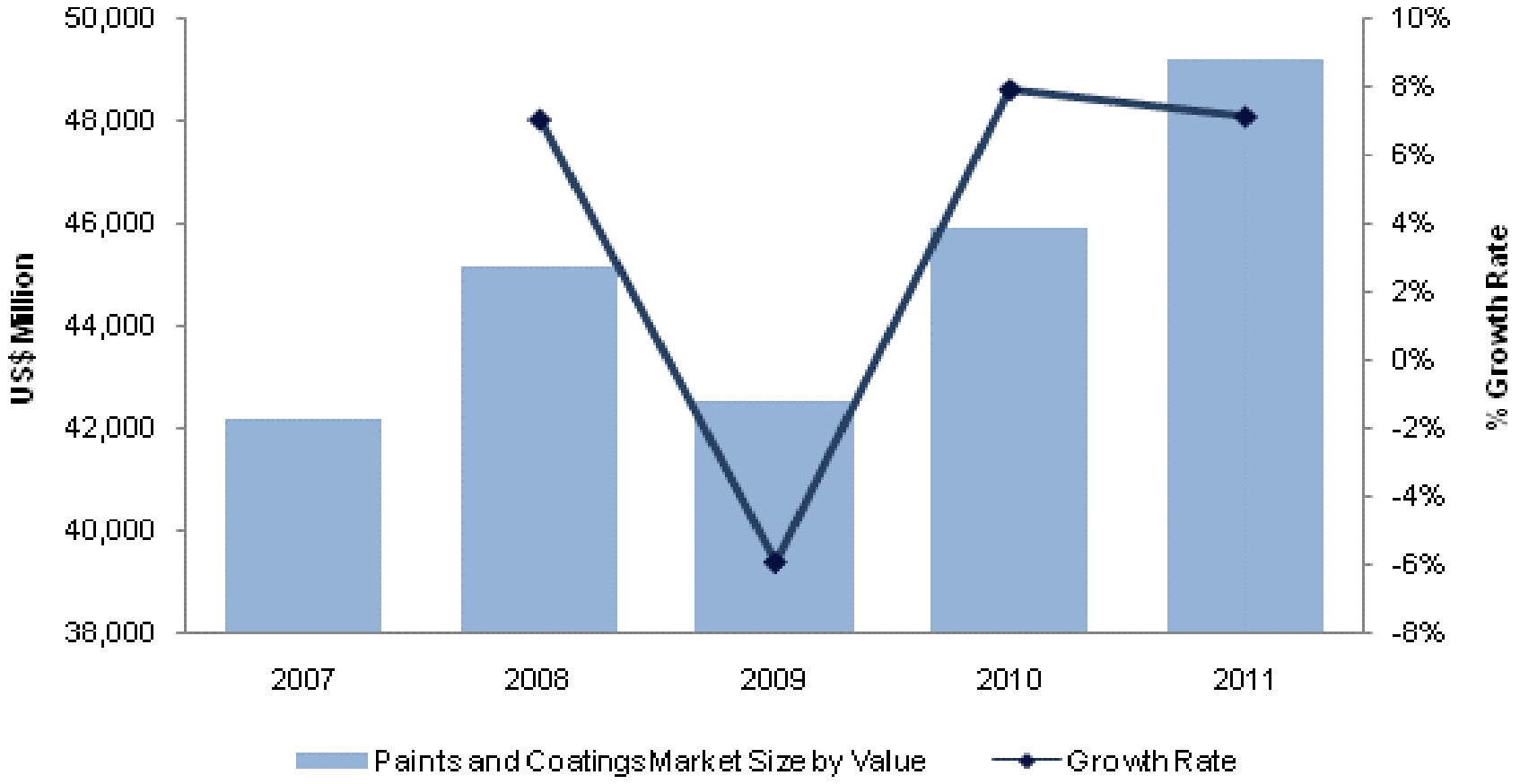


Global Paints and Coatings Market Size (US$ Million), 2007–2011



Year	US$ Million	% Growth
2007	42,220.5	
2008	45,203.2	7.1%
2009	42,547.9	-5.9%
2010	45,926.2	7.9%
2011	49,208.1	7.1%
CAGR	**2007–2011**	**3.90%**

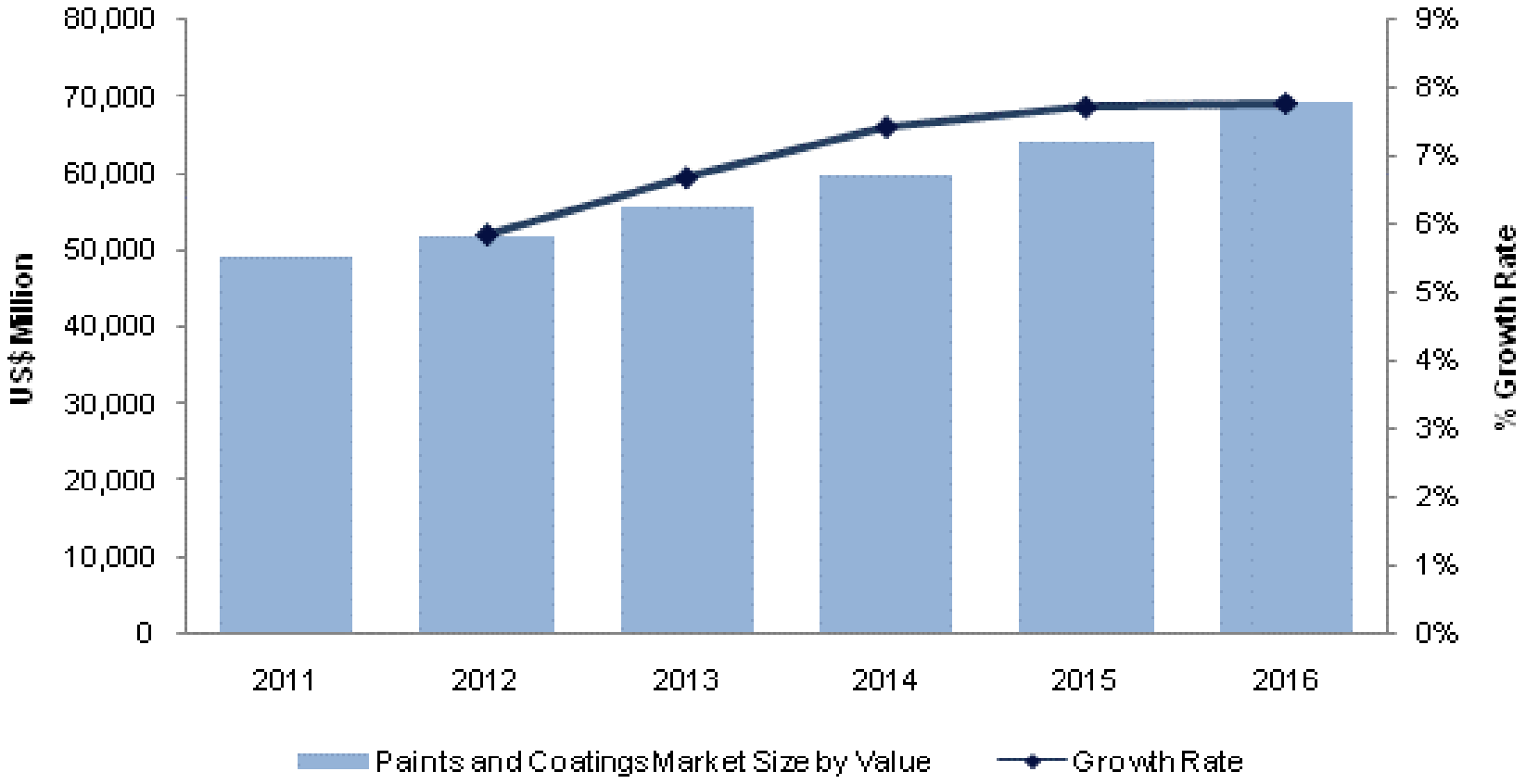
Global Paints and Coatings Market Size (US$ Million), 2007–2011



Global Paints and Coatings Market Size (US$ Million), 2011–2016

Year	US$ Million	% Growth
2011	49,20	8.1
2012	52,093.0	5.9%
2013	55,584.5	6.7%
2014	59,721.7	7.4%
2015	64,339.7	7.7%
2016	69,351.5	7.8%
CAGR	**2011–2016**	**7.10%**

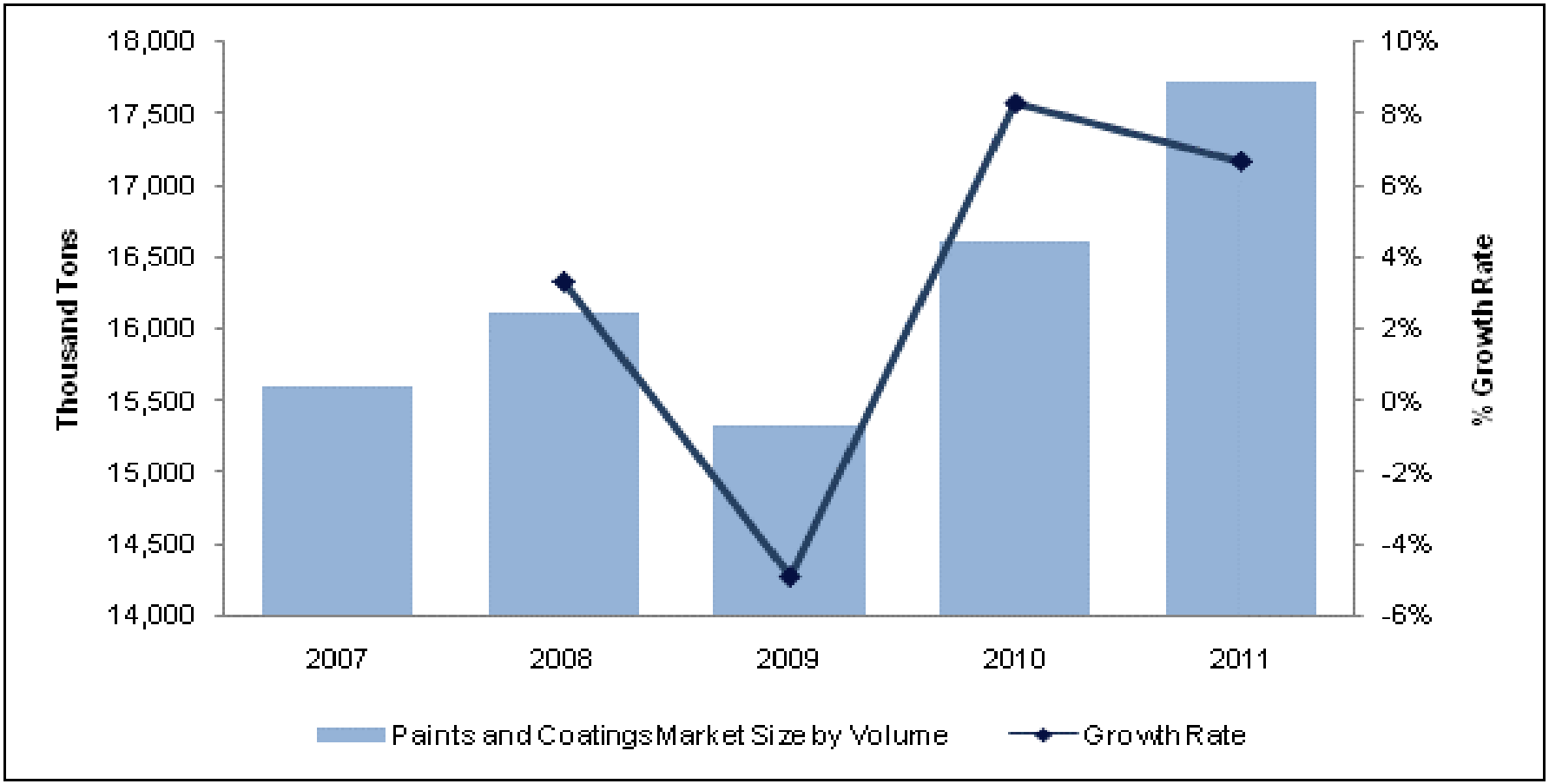
Global Paints and Coatings Market Size (US$ Million), 2011–2016



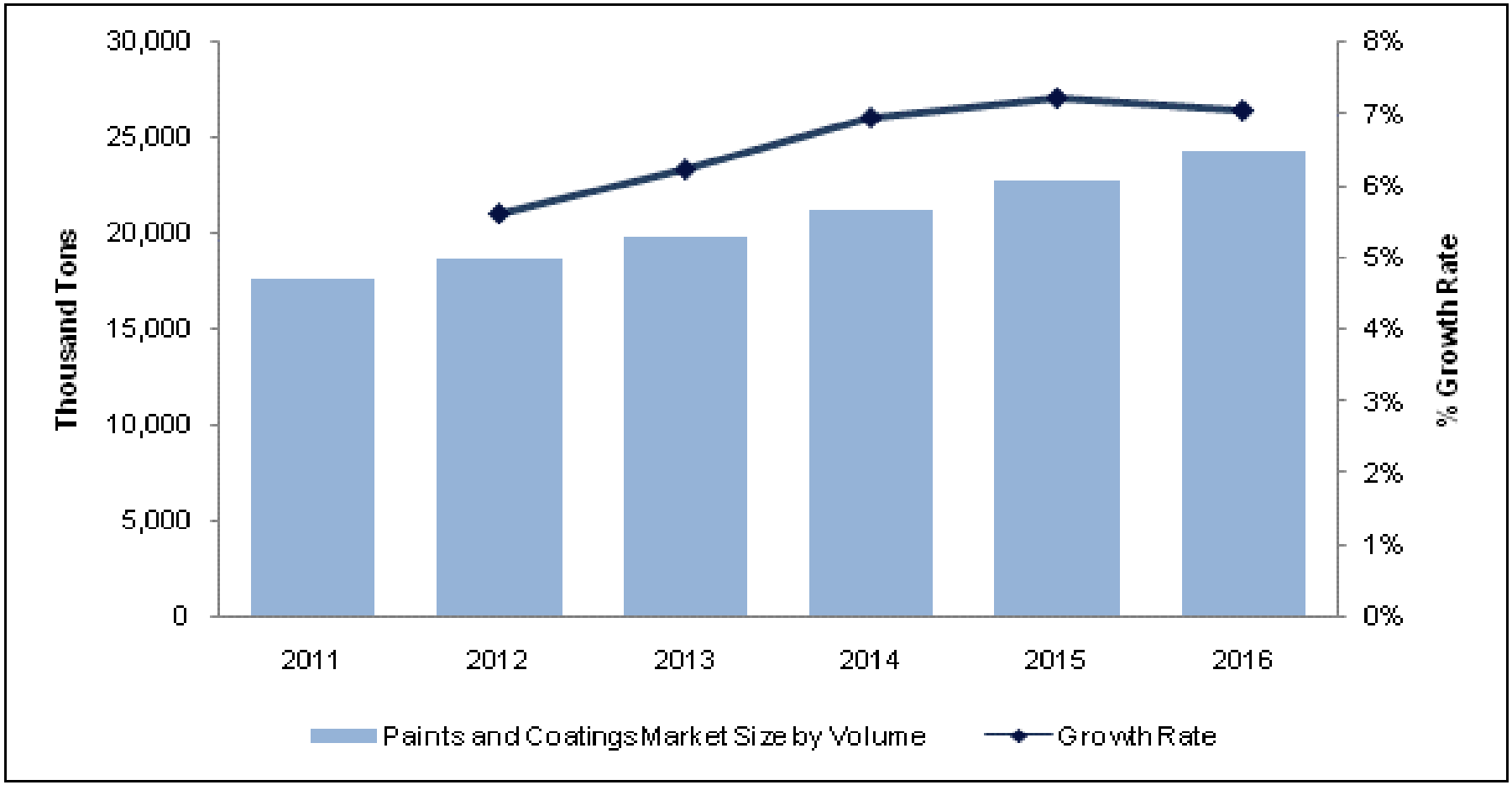
Global Paints and Coatings Market size by Volume (Thousand Tons), 2007–2011

Year	Thousand Tons	% Growth
2007	15,603.8	
2008	16,124.1	3.3%
2009	15,338.0	-4.9%
2010	16,610.6	8.3%
2011	17,719.9	6.7%
CAGR	**2007–2011**	**3.23%**

Global Paints and Coatings Market size by Volume (Thousand Tons), 2007–2011



Global Paints and Coatings Market size by Volume (Thousand Tons), 2011–2016



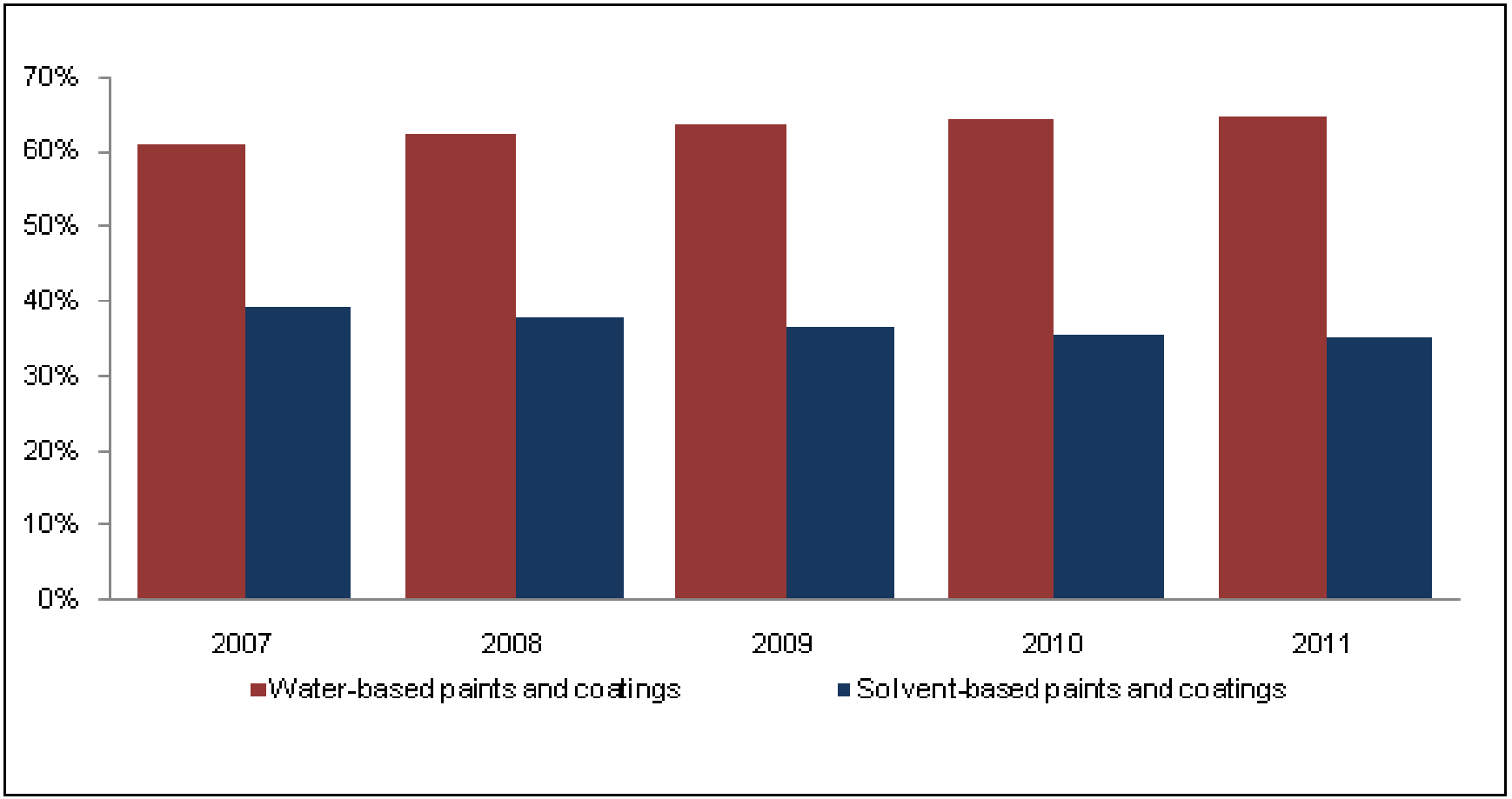
Global Paints and Coatings Market size by Volume (Thousand Tons), 2011–2016

Year	Thousand Tons	% Growth
2011	17,719.9	
2012	18,713.6	5.6%
2013	19,877.9	6.2%
2014	21,257.4	6.9%
2015	22,789.7	7.2%
2016	24,393.7	7.0%
CAGR	**2011–2016**	**6.60%**

Global Paints and Coatings Market Size by Category (US$ Million), 2007–2011

Category	2007	2008	2009	2010	2011	CAGR 2007–11
Solvent-based **Paints & Coatings**	16.6	17.1	15.5	16.4	17.4	1.21%
Water-based **Paints & Coatings**	25.7	28.1	27.1	29.6	31.8	5.54%
Overall	**42.3**	**45.2**	**42.6**	**46.0**	**49.2**	**3.90%**

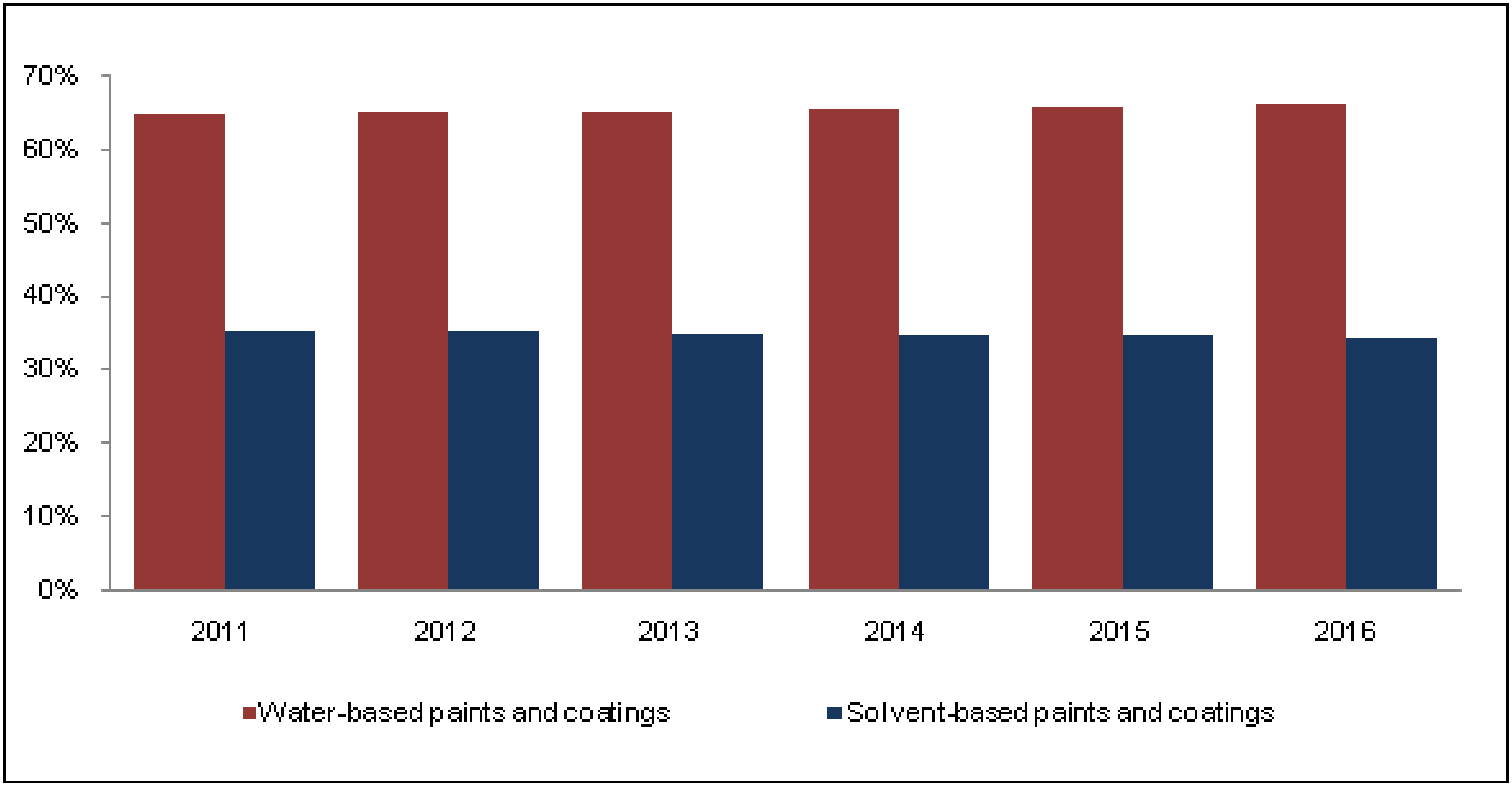
Global Paints and Coatings Market Size by Category (%), 2007–2011



Global Paints and Coatings Market Size by Category (US$ Million), 2011–2016

Category	2011	2012	2013	2014	2015	2016	CAGR 2011–16
Solvent-based **Paints & Coatings**	17.4	18.3	19.4	20.7	22.1	23.7	6.41%
Water-based **Paints & Coatings**	31.8	33.8	36.2	39.0	42.2	45.7	7.48%
Overall	**49.2**	**52.1**	**55.6**	**59.7**	**64.3**	**69.4**	**7.10%**

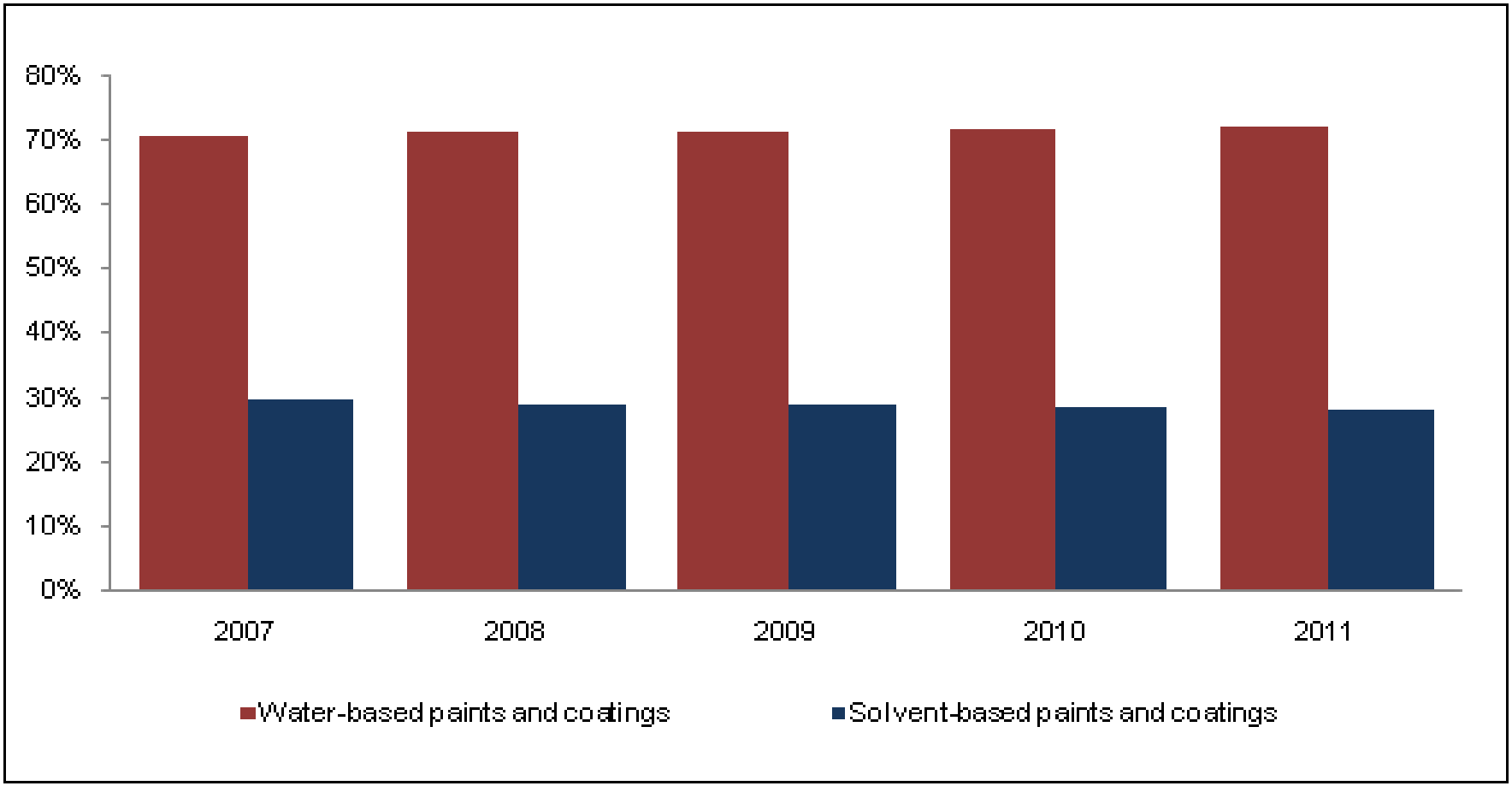
Global Paints and Coatings Market Size by Category (%), 2011–2016



Global Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007–2011

Category	2007	2008	2009	2010	2011	CAGR 2007–11
Solvent-based **Paints & Coatings**	4.6	4.7	4.4	4.7	5.0	1.94%
Water-based **Paints & Coatings**	11.0	11.5	11	11.9	12.8	3.76%
Overall	**15.6**	**16.1**	**15.3**	**16.6**	**17.7**	**3.23%**

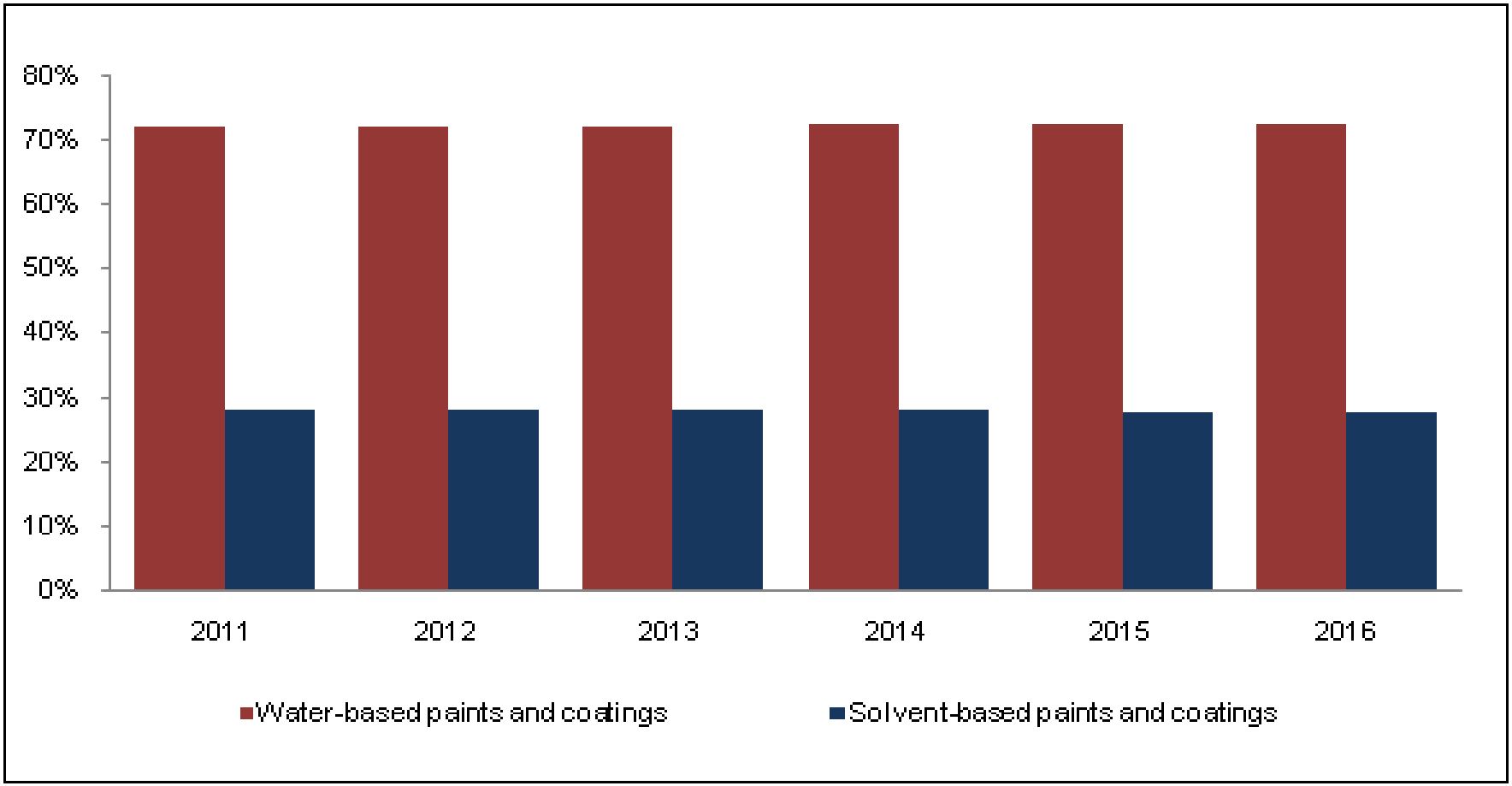
Global Paints and Coatings Market Size by Volume by Category (%), 2007–2011



Global Paints and Coatings Market size by Volume by Category (Thousand Tons), 2011–2016

Category	2011	2012	2013	2014	2015	2016	CAGR 2011-16
Solvent-based **Paints & Coatings**	5.0	5.2	5.5	5.9	6.3	6.7	6.28%
Water-based **Paints & Coatings**	12.8	13.5	14.3	15.4	16.5	17.7	6.73%
Overall	**17.7**	**18.7**	**19.9**	**21.3**	**22.8**	**24.4**	**6.60%**

Global Paints and Coatings Market size by Volume by Category (%), 2011–2016



Middle East

The Middle East's paints and coatings market is an emerging market due to the large scale construction projects being undertaken in the region's member countries. Most of the Middle Eastern countries have invested a considerable amount in their construction industries in an effort to diversify their economies from oil and oil-related business activities to other industry sectors. During 2006–2008, the Middle East nations recorded a robust economic growth due to the region's rising level of privatization, corporate sector expansion and considerable infrastructure investment as well as the strong global demand for oil.

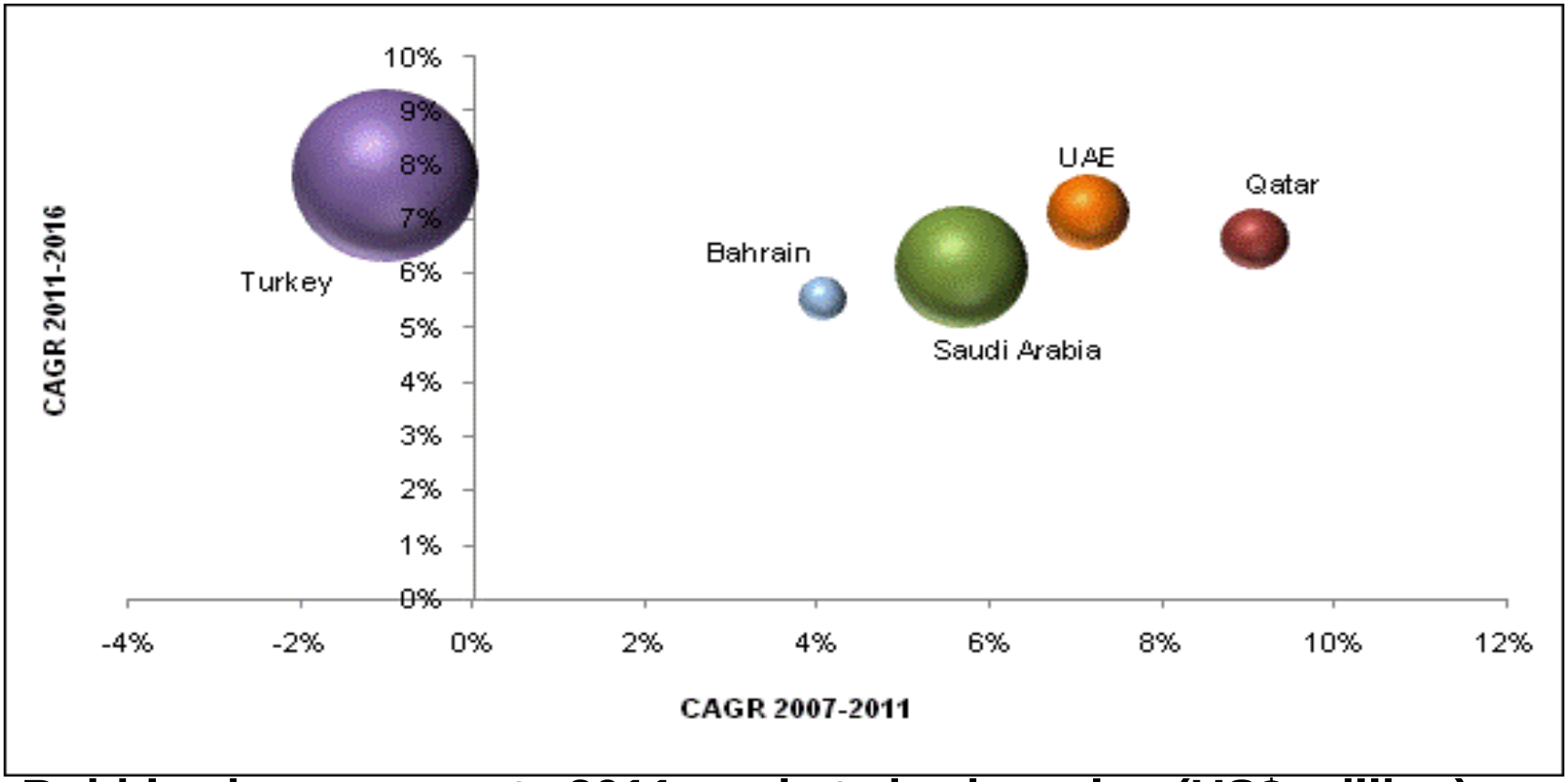
Qatari Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016

Category	**2007**	**2011**	**2016**
Solvent-based **paints and coatings**	33	41	53
Water-based **paints and coatings**	69	90	126
Overall	**102**	**131**	**178**

Middle East

- The Middle East's paints and coatings market is projected to record a CAGR of 7.10% 2007- 2011
- Middle East's production of paints and coatings has recorded a modest CAGR of 2.90% during the 2007-2011 period.
- The Middle East's paints and coatings market is projected to record a CAGR of 7.10% during 2011- 2016 period.

Middle East Paints and Coatings Market Dynamics by Value (%), 2007–2016

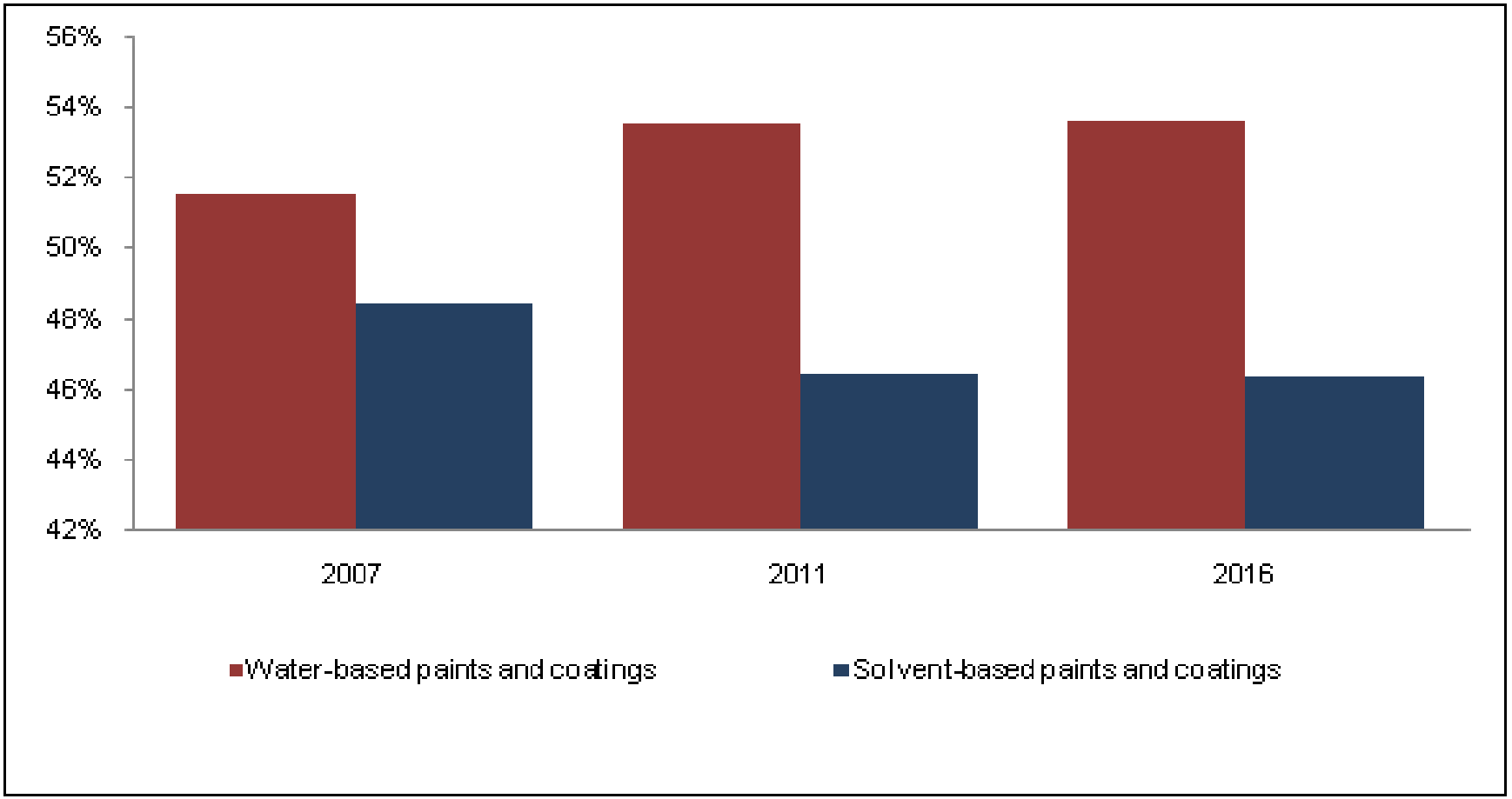


Bubble size represents 2011 market size by value (US$ million)

KSA Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016

Category	2007	2011	2016
Solvent-based paints and coatings	236	288	377
Water-based paints and coatings	251	332	437
Overall	**487**	**620**	**814**

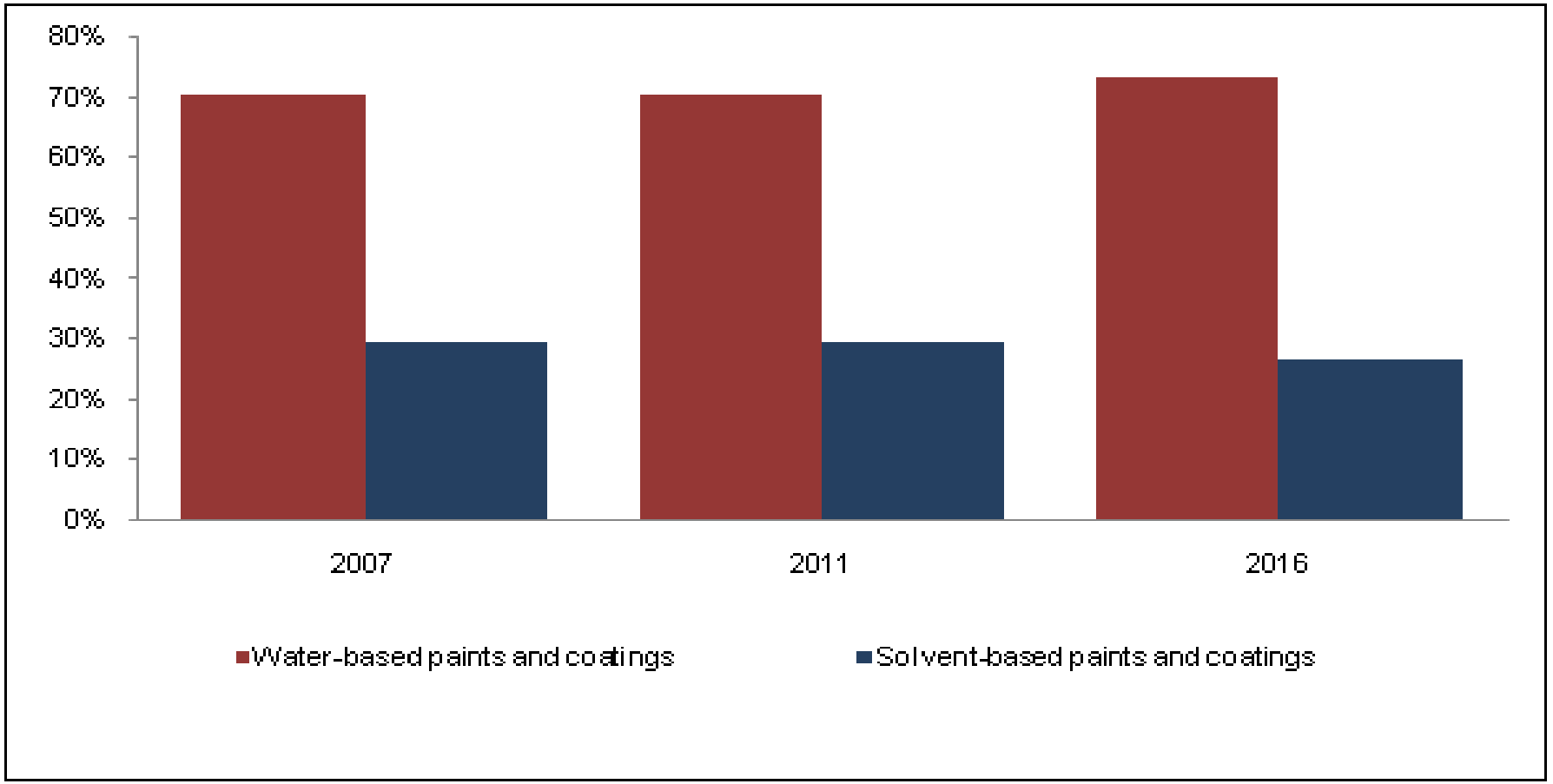
KSA Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016



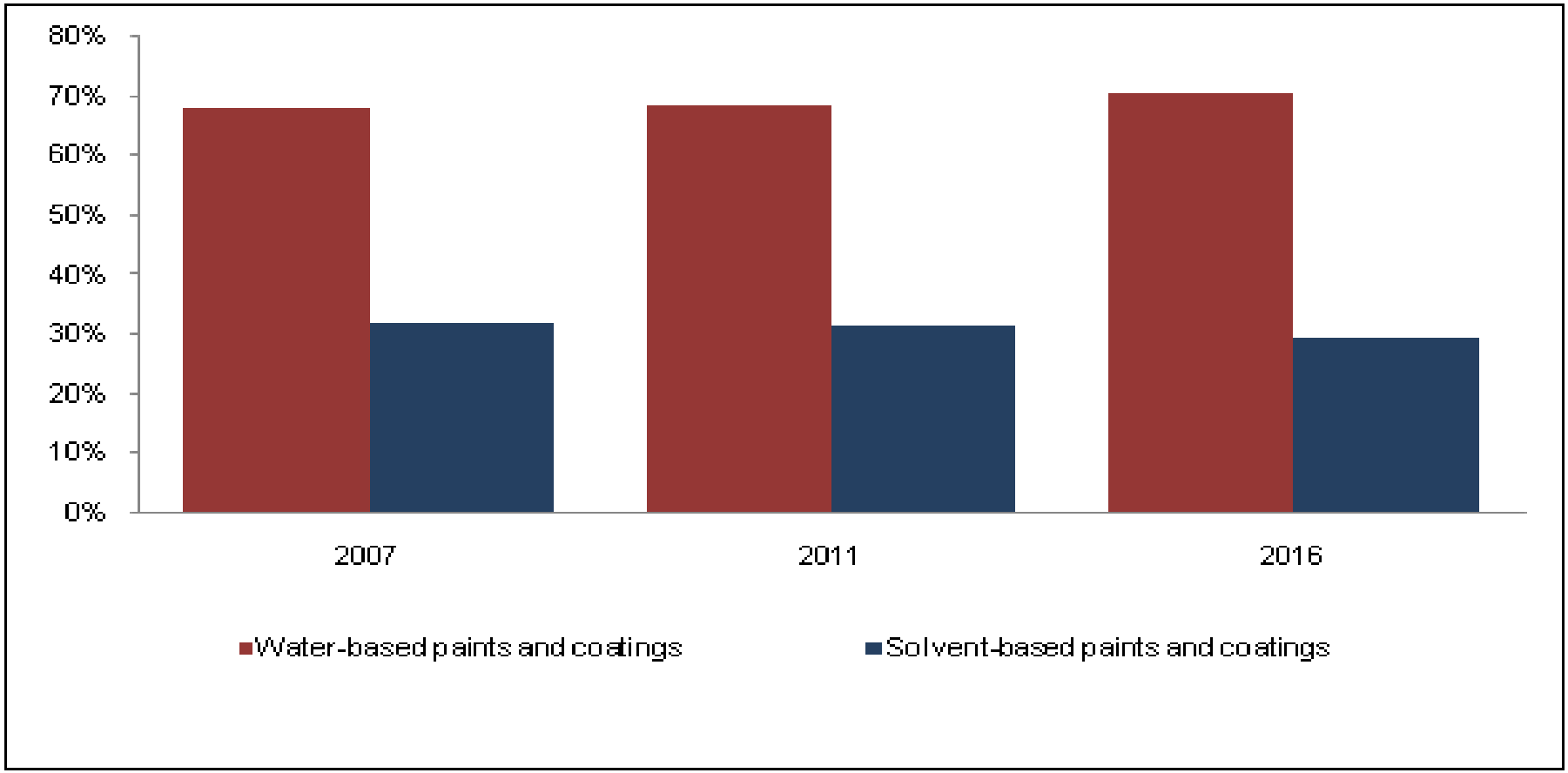
UAE Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016

Category	2007	2011	2016
Solvent-based **paints and coatings**	29	38	46
Water-based **paints and coatings**	69	90	126
Overall	**98**	**127**	**171**

UAE Paints and Coatings Market Size by Category (US$ Million), 2007, 2011 and 2016



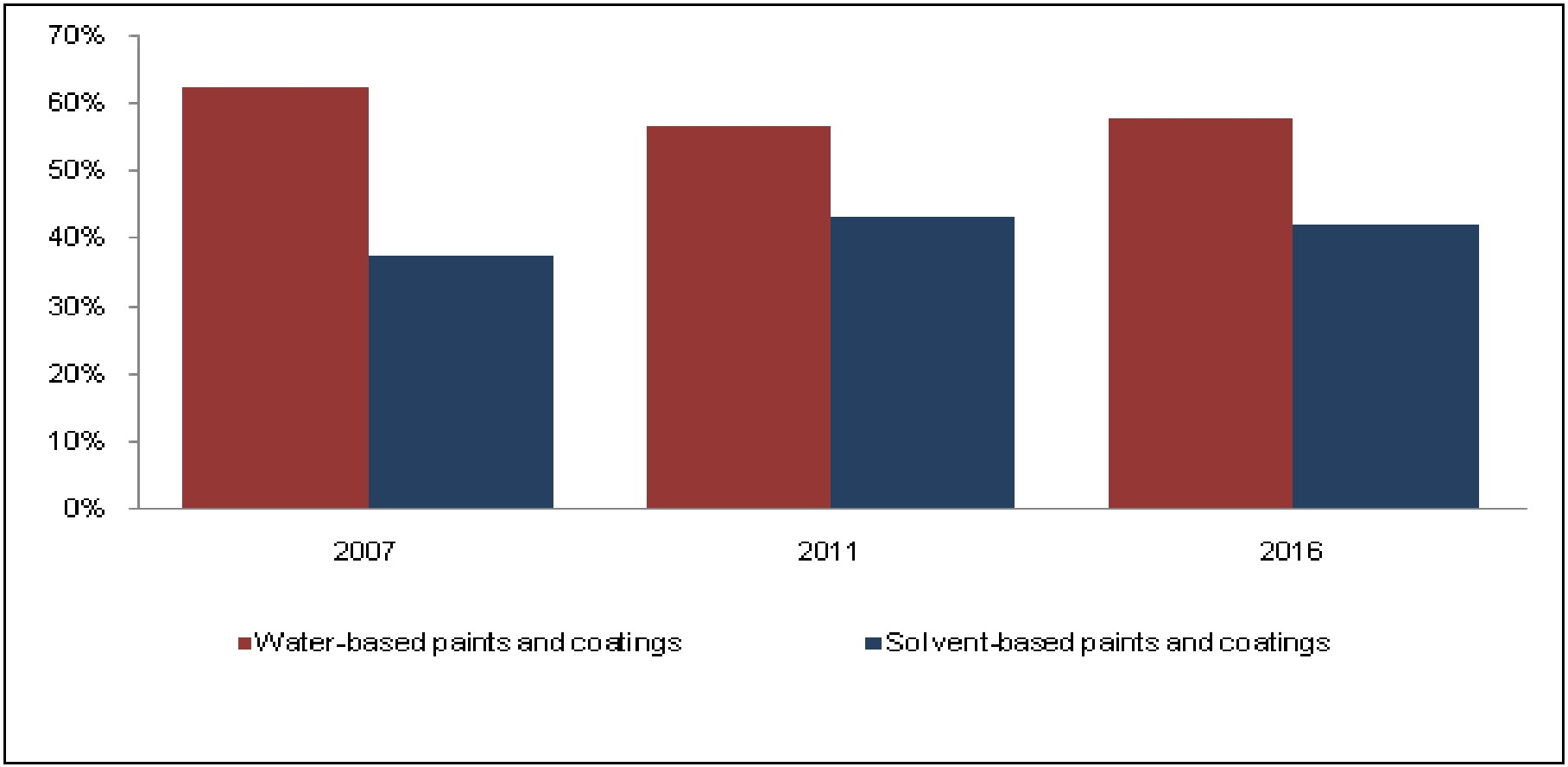
Qatari Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016



Bahrain Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016

Category	2007	2011	2016
Solvent-based paints and coatings	15	19	25
Water-based paints and coatings	25	25	33
Overall	**40**	**43**	**58**

Bahrain Paints and Coatings Market Size by Volume by Category (Thousand Tons), 2007, 2011 and 2016



Smart Technologies of the Future

Numerous technologies in the nascent stages of development will enable the industry to bring about profound changes in performance and durability.

Smart coatings

sense a change in conditions in the environment and respond to that change in a predictable and noticeable manner

These coatings can be used to detect corrosion, stress, temperature changes, microbes and other potential problems, and then take some sort of action to repair damage or destroy the cause.

Smart Technologies of the Future

- **Peizo-electric paints** can be used to measure shock and vibration damage on large structures such as bridges, off-shore platforms and pipelines.
- Coatings containing **thermo-chromic** pigments and polymers can serve as reversible temperature indicators in safety devices or indicators for food packaging.

Manufacturers and their suppliers are working diligently to commercialize these new opportunities and bring both enhanced performance and novel capabilities to their customers while further reducing the environmental impact of their operations and their products.

Outlook

The major drivers in the coating resin industry will continue to be the following:

- Green: environmentally-friendly and healthier coating systems.
- Better performance: more durable coatings, better aesthetics.
- Lower costs, in terms of price per kg and/or efficiency in use.

Thank You