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IRAN

PETROCHEMICALS REPORT

INCLUDES 5-YEAR FORECASTS TO 2019

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Iran Petrochemicals Report Q1 2016

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BMI Industry View

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. Although the sanctions are due to be withdrawn, there is lingering uncertainty. 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 tonnes per annum (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 polyethylene (PE).

The industry will become rapidly more export-oriented as trade restrictions are lifted with the government expecting exports in 2016 to return to pre-sanctions levels, although it is doubtful that the country's share of the Middle East petrochemicals market will rise from 25% to 41% by 2020. This should help raise petrochemicals capacity utilisation from 68% in 2014.

- Iran is set to see strong growth in petrochemical consuming sectors with the automotive industry returning to near its pre-sanctions peak in 2015 and set to grow by two-thirds by 2020, while the construction sector is expected to see five year average growth rise from 3.1% per annum to 4.3% as a result of the lifting of international sanctions.
- **BMI** has extended its five year petrochemicals capacity forecast to 2020 this quarter, which takes into account plans for a new complex in Chabahar that will be based around a 1.2mn tpa ethylene cracker with associated PE and polypropylene facilities and other derivatives. 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 PE capacity.

This quarter, Iran has seen a 0.7 points increase in its petrochemicals Risk/Reward Index (RRI) due to an 8.0 points increase in its market risk score. This comes amid strong investor interest in the petrochemicals industry and a willingness of the Rouhani administration to revise upstream regulation as well as engage with the global market. Although the petrochemicals industry will be a major beneficiary of sanctions relief, there are still risks that the deal will fall through. Also, structural issues continue to constrain the sector, particularly feedstock supply and pricing issues. It remains in third place, closing with the second placed UAE and raising 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. ▪ Capital flight could accelerate should negotiations on the nuclear programme fail.

Operational Risk

SWOT Analysis

Strengths

- Iran boasts high numbers of skilled graduates in technical fields such as engineering, construction and science.
- The transport network offers good internal and cross-border connections, and is currently able to meet the country's supply chain needs.
- The banking sector is relatively well developed, allowing extension of finance and credit to citizens.
- A well established intelligence agency and robust counter-terrorist capabilities deter attacks in most areas of the country.

Weaknesses

- Costs of employment are increases 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.
- There is widespread corruption and heavy handed censorship, which will pose unforeseeable operational costs and limit business activities.
- The expansion of IS in Iraq poses a significant risk to Iran's security.

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.
- There is potential to combat the drug supply into Europe through programmes in Iran.

SWOT Analysis - Continued

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 if sanctions are lifted, the difficult operating environment in Iran, typified by high taxes and widespread corruption, will continue to deter investors.

Industry Forecast

Iran's total petrochemical production capacity stands at 60mn tonnes per annum (tpa), which the country plans to double. Pre-sanction capacity utilisation rates averaged 68% in 2014, so 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. 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.

Production

Based on official statistics, Iran has a capacity to produce 60mn tpa of petrochemicals, only a fraction of which has been utilised for exports under the punitive sanctions regime. Iran's **National Petrochemical Company** (NPC) plans to launch 15 new petrochemical units by FY16/17, thereby increasing the country's capacity by 8.5mn metric tonnes. Currently 60 petrochemical plans are under way in the country. However, Deputy Oil Minister for Petrochemical Affairs Abbas Sheri Moqaddam anticipates a lower rate of expansion with 11 new petrochemical units providing 6mn tpa of capacity. With the utilisation of existing plants expected to improve, the government is anticipating an increase in petrochemicals output of 7.1mn tonnes in FY2015/16.

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 also 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. 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 PE (LDPE), high density PE (HDPE) and linear low density PE (LLDPE). Polypropylene (PP) is also set to be included, but no firm capacities are indicated.

Exports are likely to feature more strongly as sanctions are lifted and investment flows into the sector. Resumption of exports will help raise Iran's share of the Middle East's production output from 25% in 2014, although there are still doubts it will reach its target of a 41% regional market share by 2020.

According to Iranian forecasts, the value of petrochemical exports will rise by 20-25% in the 12-18 months after sanctions are lifted. Iran is expected to export 17.5mn tonnes in 2015/16, which is less than the 18.8mn tonnes exported in the previous fiscal year and well below the 21.2mn tonnes exported in 2011/12, before the sanctions were introduced. The expected post-sanctions boost is predicated on a return to pre-sanctions levels, although petrochemicals capacities have grown in the mean time. As such, growth will be unremarkable for an industry that is operating well below capacity.

Iran is looking for around USD85bn in foreign investment to rebuild its petrochemicals industry. The NPC indicated that there are some USD30bn of investment opportunities in Iran's petrochemical sector and European and Asian investors would be invited to invest after the sanctions against the country are lifted. Much will depend on the terms of investment and the overall competitiveness of the industry.

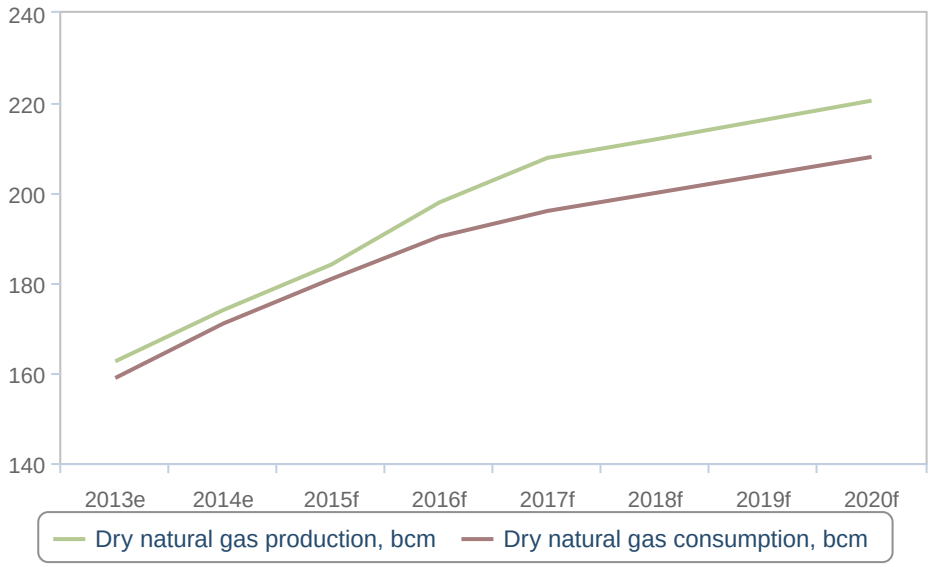
Low naphtha prices are a setback for ethane-based production in Iran and its main export market, China, is exhibiting a downturn. In spite of the good feelings generated by the prospect of the lifting of sanctions, there will still be some way to go to convince investors that Iran's petrochemicals industry - dominated by state-owned industry and in a country with a far less open economy than neighbouring Arabian Gulf states - is attractive. Nevertheless, when banking, insurance and shipping restrictions are lifted, export costs will fall and the ease of doing business will improve.

In our view, the risks to the agreement breaking down will rise over time - particularly from 2017 onwards. The deal could still unravel, especially if future political leaders in either the US or Iran decide to abandon it, either formally or by non-compliance. On the US side, Obama's term will end in January 2017 and it is likely the next President will be more hawkish towards Iran than the incumbent. Given sufficient justification, his successor could therefore seek to overturn the agreement, in combination with a Republican-controlled Congress (although the EU, Russia and China would likely not be easily persuaded to follow the US' move).

The risks are greater on the Iranian side. The failure of Iran to cooperate with the IAEA at any point over the next decade would raise serious problems for the sustainability of the Vienna agreement. Iran has presidential elections in June 2017, and while it is too early to speculate on an eventual winner, alternatives to a Rouhani second term are likely to be more hardline than the incumbent. Rouhani's popularity could suffer if economic conditions fail to improve significantly before the election.

Gas Production Will Exceed Demand Growth

(2013-2020)



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

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.

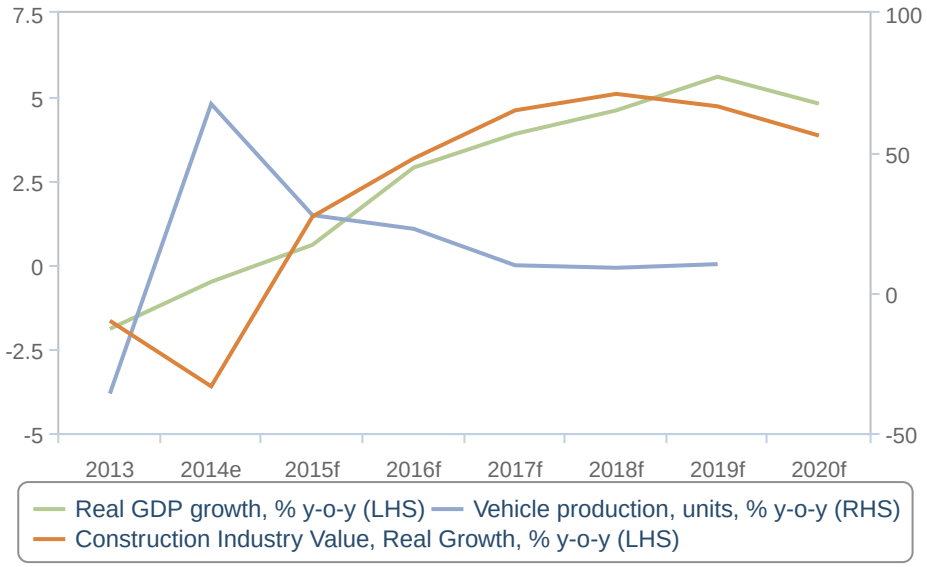
The surge in capacity will not be sustainable if feedstock supply is not forthcoming and markets do not absorb output. Some complexes are suffering feedstock shortages particularly during winter months. Iranian petrochemical complexes need 30-35mn cubic metres of gas per day. Besides pressure on supply, 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



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 polyethylene (PE) and polypropylene (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
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

Iran's Petrochemicals Industry, 2011-2020 ('000 tpa, Unless Otherwise Stated) - Continued										
	2011	2012	2013e	2014f	2015f	2016f	2017f	2018f	2019f	2020f
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

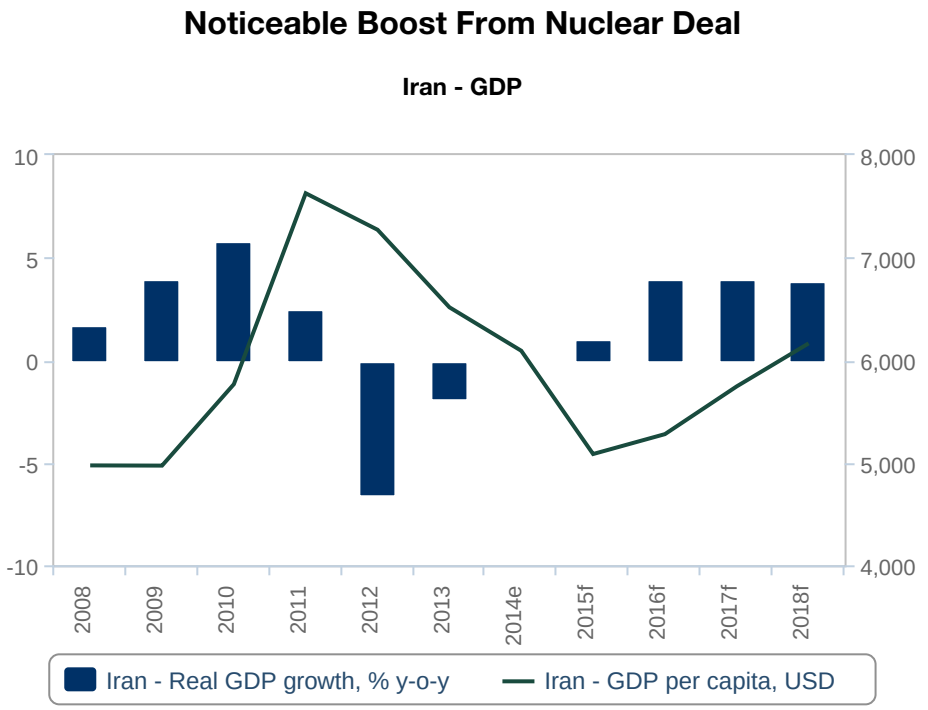
Source: BMI

Macroeconomic Forecasts

Economy To Grow Again On Sanctions Relief

BMI View: *After three years of stagnation and recession Iran's economy will return to growth in 2015. This will be primarily due to sanctions relief as we expect an agreement to be reached over the country's nuclear programme. Overall, we expect real GDP growth of 3-4% from 2016 onwards, driven increasingly by fixed investment and net exports.*

Our expectation for sanctions to be unwound on Iran from Q315 will provide a significant boost to the country's economy. Sanctions across sectors such as on shipping, banking and oil will be relaxed as Iran complies with Western powers' demand over the dismantling of its nuclear programme. On the back of this we forecast Iran's economy to return to growth in 2015, following three years of recession. The impact of the unwinding of sanctions will be tempered by growth in imports, and because sanctions on the key oil sector will not lead to a significant uptick in exports until 2016 at the very earliest. In addition, years of underinvestment across all sectors will mean that although growth will reach around 4.0% over the coming years, a booming economy is off the cards as the recovery is tempered by logistical and bureaucratic issues.

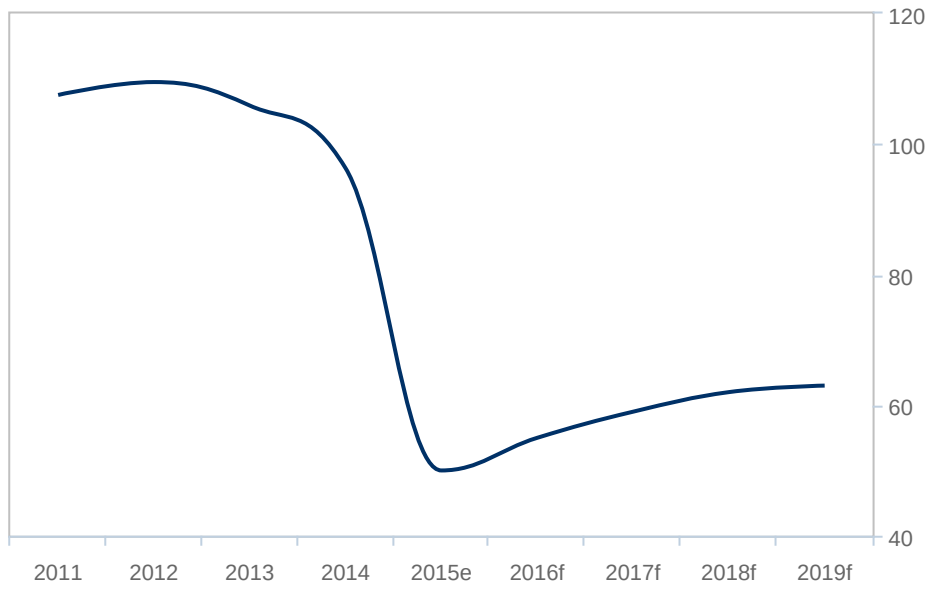


e/f = BMI estimate/forecast. Source: BMI, UN

In addition, lower oil prices will play a key role in limiting the impact of the unwinding of sanctions. We forecast oil prices to average USD53/bbl in 2015 and USD57/bbl in 2016 as a result of global oversupply. This will ensure 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 eased. 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.

Sanctions Relief To Mitigate Weaker Oil Prices

Global - OPEC Basket Average Price (USD/bbl)



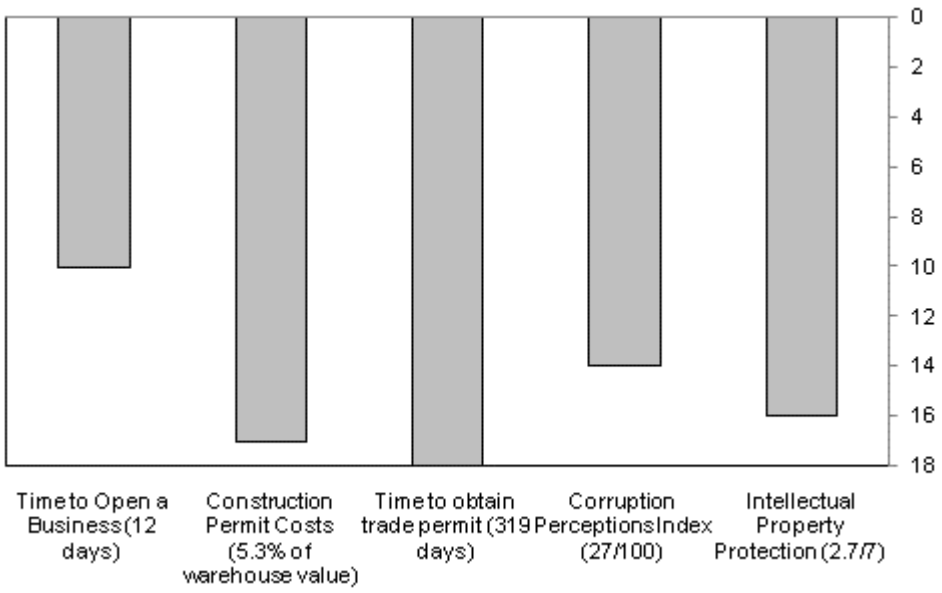
f = BMI forecasts; Source: BMI

Private Consumption Outlook: A reduction in sanctions bode 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, factors which we expect to continue over 2015, have dampened consumer demand substantially and will weigh on growth for the coming quarters. We forecast real growth of 2.0% and 4.0% in 2015 and 2016, respectively. The inflationary environment will improve, but persistently elevated price pressures will continue to hit purchasing power.

Government Spending Outlook: Lower oil prices will push Iran into a sustained fiscal deficit, averaging 4.0% of GDP over the coming three years. In response, we expect the government will quicken subsidy reforms and privatisation plans, however, this will be insufficient to prevent sustained deficits over the coming years.. As a result, government spending will remain subdued, which we forecast to increase by -3.0% and 1.0% in 2015 and 2016, respectively. *(See: 'Sustained, But Manageable, Budget Deficits Coming' April 10).*

Impediments Remain For Investment

MENA - Rankings Indicators Of Business Environment (2013)



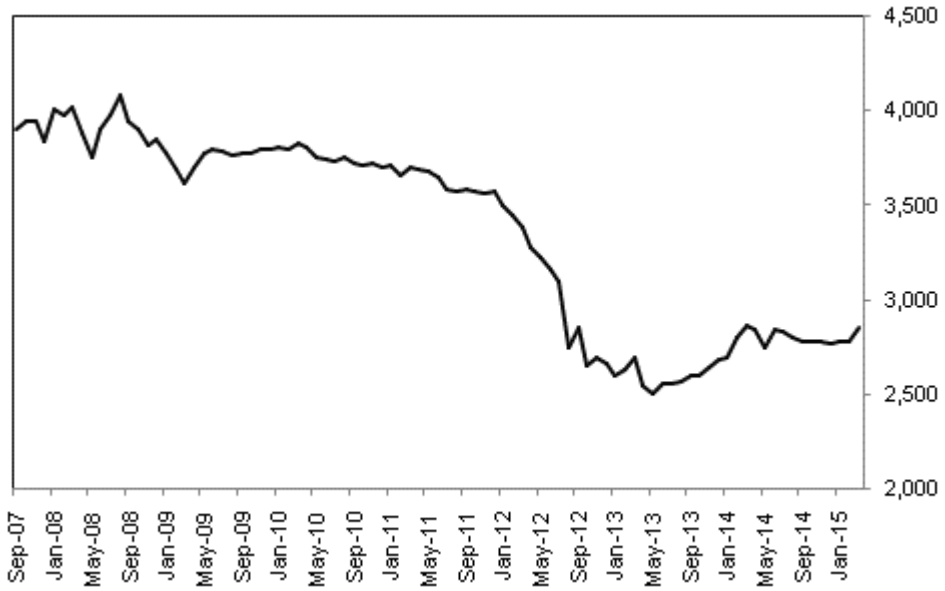
Source: BMI. NB Out of 18 MENA countries, excludes West Bank. For CPI and IPP, higher number is better.

Fixed Investment Outlook: Given Iran's dire need for investment as well as the myriad of opportunities across a range of sectors, gross fixed capital formation (GFCF) will be a key beneficiary of any reduction in sanctions, particularly for infrastructure.

Russian and Chinese companies have built a strong presence in Iran, particularly as a result of Western sanctions. However, we are starting to see growing interest from other international players in Iran, including Korean companies such as **GS Engineering & Construction** which has started surveying the Iranian market, looking for opportunities in gas infrastructure in particular. Furthermore, Arab, French, and Turkish companies are showing greater interest in returning to the Iranian construction market, with the awarding of the construction of the USD1.8bn Tabriz-Bazargan Highway to Turkish **Bergiz Insaat** in January 2015. With regards to regional players, we anticipate Omani and Qatari companies will show an interest in Iran, as well as Dubai-based **Arabtec**. Overall we forecast real growth in GFCF of 1.0% and 4.0% in 2015 and 2016 from an average of -3.1% over 2010-2014.

Slight Improvement...

Iran, Oil Production, '000bbl/d

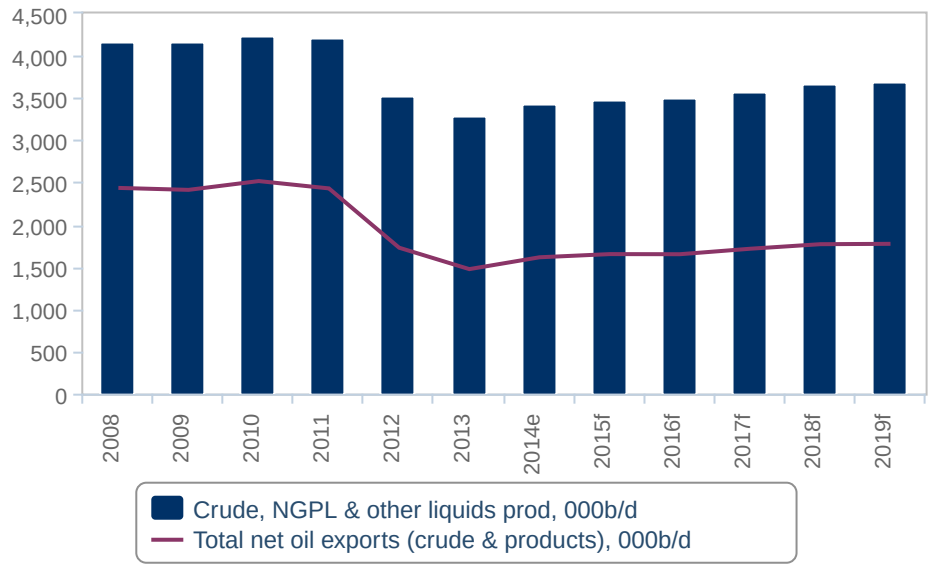


Source: IEA, BMI

However, a host of factors will hinder a more rapid expansion of fixed investment. Foreign companies in nearly every sector have recently expressed interest in returning to the Iranian market, but a key impediment will be Iran's difficult operational environment, with high levels of bureaucracy providing a significant barrier to trade and the utilities infrastructure struggling to meet demand. Iran scores poorly overall in the **BMI** Operational Risks Index, with 41.5 out of 100 ranking the country 13th out of 18 states in the MENA region. Indeed, Iran is a regional laggard across indices such as corruption and bureaucracy, factors which will not improve with a relaxation in sanctions.

... But Longer Term Growth Is Marginal

Iran - Oil Production



BMI/EIA

Net Exports Outlook: As we have previously outlined, Iranian oil exports will not suddenly increase from Q315 when a deal is announced. Sanctions on oil will take several months to be relaxed and years on underinvestment will weigh on export potential. In addition, as we have noted previously, several logistical and production difficulties preclude us from forecasting for a quick return of Iranian crude to the market.According to the International Energy Agency, total oil production expanded by 2.3% y-o-y in March, compared with a 2.1% increase in 2014. Low base effects and an uptick in condensates exports - which are not subject to international sanctions - will lead to an acceleration of energy export growth this year. We also factor in a steady incremental increase in Iranian exports, as Iran offloads oil in floating storage and slowly ramps-up production, progressively adding to oversupply in the oil market.

Import growth will remain muted over the coming quarters as we expect continued deprecation of the rial even with a deal over Iran's nuclear programme. However, once the economy begins to pick up speed from 2016 onwards, we expect import growth to head higher as consumer demand increases.

Table: Economic Activity (Iran 2010-2019)

	2010	2011	2012	2013	2014	2015e	2016f	2017f	2018f	2019f
Nominal GDP, USDbn	429.4	575.4	555.8	504.7	478.0	404.2	424.8	467.8	507.7	549.2
Real GDP growth, % y-o-y	5.8	2.5	-6.6	-1.9	0.0	1.0	4.0	4.0	3.9	4.1
GDP per capita, USD	5,766	7,628	7,272	6,516	6,092	5,085	5,279	5,745	6,164	6,594
Population, mn	74.5	75.4	76.4	77.4	78.5	79.5	80.5	81.4	82.4	83.3
Unemployment, % of labour force, eop	13.5	13.3	13.1	13.0	11.0	10.0	10.0	10.0	10.0	9.0

National Sources/BMI

Table: GDP By Expenditure (Iran 2012-2019)

	2012	2013	2014e	2015f	2016f	2017f	2018f	2019f
Private final consumption, IRRbn	2,999,816.0	3,513,034.6	4,356,163.0	5,445,203.7	6,643,148.5	7,872,131.0	9,131,671.9	10,592,739.5
Private final consumption, USDbn	245.9	195.4	168.6	175.7	184.5	207.2	228.3	252.2
Private final consumption, real growth % y-o-y	-1.7	-1.0	3.0	2.0	4.0	4.5	4.0	4.0
Government final consumption, IRRbn	715,016.5	962,204.9	1,202,756.1	1,443,307.3	1,717,535.7	1,992,341.4	2,271,269.2	2,634,672.2
Government final consumption, USDbn	58.6	53.5	46.6	46.6	47.7	52.4	56.8	62.7
Government final consumption, real growth % y-o-y	-7.2	1.6	4.0	-3.0	1.0	2.0	2.0	4.0
Fixed capital formation, IRRbn	2,443,180.6	3,490,657.1	3,005,140.7	3,179,685.8	3,457,146.7	3,769,754.0	4,123,129.2	4,502,417.6
Fixed capital formation, USDbn	200.3	194.1	116.3	102.6	96.0	99.2	103.1	107.2
Fixed capital formation, real growth % y-o-y	-12.3	-11.3	3.0	1.0	4.0	4.5	5.0	5.0
Exports of goods and	1,656,188.0	3,161,244.1	4,281,699.4	2,742,566.4	3,624,794.8	4,212,747.6	4,788,513.7	5,258,451.0

GDP By Expenditure (Iran 2012-2019) - Continued								
	2012	2013	2014e	2015f	2016f	2017f	2018f	2019f
services, IRRbn								
Exports of goods and services, USDbn	111.4	120.3	128.9	138.3	148.8	160.3	172.8	186.4
Exports of goods and services, real growth % y-o-y	-13.3	5.0	3.0	0.2	4.0	3.0	3.0	3.0
Imports of goods and services, IRRbn	1,381,800.0	2,553,261.2	1,757,353.4	1,830,024.8	1,977,877.7	2,153,663.1	2,340,346.7	2,538,519.1
Imports of goods and services, USDbn	89.7	97.2	104.9	113.0	121.7	131.1	141.2	152.2
Imports of goods and services, real growth % y-o-y	-16.1	-16.0	-5.0	-1.0	3.0	4.0	4.0	4.0
Net exports of goods and services, IRRbn	274,388.0	607,982.9	2,524,345.9	912,541.7	1,646,917.1	2,059,084.6	2,448,167.0	2,719,931.9
Net exports of goods and services, USDbn	21.7	23.0	23.9	25.3	27.1	29.2	31.6	34.3
Net exports of goods and services, real growth % y-o-y	-8.0	40.5	11.1	1.2	4.8	2.2	2.2	2.1

BMI/UN

Industry Risk Reward Index

MEA Petrochemicals Risk/Reward Index

BMI View: *This quarter has seen the Middle East and Africa (MEA) region's average petrochemicals Risk/ Reward Index (RRI) score rise by 0.1 point, but there is a wide difference in performance with the Arabian Gulf losing out due to lower naphtha-ethane feedstock cost differentials and adverse externalities. Meanwhile Iran, Nigeria and Egypt are benefitting from stronger risk scores due to greater political certainty, which paves the way for higher rates of growth.*

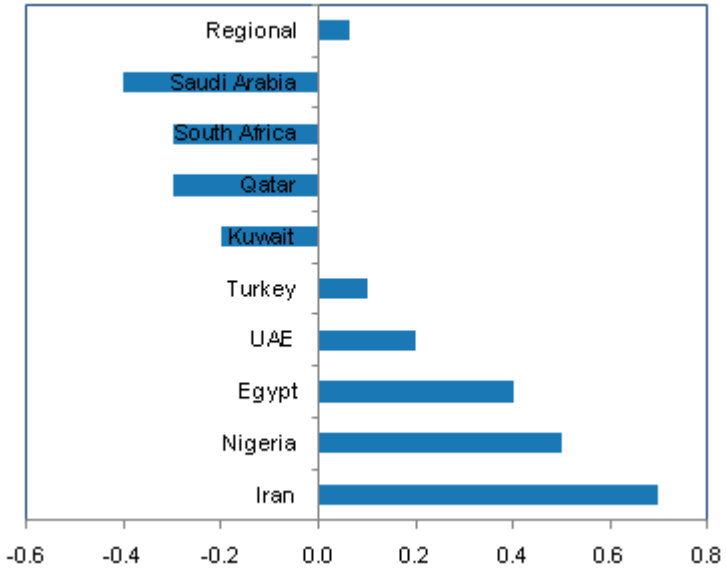
The themes of lower oil prices, heightened security risks and the improving risk-reward profile in markets such as Egypt and Iran remain the salient issues in the Middle East and North African (MENA) petrochemicals sectors. While the GCC countries - Qatar, Saudi Arabia, UAE, Bahrain and Kuwait - have seen their scores slide in recent quarters, they are continuing to outperform the region in terms of high rewards and low risks. Saudi Arabia, Qatar and Kuwait saw their scores drop 0.4, 0.3 and 0.2 points respectively. However, the prospect of expansion in the UAE has raised its score this quarter, bucking the GCC trend.

The majority of GCC countries (except Saudi Arabia) have relatively small petrochemicals markets, yet possess large export-oriented basic petrochemicals industries. This means investors will continue to reap the benefits of these countries for the foreseeable future, so long as they retain a competitive edge. This is predicated on local feedstocks remaining competitively priced. The decline in competitiveness as crude oil prices have dropped, leading to a decline in naphtha costs, has been to the detriment of the Arabian Gulf producers facing a more difficult Asian market.

Arabian Gulf producers are facing capacity constraints with the rate of capacity growth set to slow. Combined with heightened risk and declining competitiveness. The sheer size of GCC members' ambitious petrochemicals projects is leading to potential feedstock shortages and delays. The recent decline in crude oil prices has made naphtha more competitively priced against the ethane feedstock that is dominant in the GCC. These weaknesses have prompted revisions, postponements and cancellations of projects, particularly in Qatar which had shown the best promise of rapid growth in capacity.

Change In Petrochemicals Scores

Q116/Q415



Source: BMI

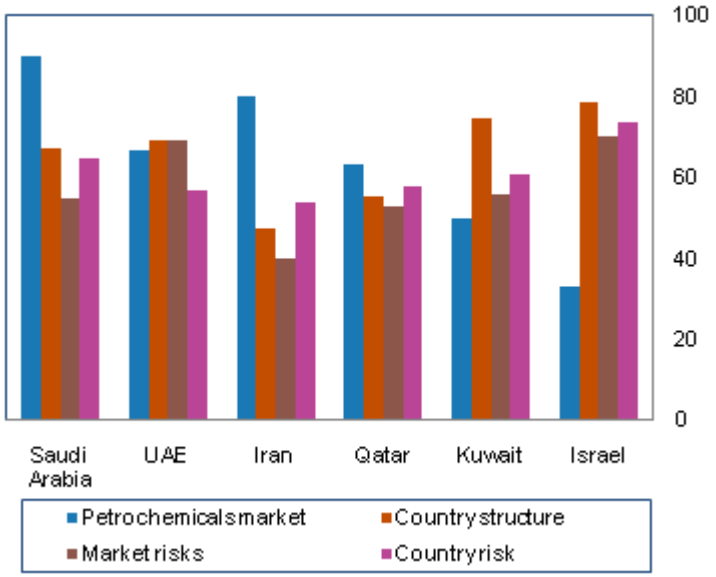
Two major markets which have in recent years been too high risk to be seen as attractive investment destinations are increasingly improving their RRI scores and beginning to gain traction in terms of investor interest - Iran and Egypt. Iran has increased its score for Market Risk, indicative of the improving relations with the P5+1 countries (China, France, Russia, US, UK and Germany), which we expect will yield a gradual lifting of some sanctions over the second half of the year. Egypt has seen its Industry Rewards score improve on the back of an improved and more stable investment climate resulting in a recent wave of major investment deals being signed.

The potential normalisation of relations with Iran presents a considerable upside risk to our petrochemicals industry forecasts from 2016 onwards as we expect considerable investment to be channelled into Iran's upstream resources, providing strong feedstock provision. Not only will this see opportunities more broadly pick up, but specifically we note that oil and gas industries will require significant capital expenditure on infrastructure to rebuild the long-neglected sectors and deliver the full potential to petrochemicals producers. In the mean time, endemic structural problems within the economy and a negative investment

environment will prevent the country's petrochemicals industry from taking full advantage of access to plentiful local feedstock.

More Rewards In High Risk Markets

Risk/Reward Ratings In The Middle East

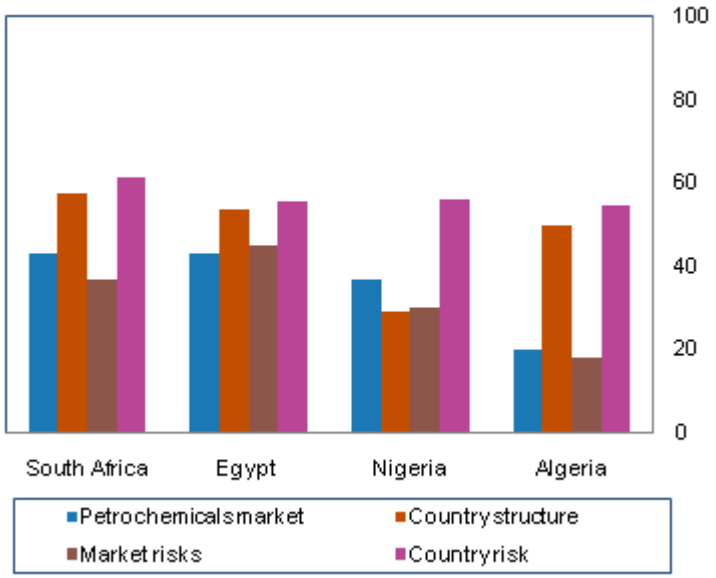


Source: BMI

Capital constraints are a pertinent downside risk to our MEA Index, particularly in Sub-Saharan Africa, where governments have not always been able to realise their ambitious capacity expansion plans due to lack of capital. Market risks will often be dictated by the relevant regulatory frameworks. Although key markets in the region have maintained relatively robust real GDP growth, the weak external economic climate, in addition to red-tape and funding difficulties, could contribute to project delays and/or cancellations.

Poor Risk, Low Rewards In Africa

Africa Risk Rewards Indices

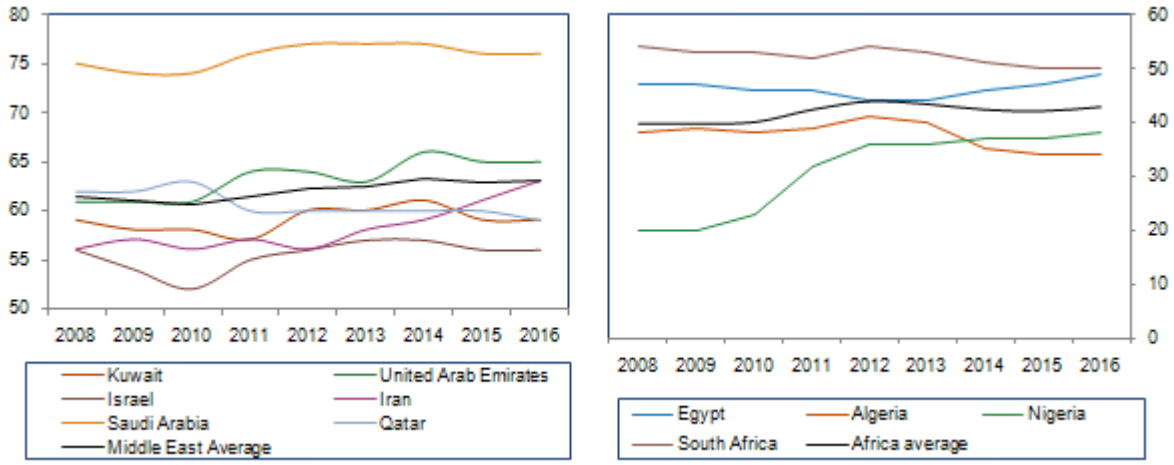


Source: BMI

Unsurprisingly, African states retain their places at the bottom of our index table with Algeria continuing to see its score decline, this quarter due to deteriorating economic fundamentals. Algeria's score took a knock in the previous quarter due to a cut in our long-term capacity forecast. The deal between **Sonatrach** and **Total** for a new petrochemicals complex has failed. This means that Algeria is unlikely to capitalise on its gas reserves to generate downstream growth. It languishes in 11th place in the regional ranking and is unlikely to make a significant recovery in the months ahead.

Risk Factors Recover From 2008 Crash

Iran & Nigeria Show Marked Improvement



Source: BMI

The election of President Buhari in March has provided some measure of certainty and stability and investors are looking towards greater clarity and transparency in the investment environment. Endemic corruption, high security risks and an underdeveloped bureaucracy are major constraints to the country's petrochemicals industry growth. There are promising signs of a turnaround with low crude prices driving down the cost of naphtha and a desire to add value to upstream resources. Growth in gas production is set to spur downstream petrochemicals industries, particularly fertiliser and methanol.

In contrast, South Africa's domestic economic woes and lack of industrial dynamism have eroded its score in recent quarters with a further decline this quarter. In line with our subdued view for the South African economy, our forecasts for growth in the South African petrochemicals industry remain subdued. The government has been largely unable to energise major petrochemicals consumers.

Table: MEA Petrochemicals Risk/Reward Index - Q1 2016

	Limits of potential returns	Risks to realisation of returns	Overall rating					
	Petrochemicals market	Country structure	Limits	Market risks	Country risk	Risks	Petrochemicals rating	Rank
Saudi Arabia	90	67.2	82	55	64.7	61.8	76	1
UAE	66.7	69.1	67.5	69	56.7	60.4	65.4	2
Iran	80	47.6	68.7	40	53.7	49.6	62.9	3
Qatar	63.3	55.4	60.5	53	57.8	56.3	59.3	4
Kuwait	50	74.8	58.7	56	61	59.5	58.9	5
Israel	33.3	78.8	49.2	70	73.8	72.7	56.3	6
South Africa	43.3	57.4	48.3	37	61.5	54.2	50	7
Turkey	40	48	42.8	78	56.6	63	48.9	9
Egypt	43.3	53.8	47	45	55.6	52.4	48.6	8
Nigeria	36.7	29.1	34	30	56.2	48.3	38.3	10
Algeria	20	49.6	30.4	18	54.7	43.7	34.4	11

Source: BMI

Iran Petrochemicals Risk/Reward Index

This quarter, Iran has seen a 0.7 point increase in its overall petrochemicals Risk/Reward Index (RRI) score due to an 8.0 points increase in its market risk score. This comes amid strong investor interest in the petrochemicals industry and a willingness of the Rouhani administration to revise upstream regulation as well as engage with the global market. Although the petrochemicals industry will be a major beneficiary of sanctions relief, there are still risks that the deal will fall through. Also, structural issues continue to constrain the sector, particularly feedstock supply and pricing issues. It remains in third place, closing with the second placed UAE and raising 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 as sanctions are lifted, 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*:** *Iran plans to open 11 petrochemical units in the current Iranian year, which began on March 21. The new units, which will reach full commercial production in 2016, aim to increase the country's petrochemical production by 6mn tonnes. 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 due to several reasons. The government has also undershot its target of 100mn tpa of capacity by 2015 due to the sanctions regime, which is set to be lifted following the P5+1 agreement on the country's nuclear programme.*

Iran claims to be the second largest petrochemicals producer in the Middle East, with a 27% share of output, compared with Saudi Arabia's 50%. It aims to represent 36% of regional output in 2015, by which time it hopes to implement 47 petrochemicals projects under the fifth five-year plan, adding 43mn tonnes per annum (tpa) of capacity and 28% of the total added capacity in the region.

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%.

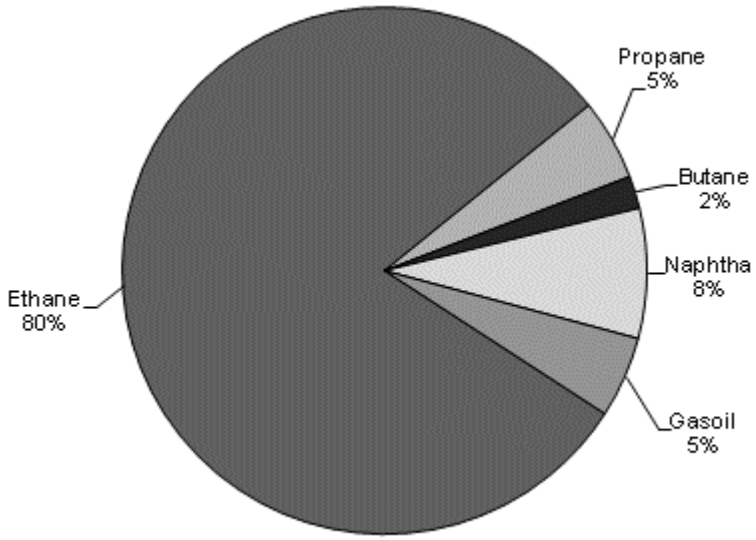
The NPC is wholly owned by the Iranian government. It is responsible for the development and operation of the country's petrochemicals sector and is the second largest producer and exporter of petrochemicals in the Middle East after **Saudi Basic Industries Corporation** (Sabic). NPC is aiming to become 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. Petrochemicals projects are struggling 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 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 are showing greater interest in the sector. While international sanctions have been relaxed, the US is likely to retain a punitive 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, 2013-2019 ('000 tpa)

	2013	2014e	2015f	2016f	2017f	2018f	2019f
NPC, Arak	320	320	320	320	320	320	320
NPC, Tabriz	136	136	136	136	136	136	136
NPC, Bandar Imam	500	500	500	500	500	500	500
Amir Kabir, B. Imam (Olefins 6)	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
Arya Sasol, B. Assaluyeh (Olefins 9)	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

Iran's Cracker Capacity, 2013-2019 ('000 tpa) - Continued							
	2013	2014e	2015f	2016f	2017f	2018f	2019f
Ilam (Olefins 13)		500	500	500	500	500	500
Kharg Island	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Arvand P'chemical (Olefins 8)	1000	1000	1000	1000	1000	1000	1000
Kavyan Petrochemical Assaluyeh (Olefins 11)	1000	1000	2,000	2,000	2,000	2,000	2,000
Morvarid Petrochemicals	500	500	500	500	500	500	500
Persian Gulf Assaluyeh (Olefins 12)	-	-	1,200	1,200	1,200	1,200	1,200
Total	**8,376**	**8,876**	**11,076**	**11,076**	**11,076**	**11,076**	**11,076**

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 has also undershot its target of 100mn 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 brings an end to 20 months of negotiations between Iran and the P5+1 powers (the US, Russia, China, France, the UK and Germany) and paves the way for the return of foreign companies into Iran as early as 2016. The sanctions easing process is far broader than previously understood and sets the stage for a return of Iranian crude in the global oil market by 2016, as well as a strong uptick in foreign investment. Petrochemicals and petrochemicals-consuming industries will be the sectors that will benefit most.

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.

As the agreement makes its way through both countries' parliaments, it will also be incorporated in a UN Security Council resolution, which will lift UN sanctions on Iran contingent on Tehran taking its agreed steps to disassemble its nuclear infrastructure. The International Atomic Energy Agency (IAEA) will verify the steps taken and has signed a roadmap with Iran with the aim of resolving all outstanding questions on its nuclear programme by end-2015 (a report is due by December 15). Assuming the IAEA reports back

positively, President Obama will grant waivers on economic and financial sanctions, while the EU will vote to lift European sanctions - a process that should happen by end-2015.

Crucially, this means practically all economic sanctions on Iran will be lifted by the beginning of 2016 if Iran complies with the IAEA's requirements. Once the implementation of the deal is confirmed, Iran will gain immediate access to approximately USD100bn in frozen assets; regain access to SWIFT and the international banking system; and see sanctions pulled back on all key sectors such as energy, transport, insurance and mining. Only sanctions on arms sales and missile deliveries, as well as sensitive nuclear related items, will remain in place for longer. This is far broader than expected and a major concession to the Iranians: until now, diplomats had hinted at a far more gradual pace of easing sanctions.

We expect Iran's economy to emerge from recession once the lifting of sanctions begins, but we warn of significant impediments to growth.

Our forecasts already factored in the impact of sanctions relief, but see the Iranian economy growing by only 0.6% in real terms this year, although this will pick up to 2.9% by 2016. 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 and 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

Over the past three years, Iran has expanded its refining capacity to about 1.8-1.9mn barrels per day (b/d) in order to reduce its dependence on imported fuels, given international sanctions have restricted the country's ability to import the requisite amounts of fuels. While most plans for greenfield refineries will not materialise under the current sanctions regime and the falling oil prices, 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.

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.

Last quarter, we have revised our gas production forecast for Iran, on the back of tangible success in developing the South Pars gas field. In 2014, Iran boosted its natural gas output by about 20bn cubic metres (bcm). Part of this increase was due to an increase in associated gas production and a reduction in gas flaring, but the biggest factor comes from the partial start-up of production at Phase 12 of the South Pars gas field. This is an important and symbolic development for Iran. While having the second largest gas reserves in the world, sanctions have affected Iran's natural gas sector, starving it from sufficient investment and technology. This has resulted in gas production growth far below the country's actual resource potential.

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 forecasted 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 that 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

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 began on March 21 2015, 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.

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.

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.

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 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.

NPC's sixth five-year plan focuses investment in the Qeshm free zone, south of Asaluyeh, which is the location of 13 ethylene crackers based on the Pars gas field. Iran's bold 20-year outlook plan envisions petrochemical output to reach 100mn tpa by 2015, but **BMI** regards this target, given current conditions, as unattainable. 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. 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.

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**, 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 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.

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, in 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 joint venture (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.

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.

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, **BMI** does not believe the markets in these petrochemical products will be strong enough to justify export-orientated production in the short-term, which is the industry's chief motivation for expansion. **BMI** believes it may be advantageous for Iranian producers to delay opening new plants in these sectors until the markets recover. This might be inevitable because of problems with feedstock allocation, which is exacerbated by cold weather in winter, when energy supplies are diverted to the power generation sector.

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.

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 tonnes per annum (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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Operational Data

- Established: 1964

Company Details

- National Petrochemical Company
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Regional Overview

Middle East And Africa Overview

BMI View: *Iranian sanctions relief, the slowdown in China and the decline in the differential between naphtha and ethane are changing the dynamic of the Middle East's petrochemicals industry. Arabian Gulf producers are experiencing a squeeze on margins as product prices have declined amid over-supply on external markets. The situation will be exacerbated by increase capacity in the Arabian Gulf region with Emirati producers set to raise output at the same time as sanctions are lifted on Iran, which will lead to a flood of Iranian polymer on the Asian markets from 2016.*

The Iranian petrochemicals industry will reap the rewards of sanctions relief under the P5+1 agreement signed in July, but structural problems will persist until feedstock issues are resolved and the industry opens up to investment and the technology transfer that comes with it. The task will be to improve the cost structure and value added and boost upstream gas output, ensuring feedstock is integrated with downstream processors.

Nevertheless, if the agreement holds, the prospects for strong exports-led growth are good as the government aims to raise capacity from the current 60mn tonnes per annum (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 benefited 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. The complex includes one of the world's largest cracker units with 1.5mn tonnes per annum (tpa) of ethylene production capacity feeding downstream units producing 1.4mntpa of polyethylene and 960,000tpa of polypropylene.

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 polyethylene (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/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. Added 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 is 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 increasing the portfolio of products and diversify away from a narrow focus on polymers.

India is an obvious alternative; however, similarly 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, benefiting 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 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 polypropylene (PP) in engineering plastics applications.

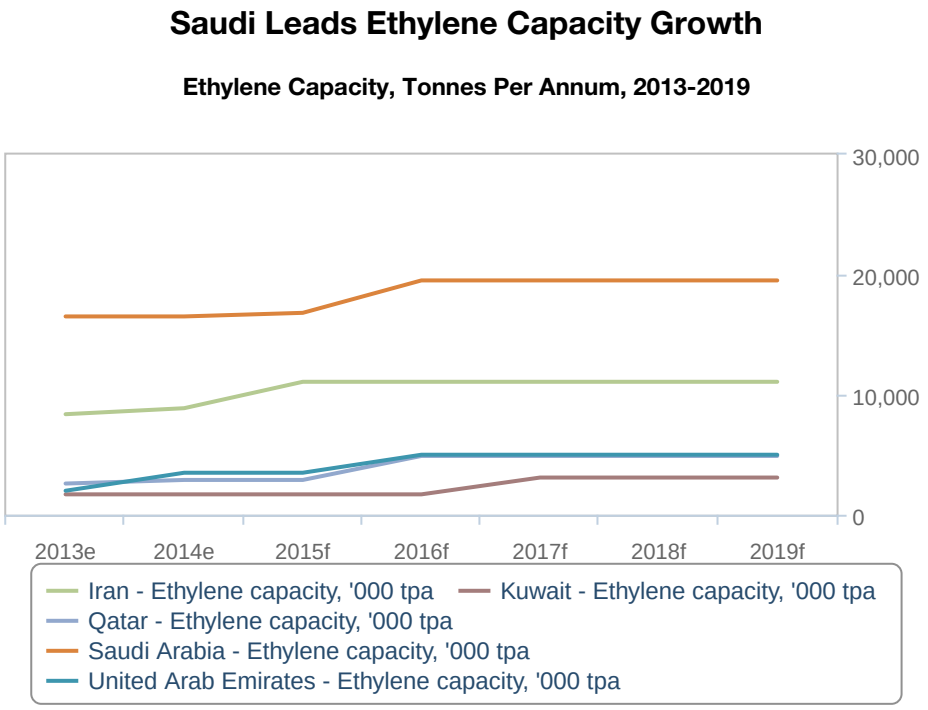
Qatar's reliance on ethane feedstock has limited its petrochemicals industry to some extent, as it does not produce the same range of by-products as other countries that rely on other feedstocks such as naphtha. This means it is likely to be sidelined in the special chemicals markets because, although 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 to 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

Africa Falls Behind

Turning to Africa, Egypt is set to be the main focus of expansion. 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. Given continued delays in investment in the energy sector, net hydrocarbons exports will remain flat over the

coming years which will limit the availability of feedstock for downstream diversification, whether in fertilisers, methanol or in the polymers chain. The government's inability to liberalise the economy and declining public revenues will also constrain both private and public investment.

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. Meanwhile, South Africa is likely to decline in importance. 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.

Global Industry Overview

In 2015, global ethylene capacity grew by 4.3% y-o-y to 175mn tonnes per annum (tpa). A total of 7.23mn tpa was added with the Middle East representing over a third of expansion, the US provided a further 20% and Asia added a net increase of 17%. Over the next five years, the world will see an extra 36mn tpa of ethylene capacity come onstream, with Asia contributing around half the growth in capacity, 25% by the US and 20% by the Middle East. Overall, the size of global ethylene capacity will have increased by around 85% between 2005 and 2020.

Within this is a sizeable shift towards ethane feedstock as producers attempt to leverage lower gas prices to achieve higher ethylene production margins. However, naphtha will remain the dominant feedstock and low oil prices, if sustained, and the high netback achieved from the greater range of by-products should ensure naphtha-fed crackers remain in business. Naphtha-fed plants in Western Europe and developed markets in East Asia will, however, see reductions in capacity as their ageing plants are replaced by larger new complexes with better downstream integration in emerging Asia, particularly India and China. 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.

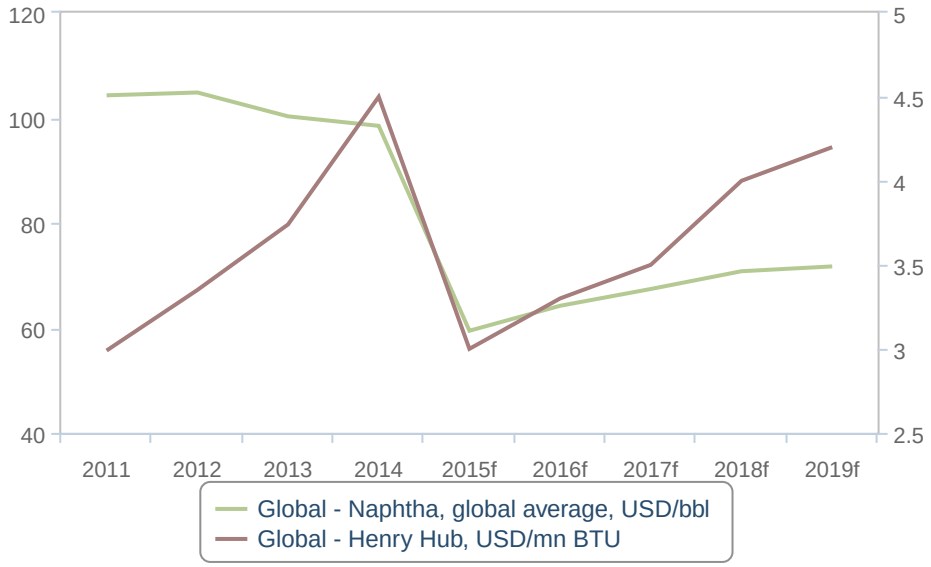
Feedstock Differentials: Respite for Europe

With feedstock and energy consumption accounting for 85% of total operating costs, the role of oil and gas markets is crucial to the competitiveness of production of olefins such as ethylene and propylene, which are the basis for the production of derivatives. 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. While alternative sources such as bio-based feed in Brazil or coal-to-olefins in China are growing, oil and gas is set to remain the chief source of feed for the global petrochemicals industry. As such, cost differentials between ethane and naphtha will be the main determinants of petrochemicals competitiveness.

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. Northeast Asian prices were sharply down in Q315 due to the impact of China's economic downturn and debt worries with over-capacity looming in some petrochemicals markets in the region.

Naphtha To Remain Low

Naphtha & Gas Price Trends



f = BMI forecast. Source: BMI/Bloomberg

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 before rising to around USD550/tonne by Q315. However, ethane remains cheaper even as gas prices have risen.

The effect has not been uniform with production further down the petrochemicals chain in Europe seeing little or no benefit from the decline in oil prices from USD100/bbl in mid-2014 to around USD50-60/bbl in 2015. This is largely due to the chronic under-investment as well as the lack of plant integration to match the world-class complexes emerging in Asia.

At the same time, polymer prices have grown and on European markets the average price of PE was up 13% y-o-y by Q315 and up 50% from the beginning of the year. As a result, margins remained healthy. Nevertheless, this was not purely driven by demand growth. Forces majeures - notably **Shell**'s facilities at Moerdjik in The Netherlands - helped drive the upward movement thereby restricting supply and undermining the health of plastics converters. The shortage of plastic in Europe has been made worse by a rise in import duties since January 2015.

Ageing plants are susceptible to unscheduled shutdowns that have helped drive up prices through the supply chain. As such, it is the basic chemicals producers that have profited, while the more value added producers - the ones Europe needs if it is to maintain competitiveness against rivals in emerging markets - are seeing margins put under pressure. Nevertheless, the European petrochemicals industry is enjoying a respite from years of high energy and feedstock costs.

2016 Feedstock Outlook

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 threatens 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/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 tonnes per annum (tpa).

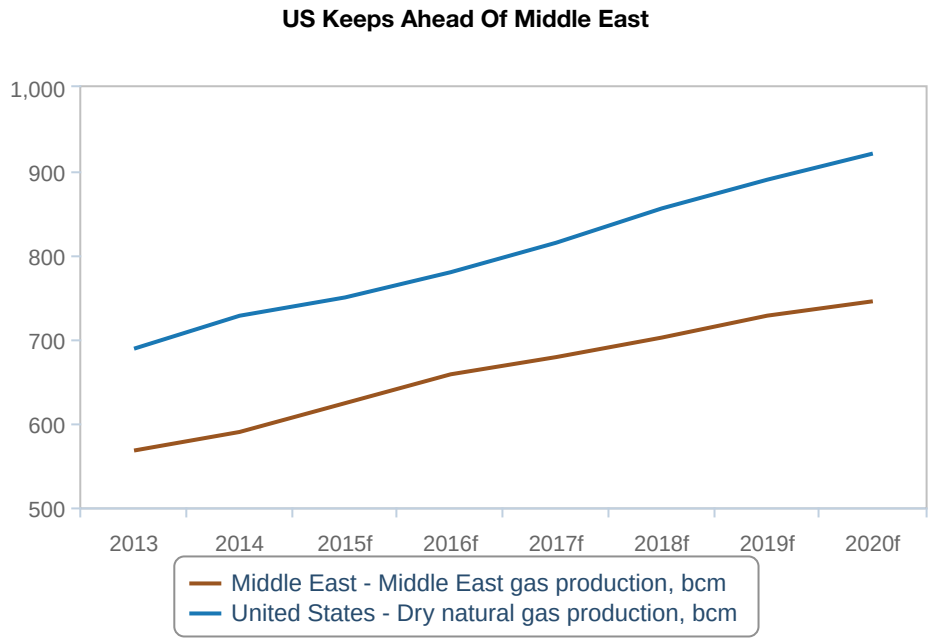
With naphtha now heavily discounted compared to 2013 levels, ethane now looks less advantageous. For example, gas-rich Qatar is radically cutting back its plans due to low naphtha prices with recent months seeing the cancellations of projects with total ethylene capacity of 2.5mn tpa and around 5mnn tpa of derivative products. Meanwhile, 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 benefiting 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?

US Versus Middle East Gas Output



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

Market Outlook: Chinese Downturn

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. The sector had already been seeing slower rates of growth as a result of a rapidly cooling national property market and government efforts to secure a soft landing for the economy. However, recent events have exposed underlying weaknesses that touch on issues of industrial over-capacity, high levels of corporate debt and market volatility, but we believe petrochemicals is better placed than other sectors to weather the storm.

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 southeast 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, which China has a significant deficits particularly in xylenes used in the production of PET, and polypropylene, of which India is a major importer.

Long-term Outlook

The structure of the global petrochemicals industry is likely to shift in response to changing market dynamics and the influence of ethane-naphtha price spreads. With so many new cracker and associated plastic production lines scheduled to come online in 2017 through 2020, global surpluses are expected to peak at more than 5mn tonnes in 2018. However, based on forecast trends, by 2022 global PE supplies are expected to be in a deficit, which could mean an additional 4mn-5mn tpa of PE needs to come onstream.

While the US is building export-oriented petrochemical projects based on shale gas, China is seeking greater self-sufficiency with cheap coal-to-olefins to boost capacity. These two dynamics could reshape the global petrochemicals markets and trade flows, with China, the motor of growth in recent years, set to see its import growth diminish while US production floods the market. As such, **BMI** believes that the process of consolidation and capacity cutbacks in mature markets such as Europe, where naphtha-fed and relatively small-scale units are increasingly uncompetitive, may not be over.

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

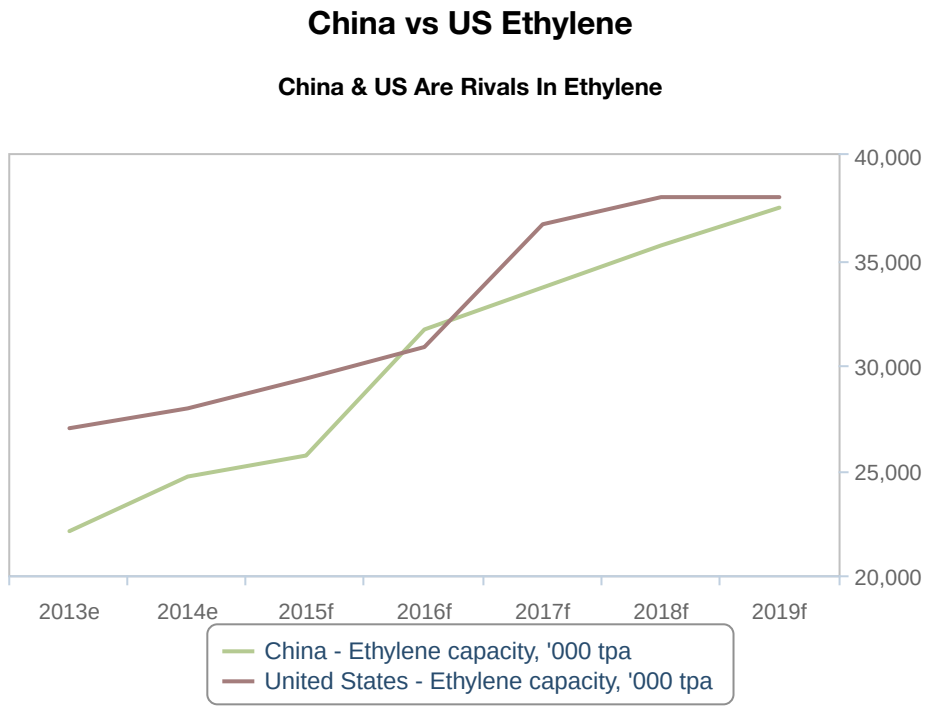
to the decision, although the country's own economic travails and a corruption scandal at project partner Petrobras were also a factor. Instead, Braskem has opted for a smaller scale expansion at an existing complex.

Braskem's decision follows the cancellation of two major complexes in Qatar: Al-Karaana and 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.

Across the Arabian Gulf, in Iran new complexes are at risk of being delayed or cancelled. The NPC aims to raise ethylene capacity at the Kavyan complex to 2mn tpa by 2015, making it the country's largest ethylene production site, but this could also be postponed. The West Ethylene Pipeline, fed by Kavyan, is also in danger of failure and its route could be shortened, threatening the planned polymers plants that it supplies. For Iran's plants to operate at reasonable levels of capacity utilisation, olefins output would have to increase by a third and polymers by a third, but the demand may not exist and may not have existed even without the sanctions regime.

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.

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.

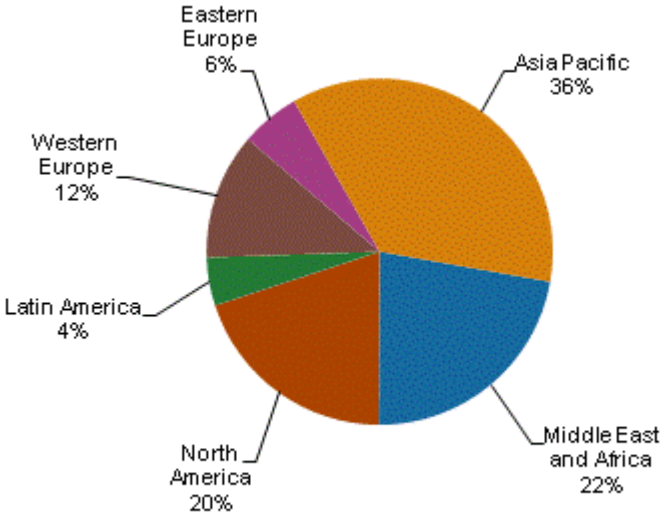


e/f = BMI estimate/forecast. Source: National Sources, BMI

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 on-stream in Asia and the Middle East over the coming years.

Global Ethylene Capacity By Region

2015 (%)



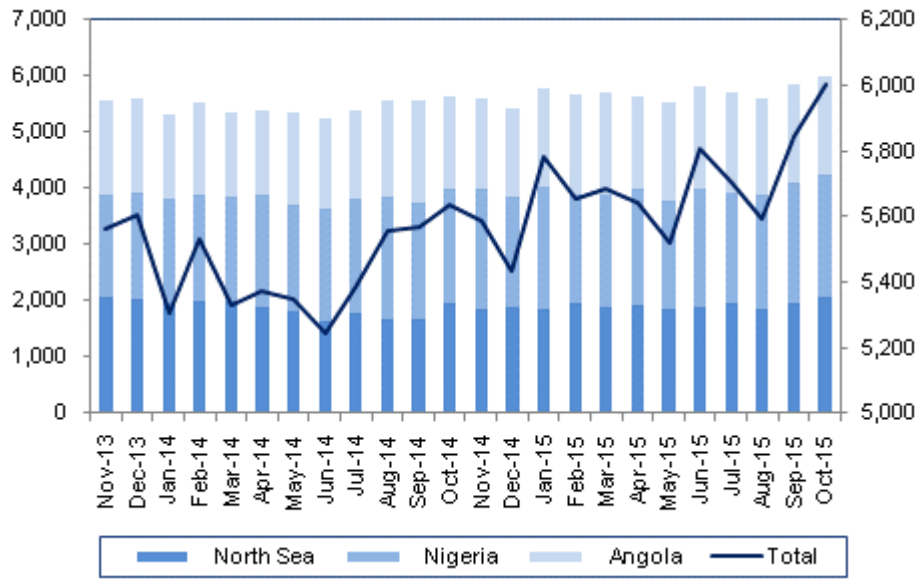
Source: BMI

Europe - Brent On Board For A Bumpy Ride

Shifting perceptions amongst market participants and the continued overhang of light sweet crudes will drive a slow and volatile increase in the price of Brent in Q4. As we have argued, the physical rebalancing of the market is underway. However, this is a multi-year process, and a strong projects pipeline will continue to increase the crude overhang in 2016-2017. West Africa and the North Sea are among the key near-term growth regions, adding over 750,000 barrels per day (b/d) of predominantly medium and light sweet production in the Atlantic basin by 2017. *Any substantial gains in the Brent price over the short term will thus be rapidly pared by profit-taking.*

Export Uptrend Set To Continue

North Sea & West Africa Crude Oil Loadings, '000 b/d



Source: Bloomberg

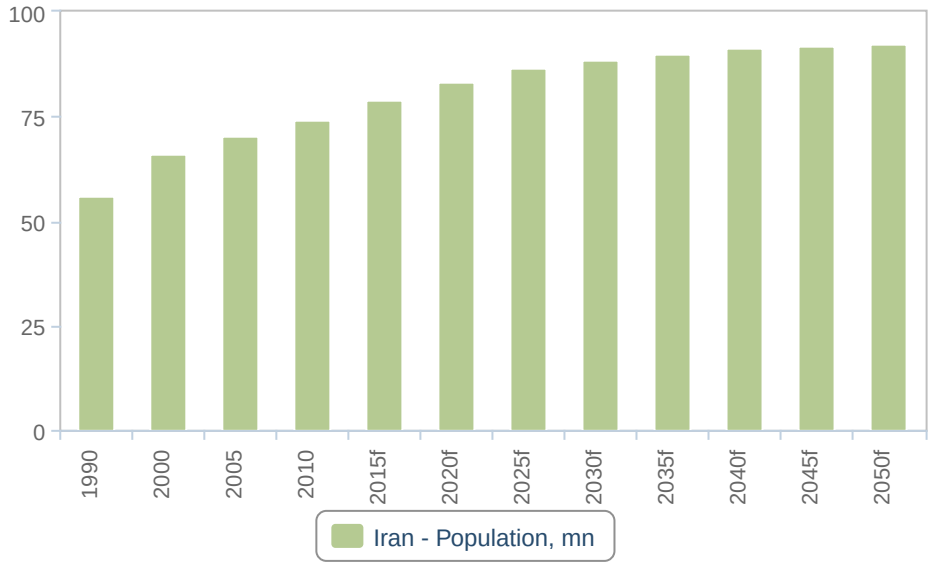
Demographic Forecast

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

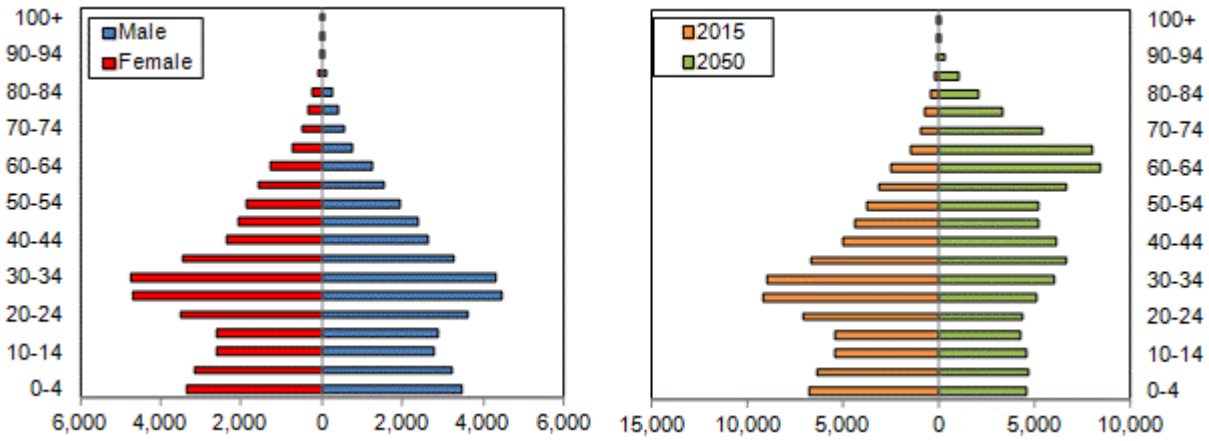
(1990-2050)



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