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IRAN

PETROCHEMICALS REPORT

INCLUDES 5-YEAR FORECASTS TO 2020

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Iran Petrochemicals Report Q2 2016

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BMI Industry View

Iran is set to ramp up petrochemicals exports following the ending of international sanctions in January. The effects are likely to be global with a large amount of basic chemicals entering the market, leading to downward pressure on prices. However, the country still faces an uphill struggle with inward investment due to infrastructural and regulatory hurdles and will remain behind its Arabian Gulf competitors.

The country's petrochemicals production capacity was around 60mn tonnes per annum (tpa) in 2015, but the shortage of natural gas as feedstock, ageing production units and the problem of sanctions, which reduced exports, have caused petrochemical complexes to work at lower capacities. Iran's petrochemical output grew 10% year-on-year to 44.4mn tonnes in FY2014/15, implying capacity utilisation of 74%. Iran also increased petrochemical production by up to 2mn tonnes to about 46mn tonnes in 2015, but mostly by increasing feedstock and not launching new petrochemical plants.

Projects that had been put on hold as a result of sanctions are likely to be revived and there is a probability that capacities will be greater. For 2020, **BMI** forecasts ethylene capacity at 12.3mn tpa with 8mn tpa of polyethylene (PE) capacity. Iran is the focus of intensive interest from investors in the petrochemicals industry, particularly European majors, but there is still an element of risk-aversion in spite of the hype. Additionally, economic structural problems, a slowdown in key export markets and the falling price of naphtha feedstock are deterrents for involvement in the ethane-fed Iranian petrochemicals sector. However, potential rewards are high with considerable Iranian upstream resources and a large domestic market that investors cannot afford to ignore.

Planned projects would raise Iran's petrochemicals capacity three-fold to 180mn tpa by 2022, although it is uncertain whether this target will be reached. **BMI** expects the next five years to see the completion of the Olefins 11 and 12 project, which will have capacities of 2.0mn tpa and 1.2mn tpa respectively. Meanwhile, the USD12bn petrochemical hub at Chabahar - the Makran Petrochemical Plan - will add 1.2mn tpa of ethylene and 900,000tpa of PE.

- Iran is faced with a number of external constraints to export growth. Lower petrochemicals prices will limit the amount of export revenue growth Iran will receive from petrochemicals. Low naphtha prices are also a setback for ethane-based production in Iran and its main export market, China, is exhibiting a downturn.
- We forecast economic growth of 3-6% leading to a boost across a range of industrial sectors. Oil and gas will gain the most attention, but petrochemicals are also very well placed as the provider of raw material for growth industries, such as packaging and automotive sectors. Pent-up demand, a youthful population, a skilled workforce, and a large hydrocarbon and consumer story all make Iran one of the most positive and relatively well-balanced growth stories in the Middle East over the next decade.

- This quarter, Iran has seen a 0.5 point increase in its overall petrochemicals Risk/Reward Index (RRI) score to 63.4 due to an 5.0 points increase in its market risk score. This comes following the lifting of sanctions, which will boost exports and encourage inward investment in the petrochemicals industry. However, significant obstacles to investment remain and further reform to investment regulations is necessary, alongside infrastructural improvements, if Iran is to match its Arabian Gulf neighbours. It remains in third place behind the UAE in the regional RRI rankings, but has increased its lead over Qatar.

SWOT

SWOT Analysis	
Strengths	▪ OPEC's second largest oil producer, accounting for 10% of the world's oil reserves, providing easy and inexpensive access to abundant petrochemicals feedstock. ▪ The petrochemicals sector is set for rapid expansion. ▪ Import and export incentives offered in special economic zones, good relations with neighboring countries and a favourable location are key advantages for the industry. ▪ A large domestic market, skilled workforce and laws supporting foreign investments.
Weaknesses	▪ International sanctions have impacted on petrochemicals projects, which led to a fall in exports and related decline in capacity utilisation, while joint ventures with foreign firms have been delayed or abandoned. ▪ Iran is a late developer in petrochemicals and is at least a decade behind regional rivals such as Qatar and Saudi Arabia. ▪ Historical lack of expertise at the state-owned National Petrochemical Company makes it difficult to successfully commission new petrochemicals plants in the country. ▪ Lack of access to foreign technology.
Opportunities	▪ The alleviation of international sanctions will provide foreign investors with an opportunity to participate in the sector's expansion, although the business environment will remain challenging. ▪ Development of the massive South Pars gas field and greater utilisation of associated oil and gas in other fields will increase the amount of available raw feedstock. ▪ Development of petrochemicals special economic zones. ▪ Ethylene supplies are being extended and pipeline capacity doubled. ▪ Iran needs foreign companies' technology.

SWOT Analysis - Continued

	▪ Establishment of new free zones in Arak, north-west Iran, and the development of Jolfa into a mega-port is expected to enhance trade with neighbouring countries such as Azerbaijan (including the autonomous Nakhchivan enclave) and Armenia.
Threats	▪ Concerns over oil production levels could undermine sector growth if feedstock supply is less than originally understood.
	▪ Cancellations of existing contracts with foreign companies by Iran could deter future foreign direct investment.
	▪ The prices of petrochemicals products in Iran are about 50-70% lower than international market prices, which is likely to hinder the domestic sector.

Political

Political SWOT Analysis

Strengths

- Since the overthrow of the Pahlavi family in 1979, there has been some reduction in the level of political corruption, while wealth distribution has improved marginally.
- The Revolutionary Guard and Basij militia are fiercely loyal to the supreme leader, helping to maintain social stability.
- Sanctions relief will boost economic growth notably.

Weaknesses

- The country has one of the poorest human rights records in the region, and authorities do not hesitate to quell dissidents. A number of journalists and anti-government protesters are being held in custody.
- While decision-making ultimately rests with the supreme leader, the regime is heavily fragmented, and consensus is hard to reach.
- Widespread perceptions of electoral fraud during the course of June 2009's presidential elections have damaged the regime's legitimacy in the eyes of many Iranians.

Opportunities

- The Majlis (parliament) is more than just a rubber stamp; the move by 150 parliamentarians (out of 290) to hold former president Mahmoud Ahmadinejad accountable for his handling of the economy in March 2012 is a positive indication that checks exist.
- The victory of moderate cleric Hassan Rouhani in Presidential elections in June 2013 is leading to a significant improvement in relations with the West.
- The long term potential in Iran across a range of sectors is enormous given a large population, well-educated workforce and pent-up demand.

Threats

- Despite progress in nuclear talks, the prospect of further US and EU sanctions and the possibility of a military strike by the US or Israel cannot be dismissed.
- Youth unemployment is high.

Political SWOT Analysis - Continued

- The strong influence of the Revolutionary Guards within the political and economic arena will continue to present a challenge to reform.

Economic

Economic SWOT Analysis

Strengths	▪ Iran has the world's second largest proven oil reserves after Saudi Arabia, and the world's second largest proven gas reserves after Russia. ▪ Oil and gas aside, Iran is rich in other resources and has a strong agricultural sector.
Weaknesses	▪ Local consumption of hydrocarbons is rising rapidly; this, coupled with ageing technology in the sector, will have a negative impact on its oil and gas exporting capacity. ▪ International sanctions discourage foreign oil companies from bringing much-needed technical knowledge and equipment to maintain oil output levels.
Opportunities	▪ The gas sector remains underdeveloped despite significant improvements in recent quarters, and there is considerable room to maximise this source of revenue. ▪ A shortage of housing, provides opportunities for investment in residential construction.
Threats	▪ Lower oil prices will have a marked impact on the economy. Although an Oil Stabilisation Fund exists to protect the economy at times of weaker oil prices, it has increasingly been used to fund government overspending and could be close to empty. ▪ A collapse of the nuclear deal is a distinct possibility, which would drastically worsen the economic outlook.

Operational Risk

SWOT Analysis

Strengths	▪ Iran boasts high numbers of skilled graduates in technical fields such as engineering, construction and science. ▪ The outlook for Iran's economic and trade growth is improving due to the gradual lifting of sanctions, which began in 2013. ▪ The transport network offers good internal and cross-border connections, and is currently able to meet the country's supply chain needs. ▪ Low levels of violent crime mean that foreign workers and business property are relatively safe.
Weaknesses	▪ Costs of employment are increasing because the Iranian Labour Code affords workers a high level of protection and generous benefits. ▪ The costs of inland transportation, as well as the risk of congestion and traffic accidents disrupting supply chains, is raised due to reliance on the road network as the dominant freight mode. ▪ Trade bureaucracy is highly time consuming and places an onerous burden on importers and exporters. ▪ Businesses in Iran face heightened security risks due to the country's involvement in regional conflicts and the presence of several active domestic terrorist groups.
Opportunities	▪ The literacy rate of the labour force is increasing as the benefits of investment in primary school education are filtering through. ▪ The development of road and rail connections with Iran's neighbours highlights the country's potential to develop into key transit point for East-West trade. ▪ Relaxing of sanctions is resulting in greater foreign direct investment inflows.

SWOT Analysis - Continued

	▪ The threat of IS has increased the urgency of reaching an agreement over Iran's nuclear programme, and offers an avenue for greater cooperation, increased dialogue, and better relations with global powers.
Threats	▪ The availability of highly skilled labour is restricted as the brain drain results in an exodus of technically qualified workers.
	▪ The risk of electricity and water shortages will be enhanced due to growth in energy- and water-intensive agricultural, mining and manufacturing industries.
	▪ Lax intellectual property protection carries the threat of patent theft, fraud or infringement, leading to profit losses.
	▪ Even when sanctions are lifted, the impact of cyber and financial crime on businesses will remain significant, requiring investors to provide expensive security and preventative measures.

Industry Forecast

The lifting of sanctions will stimulate an immediate export boost for the Iranian petrochemicals industry, which has been operating well under capacity even as it has expanded in recent years. The government has ambitious plans for the sector with the hope that foreign investment will enable it to leverage its massive upstream resources to expand basic chemicals output. However, Iran continues to face infrastructural and regulatory difficulties and a depressed market outlook. Until these are overcome, the industry will struggle to meet the target of more than doubling petrochemicals capacity to 129mn tonnes per annum (tpa) by 2021.

Production

The country's petrochemicals production capacity was around 60mn tpa in 2015, but the shortage of natural gas as feedstock, ageing production units and the problem of sanctions, which reduced exports, have caused petrochemical complexes to work at lower capacities. Iran's petrochemical output grew 10% year-on-year (y-o-y) to 44.4mn tonnes in FY2014/15, implying capacity utilisation of 74%. Iran also increased petrochemical production by up to 2mn tonnes to about 46mn tonnes in 2015, but mostly by increasing feedstock not launching new petrochemical plants.

Iran's National Petrochemical Company (NPC) said the country's petrochemical output could increase by nearly 12% in FY2016/17 due to capacity expansion and export recovery. NPC plans to launch 15 new petrochemical units by FY2016/17, thereby increasing the country's capacity by 8.5mn tonnes. Even existing capacity could spur massive growth in output, although feedstock problems will place a constraint on growth. To operate at reasonable levels of capacity utilisation, olefins output would have to increase by one-third and polymers by one-third.

By 2022, the government targets petrochemicals output of 180mn tonnes with growth largely dependent on gas extraction, a figure that can only be achieved with vastly increased access to ethane as well as continued improvement in international relations. **BMI** forecasts that by 2020, ethylene capacity alone will total 12.28mn tpa, with the completion of the Olefins 11 and 12 projects, which will have capacities of 2.0mn tpa and 1.2mn tpa respectively.

We have included in the forecast the plans for the USD12bn petrochemical hub at Chabahar, on the Gulf of Oman, which will add to the company's major petrochemical operations at Assaluyeh and Bandar Imam. The first phase of a major petrochemical complex in the Chabahar free trade-industrial zone (FTZ) will be completed by 2018. The first phase includes six plants, whereas the full project is comprised of 18 plants

with an annual output of 23mn tpa. The FTZ enables foreign investors to buy as much as 100% of any plant and the project is also exempt from income tax for 20 years. Dubbed the Makran Petrochemical Plan, the project will be the biggest carried out by private investors in Iran and will include capacities of 1.2mn tpa of ethylene and 300,000tpa each of low density polyethylene (LDPE), high density polyethylene (HDPE) and linear low density polyethylene (LLDPE). Polypropylene (PP) is also set to be included, but no firm capacities are indicated.

The revival of Iranian production will depend largely on exports. The petrochemical industry is the second largest source of foreign earnings for Iran after oil. Iran exported 25mn tonnes of petrochemical products worth USD14bn in 2014.

With banking sanctions lifted and access to SWIFT, Iranian producers hope to save up 2-5% of overall costs with each transaction. However, the Iranian central bank has said it would need months after the lifting of sanctions to unify the exchange rates between the Iranian rial and the US dollar. Iran has been using two exchange rates for the rial - the free market rate and a state-endorsed rate - to cope with the limited foreign currency availability in the country.

However, lower petrochemicals prices will limit the amount of export revenue growth Iran will receive from petrochemicals. The potential scale of Iran's exports could exacerbate surpluses in some basic chemicals segments. Low naphtha prices are also a setback for ethane-based production in Iran and its main export market, China, is exhibiting a downturn.

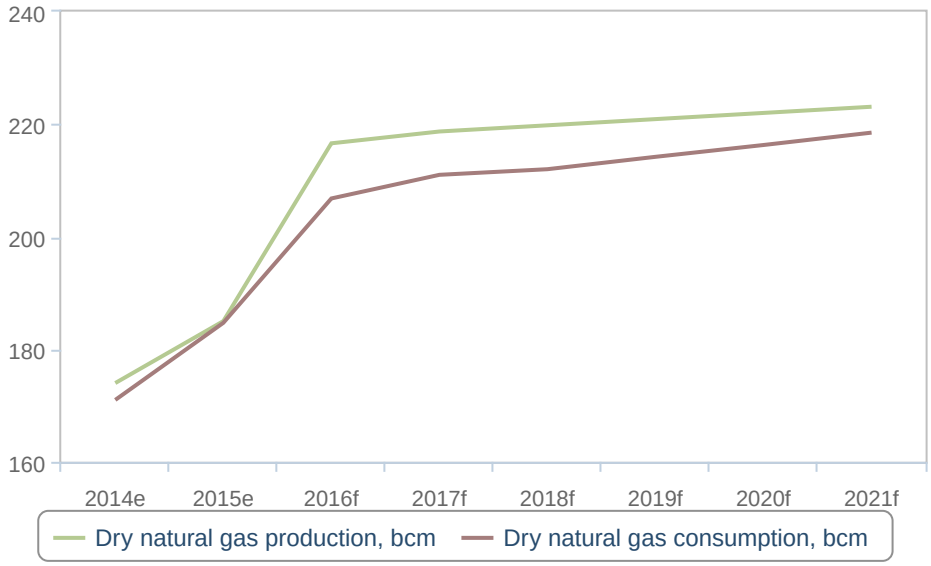
While export volumes may be boosted, given huge infrastructure deficits, the domestic economy will not undergo a boom, rather a steady acceleration in growth. However, the sustained decline in oil prices over the coming years will weigh on exports and government spending. The lack of investment over the past decade will ensure that a boom in the economy is not forthcoming for several years.

Investor wariness will not just affect Iran's hopes of diversifying downstream operations, but also its ability to increase upstream capacities, which are crucial to the development of the petrochemical sector. The political will to liberalise the petrochemicals sector is also wavering. Overbearing state interventionism and price fixing have prevented the growth of the industry. A reduction in state involvement in the sector and the provision of more facilities to investors are essential to secure future growth in petrochemicals capacity. A growing export market is also essential to help offset the negative impact of domestic sales at government fixed rates.

Nevertheless, we forecast growth of 3-6% leading to a boost across a range of industrial sectors. Oil and gas will gain the most attention, but petrochemicals are also very well placed as the provider of raw material for growth industries, such as packaging and automotive sectors. Pent-up demand, a youthful population, a skilled workforce and a large hydrocarbon and consumer story all make Iran one of the most positive and relatively well-balanced growth stories in the Middle East over the next decade.

Gas Production Will Exceed Demand Growth

(2014-2021)



e/f = BMI estimate/forecast. Source: National sources, BMI

Besides the risks associated with the nuclear agreement, the industry is faced with structural problems. In the short term, it is grappling with the issue of falling crude oil prices, which are leading to a concurrent slump in naphtha prices. With the Iranian petrochemicals industry dependent on ethane for 80% of its feedstock and naphtha for just 8%, the narrowing price differential between ethane and naphtha threatens Iranian petrochemicals margins. Ironically, the chief driver of lower oil prices will be the influx of Iranian crude on the global market.

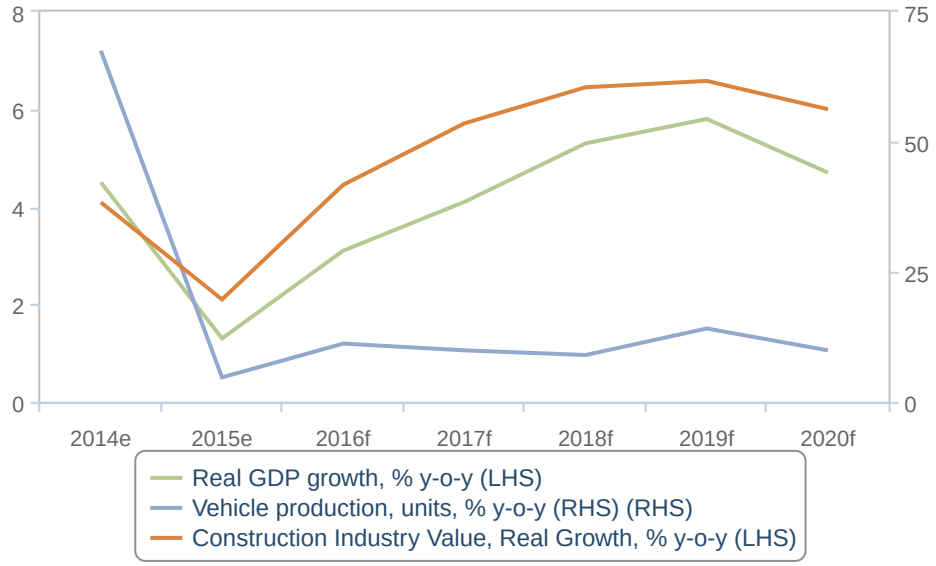
The surge in capacity will not be sustainable if feedstock supply is not forthcoming and markets do not absorb output. Some complexes are suffering feedstock shortages particularly during winter months. Iranian

petrochemical complexes need 30-35mn cubic metres of gas per day. Besides pressure on supply, Iranian ethane feedstock is nearly three times more expensive than in Saudi Arabia. While the plants may nominally come on stream, operation rates could be low and plants will be operating at a loss unless Iranian producers can pass on the full costs of production onto consumers in export markets.

Iran's main export market, China, will also move towards self-sufficiency, while Asian markets will be increasingly supplied by low-cost US petrochemicals output. Low-capacity utilisation is therefore going to be an enduring problem. Moreover, although Iran will be keen to secure tie-ups with European petrochemicals producers, the country will retain a highly risky business environment and there is no certainty that Iran's isolation will end. The industry will need foreign skills and equipment if it is to add value to output and diversify its product portfolio.

Autos Revival Will Secure Growth

Growth Rates For Iran's Key Petrochemicals Consumption Markets



e/f = BMI estimate/forecast. Source: National sources, BMI

Consumption

The automotive industry is undergoing a resurgence of activity as a result of economic recovery with output exceeding 1mn units in 2014 due to 67% growth. As the lifting of sanctions will only be fully finalised by

the end of the year, we look to 2016 for the real results. We maintain our forecast for 35% growth in car sales in calendar year 2015, which will see the market return to just below its peak of 2011, and forecast 27% growth in total vehicle output to 1.4mn units. At the moment, much of this growth is still coming from the effects of the interim deal that was agreed and allowed some imports to recommence. By 2020, we see the volumes reaching around 2.5mn units, with an improved economy and favourable demographics adding to the choice of brands as key drivers of growth. This will, in turn, stimulate domestic consumption of a wide range of petrochemicals used in car-making, including synthetic rubber, engineering plastics and polyurethanes.

On the downside, the construction industry is set for slow growth, which will limit the market performance of construction-related petrochemicals such as polyvinyl chloride (PVC) and certain applications of PE and PP. However, there will still be a turnaround from the years of contraction. We continue to forecast 1.4% y-o-y real construction industry growth in Iran in 2015, but have raised our five-year average growth from 3.1% per annum to 4.3% as a result of the lifting of international sanctions.

Table: Iran's Petrochemicals Industry, 2011-2020 ('000 tpa, Unless Otherwise Stated)

	2011	2012	2013e	2014f	2015f	2016f	2017f	2018f	2019f	2020f
Ethylene capacity, '000 tpa	5,376	7,876	8,376	8,876	11,076	11,076	11,076	11,076	11,076	12,276
Propylene capacity, '000 tpa	1,430	1,870	1,960	2,410	2,740	2,740	2,740	2,740	2,740	2,740
Benzene capacity, '000 tpa	1,090	1,090	1,090	1,390	1,770	1,770	1,770	1,770	1,770	1,770
Tolouene capacity, '000 tpa	625	625	625	825	825	825	825	825	825	825
Butadiene capacity, '000 tpa	240	240	240	240	240	240	240	240	240	240
Styrene capacity, '000 tpa	695	695	695	1,295	1,295	1,295	1,295	1,295	1,295	1,295
Acrylonitrile butadiene styrene capacity, '000 tpa	90	290	290	290	290	290	290	290	290	290
Styrene-butadiene rubber capacity, '000 tpa	90	90	90	90	90	90	90	90	90	90
Xylenes capacity, '000 tpa	1,590	1,590	1,590	1,690	2,310	2,310	2,310	2,310	2,310	2,310
Ethylbenzene capacity, '000 tpa	100	100	100	100	100	100	100	100	100	100
Ethylene dichloride capacity, '000 tpa	700	700	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
Ethylene glycol capacity, '000 tpa	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,950	1,950
Ethylene oxide capacity, '000 tpa	1,770	1,770	1,770	1,770	1,770	1,770	1,770	1,770	1,770	1,770
High density polyethylene capacity, '000 tpa	1,785	1,785	2,385	2,685	2,685	2,685	2,685	2,685	2,685	2,985
Low density polyethylene capacity, '000 tpa	775	2,075	2,375	2,375	2,375	2,375	2,375	2,375	2,375	2,675
Linear low density polyethylene capacity, '000 tpa	1,095	1,395	1,995	1,995	1,995	1,995	1,995	1,995	1,995	2,295

Iran's Petrochemicals Industry, 2011-2020 ('000 tpa, Unless Otherwise Stated) - Continued										
	2011	2012	2013e	2014f	2015f	2016f	2017f	2018f	2019f	2020f
PE capacity, '000 tpa	3,655	5,255	6,755	7,055	7,055	7,055	7,055	7,055	7,055	7,955
Polypropylene capacity, '000 tpa	1,040	1,040	1,040	1,290	1,290	1,290	1,290	1,290	1,290	1,290
Vinyl acetate capacity, '000 tpa	180	180	320	320	320	320	320	320	320	320
Vinyl chloride capacity, '000 tpa	630	630	930	930	930	930	930	930	930	930
PVC capacity, '000 tpa	400	640	640	940	940	940	940	940	940	940
PS capacity, '000 tpa	250	250	250	250	250	250	250	250	250	250
Polyethylene terephthalate capacity, '000 tpa	705	705	705	705	705	705	705	705	705	705
Methanol capacity, '000 tpa	5,345	8,865	11,505	14,705	14,705	14,705	14,705	14,705	14,705	14,705
Ammonia capacity, '000 tpa	4,930	4,930	6,365	6,365	6,605	6,605	6,605	6,605	6,605	6,605
Urea capacity, '000 tpa	7,405	7,405	10,620	10,620	12,560	12,560	12,560	12,560	12,560	12,560

e/f = BMI estimate/forecast. Source: BMI

Macroeconomic Forecasts

Economic Analysis

***BMI View**: Iran's economy will see a substantial uptick in growth in the coming years as a result of the removal of sanctions. Three years of recession will end, but a long-lasting boom is still a long way off given structural issues in the economy.*

- Removing sanctions on the economy will end recession, but not presage a boom.
- The sustained decline in oil prices over the coming years will weigh on exports and government spending.
- The lack of investment over the past decade will substantially restrain growth over the coming years.
- We forecast substantial growth across a range of sectors. Oil and gas will gain the most attention, but consumer segments are also very well placed.

Table: Iran - Key Economic Indicators

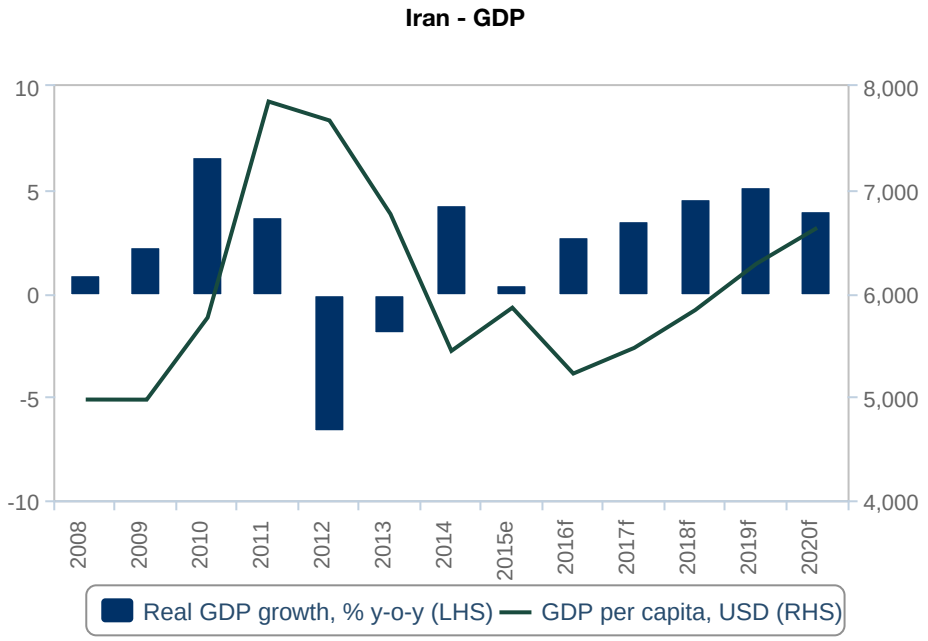
	2013	2014	2015f	2016f	2017f	2018f	2019f
Real GDP growth, % y-o-y	-1.9	-0.5	0.6	2.9	3.9	4.1	4.1
Unemployment, % of labour force, ave	13	11	10	10	10	10	9

f = BMI forecast. Source: BMI, CBI

The removal of almost all sanctions on Iran's economy - which we expect to occur in H116 - will cause a significant uptick in economic growth over the coming years, reaching between 3% and 6%. We expect Iran's economy to emerge from recession as the country complies with demands on its nuclear programme. Iran has huge potential across almost all sectors, not just oil and gas which attracts most of the attention, and we highlight industries related to the consumer - especially autos and food and drink.

Pent-up demand, a youthful population, a skilled workforce, and a large hydrocarbon and consumer story all make Iran one of the most positive and relatively well-balanced growth stories in the Middle East over the next decade. That said, there are, of course, major impediments facing the Iranian economy - not least the rampant corruption in the country and the years of underinvestment across almost all sectors - which will prevent it from truly booming in the coming years.

Noticeable Boost From Nuclear Deal

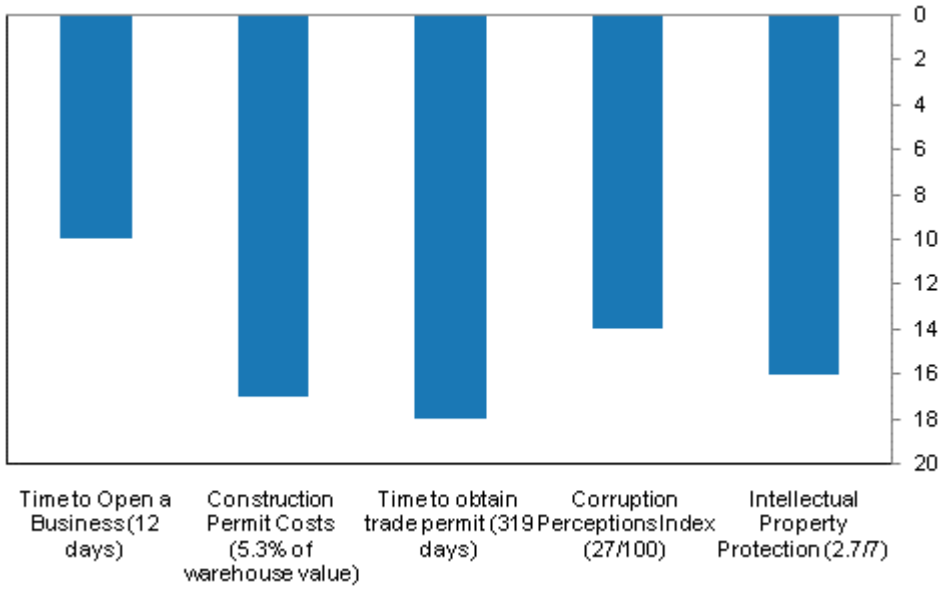


e/f = BMI forecast. Source: UN, BMI

Lower oil prices will play a key role in limiting the impact of the unwinding of sanctions. We forecast oil prices (Brent crude) to average USD57 per barrel (/bbl) in 2015 and USD56/bbl in 2016 as a result of global oversupply. This will ensure that government spending and private consumption growth will be relatively low. Fixed investment and exports will become increasingly important growth drivers, though this will be a slow process as opposed to a sudden jump once sanctions are removed. Indeed, while we expect President Hassan Rouhani's administration to undertake significant efforts to reform to the economy, the effects will be limited by a persistently opaque business environment, domestic resistance to opening up the economy and the slow political process.

Impediments Remain Even Beyond Sanctions

MENA - Rankings Indicators Of Business Environment (2014)



Note: Out of 18 MENA countries, excludes West Bank; for CPI and IPP, a higher number is better. Source: BMI

In turn, the easing of financial sanctions will facilitate project finance and attract foreign investment into the infrastructure sector. International sanctions have severely restricted access to funding for projects, reflected in Iran's average construction industry growth of only -0.1% over the past six years. In fact, in the Financing Risk pillar of our Project Risk Index (PRI), Iran scores only 18.8 out of 100, with a particularly weak score of five out of 100 in the Cost of Financing subcomponent. Iran ranks 79 out of 82 countries globally in our PRI.

GDP By Expenditure

Iran's economy is dominated by private consumption (39% of GDP in 2014), a share which has remained fairly constant over the past decade. We expect this percentage to rise over the coming years as the component benefits from an unwinding of sanctions. Given the aforementioned weaknesses in Iran's business environment we expect fixed investment (27%) will decline over the coming decade. Government consumption (11%) will see minimal growth as austerity measures take effect. Net exports (22%) will see a modest rise as oil exports are gradually allowed from Q116.

Table: Iran - Private Consumption Forecast

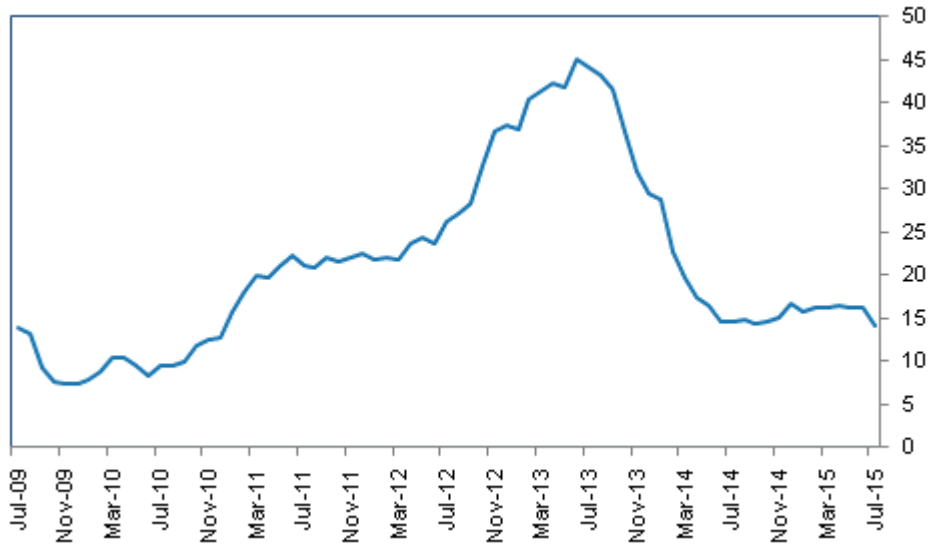
	2014	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f
IRRtrn	4573	5670	6861	8096	9391	10894	12092	13422	14765	16241	17865
% of GDP	36.0	43.9	43.8	44.5	45.2	46.1	46.0	46.4	47.0	47.6	48.2
Real growth % y-o-y	2.0	1.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0

f = BMI forecast. Source: BMI, CBI

Private Consumption Outlook: A reduction in sanctions bodes well for private consumption over the longer term, however, this positive impact is unlikely to be felt until 2016 at the earliest. Subsidy cuts, high inflation and a depreciating rial - trends which we expect to continue over the rest of 2015 - have dampened consumer demand substantially and will weigh on growth in the coming quarters. We forecast real growth of 1.0% and 3.0% in 2015 and 2016, respectively. The inflationary environment will improve, but persistently elevated price pressures will continue to hit purchasing power.

Inflation Coming Down But Still Elevated

Iran - CPI Inflation % chg y-o-y



Source: BMI, Central Bank of Iran

Iranians' purchasing power has been eroding steadily over past quarters, with inflation making it increasingly difficult to purchase basic goods. According to reports from the government's statistics office, consumer price inflation increased 14.5% y-o-y in July 2015, although this was a significant drop on the previous two years. In addition, the availability of imported goods has decreased significantly as a result of the ongoing depreciation of the rial in the black market.

Government Spending Outlook: We forecast sustained fiscal deficits over the coming years primarily on the back of lower oil prices and an only modest reduction in spending. We expect the government will quicken subsidy reforms and privatisation plans, however, this will be insufficient to prevent sustained deficits over the coming years.

Indeed, the administration will maintain its efforts to invest in areas such as social services and education, in a bid to maintain public support. For instance, in July parliament approved a plan for the country's most vulnerable groups to receive subsidised staple goods - including rice, vegetable oil and meat - every three months, in order to offset the erosion of their purchasing power

Table: Iran - Government Consumption Forecast

	2014	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f
IRRtrn	1,272	1,526	1,816	2,107	2,401	2,786	3,092	3,432	3,775	4,153	4,568
% of GDP	10.0	11.8	11.6	11.6	11.5	11.8	11.8	11.9	12.0	12.2	12.3
Real growth % y-o-y	4.0	-3.0	1.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0

f = BMI forecast. Source: BMI, CBI

Fixed Investment Outlook: Even with an unwinding of sanctions against Iran, huge impediments remain to foreign companies looking to tap one of the Middle East's largest markets. Foreign companies in nearly every sector have recently expressed interest in returning to the Iranian market, however, the difficult operational environment - where corruption, bureaucracy and nepotism are rife - will ensure only a slow return of investment. Indeed, Iran scores poorly in **BMI**'s Operational Risk Index, with 41.5 out of 100 ranking the country 13th out of 18 states in the MENA region.

Table: Iran - Fixed Investment Forecast

	2014	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f
IRRtrn	3,005	3,180	3,424	3,716	4,064	4,438	4,839	5,269	5,730	6,224	6,753
% of GDP	23.6	24.6	21.9	20.4	19.5	18.8	18.4	18.2	18.3	18.2	18.2
Real growth % y-o-y	3.0	1.0	3.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0

f = BMI forecast. Source: BMI, CBI

Net Exports Outlook: Iran will not be able to boost oil production and exports to pre-sanction levels within the coming one-to-two years. Sanctions will be lifted slowly and in a phased manner, limiting the speed and quantities at which additional Iranian oil can reach the market. Most importantly, years of underinvestment, maturing of oil fields and a lack of field and well maintenance could possibly have permanently destroyed some of the country's production capacity.

Output To Pick Up In 2016

Iran - Oil Output ('000)

Source: BMI, CBI

Overall, we estimate that Iran could bring back online some 550,000-650,000 barrels per day (b/d) of additional crude oil production in the one-to-two years following a lifting of oil sanctions. This is in contrast to a more mainstream expectation of additional output capacity of 1mn b/d shortly after the lifting of sanctions. Import growth will be minimal due to a weak rial and only a small pick-up in economic activity.

Table: Iran - Net Exports Forecast

	2014	2015f	2016f	2017f	2018f	2019f	2020f	2021f	2022f	2023f	2024f
IRRtrn	2,524	913	1,616	2,061	2,467	2,739	3,284	3,643	3,720	3,870	4,021
% of GDP	19.9	7.1	10.3	11.3	11.9	11.6	12.5	12.6	11.9	11.3	10.8
Real growth % y-o-y	11.1	1.2	2.8	3.8	3.0	2.2	2.2	0.3	1.1	1.1	1.1

f = BMI forecast. Source: BMI, CBI

Industry Risk Reward Index

Middle East And Africa Overview

Weaker regional demand, oversupply and competition posed by Iran following the lifting of sanctions will put downward pressure on prices in the Arabian Gulf. Suppliers are expressing concern over diminishing margins with polymer demand failing to recover in Q415. Additionally, the UAE is ramping up production at the third phase of its expansion, known as Borouge 3, which is heightening market competition.

Borouge 3 comprises a 1.5mn tonnes per annum (tpa) cracker and derivative plants, including high density polyethylene (HDPE) and linear low density polyethylene (LLDPE) units with a combined capacity of 1.08mn tpa, a 350,000tpa low density polyethylene (LDPE) and two polypropylene (PP) units with a combined capacity of 960,000tpa. In December 2015, **Sadara Chemical** started up a 375,000tpa LLDPE plant in Saudi Arabia, the first of the 26 petrochemical units at its Jubail complex. The Jubail complex, which is a joint venture between **Saudi Aramco** and **Dow Chemical** - will be able to produce 1.08mn tpa of polyethylene (PE). It is the first petrochemical complex in the Middle East that will use naphtha as feedstock, which should enable it to capitalise on lower naphtha costs.

Adding to the supply woes is the expected return of Iran in the global polymer scene. The country is a major PE producer in the Middle East that was prevented from exporting to its main market - Europe - by international sanctions imposed on suspicion that it was developing a nuclear weapon. Arabian Gulf producers in the Gulf Co-operation Council (GCC) will compete directly with Iran in the European market, a prospect that is unsettling them. Buyers may also turn more cautious in procuring cargoes amid the bleak macroeconomic outlook prevailing in the Middle East. Buying appetite could also be affected by Middle East polymer suppliers becoming more cautious over giving credit to less established players. This could worsen the buying appetite even further for 2016.

The prospects for strong exports-led growth in Iran are good as the Iranian government aims to raise capacity from the current 60mn tpa to 100mn tpa by 2020. The relief of sanctions should raise the operating rates from 68% of capacity, as they were in 2014, even as capacity grows. In 2015/16, Iran plans to open 11 petrochemical units, increasing the country's petrochemical production by 6mn tonnes.

The dominant ethane feedstock in the Arabian Gulf has declined in competitiveness as a result of lower naphtha costs, which have been driven down by falling crude prices. This has benefitted more naphtha-reliant competitors, particularly in Asia, its main export market. At the same time, slackening demand in export markets has weakened product prices.

In these unfavourable market trends, the opening of the Borouge 3 petrochemicals facility in 2014 came at an inopportune time for the UAE's petrochemicals industry. Added to this is the planned Chemaweyaat complex, which the emirate hopes will be the world's largest petrochemical complex when it comes into operation in 2016. The first part of the development, Tacaamol, will use heavy naphtha feed for aromatics units and a lighter naphtha feed for a 1.5mntpa mixed feed cracker. This will capitalise on the lower price of naphtha as well as more the diverse product portfolio that naphtha provides. The availability of naphtha in the UAE is being boosted by refinery expansion at Ruwais, helping to retain the Emirati industry's competitive edge and enabling it to produce a wider range of products.

In contrast, Qatari petrochemicals production is threatened by reduced demand growth in key export markets and the surge in output from Iran. Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as the country does not produce the same range of by-products as competitors which rely on other feedstock. The country's drive towards diversification with a mixed feed petrochemicals complex, which would help diversify and take advantage of lower naphtha costs, has received setbacks in recent months with the cancellation of major projects. Current circumstances do not support a revival of shelved plans or any further capacity expansion beyond 2016.

Over the medium term, Saudi Arabia is likely to become better placed than some smaller ethane-orientated regional rivals as it develops mixed feed crackers and continues efforts to diversify and add value to the production chain. Its main competitor is likely to be Iran, as the international sanctions regime is eased.

Kuwait is arguably in a better position than other Gulf producers as its production is geared towards naphtha feedstock. Heavier cracks from naphtha should be conducive to diversification. The first phase of debottlenecking operations at Equate's PE facilities put it on course for a 175,000tpa increase in capacity in 2016. This will be followed in 2017 with **Kuwait Petroleum Corporation**'s Olefins III project, which should see ethylene capacity grow 1.4mn tpa with a corresponding rise in polyethylene and ethylene glycol capacities.

However, delays to the establishment of the Al-Zour refinery project are set to undermine Kuwaiti petrochemicals competitiveness. The Al-Zour project was set to raise downstream refinery capacity to 1.4mn barrels per day (b/d) by 2019, but it looks set to be delayed until 2020 as costs escalate and Kuwait continues in its effort to secure financing. In the meantime, refining capacity is set to decline as a result of consolidation within the refining sector, a move that could restrict naphtha supply to petrochemicals and raise feedstock costs.

Market Diversification Crucial To Growth

The Arabian Gulf states are seeking counter Iran's rise with a comprehensive free trade agreement between Gulf Cooperation Council countries and the EU that could reduce export costs and increase production returns for companies participating in the Gulf states' chemicals industry. However, this may be insufficient to give producers an edge, particularly given the slow growth in the EU market.

Larger external markets like China and India are witnessing a slowdown in demand while they are at the same time becoming self-sufficient. Adding to the issue of reduced sanctions on Iran, which offers the prospect of a massive rise in Iranian exports, these market factors will constrain prices and growth.

For exporters, diversifying away from China is essential. With the Chinese market moving towards a situation of self-sufficiency as its market growth slows and capacities continue to rise, Gulf output will need to diversify to other markets as well as increase the portfolio of products and diversify away from a narrow focus on polymers.

India is an obvious alternative; however, similar to China, India is also aiming for self-sufficiency. We note that while it is unlikely that India will reach this target in the short term, capacities in India will grow in the long term, making the country increasingly self-sufficient. This will force exporters in the Arabian Gulf to look to South East Asia and other regions for growth opportunities.

Arabian Gulf producers are also seeking to diversify their product portfolios. Saudi Arabia's focus will be on developing high-performance and speciality grades, which can add value to exports and put the Saudi Arabian industry in direct competition with Japanese producers and other more mature markets. As a result, Saudi Arabia's manufacturing base will grow, moving the country away from exporting basic chemicals and importing finished goods as it grows its five industrial clusters: minerals and metals processing, automotives, plastics and packaging, home appliances and solar energy.

Kuwait, the UAE and Qatar are also likely to pursue diversification, although on a smaller scale. Kuwait is set to be a growth driver in the Gulf States, benefitting from cracking heavier feedstock to produce a wider range of products. By using a mixed feed, Kuwait's Olefins III complex will be able to diversify production when it comes on stream in 2016. Meanwhile, the UAE's petrochemicals industry will benefit from the rapid expansion of capacities in highly integrated, state-of-the-art complexes but will be limited by the narrow product range and lack of downstream diversification.

We note that Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as the country does not produce the same range of by-products as competitors which rely on other feedstock. The US and China, for example, also rely on naphtha. Due to the lack of diversification, Qatar is likely to be sidelined in the special chemicals market. Although the government is seeking to redress the balance with mixed crackers, other industries are also capitalising on the increasing global demand, which will cause Qatar to be left behind.

Tightening Ethane Supplies

By the end of the decade, US gas production will be five times greater than Saudi Arabia. While Arabian Gulf states will increasingly come up against capacity constraints for ethane, with a resulting rise in feedstock prices, the US petrochemicals industry will enjoy access to abundant resources. Unless new sources of gas are found, including unconventional forms that the region's governments have yet to exploit, the Gulf's petrochemicals industry will face pressure on margins as it faces heightened competition, particularly in Asia. Where the Gulf can succeed is in heavier cracks, which can come from new mixed feed crackers that utilise locally available naphtha.

In the Middle East, the main factors behind rising ethane prices are the requirement to supply domestic markets to fuel economic growth and the desire to achieve higher revenues via export sales agreements. Domestic requirements include electricity generation, with natural gas seen as a cheap and easy way to meet consumption growth, which has registered a compound annual growth rate (CAGR) of 6-8%.

A tightening of the market, the rising costs of extraction and a need for incentives to encourage the drilling of non-associated gas are prompting governments to raise gas prices, reducing the differential with naphtha and eroding the region's competitive edge. However, over the short term, with crude prices remaining stubbornly high, Middle Eastern ethane-based petrochemicals production is still likely to prove a challenge to naphtha-based production, particularly in Europe.

The UAE is particularly vulnerable to a gas supply deficit during summer months, forcing it to rely on supplies from Qatar while it taps largely undeveloped offshore sour gas fields. Qatar's dependence on ethane, the tightening on supplies and subsequent rises in feedstock costs as well as its lack of indigenous oil resources means it is being forced to cut back on planned major projects in the face of pressure on margins.

Reliance on ethane in Saudi Arabia and Qatar is also limiting product diversification due to the fact that there are significantly fewer by-products compared to naphtha. In polymers, this will invariably lead to an

overwhelming reliance on PE grades. Research and development will need to focus on greater utilisation of PE as an alternative to PP in engineering plastics applications.

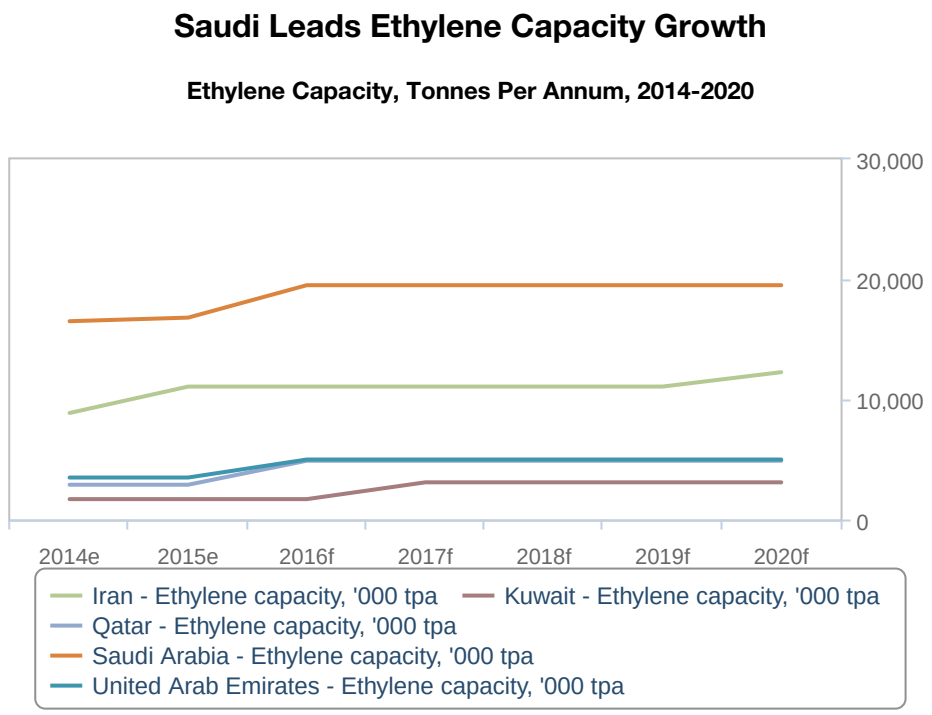
Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as it does not produce the same range of by-products as other countries that rely on other feedstocks such as naphtha. This means it is likely to be sidelined in the special chemicals markets because, although the government is seeking to redress this imbalance with mixed crackers, other industries are also capitalising on the increasing global demand, and Qatar will be left behind.

Should Iranian sanctions be permanently lifted and oil prices fall further, OPEC may eventually decide to cut oil production. This would tighten the naphtha market, providing yet more pressure on naphtha based production.

The biggest loser of a naphtha price rise would be Kuwait, the gas-poor Gulf state that has relied heavily on its oil resources. It has capitalised on the narrowing of the naphtha-ethane price differential as well as the diversification of downstream production. Kuwait's petrochemical development strategy includes the expansion of Aromatics and Olefins III projects and entering the specialised petrochemical industry.

Flexibility in feedstocks and diversification of production slates will be key in facing the surging growth of US ethane-based output in the decade ahead. In such a scenario, Saudi Arabia and Iran are likely to triumph while smaller producers will fall by the wayside, although we do not discount the potential of gas-rich North African states.

Diversification Is The Long-Term Focus



e/f = BMI estimate/forecast. Source: National sources, BMI

Modest Upside In Africa

Turning to Africa, North Africa's unexploited gas fields could offer major rewards, although instability has caused a setback. Gas-rich Algeria is still some way off constructing a world-scale complex due to regulatory problems. However, plans for new developments in Egypt - put on ice during the Arab Spring rebellion - are likely to come to fruition in coming years, utilising the country's gasfields and exploiting its geographically strategic position.

Investment in the African downstream sector will be concentrated in fertiliser and liquefied natural gas production, while the basic chemicals segment will generally fail to capitalise on the region's massive oil and gas reserves. North Africa retains its advantage in ethane feedstock, West Africa is a major oil producing hub and South Africa has a sophisticated and significant petrochemicals market accounting for

half of the continent's petrochemicals revenues. Although there is tentative interest in developing the Nigerian industry, most investment in petrochemicals production is concentrated near hydrocarbons reserves along the North African coast.

Egypt is one of the most promising growth markets for petrochemicals and in spite of infrastructural and feedstock constraints it is set to become a significant exporter of petrochemicals over the long term. Plans will be put into operation in 2016 for a series of new plants over the next five years, culminating in **Carbon Holdings**' world-scale Tahrir Petrochemicals project due is set to come into commercial operation in 2020.

However, gas shortages are plaguing the petrochemicals and chemical fertiliser sectors. Egypt needs around 500,000tpa of ethylene in order to sustain downstream production, but in 2014 local production was well below this level. Schemes that could boost downstream developments, bringing much-needed investment into the industry, include the first stage of a complex in Alexandria led by **Egyptian Ethylene & Derivatives Company** (Ethydco). The USD1.3bn scheme involves building a 460,000tpa ethylene and 20,000tpa butadiene plant by 2015. Meanwhile, Carbon Holdings will also manufacture 1.35mn tpa PE, as well as PP, butadiene and benzene. Work is due to be completed in 2020.

Having abandoned the Arzew petrochemicals complex, Algeria is unlikely to add value to domestic upstream output which would have allowed the country's petrochemicals industry to grow. As the rising consumption is set to be met by imports, the potential for expansion in manufacturing is limited. In 2015, the fertiliser sector was the focus of expansion. Production was supported by the opening in H1 of **Sonatrach**'s joint venture with Oman's **Suhail Bahwan Holding Group**, Al Djazaïria Al Omania Lil Asmida (AOA), which was built at a cost of USD2.6bn and produces ammonia and urea for fertiliser. AOA has a capacity of 2.4mn tpa, leading to an increase in national production by about one-third. The launch of the AOA plant follows the announcement of modernisation and expansion plans at two other large ammonia and urea facilities.

The country also has around 178,000tpa of PE, 40,000tpa of vinyl chloride monomer (VCM), 35,000tpa of polyvinyl chloride (PVC), 120,000tpa of methanol (rising to 1.12mn tpa by 2017) and 990,000tpa of ammonia, which should increase to 5.6mn tpa when new fertiliser plants enter production. These rises in capacity will also result in the production capacity for urea hitting 3.59mn tpa.

Sub-Saharan Africa will lag behind in gas-based feedstock, in spite of the high rate of petrochemicals consumption growth in the region. While Nigeria has the most promising prospects in feedstock, the business environment militates against investment and progress has been slow. The government is

attempting to attract foreign direct investment (FDI) into the country's petrochemicals sector. However, a lack of skilled labour, political and social unrest and sabotage of upstream infrastructure could delay projects planned in the coming years. The focus of investment is the fertiliser sector, which uses domestic gas resources and has access to significant markets in sub-Saharan Africa. Urea capacity is set to exceed 8mn tpa by 2020, which should make Nigeria a major exporter of fertiliser, as well as ensuring self-sufficiency in the long-run. Methanol is also set to grow with total additional capacity of 3.6mn tpa over the next five years.

Iran Petrochemicals Risk/Reward Index

This quarter, Iran has seen a 0.5 point increase in its overall petrochemicals Risk/Reward Index (RRI) score to 63.4 due to a 5.0 points increase in its market risk score. This comes following the lifting of sanctions, which will boost exports and encourage inward investment in the petrochemicals industry. However, significant obstacles to investment remain and further reform to investment regulations is necessary, alongside infrastructural improvements, if Iran is to match its Arabian Gulf neighbours. It remains in third place behind the UAE in the regional RRI rankings, but has increased its lead over Qatar.

In terms of Rewards, a poor regulatory and investment environment is counter-balanced by internationally significant hydrocarbons reserves and expanding domestic capacity. Iran needs a more positive political risk outlook and a breakthrough in terms of the regulatory regime if it is to improve its score and ranking.

Iran remains the worst-performing country in the region in relation to factors such as financial infrastructure and trade bureaucracy, which weigh down its Rewards ranking. In terms of petrochemicals-related risk, Iran not only has a poor business environment, but more generally displays a number of long-term financial, institutional and political risks - which make up its Country Rewards score. Iran's largest banks are subject to international sanctions, while the economy is heavily protected with high tariffs and price controls.

The sanctions regime on trade and investment led to a resulting decline in investor sentiment, labour disputes over unpaid wages, technological difficulties and equipment failures. Some of these issues are likely to improve following the lifting of sanctions, but over the short-term investment and trade will not have a major impact on the structural problems in the petrochemicals sector.

State-owned **National Petrochemicals Company** (NPC) dominates the petrochemicals sector, and the market is heavily regulated, with fixed prices that undermine profitability. Petrochemicals projects are prone to delays as they struggle with a lack of expertise, financial capital and the involvement of foreign majors. Additionally, international sanctions impacted on the progress of existing projects, with producers finding it difficult to tap into international financial markets and forge partnerships with petrochemicals majors and import specialist equipment.

Market Overview

***BMI View*:** *The country has significantly expanded the range and volume of its petrochemical production in recent years. Iran has the capacity to produce about 60mn tonnes of petrochemicals a year, but only 68% of this capacity is tapped on average. The government has also undershot its target of 100mn tonnes per annum of capacity by 2015 due to the sanctions regime. Iran is looking to expand its petrochemical industry in order to become the largest downstream producer in the Middle East region, once sanctions on the country are eased. Many European majors have shown interest in investing in Iran's petrochemical sector.*

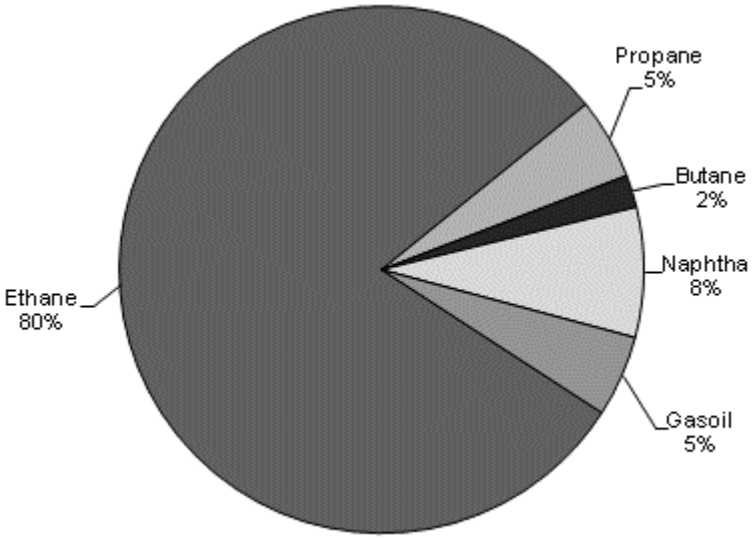
The Iranian petrochemicals industry has 81 companies, of which 51 are in the private sector (in reality, run by government-controlled funds). The privatisation of the **National Petrochemicals Company** (NPC)'s subsidiaries is set to lead to a further 19 firms going into private hands, with regulations requiring that the NPC share in any firm does not exceed 20%.

The NPC is wholly owned by the Iranian government. It is responsible for the development and operation of the country's petrochemicals sector and is the second largest producer and exporter of petrochemicals in the Middle East after **Saudi Basic Industries Corporation** (Sabic). NPC is aiming to become the largest petrochemical producer in the Middle East by 2024, overtaking Sabic. It has a number of hurdles to overcome, namely the long-term effects of international sanctions and the fragmentation of the company through the spinning off and privatisation of its subsidiaries. Construction costs are also high. Under the sanctions regime, petrochemicals projects struggled to raise sufficient finance due to their inability to tap into global financial markets and import specialist equipment, and Iran lacks the necessary skills. These factors have led to long and costly delays with projects. Delays with upstream projects are also creating uncertainty over feedstock supply.

The government's petrochemicals investment programme under the current five-year plan (2010-2015) involves the construction of 30 plants with combined capacity for 37mn tonnes per annum (tpa), including the 15th, 16th and 17th olefin complexes, and eight large-scale methanol plants, as well as ammonia and urea production facilities. To support this growth, the government is establishing five new special economic zones (SEZs): Chabahar, on the coast of the Gulf of Oman; Qeshm Island, near Bandar Abbas; Kish Island and Lavan, on the south coast of Iran; and North Pars, north of Assaluyeh. Zones include Pars SEZ at Assaluyeh and Mahshahr Petrochemical SEZ at Bandar Imam. These are designed to host processing and plastic conversion industries and will have different product chains.

Ethane Provides Competitively Priced Feedstock

Iran Cracker Feedstock Sources



Source: BMI

Iran plans to invest about USD20bn to develop the Chabahar hub, which is the first new SEZ scheduled to be established. Five methanol projects, an ammonia and urea complex, and the 18th and 19th olefin complexes are planned at Chabahar. It will have access to 20mn cubic metres per day of natural gas and 3.6mn tpa of ethane from the South Pars gas field near Assaluyeh via an 800km pipeline. These could feed two crackers with 1mn tpa each of ethylene production capacity. Iran is also seeking to diversify into polypropylene by installing propane dehydrogenation units and methanol-to-propylene converters as well as expanding refinery capacity.

The Iranian petrochemical industry has a number of competitive advantages, mainly the easy availability of gas for feedstock and the large domestic market. Iran's petrochemicals chain is diversifying, and labour is highly skilled and relatively cheap.

Iran's global political isolation, heightened by its controversial nuclear programme, has led to a reduction in business from international contractors and banks, making it difficult to secure technology and finance for projects. Investors with an exposure to the American market have been cautious in the past due to sanctions.

Asian investors with little or no exposure to the US have shown greater interest in the sector and as such will have the advantage of earlier entry into the Iranian petrochemicals industry. While international sanctions have been relaxed, the US is likely to retain its own unilateral sanctions regime.

As Iran undergoes international rehabilitation under President Rouhani, it is steadily recovering from the effects of the EU and US sanctions regimes, as well as more limited international sanctions, which prompted an economic crisis fuelled by the collapse of the *rial* and hyperinflation.

The lack of sufficient local expertise in technology has caused delays in project implementation. Delays with project completion have knock-on effects throughout the petrochemicals chain, pushing back downstream projects by months and years. Insufficient ethylene feedstock is likely to undermine the confidence of potential foreign investors, who are essential to providing much-needed capital, technology and expertise to the Iranian petrochemicals sector.

Over the long term, operating rates can only be raised through market diversification, a process that has been severely curtailed by the sanctions regime that was imposed by the US and the UN. Asia, particularly China, represents around 37% of exports, while the Middle East comprised 25%, South Asia 18% and Europe 11%. The dependence on the Chinese market could cause problems for Iranian petrochemicals producers as it slows. Market growth is particularly limited in the petrochemicals-intensive automotive and electronics segments, where investment has been severely curtailed. Even with strong export growth, the anticipated moderation in domestic consumption over the medium term means polymer plants will continue to operate well below nameplate capacity. Iranian producers had said plants were not performing at full capacity owing to technical problems.

Table: Iran's Cracker Capacity, 2013-2020 ('000 tpa)

	2013	2014	2015e	2016f	2017f	2018f	2019f	2020f
NPC, Arak	320	320	320	320	320	320	320	320
NPC, Tabriz	136	136	136	136	136	136	136	136
NPC, Bandar Imam	500	500	500	500	500	500	500	500
Amir Kabir, B. Imam (Olefins 6)	520	520	520	520	520	520	520	520
Marun PC, B. Imam (Olefins 7)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Arya Sasol, B. Assaluyeh (Olefins 9)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Jam Pchem, B. Assaluyeh (Olefins 10)	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Ilam (Olefins 13)		500	500	500	500	500	500	500
Kharg Island	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Iran's Cracker Capacity, 2013-2020 ('000 tpa) - Continued								
	2013	2014	2015e	2016f	2017f	2018f	2019f	2020f
Arvand P'chemical (Olefins 8)	1000	1000	1000	1000	1000	1000	1000	1000
Kavyan Petrochemical Assaluyeh (Olefins 11)	1000	1000	2,000	2,000	2,000	2,000	2,000	2,000
Morvarid Petrochemicals	500	500	500	500	500	500	500	500
Persian Gulf Assaluyeh (Olefins 12)	-	-	1,200	1,200	1,200	1,200	1,200	1200
Makran Petrochemical (Chabahar)								1200
Total	**8,376**	**8,876**	**11,076**	**11,076**	**11,076**	**11,076**	**11,076**	**12,276**

e/f = BMI estimate/forecast. Source: BMI

Privatisation

The government intends to privatise the petrochemicals sector in order to accelerate petrochemicals projects and support production. It is uncertain which Iranian private sector businesses would be capable and willing to take charge of production facilities and invest in expansion.

Privatisation is an obligation under the terms of Article 44 of the Iranian constitution, which requires 80% of the country's state-owned companies to be sold. Divestment is being pursued through the sale of shares in the **Persian Gulf Holding** (PGH), which comprises 15 petrochemical plants and represents 40% of national petrochemicals output and 33% of domestic supply.

BMI believes floating a minority stake on the stock exchange is unlikely to provide the petrochemicals industry with the capital it needs in the long term, while the allocation of nearly half the company to cooperatives and personnel will add nothing of value to the privatised firms.

Industry Trends And Developments

The country has significantly expanded the range and volume of its petrochemical production in recent years. Iran has the capacity to produce about 60mn tonnes of petrochemicals a year, but only 68% of this capacity is tapped on average. The government undershot its target of 100mn tonnes per annum (tpa) of capacity by 2015 due to the sanctions regime. Iran is looking to expand its petrochemical industry in order to become the largest downstream producer in the Middle East region, once sanctions on the country are eased. Many European majors have shown interest in investing in Iran's petrochemical sector.

Post-Sanctions Outlook

The Iranian nuclear agreement paves the way for a revival of the Iranian petrochemicals industry, with export-led growth and significant demand from domestic consumer, automotive and construction sectors that are set for growth over the medium term. However, operational and political risk concerns will dampen the growth dividends from sanctions relief.

The landmark Iranian nuclear agreement reached in Vienna on July 14 brought an end to 20 months of negotiations between Iran and the P5+1 powers (the US, Russia, China, France, the UK and Germany) and paved the way for the return of foreign companies into Iran as early as 2016. In January 2016, the sanctions were lifted, creating the prospect of a return of Iranian crude in the global oil market as well as a strong uptick in foreign investment. Petrochemicals and petrochemicals-consuming industries will be the sectors that will benefit most.

Lower oil prices will play a key role in limiting the impact of the unwinding of sanctions. We forecast oil prices (Brent crude) to average USD51 per barrel (/bbl) in 2016 and USD53/bbl in 2017 as a result of global oversupply. This will ensure that government spending and private consumption growth will be relatively low.

Fixed investment and exports will become increasingly important growth drivers, though this will be a slow process as opposed to a sudden jump once sanctions are removed. Indeed, while we expect President Hassan Rouhani's administration to undertake significant efforts to reform to the economy, the effects will be limited by a persistently opaque business environment, domestic resistance to opening up the economy and the slow political process. Iran's economy will see a substantial uptick in growth over the coming years as a result of the removal of sanctions. The petrochemicals sector presents one of the most exciting opportunities globally. The country has the fourth largest oil reserves and second largest gas reserves globally, and years of sanctions have kept the industry far below potential. While Iran will certainly not

allow unfettered access to its oil reserves given historical suspicion and its desire to protect industries of national security, the government is likely to push for partnership with local firms. Even with these restrictions, as well as substantial investment deficits, the country has enormous potential.

However, we caution against excessive optimism; beyond sanctions, hurdles remain for companies looking to tap the Iranian market, most notably the difficult operating environment. The Iranian economy will benefit, but the Vienna agreement does not presage a boom.

The risks of the agreement breaking down will rise over time, particularly from 2017 onward. Under Obama's successor, the US could decide to abandon it, but we believe the risks are greater on the Iranian side.

Consumer and business confidence will be strengthened over the coming months, and we expect a temporary appreciation of the Iranian rial as well as steady gains in the Tehran stock market. The easing of financial sanctions will facilitate project finance and attract greater foreign investment, notably in consumer sectors (such as autos, food & drink and telecoms) and infrastructure. A large and well-educated population, high per capita income and a considerable infrastructure deficit provide significant attractions for foreign investors. Those that already had a presence in Iran prior to the sanctions and have successfully maintained ties with the country in recent years will be the main beneficiaries.

Upstream Developments

Currently, Iran has seven large refineries (100,000 barrels per day, or b/d), with a number of smaller facilities of less than 60,000b/d each. While refining capacity estimates vary wildly due to the lack of reliable data, we estimate combined capacity currently stands at about 1.955mn b/d. All refineries are operated by the National Iranian Oil Refining and Distribution Company (NIORDC), an National Iranian Oil Company (NIOC) subsidiary. We believe the first phase of the Persian Gulf Star refinery could come online by 2016/2017, which would further boost Iran's gasoline production capacity.

With the lifting of international sanctions on Iran's energy sector from early 2016, we could see a renewed interest in investing in the country's downstream sector. This poses upside risk to our forecast over the longer term. That said, given the well-supplied global fuels market it is more likely companies will target Iran for fuels exports rather than invest in expanding downstream capacity. Any refining developments will therefore likely be lead by the national oil company.

The country is the third largest natural gas producer in the world. About 35-30% of domestic production comes from the giant offshore South pars gas field shared with Qatar. Sizeable production also comes from

the Kangan and Tabnak fields, in addition to associated natural gas production originating from the Khuzestan, Ilam and Kermanshah provinces. However, despite impressive production growth, sanctions have affected its natural gas sector, which remains underdeveloped compared to its potential, and used mostly to meet domestic demand.

We forecast gas production to rise from 174.0bn cubic metres (bcm) in 2014 to 216.4bcm in 2016, then stabilise over the remainder of the forecast. Our forecast takes into account the ramp-up in phases 12, 15 and 16 of the South Pars field, as well as parts of phases 17 and 18.

With the lifting of sanctions, Iran will be able to access new finance and technology to speed up the development of delayed and unfinished phases of South Pars. This will enable the country to increase production at producing phases and to bring online new phases currently under development.

Considering Iran has the second largest gas reserves in the world, the country clearly has the potential to become one of the largest gas producers globally. The removal of sanctions will open more than 20 natural gas project to international investment. We have not yet included these in our forecast given uncertainty in international interest, but see strong upside potential post 2019. Further phases of South Pars are also yet to be developed and could add considerable production capacity over the forecast.

Notably, progress had stalled at the giant offshore South Pars field, shared with Qatar. The field's development entails 24 phases, of which phases 1-10 were completed before 2011. However, the start of Western sanctions saw the international companies developing further phases exit the country. In addition, Iran was prevented from accessing the necessary finances and technology required for the development of further phases. As a result, it was extremely uncertain as to whether Iran would successfully develop further phases in a context of continued sanctions. Reflective of this situation, we had previously forecast slow progress on South Pars.

Iran's successful start-up of Phase 12, however, highlights that the country is managing to partly develop these phases despite continued sanctions. Despite the slow pace at which development is occurring, this is prompting us to review our production forecast to the upside, with output likely to continue increasing in the coming years.

While we have revised production to the upside, we will mention however that sanctions have been slowing the development of the phases. For example, Mehdi Etesami, managing director of offshore rig constructor **Iran Marin Industrial Company**, recently highlighted that the deadlines for South Pars are unrealistic,

mentioning that his company lacks the resources to buy the necessary equipment and faced severe problems when sourcing it from abroad due to sanctions.

This is similar to a recent interview with Gholam-Hossein Khaje-Ali, former managing director of South Pars gas field's main contractor **Sepanir Oil & Gas Energy Company**. He highlights the inability to obtain the necessary equipment, preventing completion and a full ramp-up at several of the ongoing phases. This shows that a full ramp-up of South Pars to its maximum capacity is highly unlikely in a context whereby sanctions remain in place.

Currently, phases 1 to 10 are producing at full capacity, with Phase 12 expected to ramp-up to full capacity (30bcm) by 2016/2017. According to press statements, Phases 15 and 16 could be the next to come online, with a possible start-up in 2015/2016. The two phases would add some 20bcm of natural gas production when fully ramped-up.

Current Plans

Iran is likely to look to China - its main oil export market - for investment in new petrochemicals projects, although Europe and India are likely to play a strong role in the sector. China reportedly owes Iran over USD20bn in outstanding oil payments. The cash has been frozen in overseas banks after the US-led sanctions made it difficult for Beijing to transfer money to Tehran. Accordingly, the two countries have reportedly reached a deal to settle a part of the frozen money through China's funding of Iranian petrochemical projects.

Iran's Oil Minister Bijan Zangeneh has recently said Iran may award phase two of the North Azadegan oilfield to China for development. China's **China National Petroleum Corp** (CNPC) and Iran's **Petroleum Engineering and Development Company** (PEDEC) have already signed an initial agreement to produce 25,000 barrels a day from the field in the second phase. CNPC also operated the first development phase of North Azadegan.

China's energy companies were reportedly instructed in 2010 to slow or stop work in Iran because of pressures from the US which has a sanctions regime in place against Tehran. State-run **Sinopec Group** and CNPC had been reported to begin producing 160,000b/d of oil from South Azadegan and Yadavaran in southwestern Iran from October 2015. Sinopec officials have said they expected the first phase of the Yadavaran oilfield to yield 85,000b/d.

Chinese companies are also making investments in Iran's petrochemical projects with Chinese finance provided for 16 petrochemical projects with a total budget of USD16bn. By the beginning of 2016, USD12bn of the finance had been referred to the Central Bank of Iran for receiving facilities.

Completion of 67 part-build petrochemical projects, which were scheduled to become operational by 2015, are to be launched in the sixth five-year economic development plan (2015-2020). The total capacity of the projects are estimated at over 60mn tpa and involve USD40bn in investment. However, projects with a completion rate of under 10% are set to be cancelled. The West Ethylene Pipeline project narrowly missed out on cancellation.

Iran plans to open 11 new petrochemical units in the current Iranian year, which ends on March 20 2016, according to Deputy Oil Minister for Petrochemical Affairs Abbas Sheri Moqaddam. The new units, which will come into operation in 2015, aim to increase the country's petrochemical production by 6mn tonnes. Iran has significantly expanded the range and volume of its petrochemical production in recent years. Iran has the capacity to produce about 60mn tonnes of petrochemicals a year, but only 68% of this capacity is tapped on average due to several reasons, including a shortage of raw material.

Areas where Iran is falling behind are the vinyl and styrenes segments. With polyvinyl chloride (PVC) capacity set to reach 940,000tpa and polystyrene (PS) capacity at only 250,000tpa by 2015, Iran risks becoming more dependent on imports. However, with PVC and PS prices under pressure in 2015, the markets in these petrochemical products was not strong enough to justify export-orientated production in the short-term, which is the industry's chief motivation for expansion. **BMI** believes the post-sanctions outlook could provide an opportunity for Iranian producers to open new plants in these sectors.

The Iranian government is seeking to set up a new petrochemical hub in the south-eastern port city of Chabahar with an investment of USD20bn, adding 15mn tpa to the country's petrochemical production. The hub will focus on exports to India and China, despite the move by both countries towards greater self-sufficiency in basic chemicals.

In Q214, the **Persian Gulf Petrochemical Industry Company** (PGPIC) started construction of two new petrochemical plants at the Chabahar Port in Iran. A 1.2mn tpa ethane cracker and three polyethyelene (PE) plants are being planned as part of a mega petrochemicals and fertiliser project. The PE facility will produce 300,000tpa each of low density polyethylene (LDPE), high density polyethylene (HDPE) and linear low density polyethylene (LLDPE). The site, which has access to feedstock from the South Pars gas field and Khuzestan reserves, will also produce polypropylene (PP), methanol, ammonia and urea. The Chabahar Free Zone Organisation states that it will be on stream by the end of the decade.

The Indian government is planning to invest in both the Iranshahr and Chabahar petrochemical sites in the Sistan and Baluchestan province of Iran, according to NPC's deputy director, Mohammad Hossein Peivandi. Geographical proximity will ultimately reduce transportation costs for India. Iranshahr is around 1,000km nearer to India and China than other Iranian petrochemical production sites such as Mahshahr and Asaluyeh, Peivandi said in June 2014.

Two Indian state-run fertiliser companies have jointly appointed India-based **SBI Capital Markets** (SBICap) to look for Iranian partners for building a India-Iran joint urea plant in the petrochemicals hub at Chabahar. The two companies, **Rashtriya Chemicals and Fertilizers** (RCF) and **Gujarat Narmada Valley Fertilizers and Chemicals**, are seeking Iranian partners for the proposed urea joint venture to capitalise on low gas prices in Iran for producing the commodity. The proposed project is expected to cost an estimated INR70bn (USD1.16bn), according to two officials from India's fertiliser ministry. Iran has offered to provide gas for the project at a rate of USD3.00 per million British thermal units, which makes it cheaper for India to produce urea in Iran and then transport it to India.

A number of projects are due to be completed by 2016. The government has already confirmed the 14th olefins complex, which will be built at Firouzabad and produce 1mn tpa ethylene, and the 15th olefins complex, planned at Genaveh with 500,000tpa of ethylene. The 17th olefins complex will be built at Dehloran in Ilam Province by **Dehloran Petrochemical Company**, and will have a mixed-feed cracker with the capacity to produce 607,000tpa ethylene. Completion was expected in 2014/2015. The 16th olefins and methanol complex is already being constructed by **Bushehr Petrochemical Company** as part of Phase II of the Pars special economic zone (SEZ) at Asaluyeh. Completion of the plants, with capacity for 1mn tpa ethylene and 1.65mn tpa methanol, was due in 2014. However, the 12th olefins complex has been postponed and this might have an impact on the completion dates of various other plants and petrochemical complexes.

Construction of the Marjan Petrochemical Complex at the Pars SEZ began in Assalouyeh in Q111. The complex will have the capacity to produce 1.65mn tpa of methanol when it comes on stream at a cost of IRR2.12trn (USD212mn). It was due for completion in 2015, but by H215 it was only 30% complete. It will put yet more pressure on demand for gas, and Iran will have to ensure significant increases in supply in order to fulfil growing domestic requirements.

The Kavyan crackers are linked to Iran's west ethylene pipeline, which is supplying several polymer plants along its route. The west ethylene pipeline and its offshoot, the Dena region ethylene pipeline, are set to have in total 11 downstream petrochemical projects along their routes, stretching from the south where the

two Kavyan ethylene complexes and the Morvarid 5th olefins facility are based, to the north, linking seven downstream plants. The 1,200km pipeline carries ethylene produced by the Kavian petrochemical plant, in the south of the country, to petrochemical plants located in the west of the country.

The seven downstream plans along the main line include:

- **Kermanshah Polymer**'s 300,000tpa HDPE plant at Kermanshah.
- **Lorestan Petrochemical Company**'s 300,000tpa HDPE plant at Khoramabad.
- **Kordestan Petrochemical Company**'s 300,000tpa LDPE unit at Sanandaj.
- **Mahabad Petrochemical Company**'s 300,000tpa HDPE unit at Mahabad.
- **Miandoab Petrochemical Company**'s 140,000tpa HDPE facility at Miandoab.
- **Andimeshk Petrochemical**'s 300,000tpa LDPE plant at Andimeshk.
- **Ibn-e-Sina Hamedan**'s 100,000tpa ethylene oxide and 80,000tpa ethoxylates complex at Hamedan.

The Dena region ethylene pipeline will provide feedstock to:

- **Kazeroon Petrochemical Company**'s 300,000tpa HDPE/ LLDPE plant at Kazeroon.
- **Mamasani Petrochemical Company**'s 300,000tpa HDPE plant at Mamasani.
- **Dehdasht Petrochemical Industry Company**'s 300,000tpa HDPE plant at Dehdasht.
- A 300,000tpa HDPE plant at Boroujen.

Company Profile
National Petrochemical Company

Strengths

- Iran's largest petrochemicals producer with a high level of integration throughout the value chain.
- The Middle East's second largest single producer after Saudi Arabia's Sabic and is allied with more than 50 subsidiaries, including nine production complexes and 27 project implementing companies.
- It has an overwhelming share of the Iranian market and dominates Iran's export markets.

Weaknesses

- NPC is notorious for lengthy delays in project completion.
- Ethane costs are higher than its regional competitors, making it difficult for NPC to boost margins in an over-supplied global market.
- Sanctions have constrained NPC's ability to diversify markets.
- Political decisions often overrule NPC's commercial interests.

Opportunities

- NPC's sixth five-year plan focuses investment in the Qheshen free zone, south of Assaluyeh, which is the location of 13 ethylene crackers based on the Pars gas field.
- The P5+1 deal offers new prospects for growth in investment, technology acquisition and trade.

Threats

- Natural gas production growth is lagging behind growth in cracker capacity.
- The narrowing ethane-naphtha cost differential is working against NPC's favour with most planned capacity utilising domestic ethane feedstocks.

Company Overview

NPC is wholly owned by the Iranian government. It is responsible for the development and operation of the country's petrochemicals sector and is the second largest producer and exporter of petrochemicals in the Middle East after Saudi Arabia's Sabic.

NPC's major activities are the production, sale, distribution and export of chemicals and petrochemicals. It is allied with more than 50 subsidiaries, including nine production complexes and 27 project implementing companies. NPC operates as a holding company, making policy, planning, directing and overseeing the activities of its subsidiaries and affiliates. The group operates major sites through operating subsidiaries in Arak, Bandar Imam Khomeini, Isfahan, Kharg Island, the Khorasan provinces, Urmia, Shiraz and Tabriz. NPC markets and distributes its products internationally through its subsidiary, the Iran Petrochemical Commercial Company.

Karoon Petrochemical Company (KRNPC) was the first international joint venture (JV) company in the petrochemicals field to be registered in Iran after the 1979 revolution. The firm's shareholders are NPC (40%), Swedish company Chematur Engineering (30%) and Hansa Chemie International from Germany (30%). The KRNPC plant, under construction at Bandar Imam Khomeini, should produce 80,000 tonnes per annum (tpa) of toluene di-isocyanate (TDI) and methylene phenyl di-isocyanate (MDI) for use in polyurethane foam, insulation material, roof sealing, adhesives, automobile parts and floor coverings. Hansa Chemie's total investment in the firm amounts to about EUR380mn (USD462.19mn). It will be responsible for marketing the plant's output in Europe.

Strategy

NPC's sixth five-year plan focuses investment in the Qeshm free zone, south of Assaluyeh, which is the location of 13 ethylene crackers based on the Pars gas field. Iran's bold 20-Year outlook plan envisages petrochemical output to reach 100mn tpa by 2015, but BMI regards this target as unlikely to be achieved. Given Iran's notoriety for lengthy project delays and a lack of investment from major global companies, we doubt NPC will come anywhere near reaching these targets. The success in achieving the government's ambitious objectives rests on a number of related factors: the strength of the domestic economy, Iran's diplomatic and trade relations, and progress on capacity expansion.

International sanctions have had a deleterious impact on the progress of existing projects, with NPC finding it difficult to tap into international financial markets, forge partnerships with petrochemicals majors and import specialist equipment. Global technology licensers have stopped doing business with Iran in order to maintain business interests in the US. Meanwhile, the complexity of raising finance from abroad as a result of the sanctions regime deterred global banks. The sanctions undermined business with European firms, which are insisting on approval of contracts by the

European Commission. As such, the alleviation of sanctions should improve NPC's operating environment.

A number of plants have been proposed over the years with NPC tabulating a 30 petrochemical projects for which it is seeking investors. Some of the most significant projects are focused on converting methane gas into olefins for conversion into derivatives. Additionally, the company is looking to expand production of aromatics in the benzene and styrene chains, a move that would significantly diversify downstream products.

If NPC manages to leverage the country's feedstock potential, it will rival Saudi Arabia's Aramco as a globally competitive petrochemicals producer. However, projects still remain focused on lower value, high volume production. It will need to add value to its production chains in order to realise significant margins.

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Methanol forms a significant part of Iran's petrochemicals development. The country already possesses 5.3mn tpa of methanol production capacity and plans to add eight new methanol plants, each with capacity of 1.65mn tpa, by 2015. Although South Africa's Sasol has stated it will no longer pursue methanol investments in Iran due to the sanctions, Turkey's Petkim is pressing ahead with its JV with Sabalan Petrochemical Company for a facility due on stream in 2014. Dena Petrochemical is also purportedly planning another methanol complex in a JV with a Singaporean firm.

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methanol when it comes on stream at a cost of IRR2.12trn (USD212mn). It was due for completion in 2015, but by H215 it was only 30% complete. It will put yet more pressure on demand for gas, and Iran will have to ensure significant increases in supply in order to fulfil growing domestic requirements.

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- A 300,000tpa HDPE plant at Boroujen.

Operational Data

- Established: 1964

Company Details

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Regional Overview

Middle East And Africa Overview

Weaker regional demand, oversupply and competition posed by Iran following the lifting of sanctions will put downward pressure on prices in the Arabian Gulf. Suppliers are expressing concern over diminishing margins with polymer demand failing to recover in Q415. Additionally, the UAE is ramping up production at the third phase of its expansion, known as Borouge 3, which is heightening market competition.

Borouge 3 comprises a 1.5mn tonnes per annum (tpa) cracker and derivative plants, including high density polyethylene (HDPE) and linear low density polyethylene (LLDPE) units with a combined capacity of 1.08mn tpa, a 350,000tpa low density polyethylene (LDPE) and two polypropylene (PP) units with a combined capacity of 960,000tpa. In December 2015, **Sadara Chemical** started up a 375,000tpa LLDPE plant in Saudi Arabia, the first of the 26 petrochemical units at its Jubail complex. The Jubail complex, which is a joint venture between **Saudi Aramco** and **Dow Chemical** - will be able to produce 1.08mn tpa of polyethylene (PE). It is the first petrochemical complex in the Middle East that will use naphtha as feedstock, which should enable it to capitalise on lower naphtha costs.

Adding to the supply woes is the expected return of Iran in the global polymer scene. The country is a major PE producer in the Middle East that was prevented from exporting to its main market - Europe - by international sanctions imposed on suspicion that it was developing a nuclear weapon. Arabian Gulf producers in the Gulf Co-operation Council (GCC) will compete directly with Iran in the European market, a prospect that is unsettling them. Buyers may also turn more cautious in procuring cargoes amid the bleak macroeconomic outlook prevailing in the Middle East. Buying appetite could also be affected by Middle East polymer suppliers becoming more cautious over giving credit to less established players. This could worsen the buying appetite even further for 2016.

The prospects for strong exports-led growth in Iran are good as the Iranian government aims to raise capacity from the current 60mn tpa to 100mn tpa by 2020. The relief of sanctions should raise the operating rates from 68% of capacity, as they were in 2014, even as capacity grows. In 2015/16, Iran plans to open 11 petrochemical units, increasing the country's petrochemical production by 6mn tonnes.

The dominant ethane feedstock in the Arabian Gulf has declined in competitiveness as a result of lower naphtha costs, which have been driven down by falling crude prices. This has benefitted more naphtha-reliant competitors, particularly in Asia, its main export market. At the same time, slackening demand in export markets has weakened product prices.

In these unfavourable market trends, the opening of the Borouge 3 petrochemicals facility in 2014 came at an inopportune time for the UAE's petrochemicals industry. Added to this is the planned Chemaweyaat complex, which the emirate hopes will be the world's largest petrochemical complex when it comes into operation in 2016. The first part of the development, Tacaamol, will use heavy naphtha feed for aromatics units and a lighter naphtha feed for a 1.5mntpa mixed feed cracker. This will capitalise on the lower price of naphtha as well as more the diverse product portfolio that naphtha provides. The availability of naphtha in the UAE is being boosted by refinery expansion at Ruwais, helping to retain the Emirati industry's competitive edge and enabling it to produce a wider range of products.

In contrast, Qatari petrochemicals production is threatened by reduced demand growth in key export markets and the surge in output from Iran. Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as the country does not produce the same range of by-products as competitors which rely on other feedstock. The country's drive towards diversification with a mixed feed petrochemicals complex, which would help diversify and take advantage of lower naphtha costs, has received setbacks in recent months with the cancellation of major projects. Current circumstances do not support a revival of shelved plans or any further capacity expansion beyond 2016.

Over the medium term, Saudi Arabia is likely to become better placed than some smaller ethane-orientated regional rivals as it develops mixed feed crackers and continues efforts to diversify and add value to the production chain. Its main competitor is likely to be Iran, as the international sanctions regime is eased.

Kuwait is arguably in a better position than other Gulf producers as its production is geared towards naphtha feedstock. Heavier cracks from naphtha should be conducive to diversification. The first phase of debottlenecking operations at Equate's PE facilities put it on course for a 175,000tpa increase in capacity in 2016. This will be followed in 2017 with **Kuwait Petroleum Corporation**'s Olefins III project, which should see ethylene capacity grow 1.4mn tpa with a corresponding rise in polyethylene and ethylene glycol capacities.

However, delays to the establishment of the Al-Zour refinery project are set to undermine Kuwaiti petrochemicals competitiveness. The Al-Zour project was set to raise downstream refinery capacity to 1.4mn barrels per day (b/d) by 2019, but it looks set to be delayed until 2020 as costs escalate and Kuwait continues in its effort to secure financing. In the meantime, refining capacity is set to decline as a result of consolidation within the refining sector, a move that could restrict naphtha supply to petrochemicals and raise feedstock costs.

Market Diversification Crucial To Growth

The Arabian Gulf states are seeking counter Iran's rise with a comprehensive free trade agreement between Gulf Cooperation Council countries and the EU that could reduce export costs and increase production returns for companies participating in the Gulf states' chemicals industry. However, this may be insufficient to give producers an edge, particularly given the slow growth in the EU market.

Larger external markets like China and India are witnessing a slowdown in demand while they are at the same time becoming self-sufficient. Adding to the issue of reduced sanctions on Iran, which offers the prospect of a massive rise in Iranian exports, these market factors will constrain prices and growth.

For exporters, diversifying away from China is essential. With the Chinese market moving towards a situation of self-sufficiency as its market growth slows and capacities continue to rise, Gulf output will need to diversify to other markets as well as increase the portfolio of products and diversify away from a narrow focus on polymers.

India is an obvious alternative; however, similar to China, India is also aiming for self-sufficiency. We note that while it is unlikely that India will reach this target in the short term, capacities in India will grow in the long term, making the country increasingly self-sufficient. This will force exporters in the Arabian Gulf to look to South East Asia and other regions for growth opportunities.

Arabian Gulf producers are also seeking to diversify their product portfolios. Saudi Arabia's focus will be on developing high-performance and speciality grades, which can add value to exports and put the Saudi Arabian industry in direct competition with Japanese producers and other more mature markets. As a result, Saudi Arabia's manufacturing base will grow, moving the country away from exporting basic chemicals and importing finished goods as it grows its five industrial clusters: minerals and metals processing, automotives, plastics and packaging, home appliances and solar energy.

Kuwait, the UAE and Qatar are also likely to pursue diversification, although on a smaller scale. Kuwait is set to be a growth driver in the Gulf States, benefitting from cracking heavier feedstock to produce a wider range of products. By using a mixed feed, Kuwait's Olefins III complex will be able to diversify production when it comes on stream in 2016. Meanwhile, the UAE's petrochemicals industry will benefit from the rapid expansion of capacities in highly integrated, state-of-the-art complexes but will be limited by the narrow product range and lack of downstream diversification.

We note that Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as the country does not produce the same range of by-products as competitors which rely on other feedstock. The US and China, for example, also rely on naphtha. Due to the lack of diversification, Qatar is likely to be sidelined in the special chemicals market. Although the government is seeking to redress the balance with mixed crackers, other industries are also capitalising on the increasing global demand, which will cause Qatar to be left behind.

Tightening Ethane Supplies

By the end of the decade, US gas production will be five times greater than Saudi Arabia. While Arabian Gulf states will increasingly come up against capacity constraints for ethane, with a resulting rise in feedstock prices, the US petrochemicals industry will enjoy access to abundant resources. Unless new sources of gas are found, including unconventional forms that the region's governments have yet to exploit, the Gulf's petrochemicals industry will face pressure on margins as it faces heightened competition, particularly in Asia. Where the Gulf can succeed is in heavier cracks, which can come from new mixed feed crackers that utilise locally available naphtha.

In the Middle East, the main factors behind rising ethane prices are the requirement to supply domestic markets to fuel economic growth and the desire to achieve higher revenues via export sales agreements. Domestic requirements include electricity generation, with natural gas seen as a cheap and easy way to meet consumption growth, which has registered a compound annual growth rate (CAGR) of 6-8%.

A tightening of the market, the rising costs of extraction and a need for incentives to encourage the drilling of non-associated gas are prompting governments to raise gas prices, reducing the differential with naphtha and eroding the region's competitive edge. However, over the short term, with crude prices remaining stubbornly high, Middle Eastern ethane-based petrochemicals production is still likely to prove a challenge to naphtha-based production, particularly in Europe.

The UAE is particularly vulnerable to a gas supply deficit during summer months, forcing it to rely on supplies from Qatar while it taps largely undeveloped offshore sour gas fields. Qatar's dependence on ethane, the tightening on supplies and subsequent rises in feedstock costs as well as its lack of indigenous oil resources means it is being forced to cut back on planned major projects in the face of pressure on margins.

Reliance on ethane in Saudi Arabia and Qatar is also limiting product diversification due to the fact that there are significantly fewer by-products compared to naphtha. In polymers, this will invariably lead to an

overwhelming reliance on PE grades. Research and development will need to focus on greater utilisation of PE as an alternative to PP in engineering plastics applications.

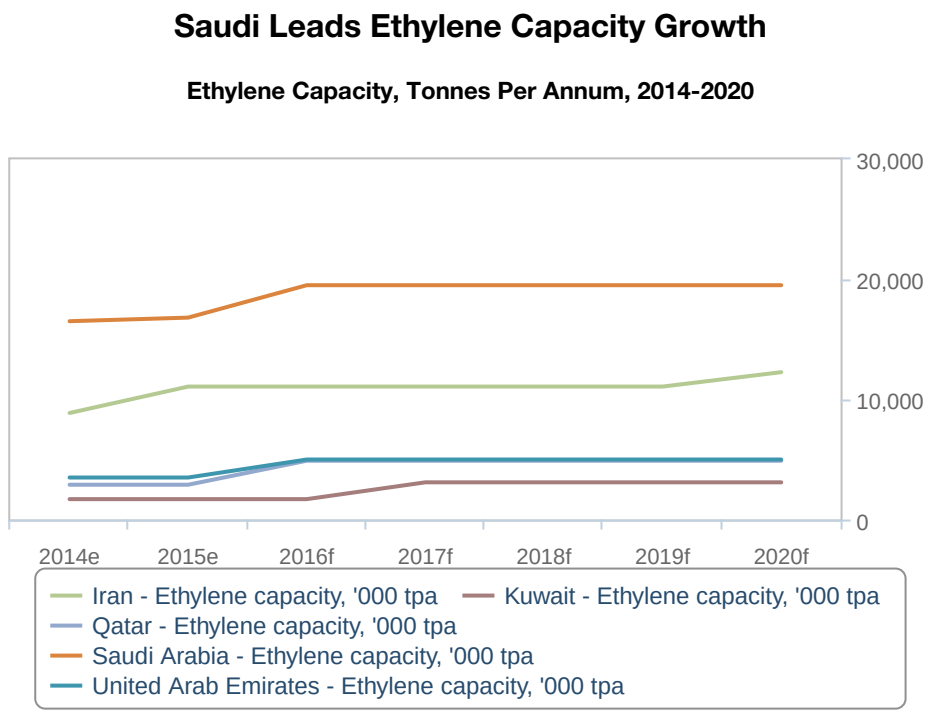
Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as it does not produce the same range of by-products as other countries that rely on other feedstocks such as naphtha. This means it is likely to be sidelined in the special chemicals markets because, although the government is seeking to redress this imbalance with mixed crackers, other industries are also capitalising on the increasing global demand, and Qatar will be left behind.

Should Iranian sanctions be permanently lifted and oil prices fall further, OPEC may eventually decide to cut oil production. This would tighten the naphtha market, providing yet more pressure on naphtha based production.

The biggest loser of a naphtha price rise would be Kuwait, the gas-poor Gulf state that has relied heavily on its oil resources. It has capitalised on the narrowing of the naphtha-ethane price differential as well as the diversification of downstream production. Kuwait's petrochemical development strategy includes the expansion of Aromatics and Olefins III projects and entering the specialised petrochemical industry.

Flexibility in feedstocks and diversification of production slates will be key in facing the surging growth of US ethane-based output in the decade ahead. In such a scenario, Saudi Arabia and Iran are likely to triumph while smaller producers will fall by the wayside, although we do not discount the potential of gas-rich North African states.

Diversification Is The Long-Term Focus



e/f = BMI estimate/forecast. Source: National sources, BMI

Modest Upside In Africa

Turning to Africa, North Africa's unexploited gas fields could offer major rewards, although instability has caused a setback. Gas-rich Algeria is still some way off constructing a world-scale complex due to regulatory problems. However, plans for new developments in Egypt - put on ice during the Arab Spring rebellion - are likely to come to fruition in coming years, utilising the country's gasfields and exploiting its geographically strategic position.

Investment in the African downstream sector will be concentrated in fertiliser and liquefied natural gas production, while the basic chemicals segment will generally fail to capitalise on the region's massive oil and gas reserves. North Africa retains its advantage in ethane feedstock, West Africa is a major oil producing hub and South Africa has a sophisticated and significant petrochemicals market accounting for

half of the continent's petrochemicals revenues. Although there is tentative interest in developing the Nigerian industry, most investment in petrochemicals production is concentrated near hydrocarbons reserves along the North African coast.

Egypt is one of the most promising growth markets for petrochemicals and in spite of infrastructural and feedstock constraints it is set to become a significant exporter of petrochemicals over the long term. Plans will be put into operation in 2016 for a series of new plants over the next five years, culminating in **Carbon Holdings**' world-scale Tahrir Petrochemicals project due is set to come into commercial operation in 2020.

However, gas shortages are plaguing the petrochemicals and chemical fertiliser sectors. Egypt needs around 500,000tpa of ethylene in order to sustain downstream production, but in 2014 local production was well below this level. Schemes that could boost downstream developments, bringing much-needed investment into the industry, include the first stage of a complex in Alexandria led by **Egyptian Ethylene & Derivatives Company** (Ethydco). The USD1.3bn scheme involves building a 460,000tpa ethylene and 20,000tpa butadiene plant by 2015. Meanwhile, Carbon Holdings will also manufacture 1.35mn tpa PE, as well as PP, butadiene and benzene. Work is due to be completed in 2020.

Having abandoned the Arzew petrochemicals complex, Algeria is unlikely to add value to domestic upstream output which would have allowed the country's petrochemicals industry to grow. As the rising consumption is set to be met by imports, the potential for expansion in manufacturing is limited. In 2015, the fertiliser sector was the focus of expansion. Production was supported by the opening in H1 of **Sonatrach**'s joint venture with Oman's **Suhail Bahwan Holding Group**, Al Djazaïria Al Omania Lil Asmida (AOA), which was built at a cost of USD2.6bn and produces ammonia and urea for fertiliser. AOA has a capacity of 2.4mn tpa, leading to an increase in national production by about one-third. The launch of the AOA plant follows the announcement of modernisation and expansion plans at two other large ammonia and urea facilities.

The country also has around 178,000tpa of PE, 40,000tpa of vinyl chloride monomer (VCM), 35,000tpa of polyvinyl chloride (PVC), 120,000tpa of methanol (rising to 1.12mn tpa by 2017) and 990,000tpa of ammonia, which should increase to 5.6mn tpa when new fertiliser plants enter production. These rises in capacity will also result in the production capacity for urea hitting 3.59mn tpa.

Sub-Saharan Africa will lag behind in gas-based feedstock, in spite of the high rate of petrochemicals consumption growth in the region. While Nigeria has the most promising prospects in feedstock, the business environment militates against investment and progress has been slow. The government is

attempting to attract foreign direct investment (FDI) into the country's petrochemicals sector. However, a lack of skilled labour, political and social unrest and sabotage of upstream infrastructure could delay projects planned in the coming years. The focus of investment is the fertiliser sector, which uses domestic gas resources and has access to significant markets in sub-Saharan Africa. Urea capacity is set to exceed 8mn tpa by 2020, which should make Nigeria a major exporter of fertiliser, as well as ensuring self-sufficiency in the long-run. Methanol is also set to grow with total additional capacity of 3.6mn tpa over the next five years.

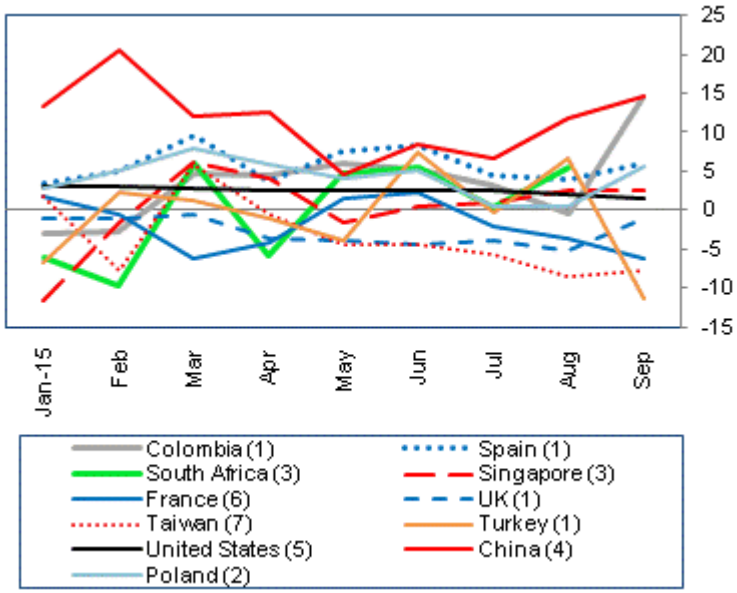
Global Industry Overview

China's rapid growth in petrochemicals, coupled with its slowing domestic economy, has contributed to significant regional overcapacity in some segments. Having fulfilled its own demand for chemicals, China is now exporting in significant volumes, leading to downward pressure on prices. This will weigh on the margins of some producers, potentially leading to cuts in capacity.

China reported strong double-digit growth in plastics output throughout 2015, a trend that depressed global prices and prompted producers in some countries to scale back production. The worst affected were East Asian producers that depend on the Chinese market for exports, notably Singapore, South Korea and Taiwan, which all saw slower rates of growth or even contractions in output. Northeast Asian prices were sharply down in H215 due to the impact of China's economic downturn and debt worries, with overcapacity looming in some petrochemicals markets in the region. Although oil prices fell and offered potential for better petrochemicals margins, the naphtha-based producers in UK and France also witnessed declines in output as the European market remained sluggish.

Chinese Output Sucks Growth Elsewhere

Year-on-year growth rates (%) of selected petchems producing countries



Source: National statistical agencies

1 Rubber and plastic index; 2 Rubber and plastic volume; 3 Chemical index; 4 Plastic volume; 5 Chemicals three month moving average growth; 6 Chemicals, rubber and plastic; 7 Plastic index

The performance of the Chinese market will be one of the most crucial issues through 2016. The events of August 2015, when the yuan was devalued and the stock market crashed, serve as a warning of the fragility of the country's economic growth and the impacts on the wider global economy. Issues of industrial overcapacity, high levels of corporate debt and market volatility will continue to tarnish China's outlook, but we believe petrochemicals is better placed than other sectors to weather the storm.

Going forward, eyes will also be on Iran's political rehabilitation, which is set to lead to a surge in commodity chemicals on the global market. In the short term, its petrochemicals complexes stand to ramp up production, having been run at low rates of capacity utilisation. This could raise concerns over price dumping, putting further on margins. In the long term, Iran will be seeking foreign investment and is already attracting the attention of majors, although regulatory reform will be crucial to growth.

In the Americas, Mexico's Ethylene XXI project will boost supply of basic chemicals from Latin America, but it will be an isolated case in the region as it faces the onslaught of cheap US ethane-fed production. However, **BMI** is increasingly sceptical about the time scale of some projects in a low oil-price environment.

Amid the uncertainties caused by China's slowdown is a sizeable shift towards ethane feedstock, as producers attempt to leverage lower gas prices to achieve higher ethylene production margins. Naphtha is setting the marginal price for olefins - ethylene and propylene - and in turn influences the price of derivatives, such as polyethylene (PE) and polypropylene (PP). The rate of change is influenced by market trends, with a tighter market likely to support prices. In H215, spot and contract petrochemical prices had declined sharply, primarily due to falls in oil prices. Margins were also volatile, with lower feedstock costs influencing profitability and creating greater uncertainty.

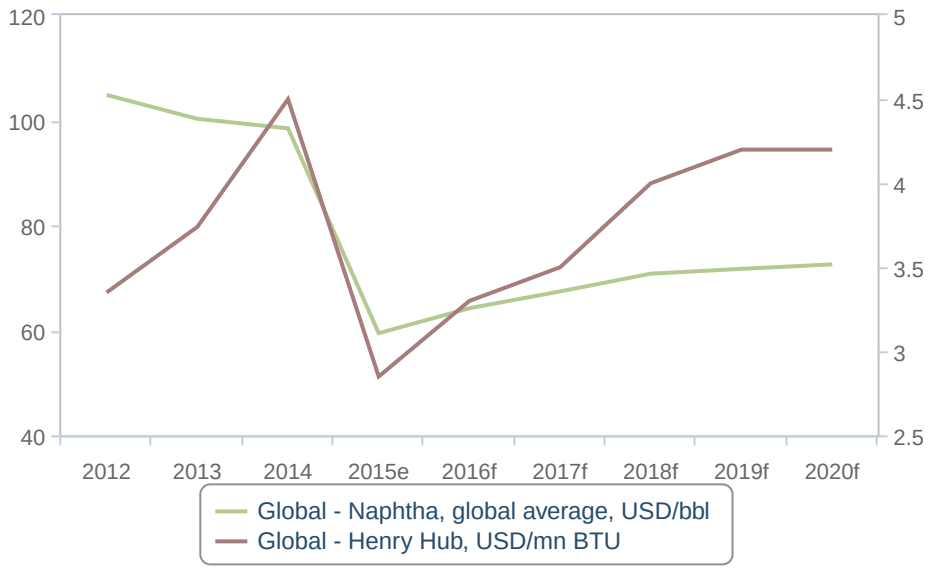
Oil-derived naphtha is overwhelmingly the dominant feedstock for cracker plants that produce ethylene in Europe, Asia and Latin America, while gas-derived ethane is the feedstock of choice for the Middle East and North America. Naphtha will remain the dominant feedstock worldwide and naphtha-fed crackers should be assisted by low oil prices, if sustained, and by the high netback achieved from the greater range of by-products than ethane-fed crackers. Naphtha-fed plants in Western Europe and developed markets in East Asia will, however, see reductions in capacity as their ageing plants, operating in the context of sluggish domestic economic growth, are replaced by larger new complexes with better downstream integration in emerging Asia, particularly India and China.

The downturn in Chinese manufacturing will have significant effects on producers in Asia and the Middle East, who are reliant on China for petrochemicals exports. Singapore will be worst affected as its new petrochemicals complexes are geared towards the needs of industries in the south east of China. High volume producers in the Middle East are also set to be affected, with spot cargos to China already showing downwards movement. Where there will be more support will be in aromatics - in which China has a significant deficit, particularly in xylenes used in the production of PET - and in polypropylene - of which India is a major importer

The task for mature markets will be to compete in value-added chains rather than basic chemicals volumes, an area they retain a high degree of competitiveness due to research and development strengths. While commodity chemicals markets are seeing overcapacity, there is significant advantage for producers with a strong technological edge that can add value to production. Yet, even in high-margin speciality products, China is gaining ground.

Naphtha To Remain Low

Naphtha & Gas Price Trends



f = BMI forecast. Source: Bloomberg, BMI

2016 Feedstock Outlook

The cut in the price of crude since mid-2014 has proved to be a boon to naphtha-based crackers in Asia and Europe. Naphtha plunged from a high of USD975/tonne in mid-2014 to a low of around USD370/tonne at the beginning of 2015. At the beginning of 2016, the price had settled to around USD380/tonne, although it had soared above USD550/tonne in mid-2015.

Lower naphtha prices helped European cracker margins grow 28% in December to EUR549/tonne, which encourages higher production. An extension of length in olefins was seen following the December 4 restart of **Shell**'s 900,000 tonnes per annum (tpa) Moerdijk steam cracker in the Netherlands.

BMI expects the situation to remain broadly the same over 2016 with fewer outages likely to boost supply and put downward pressure on product prices. Much depends on the oil price and whether producers will be able to keep supply tight enough to realise profitability gains.

There is strong justification for predictions of sustained low naphtha prices. The weakness of the Chinese market, underlined by its currency devaluation and stock market crash in August, will ensure soft economic growth for the world's second largest energy consumer. On the supply side, the Iranian nuclear agreement threatening to release more crude on the global market; the absence of production cuts from OPEC; high crude stock levels; booming shale gas supplies in North America; and European market stagnation mean that there is little upside for oil prices in the short-to-medium term.

While short-term fluctuations in price are evened out over longer periods, petrochemicals producers will have to ensure they are more resilient to greater volatility in a lower price environment. **BMI** believes there will be resilience to sub-USD50 per barrel (/bbl) crude prices, but in a sluggish market environment there will be further scope for petrochemicals product cuts.

The narrowing of the ethane-naphtha differential spells trouble for many petrochemicals producers who have slashed naphtha-fed capacities, particularly in Europe, and poured investment into ethane-based projects with capacities well over 1mn tpa.

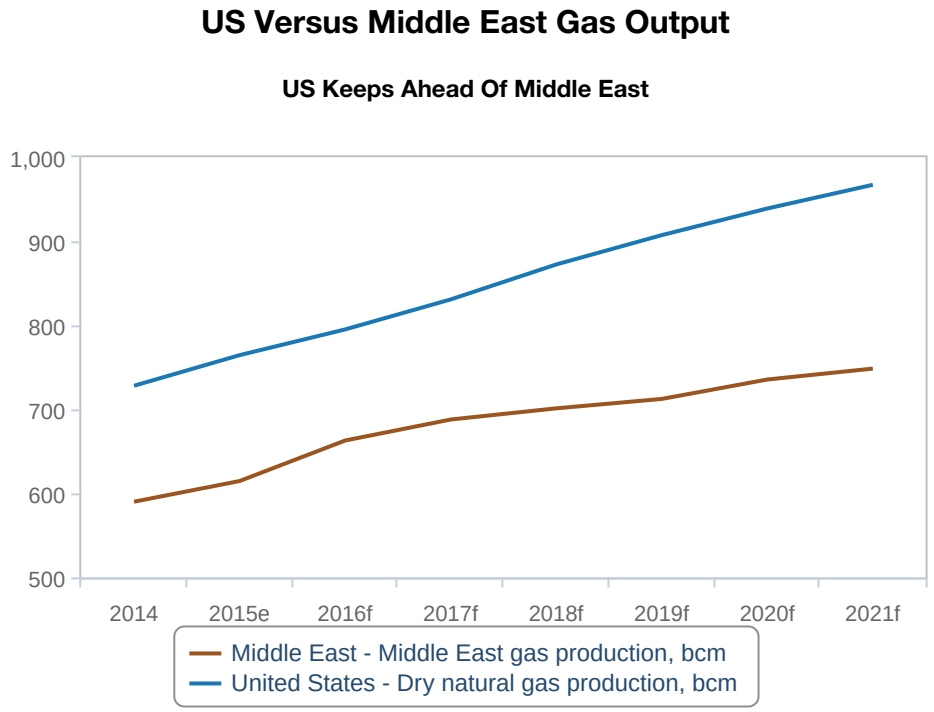
With naphtha now heavily discounted compared to 2013 levels, ethane now looks less advantageous. For example, gas-rich Qatar is radically cutting back its plans due to low naphtha prices, with recent months seeing the cancellations of projects with total ethylene capacity of 2.5mn tpa and around 5mnn tpa of derivative products. Although current ethane supply contracts have been linked to naphtha prices, the conversion of crackers to take shale-derived liquefied natural gas (LNG) imported from the US, such as **INEOS**' cracker in Grangemouth, Scotland, appears to have been miscalculated, and their long-term continuity is in doubt. However, there has been no pause in the planned ethane expansions in Europe. In the US, ethane will remain advantaged and continue to be used as the main feedstock, although some proposed projects may not get off the drawing board.

Naphtha is likely to remain the main feedstock in Europe and Asia for the foreseeable future, but the feedstock flexibility of new crackers in Asia will ensure that emerging Asian producers will retain an edge. In the event that oil prices do recover, this would restore much of the lost ethane cost advantage. However, the lower propylene yield in ethane cracking means there is still a place for heavier cracks in order to produce propylene derivatives, such as PP.

The cracking of heavier naphtha feedstock allows for greater petrochemicals product diversity, thereby benefitting Asian producers in the long term. The Middle East will have to engage in a serious drive towards adding value and establishing downstream conversion industries to support sales. Demand for

propylene derivatives remains strong in Asia, and **BMI** believes this is where the growth will be strongest (North American production will be less significant).

Could US Gas Run Out?



e/f = BMI estimate/forecast. Source: BMI, EIA

Project Cancellations

In recent quarters there has been a number of project cancellations as a result of the feedstock costs, the surge in US output and slower markets. **Braskem** has postponed indefinitely its involvement in the petrochemicals element of the massive Comperj complex in Brazil, the only planned greenfield development in South America for many years. Concerns about the competitiveness of feedstock were core to the decision, although the country's own economic travails and a corruption scandal at project partner Petrobras were also a factor. Instead, Braskem has opted for a smaller-scale expansion at an existing complex.

Braskem's decision follows the cancellation of two major complexes in Qatar: Al-Karaana and Al Sejeel. Together, these would have added ethylene capacity of near 3mn tpa and up to 5mn tpa of derivative products. The decision was prompted by the fall in oil prices, which reduced the competitive advantage of Qatar's ethane feedstock over naphtha. The possibility of ethane supply constraints also raised the possibility of higher feedstock costs. However, projects currently under construction are too far advanced to cancel, such as **ExxonMobil**'s joint venture with QP, which will see an ethane-fed cracker with capacity of 1.6mn tpa ethylene and downstream units including 1.3mn tpa of PE plants and a 700,000tpa ethylene glycol unit. The complex is due on stream in Q415, although delays to engineering contracts could push the date back to 2016.

Concerns over feedstock costs also prompted **Sonatrach** to cancel its joint venture with **Total** for a petrochemicals complex in Arzew, Algeria. This ruled out a cracker with 1.1mn tpa of ethylene capacity and around 1.4mn tpa of derivatives capacities.

M&A Activity

Tough market conditions, growth in cheap US exports and rising Chinese technical capability will be the industry-shaping changes that will begin to affect the global petrochemicals industry going forward. **Dow Chemical** and **DuPont** entered 2016 after agreeing to merge to form a USD130bn corporation. The companies, with positions in everything from plastics to agriculture, have substantial operations across Asia, particularly China. This merger will help them cope with the challenges posed by an increasingly competitive market.

They ended a year that saw strong M&A activity and new joint ventures. INEOS and **Solvay** announced the launch of their INOVYN joint venture in July 2015 that has led to developments in the formation of the polyvinyl chloride (PVC) market in Europe. Solvay also completed the acquisition of the Ryton PPS (polyphenylene sulphide) business from **Chevron Phillips Chemical**, enlarging its high-performance polymers offering and entering a solid growth market.

Indorama Ventures (IVL) acquired 100% of the 600,000tpa PTA business of CEPSA Chimie Montreal. The 600,000 ton PTA plant will provide Indorama Ventures with feedstock security. IVL also acquired Indian polyethylene terephthalate (PET) manufacturer **Micro Polypet Private Ltd** (MicroPet), which has 216,000tpa capacity.

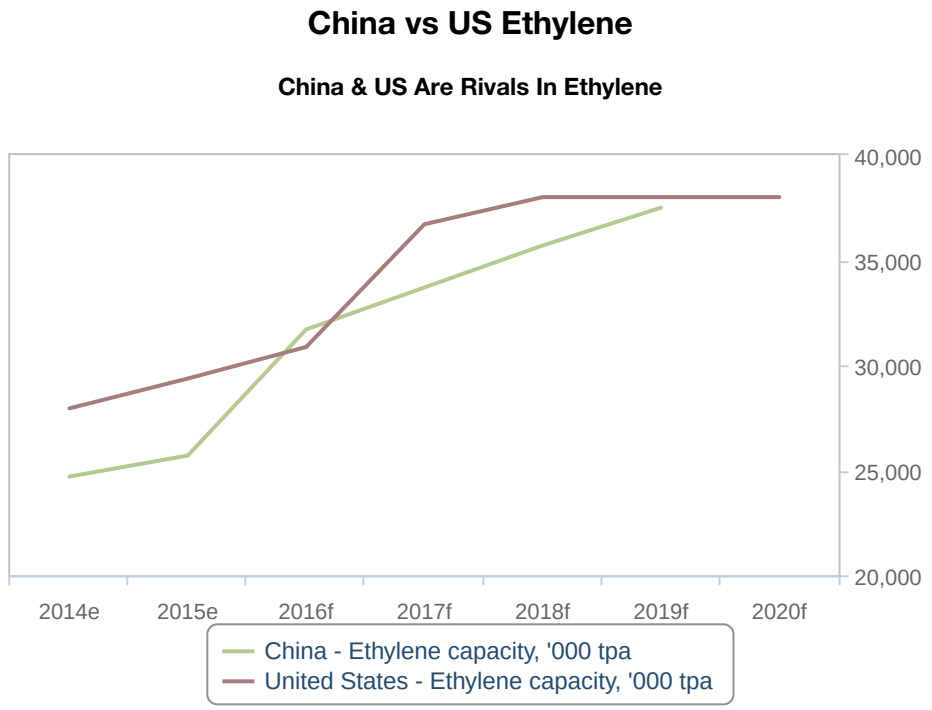
The **Samsung** group agreed to sell its stakes in petrochemical affiliates to the **Lotte** group, in a deal worth an estimated KRW3trn (USD2.66bn billion), exiting the petrochemicals industry to focus on mainstay businesses such as electronics and finance.

Solvay also completed the acquisition of Cytec and is integrating Cytec's businesses to deliver cost efficiency and expand its position in advanced lightweighting materials for the aerospace and automotive industries.

Total has been investing in specialised chemicals products in Germany, acquiring a majority 68% interest in Germany's **Polyblend**. Polyblend produces compounds, which are blends of polymers (polyethylene and polypropylene) and other ingredients such as mineral fillers, glass fibres, elastomers and additives, formulated to customer specifications. Meanwhile, it is planning to open two polypropylene compounding lines at the Carling Platform as part of its project to secure the French site's future.

Long-Term Trends

A slow, long-term oil price recovery would have a profound impact on both global PE and PP markets. Western Europe and Asia would benefit greatly from more competitive feedstock and buoyant demand, while North America would experience lower integrated margins. However, a prolonged period of low oil prices would put new Russian PE projects in jeopardy because of the resulting poor investment climate, leaving Russia as a net-importer of the chemical.

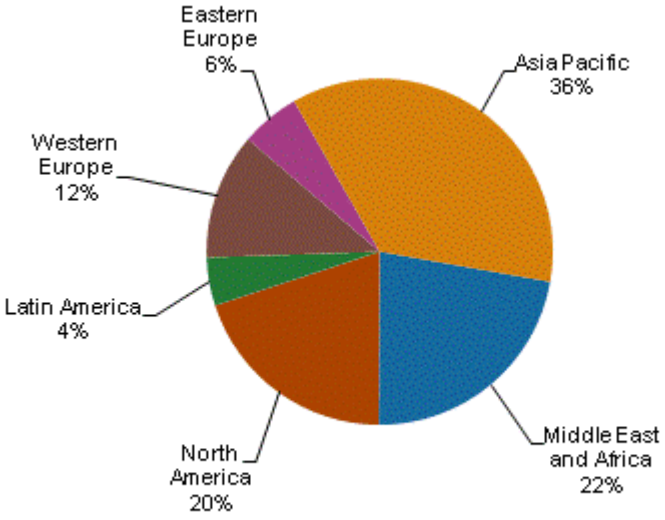


e/f = BMI estimate/forecast. Source: National Sources, BMI

The change in structure in the global market could lead a move to C4s, aromatics and heavier product lines, as well as the further development of bio-based and coal feedstocks for chemicals. This will provide an advantage over purely ethane-fed crackers, which have a lower capacity to produce olefins other than ethylene. In turn, this could protect the competitive edge of planned complexes based on mixed feed and naphtha-fed crackers, which are the majority due to come onstream in Asia and the Middle East over the coming years.

Global Ethylene Capacity By Region

2015 (%)



Source: BMI

Global - Crude Oil, Refined Fuels And Natural Gas Prices

Table: Global Energy Price Forecasts (2014-2019)

	2014	2015e	2016f	2017f	2018f	2019f
OPEC basket, USD/bbl	96.30	49.77	37.00	50.00	59.00	62.00
WTI, USD/bbl	93.06	48.76	39.50	53.00	62.50	65.50
Brent, USD/bbl	99.50	53.60	40.00	53.00	62.00	65.00
Urals, USD/bbl	98.09	52.56	38.00	51.00	60.00	63.00
Dubai, USD/bbl	96.50	50.95	36.00	49.00	58.00	61.00
Unleaded gasoline, Rotterdam, USD/bbl	110.71	68.85	55.00	62.50	63.75	68.25
Unleaded gasoline, New York, USD/bbl	114.83	70.10	56.00	63.50	65.00	69.50
Unleaded gasoline, Singapore, USD/bbl	112.46	67.85	55.00	63.00	64.75	70.00
Unleaded gasoline, global average, USD/bbl	112.67	68.93	55.33	63.00	64.50	69.25
Gasoil/diesel, Rotterdam, USD/bbl	111.00	65.80	46.00	44.50	46.50	48.20
Gasoil/diesel, Singapore, USD/bbl	112.45	63.52	45.00	42.00	43.50	45.00
Gasoil/diesel, global average, USD/bbl	111.82	65.95	46.33	44.33	46.17	47.73
Naphtha, Rotterdam, USD/bbl	98.30	59.30	64.00	67.20	70.56	71.60
Naphtha, Singapore, USD/bbl	98.62	59.60	64.40	67.60	71.00	71.80
Naphtha, global average, USD/bbl	98.46	59.45	64.20	67.40	70.78	71.70
Jet/kerosene, Rotterdam, USD/bbl	116.21	69.80	51.68	63.30	64.40	72.00
Jet/kerosene, New York, USD/bbl	117.36	70.20	53.04	67.80	68.00	75.00
Jet/kerosene, Singapore, USD/bbl	112.38	66.10	53.65	63.30	64.40	72.00
Jet/kerosene, global average, USD/bbl	115.32	68.70	52.79	64.80	65.60	73.00
Bunker fuel 180, Rotterdam, USD/bbl	83.64	50.69	41.15	47.00	48.00	51.00
Bunker fuel 180, New York, USD/bbl	96.85	61.00	47.40	55.00	54.50	56.00
Bunker fuel 180, Singapore, USD/bbl	86.96	45.60	36.15	43.00	45.00	50.00
Bunker fuel 180, global average, USD/bbl	89.15	52.43	41.57	48.33	49.17	52.33
Bunker fuel 380, Rotterdam, USD/bbl	79.84	39.45	33.20	37.80	38.50	40.90
Bunker fuel 380, New York, USD/bbl	83.55	43.37	35.50	41.20	41.00	42.30
Bunker fuel 380, Singapore, USD/bbl	83.27	43.12	35.70	42.30	43.40	44.00
Marine Gasoil, global average, USD/bbl	111.97	67.70	47.80	57.00	59.50	65.00
Bunker fuel 380, global average, USD/bbl	82.22	41.98	34.80	40.43	40.97	42.40
Bunker fuel, Rotterdam, USD/bbl	88.04	45.07	37.18	42.40	43.25	45.95
Bunker fuel, New York, USD/bbl	94.02	52.19	41.45	48.10	47.75	49.15
Bunker fuel, Singapore, USD/bbl	90.23	44.36	35.93	42.65	44.20	47.00
Bunker fuel, global average, USD/bbl	90.76	47.21	38.18	44.38	45.07	47.37

Global Energy Price Forecasts (2014-2019) - Continued						
	2014	2015e	2016f	2017f	2018f	2019f
Henry Hub, USD/mn BTU	4.50	2.85	3.25	3.50	4.00	4.20

f = BMI forecast. Source: BMI, Bloomberg

Table: Global Energy Price Forecasts (2020-2025)						
	2020f	2021f	2022f	2023f	2024f	2025f
OPEC basket, USD/bbl	68.00	67.00	69.00	71.00	72.00	72.00
WTI, USD/bbl	72.00	71.00	73.00	75.00	76.00	76.00
Brent, USD/bbl	71.00	70.00	72.00	74.00	75.00	75.00
Urals, USD/bbl	69.00	68.00	70.00	72.00	73.00	73.00
Dubai, USD/bbl	67.00	66.00	68.00	70.00	71.00	71.00
Unleaded gasoline, Rotterdam, USD/bbl	75.00	76.50	76.50	76.50	76.50	76.50
Unleaded gasoline, New York, USD/bbl	76.25	76.25	76.25	76.25	76.25	76.25
Unleaded gasoline, Singapore, USD/bbl	77.75	77.75	77.75	77.75	77.75	77.75
Unleaded gasoline, global average, USD/bbl	76.33	76.83	76.83	76.83	76.83	76.83
Gasoil/diesel, Rotterdam, USD/bbl	48.50	48.50	48.50	48.50	48.50	48.50
Gasoil/diesel, Singapore, USD/bbl	45.50	45.50	45.50	45.50	45.50	45.50
Gasoil/diesel, global average, USD/bbl	48.00	48.00	48.00	48.00	48.00	48.00
Naphtha, Rotterdam, USD/bbl	72.50	73.40	73.40	73.40	73.40	73.40
Naphtha, Singapore, USD/bbl	72.60	73.30	73.30	73.30	73.30	73.30
Naphtha, global average, USD/bbl	72.55	73.35	73.35	73.35	73.35	73.35
Jet/kerosene, Rotterdam, USD/bbl	78.00	89.00	91.00	93.00	95.00	95.00
Jet/kerosene, New York, USD/bbl	81.00	90.00	92.00	94.00	96.00	96.00
Jet/kerosene, Singapore, USD/bbl	78.00	87.00	89.00	91.00	93.00	93.00
Jet/kerosene, global average, USD/bbl	79.00	88.67	90.67	92.67	94.67	94.67
Bunker fuel 180, Rotterdam, USD/bbl	55.00	55.00	55.00	55.00	55.00	55.00
Bunker fuel 180, New York, USD/bbl	58.00	58.00	58.00	58.00	58.00	58.00
Bunker fuel 180, Singapore, USD/bbl	56.00	56.00	56.00	56.00	56.00	56.00
Bunker fuel 180, global average, USD/bbl	56.33	56.33	56.33	56.33	56.33	56.33
Bunker fuel 380, Rotterdam, USD/bbl	44.10	44.10	44.10	44.10	44.10	44.10
Bunker fuel 380, New York, USD/bbl	43.80	43.80	43.80	43.80	43.80	43.80
Bunker fuel 380, Singapore, USD/bbl	45.00	45.00	45.00	45.00	45.00	45.00
Marine Gasoil, global average, USD/bbl	72.00	80.00	80.00	80.00	80.00	80.00

Global Energy Price Forecasts (2020-2025) - Continued						
	2020f	2021f	2022f	2023f	2024f	2025f
Bunker fuel 380, global average, USD/bbl	44.30	44.30	44.30	44.30	44.30	44.30
Bunker fuel, Rotterdam, USD/bbl	49.55	49.55	49.55	49.55	49.55	49.55
Bunker fuel, New York, USD/bbl	50.90	50.90	50.90	50.90	50.90	50.90
Bunker fuel, Singapore, USD/bbl	50.50	50.50	50.50	50.50	50.50	50.50
Bunker fuel, global average, USD/bbl	50.32	50.32	50.32	50.32	50.32	50.32
Henry Hub, USD/mn BTU	4.20	4.20	4.20	4.20	4.20	4.20

f = BMI forecast. Source: BMI, Bloomberg

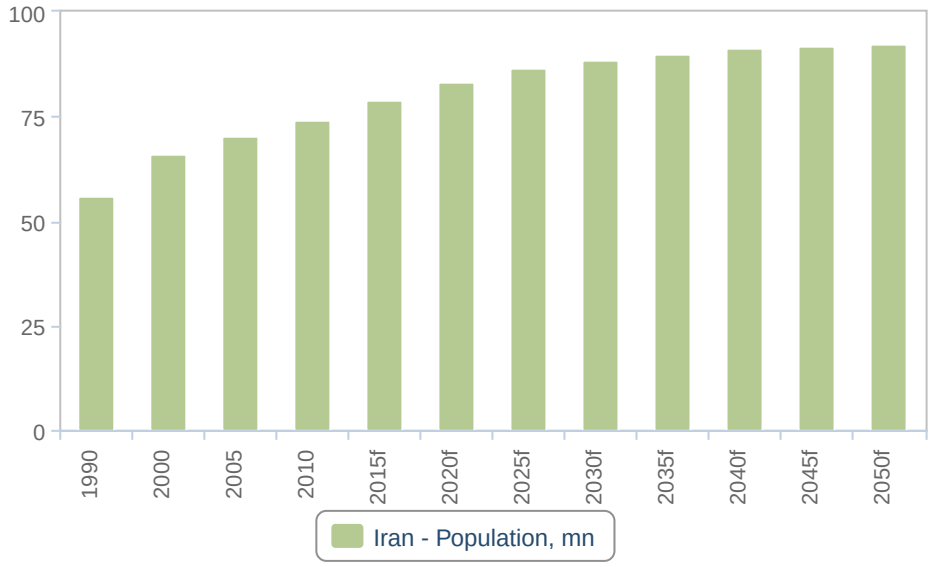
Demographic Forecast

Demographic analysis is a key pillar of **BMI**'s macroeconomic and industry forecasting model. Not only is the total population of a country a key variable in consumer demand, but an understanding of the demographic profile is essential to understanding issues ranging from future population trends to productivity growth and government spending requirements.

The accompanying charts detail the population pyramid for 2015, the change in the structure of the population between 2015 and 2050 and the total population between 1990 and 2050. The tables show indicators from all of these charts, in addition to key metrics such as population ratios, the urban/rural split and life expectancy.

Population

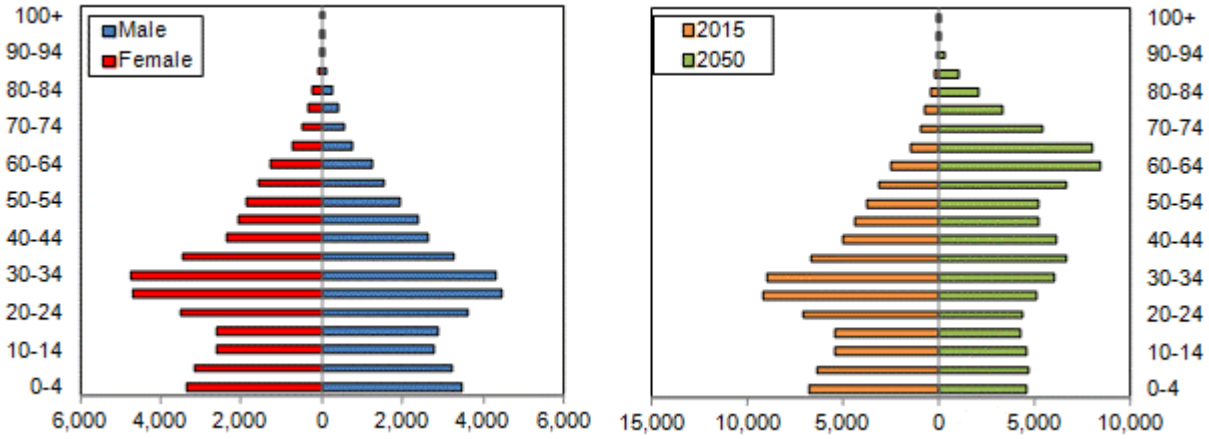
(1990-2050)



f = BMI forecast. Source: World Bank, UN, BMI

Iran Population Pyramid

2015 (LHS) & 2015 Versus 2050 (RHS)



Source: World Bank, UN, BMI

Table: Population Headline Indicators (Iran 1990-2025)

	1990	2000	2005	2010	2015f	2020f	2025f
Population, total, '000	56,169	65,850	70,122	74,253	79,109	83,403	86,496
Population, % y-o-y	na	1.7	1.2	1.2	1.2	0.9	0.6
Population, total, male, '000	28,617	33,372	35,796	37,542	39,835	41,940	43,439
Population, total, female, '000	27,551	32,477	34,325	36,710	39,274	41,463	43,057
Population ratio, male/female	1.04	1.03	1.04	1.02	1.01	1.01	1.01

na = not available; f = BMI forecast. Source: World Bank, UN, BMI

Table: Key Population Ratios (Iran 1990-2025)

	1990	2000	2005	2010	2015f	2020f	2025f
Active population, total, '000	28,800	40,064	48,413	53,171	56,428	58,737	61,495
Active population, % of total population	51.3	60.8	69.0	71.6	71.3	70.4	71.1
Dependent population, total, '000	27,368	25,785	21,709	21,081	22,681	24,665	25,000
Dependent ratio, % of total working age	95.0	64.4	44.8	39.6	40.2	42.0	40.7

Key Population Ratios (Iran 1990-2025) - Continued

	1990	2000	2005	2010	2015f	2020f	2025f
Youth population, total, '000	25,492	23,011	18,251	17,418	18,677	19,449	18,237
Youth population, % of total working age	88.5	57.4	37.7	32.8	33.1	33.1	29.7
Pensionable population, '000	1,876	2,773	3,457	3,662	4,003	5,216	6,763
Pensionable population, % of total working age	6.5	6.9	7.1	6.9	7.1	8.9	11.0

f = BMI forecast. Source: World Bank, UN, BMI

Table: Urban/Rural Population & Life Expectancy (Iran 1990-2025)

	1990	2000	2005	2010	2015f	2020f	2025f
Urban population, '000	31,640.1	42,171.7	47,373.1	52,442.2	58,046.4	63,173.8	67,253.7
Urban population, % of total	56.3	64.0	67.6	70.6	73.4	75.7	77.8
Rural population, '000	24,529.1	23,678.4	22,749.0	21,811.2	21,062.8	20,229.5	19,242.9
Rural population, % of total	43.7	36.0	32.4	29.4	26.6	24.3	22.2
Life expectancy at birth, male, years	61.6	69.2	70.4	72.5	74.5	75.1	75.8
Life expectancy at birth, female, years	66.3	71.1	73.5	75.5	76.7	77.4	78.1
Life expectancy at birth, average, years	63.8	70.1	71.9	74.0	75.6	76.2	76.9

f = BMI forecast. Source: World Bank, UN, BMI

Table: Population By Age Group (Iran 1990-2025)

	1990	2000	2005	2010	2015f	2020f	2025f
Population, 0-4 yrs, total, '000	9,346	6,379	5,494	6,402	6,855	6,228	5,197
Population, 5-9 yrs, total, '000	8,885	7,598	5,556	5,472	6,395	6,836	6,213
Population, 10-14 yrs, total, '000	7,260	9,034	7,200	5,543	5,426	6,384	6,826
Population, 15-19 yrs, total, '000	5,775	8,781	9,299	7,136	5,478	5,407	6,365
Population, 20-24 yrs, total, '000	4,674	6,868	9,123	9,148	7,086	5,434	5,369
Population, 25-29 yrs, total, '000	4,031	5,269	6,796	8,996	9,158	7,026	5,388
Population, 30-34 yrs, total, '000	3,506	4,419	5,156	6,759	9,045	9,096	6,979
Population, 35-39 yrs, total, '000	3,005	3,864	4,670	5,140	6,738	8,988	9,044
Population, 40-44 yrs, total, '000	2,123	3,344	4,091	4,580	5,029	6,688	8,931
Population, 45-49 yrs, total, '000	1,621	2,832	3,393	3,920	4,454	4,979	6,629

Population By Age Group (Iran 1990-2025) - Continued							
	1990	2000	2005	2010	2015f	2020f	2025f
Population, 50-54 yrs, total, '000	1,527	1,930	2,776	3,227	3,813	4,384	4,906
Population, 55-59 yrs, total, '000	1,393	1,431	1,767	2,631	3,124	3,723	4,286
Population, 60-64 yrs, total, '000	1,140	1,322	1,336	1,629	2,497	3,009	3,594
Population, 65-69 yrs, total, '000	899	1,145	1,258	1,193	1,475	2,338	2,828
Population, 70-74 yrs, total, '000	508	826	1,055	1,054	1,009	1,299	2,075
Population, 75-79 yrs, total, '000	269	509	654	780	785	776	1,015
Population, 80-84 yrs, total, '000	136	203	347	413	477	494	502
Population, 85-89 yrs, total, '000	49	67	113	174	194	232	249
Population, 90-94 yrs, total, '000	11	18	22	40	54	63	79
Population, 95-99 yrs, total, '000	1	2	3	5	7	10	12
Population, 100+ yrs, total, '000	0	0	0	0	0	0	1

f = BMI forecast. Source: World Bank, UN, BMI

Table: Population By Age Group % (Iran 1990-2025)							
	1990	2000	2005	2010	2015f	2020f	2025f
Population, 0-4 yrs, % total	16.64	9.69	7.84	8.62	8.67	7.47	6.01
Population, 5-9 yrs, % total	15.82	11.54	7.92	7.37	8.08	8.20	7.18
Population, 10-14 yrs, % total	12.93	13.72	10.27	7.47	6.86	7.66	7.89
Population, 15-19 yrs, % total	10.28	13.34	13.26	9.61	6.93	6.48	7.36
Population, 20-24 yrs, % total	8.32	10.43	13.01	12.32	8.96	6.52	6.21
Population, 25-29 yrs, % total	7.18	8.00	9.69	12.12	11.58	8.42	6.23
Population, 30-34 yrs, % total	6.24	6.71	7.35	9.10	11.43	10.91	8.07
Population, 35-39 yrs, % total	5.35	5.87	6.66	6.92	8.52	10.78	10.46
Population, 40-44 yrs, % total	3.78	5.08	5.84	6.17	6.36	8.02	10.33
Population, 45-49 yrs, % total	2.89	4.30	4.84	5.28	5.63	5.97	7.66
Population, 50-54 yrs, % total	2.72	2.93	3.96	4.35	4.82	5.26	5.67
Population, 55-59 yrs, % total	2.48	2.17	2.52	3.54	3.95	4.46	4.96
Population, 60-64 yrs, % total	2.03	2.01	1.91	2.19	3.16	3.61	4.16
Population, 65-69 yrs, % total	1.60	1.74	1.79	1.61	1.87	2.80	3.27
Population, 70-74 yrs, % total	0.90	1.25	1.51	1.42	1.28	1.56	2.40
Population, 75-79 yrs, % total	0.48	0.77	0.93	1.05	0.99	0.93	1.17
Population, 80-84 yrs, % total	0.24	0.31	0.50	0.56	0.60	0.59	0.58

Population By Age Group % (Iran 1990-2025) - Continued							
	1990	2000	2005	2010	2015f	2020f	2025f
Population, 85-89 yrs, % total	0.09	0.10	0.16	0.23	0.25	0.28	0.29
Population, 90-94 yrs, % total	0.02	0.03	0.03	0.05	0.07	0.08	0.09
Population, 95-99 yrs, % total	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Population, 100+ yrs, % total	0.00	0.00	0.00	0.00	0.00	0.00	0.00

f = BMI forecast. Source: World Bank, UN, BMI

Glossary

Table: Glossary Of Petrochemicals Terms			
ABS	acrylonitrile-butadiene-styrene	MTBE	methyl tertiary butyl ether
AN	acrylonitrile	NOC	national oil company
AS	acrylonitrile styrene	OX	orthoxylene
bbl	barrel	PE	polyethylene
bcm	billion cubic metres	PET	polyethylene terephthalate
b/d	barrels per day	PG	propylene glycol
BR	butadiene rubber	PO	propylene oxide
btu	British thermal units	PP	polypropylene
DMT	dimethyl terephthalate	PS	polystyrene
EB	ethylbenzene	PTA	purified terephthalic acid
EDC	ethylene dichloride	PU	polyurethane
EG	ethylene glycol	PVC	polyvinyl chloride
EO	ethylene oxide	PX	paraxylene
GTL	gas-to-liquids	q-o-q	quarter-on-quarter
HDPE	high density polyethylene	SBR	styrene butadiene rubber
IOC	international oil company	SM	styrene monomer
JV	joint venture	TDI	toluene diisocyanate
LAB	linear alkylbenzene	tpa	tonnes per annum
LDPE	low density polyethylene	VAM	vinyl acetate monomer
LLDPE	linear low density polyethylene	VCM	vinyl chloride monomer
LNG	liquefied natural gas	y-o-y	year-on-year
MEG	mono-ethylene glycol		

Source: BMI

Methodology

Industry Forecast Methodology

BMI's industry forecasts are generated using the best-practice techniques of time-series modelling and causal/econometric modelling. The precise form of model we use varies from industry to industry, in each case determined, as per standard practice, by the prevailing features of the industry data being examined.

Common to our analysis of every industry is the use of vector autoregressions, which allow us to forecast a variable using more than the variable's own history as explanatory information. For example, when forecasting oil prices, we can include information about oil consumption, supply and capacity.

When forecasting for some of our industry sub-component variables, however, using a variable's own history is often the most desirable method of analysis. Such single-variable analysis is called univariate modelling. We use the most common and versatile form of univariate models: the autoregressive moving average model (ARMA).

In some cases, ARMA techniques are inappropriate because there is insufficient historic data or data quality is poor. In such cases, we use either traditional decomposition methods or smoothing methods as a basis for analysis and forecasting.

BMI mainly uses OLS estimators and in order to avoid relying on subjective views and encourage the use of objective views, **BMI** uses a 'general-to-specific' method. **BMI** mainly uses a linear model, but simple non-linear models, such as the log-linear model, are used when necessary. During periods of 'industry shock', for example poor weather conditions impeding agricultural output, dummy variables are used to determine the level of impact.

Effective forecasting depends on appropriately selected regression models. **BMI** selects the best model according to various different criteria and tests, including but not exclusive to:

- R^2 tests explanatory power; adjusted R^2 takes degree of freedom into account;
- Testing the directional movement and magnitude of coefficients;
- Hypothesis testing to ensure coefficients are significant (normally t-test and/or P-value);
- All results are assessed to alleviate issues related to auto-correlation and multi-collinearity.

BMI uses the selected best model to perform forecasting.

Human intervention plays a necessary and desirable role in all of our industry forecasting. Experience, expertise and knowledge of industry data and trends ensure analysts spot structural breaks, anomalous data, turning points and seasonal features where a purely mechanical forecasting process would not.

Sector-Specific Methodology

Plant Capacity

The ability of a country to produce basic chemical products depends on domestic plant capacity. The number and size of ethylene crackers determines both a country's likely output and also its relative efficiency as a producer. We therefore examine:

- Stated year-end capacity for key petrochemicals products: ethylene, propylene, polypropylene, polyethylene and other petrochemicals;
- Specific company and/or government capacity expansion projects aimed at increasing the number and/or size of crackers and downstream processing facilities;
- Government, company and third-party sources.

Chemicals Supply

A mixture of methods is used to generate supply forecasts, applied as appropriate to each individual country:

- Basic plant capacity and historic utilisation rates. Unless a company imports chemicals products for domestic re-sale, supply is expected to be governed by production capacity;
- Underlying economic growth trends. The chemicals industry is highly cyclical. Strong domestic or regional demand should be met by increased supply and higher plant utilisation rates;
- Third-party projections from national and international industry trade associations.

Chemicals Demand

Various methods are used to generate demand forecasts, applied as appropriate to each individual country:

- Underlying economic growth trends. The chemicals industry is highly cyclical. Strong domestic or regional demand is expected to require larger volumes of either domestically produced or imported olefins (ethylene, propylene), polyolefins (PE, PP) or downstream products;

- Trends in end-user industries. Strong demand for motor vehicles, construction materials, packaging products and pharmaceuticals imply rising demand for basic chemicals;
- Government/industry projections;
- Third-party forecasts from national and international industry trade associations.

Cross Checks

Whenever possible, we compare government and/or third party agency projections with spending and capacity expansion plans of the companies operating in each individual country. Where there are discrepancies, we use company-specific data, such as physical spending patterns to determine capacity and supply capability. Similarly, we compare capacity expansion plans and demand projections to check the chemicals balance of each country. Where the data suggest imports or exports, we check that necessary capacity exists or that the required investment in infrastructure is taking place.

Risk/Reward Index Methodology

BMI's Risk/Reward Index (RRI) provide a comparative regional ranking system evaluating the ease of doing business and the industry-specific opportunities and limitations for potential investors in a given market. The RRI system is divided into two distinct areas:

***Rewards*:** Evaluation of sector's size and growth potential in each state, and also broader industry/state characteristics that may inhibit its development. This is broken down into two sub-categories:

- Industry Rewards. This is an industry-specific category taking into account current industry size and growth forecasts, the openness of market to new entrants and foreign investors, to provide an overall score for potential returns for investors.
- Country Rewards. This is a country-specific category, which factors in favourable political and economic conditions for the industry.

***Risks*:** Evaluation of industry-specific dangers and those emanating from the state's political/economic profile that call into question the likelihood of anticipated returns being realised over the assessed time period. This is broken down into two sub-categories:

- Industry Risks: This is an industry-specific category whose score covers potential operational risks to investors, regulatory issues inhibiting the industry and the relative maturity of a market.
- Country Risks: This is a country-specific category in which political and economic instability, unfavourable legislation and a poor overall business environment are evaluated to provide an overall score.

We take a weighted average, combining Industry and Country Risks, or Industry and Country Rewards. These two results in turn provide an overall Risk/Reward Index score, which is used to create our regional ranking system for the risks and rewards of involvement in a specific industry in a particular country.

For each category and sub-category, each state is scored out of 100 (100 being the best), with the overall Risk/Reward Index score a weighted average of the total score. Importantly, as most of the countries and territories evaluated are considered by **BMI** to be 'emerging markets', our index is revised on a quarterly basis. This ensures that the index draws on the latest information and data across our broad range of sources, and the expertise of our analysts.

Indicators

The following indicators have been used. Overall, the index uses three subjectively measured indicators, and 41 separate indicators/datasets.

Table: Petrochemicals Risk/Reward Index Indicators

	Rationale
Rewards	
Industry Rewards	
Cracker capacity, current year	Objective measure of sector size
Cracker capacity, future year	Forecast of sector development
Downstream capacity, current year	Objective measure of domestic demand
Country Rewards	
Financial infrastructure	Score from BMI's Country Risk Index (CRI) to denote ease of obtaining investment finance. Poor availability of finance will hinder company operations across the economy.
Trade bureaucracy	From CRI. Low trade restrictions are essential for this export-based industry.
Physical infrastructure	From CRI. Given the size of manufacturing units, sector development requires strong supporting power/water/transport infrastructure.
Risks	
Industry Risks	
Industry regulatory environment	Subjective evaluation against BMI-defined criteria. Evaluates predictability of operating environment.
Country Risks	
Structure of economy	From CRI. Denotes health of underlying economic structure, including seven indicators such as volatility of growth, reliance on commodity imports, reliance on single sector for exports

Petrochemicals Risk/Reward Index Indicators - Continued	
	Rationale
Long-term external economic risk	From CRI. Denotes vulnerability to external shock, which is the principal cause of economic crises.
Long-term external financial risk	From CRI. Denotes vulnerability of currency/stability of financial sector.
Institutions	From CRI. Denotes strength of bureaucracy and legal framework and evaluates level of corruption.
Long-term political risk	From CRI. Denotes strength of political environment

Source: BMI

Weighting

Given the number of indicators/datasets used, it would be wholly inappropriate to give all sub-components equal weight. Consequently, the following weighting has been adopted.

Table: Weighting Of Indicators	
Component	**Weighting, %**
Rewards	70, of which
- Industry Rewards	65
- Country Rewards	35
Risks	30, of which
- Industry Risks	40
- Country Risks	60

Source: BMI