

IRAN

PETROCHEMICALS REPORT

INCLUDES 5-YEAR FORECASTS TO 2014





IRAN PETROCHEMICALS REPORT Q3 2010

INCLUDES 5-YEAR FORECASTS TO 2014

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Executive Summary

The petrochemicals industry has become an important aspect of Iran's non-oil economy and the basis of the country's economic diversification, but **BMI** believes further capacity expansion in the medium-term will be obstructed by poor investment risk and the country's increasing international isolation.

Around 40% of non-oil exports totalling US\$6.5bn were from the petrochemicals industry in FY09/10. Ordinarily this would attract foreign investment, but Iran's increasing political isolation and economic problems have made the country a risky prospect for petrochemicals majors and financiers. Similarly to upstream sectors, an increasing number of foreign companies abandoning the petrochemicals sector, fearing the risks posed by the sanctions against the Iranian government. Western European firms are being followed by companies from Russia, which has been regarded as less hostile to Iran than the US. Russian companies such as oil and gas trader **Vitol** and oil company **Lukoil** have suspended work in Iran because of Western economic pressure and signs of growing impatience in Moscow over Tehran's stance on its nuclear programme. This will have an impact on investment prospects for petrochemicals in terms of joint ventures and the security of feedstock availability.

BMI estimates that Iranian petrochemicals output totalled approximately 30mn tonnes in 2009/10, an increase of 13% year-on-year (y-o-y). Output has been boosted by increased capacity and domestic demand faring better than expected, although exports are unlikely to have reached the targets the government have set. Ethylene exports from Iran plunged in 2009 to about 450,000 tonnes per annum (tpa) from 700,000tpa in 2008. Nevertheless, weaknesses remain and according to **BMI**'s estimates Iran's petrochemical output in 2009/10 was below the 80-85% capacity utilisation rate we consider financial sustainable.

Iran's bold 20-Year Outlook Plan envisions petrochemical output reaching 100mn tpa by 2015, but **BMI** believes that this target, given the current conditions, is verging on fantasy. Given Iran's notoriety for overrunning projects and a lack of investment from global majors, we doubt the **National Petrochemical Company** (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 US\$25bn investment outlay is planned for 2010/11 to help meet these targets, with the beginning of the construction of 46 new petrochemicals projects adding 50mn tpa to capacity. Twenty-nine projects are already being built at the cost of US\$18bn, adding 22.5mn tpa to current production capacity. In Q110, NPC commissioned six petrochemical complexes in Assaluyeh, on the southern coast of Iran, including a complex with capacity for 645,000tpa of ethyl benzene and 600,000tpa of styrene belonging to NPC subsidiary **Pars Petrochemical**; a 1.65mn tpa methanol complex owned by **Zagros Petrochemical**; and a 245,000tpa butadiene plant operated by **Jam Petrochemical**. Several new jetties at the Pars

petrochemical port in Assaluyeh were also completed, bolstering its position as one of the major specialised ports in the Middle East for exporting petrochemicals products. It has the capacity to export 35mn tpa of liquid and solid products.

In April 2010, the Ministry of Petroleum announced that work was underway on the privatisation of the refining sector. Minister of Petroleum Masoud Mir Kazemi told the semi-state Mehr News Agency (MNA) that 'all petrochemical units and refineries' will be sold to private hands. Privatisation is being carried out under the terms of Article 44 of the Iranian constitution, which requires 80% of the country's state-owned companies to be sold. **BMI** believes the privatisation programme is a poor compromise between economic liberalisation and the supposedly redistributive policies of the Ahmadinejad administration. Spinning off of NPC's assets into smaller units will lead to fragmentation, adding complexity to the production chain in an industry that is already overregulated. This will ultimately undermine Iran's competitiveness against regional rivals such as Saudi Arabia, which is benefiting from foreign capital and expertise, where larger petrochemicals firms are aiming to become global suppliers and investors. By splitting up NPC, Iran is stunting the growth potential of its subsidiaries and they will be worth less as individual units than as part of a larger company.

SWOT Analysis

Iran Petrochemicals Industry SWOT

- Strengths**
- OPEC's second largest oil producer and accounts for 10% of the world's oil reserves, providing easy and inexpensive access to abundant petrochemicals feedstock.
 - The country is the 60th largest producer and exporter of petrochemicals in the world and is forecast to account for more than 5% of global and 30% of the Middle East's petrochemicals production by 2010.
 - The petrochemicals sector is set for rapid expansion.
 - Import and export incentives offered in special zones, good relations with neighbouring countries and a favourable location are more advantages of the industry.
 - A large domestic market, skilled workforce and laws supporting foreign investments.
- Weaknesses**
- 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 NPC makes it difficult to successfully commission new petrochemicals plants in the country.
 - Lack of access to foreign technology; concerns about future if trade embargo imposed.
- Opportunities**
- Sustained high petrochemical prices based on strong demand.
 - 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.
 - Establishment of new free zones in Arak, north west Iran, and 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**
- Iran faces the threat of international sanctions, including a trade embargo, over its development of nuclear technology. If applied, petrochemicals projects involving joint ventures with foreign firms could be delayed or abandoned.
 - Concerns over oil production levels could undermine sector growth if feedstock supply is less than originally thought.
 - 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.

Iran Political SWOT

- Strengths**
- Since overthrow of monarchy in the 1979 revolution there has been some reduction in the level of political corruption and wealth distribution has improved marginally.
 - The Pasdaran (Revolutionary Guard) and the Basij militia are fiercely loyal to the Supreme Leader Ali Khamenei, helping to maintain social stability.
- Weaknesses**
- Iran has one of the poorest human rights records in the region and the authorities do not hesitate in stopping dissidents. A number of journalists are 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 June 2009's presidential elections has damaged the regime's legitimacy in the eyes of many Iranians.
- Opportunities**
- The *majlis* (parliament) is more than just a rubber stamp for legislation and the move by 150 representatives (out of 290) to hold the president accountable for his handling of the economy is a positive indication that checks exist.
- Threats**
- Ongoing tension over nuclear programme raises prospect of further US and UN Security Council sanctions and the possibility of military strike by US or Israel.
 - Ethnic tensions are on the rise.
 - High youth unemployment.
 - The rising influence of the Pasdaran in the political and economic arenas may challenge the status quo over the long term.

Iran Economic SWOT

- 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.
 - The country is also rich in other resources and has a strong agricultural sector.
- Weaknesses**
- Local consumption of hydrocarbons is rising rapidly and coupled with ageing technology in the oil and gas sector this will have a negative impact on oil and gas exporting capacity.
 - After a concerted effort to reduce public debt in recent years there are signs that it is once again rising.
- Opportunities**
- Gas sector is underdeveloped; considerable room to maximise this source of revenue.
- Threats**
- A decline in world oil prices would have a considerable impact. Although the Oil Stabilisation Fund exists to protect the economy at times of weaker oil prices, it has been used to fund government overspending and could be close to empty.
 - Further deterioration in Iran's relations with the international community over its nuclear programme could result in the imposition of more extensive economic sanctions by the UN Security Council or the US.
 - There is a serious risk of capital flight due to fears of conflict or sanctions.

Iran Business Environment SWOT

- Strengths**
- The Foreign Investment Promotion and Protection Act gives some protection to foreign investors and relatively good terms for the repatriation of profits.
 - Although stifled in the years since the revolution, Iranians are known for their entrepreneurial skills, which is potentially a strong pull for foreign investors.
- Weaknesses**
- Progress on privatisation front remains slow despite some recent encouraging signs.
 - Foreign firms are unable to own hydrocarbon resources in Iran. The 'buy back' deals offer less advantageous terms than those elsewhere, limiting the hopes for new investment.
- Opportunities**
- As part of the fourth Five Year Development Plan (FYDP), the government will end tax and customs exemptions afforded to *bonyads* (government subsidised foundations that dominate Iran's non-oil economy).
 - The government has started the first phase of an oil-swap project with Russia, Kazakhstan and Turkmenistan. The project will compete with the US-backed pipeline that will run from Baku in Azerbaijan, through Georgia, to Ceyhan in Turkey.
- Threats**
- UN and EU sanctions on Iran pose a significant threat to the participation of foreign firms in the oil and gas sector.
 - Central bank supervision of charitable funds will be stepped up sharply after it emerged that a number of these funds had collapsed due to indiscriminate lending practices.

Global Overview

Petrochemicals Market Overview

Table: World Ethylene Production By Country, 2009 And 2014 ('000 tonnes capacity)

Country	2009e	2014f
US	27,387	25,500
Saudi Arabia	12,930	18,430
China	11,410	24,700
Japan	8,760	8,760
South Korea	7,380	7,580
Germany	5,745	5,745
Iran	5,376	7,876
Canada	4,951	4,951
Taiwan	4,045	4,765
Netherlands	3,980	3,980
Brazil	3,440	5,000
France	3,135	3,135
Russia	3,095	4,220
India	3,025	8,505
United Kingdom	2,840	2,840
Qatar	2,600	6,250
Belgium	2,540	2,540
Thailand	2,525	4,425
Singapore	1,990	3,790
Malaysia	1,770	1,770
Kuwait	1,700	1,700
Spain	1,645	1,645
Mexico	1,580	2,580
Argentina	800	800
Egypt	300	600
Poland	700	700
South Africa	650	650
Hungary	620	620
Indonesia	620	620
UAE	600	3,500

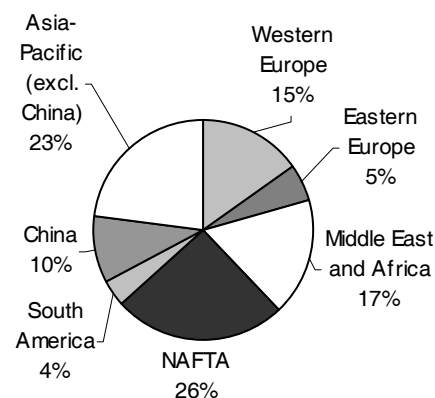
Table: World Ethylene Production By Country, 2009 And 2014 ('000 tonnes capacity)

Country	2009e	2014f
Venezuela	600	1,900
Ukraine	550	550
Czech Republic	545	595
Turkey	520	520
Australia	515	515
Bulgaria	450	450
Israel	450	450
Nigeria	300	300
Azerbaijan	300	300
Central Asia	240	1,450
Slovakia	210	210
Romania	200	200
Algeria	130	1,230
Colombia	60	660
Chile	60	60
Philippines	0	320

e/f = estimate/forecast. Source: BMI

Despite growth in Middle Eastern capacity in 2009, the expected large drop in petrochemicals margins and operating rates did not materialise. Indeed, the fears that plagued producers in North America and Europe were abated by lower than expected feedstock costs and delays in Middle Eastern projects, which helped support prices and margins. Ethane-based production performed better than facilities reliant on naphtha due to the lower price of gas compared to oil; by 2010, the crude oil-to-natural gas price ratio reached 20:1 with gas priced at

Ethylene Capacities By Region 2009 Estimate



Source: BMI

US\$4/mn British thermal units (btu) and oil at US\$80/bbl, well above the historical average of 8:1. As a result, naphtha-reliant PE producers in Asia and Europe have felt the downturn much more than ethane-based production in the Middle East and North America.

Although 2010 is likely to be tough compared to previous years in terms of market demand and the challenge of yet more capacity coming onstream in the Middle East and Asia, a recovery is expected. From Q409 into H110 customers were restocking inventories with growth in demand in some segments, although growth will be sluggish in basic chemicals due to uncertainties in the construction and automotive sectors. The slowest recoveries are likely to be in North America and Europe, with prolonged periods of under-capacity likely to lead to permanent closures. Asia is leading the way to recovery, with ethylene demand in China up by 7.8% y-o-y to 11.5mn tonnes in 2009, offsetting declines of 0.5% in North America and 4% in Western Europe. China's demand for polyolefins could grow by up to 15% in 2010 as a result of the government's stimulus packages. In North America the strongest output growth rates are in LLDPE and HDPE with growth of 9% and 4% respectively in 2009, while LDPE and PP were down 5% and 1% respectively, indicating the unevenness of the region's recovery.

BMI estimates that global olefins demand should grow by around 4% to around 115mn tonnes in 2010, from zero growth in 2009. Thereafter, growth rates should remain above 5%, reaching around 150mn tonnes in 2014.

Petrochemical demand growth for 2010 is projected at 4-5mn tonnes, well below the 10mn tonnes of new capacity scheduled to start up, even after accounting for the 3-3.5mn tpa of nameplate capacity coming offline in North America by the end of 2010. Short-term shut-downs will be necessary to stabilise the market. Over-capacity problems are being felt particularly bad by polyolefins producers. Around 1mn tpa of PP and 2mn tpa of PE capacity needs to be taken offline to ensure stability over the next three years.

BMI estimates that total global ethylene capacity was around 133.3mn tpa in 2009, with Asia Pacific representing one-third of installed capacity (China contributed 29% of Asian capacity) and North America around 26%.

Although the Middle East and Africa are the largest source of oil and gas, the region contributed just 17% of total capacity. This is set to change over the medium to long term as new capacity comes online, with global capacity set to reach 177.9mn tpa in 2014. The region's contribution to global capacity is forecast to rise from 11.8% in 2007 to 23.3% by 2014. This would be an increase of nearly one-third over 2009 levels, but is a downward revision of around 7mn tpa from our previous estimates, reflecting the impact of the recession and the financial crisis on some projects, particularly in Asia. Gulf countries are expected to account for around 20% of the world's ethylene production by 2010 compared with the current 8%. Some 50% of all new ethylene projects being developed in the world are located in the region. Saudi Arabia represents around 63% of total investment in the region, while Qatar comes second, with a 14%

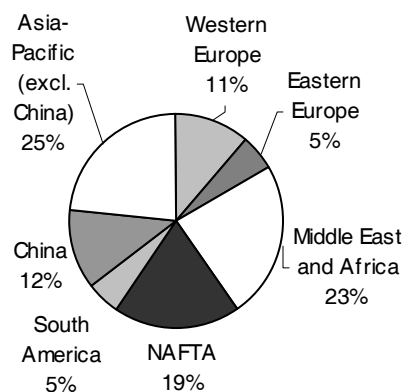
share. The Gulf Petrochemicals and Chemicals Association (GPCA) has forecast that the region will account for 40% of total global petrochemical production within 10 years, but has also warned that this would bring fresh challenges to the region's producers in terms of the need to secure more feedstock.

About 5-6mn tpa of ethylene capacity was projected to come onstream in 2009, but only about 2.8mn tpa of that capacity actually started production due to delays and routine start-up problems. Middle East production is slowly working its way into the marketplace, rather than flooding the markets. In 2009 the **Saudi Ethylene and Polyethylene Company (SEPC)**, a 25:75 joint venture (JV) between **LyondellBasell** and **Sahara Petrochemical Company** at Al-Jubail, started with 1mn tpa ethylene capacity and **Equate Petrochemical Company** started production at its ethyl benzene-styrene production plant at Shuaiba, Kuwait, with 450,000tpa of styrene capacity. In China, **Sinopec** and its partners **Saudi Aramco** and **ExxonMobil** started operations at their **Fujian Refining and Petrochemicals Company JV** complex at Quanzhou with capacity of 800,000tpa ethylene, as well as PE and paraxylene. Also in Asia, **Shell** started up its 750,000tpa ethylene glycol plant at the **Shell Eastern Petrochemicals** complex at Jurong Island and expects to bring onstream an 800,000tpa ethylene plant and a butadiene extraction facility at the same site in 2010.

The upside of the economic slowdown is the halt and in some cases decline in the cost of petrochemicals plant construction, which had accelerated rapidly from 2002 to 2008 amid a construction boom in the Gulf region. A scarcity of raw materials, labour and engineering expertise has plagued the Gulf petrochemicals industry, leading to project schedule slippages. Some olefins complexes have seen costs increasing nearly four-fold from 2002. A downturn in construction has freed up resources and given the petrochemical industry more negotiating

leverage over costs of planned projects. On the downside, there is a danger in over-reliance on Asian markets, where growth is moderating as they expand their own domestic petrochemicals capacities, contributing to the risk of global over-capacity. The greatest uncertainties come from China, which is massively expanding capacity in 2010-2012, potentially leading to a decline in cracker operating rates to 80-85%, which is widely regarded as the break-even point for most petrochemicals producers. Gulf producers will be hoping that capacities in Europe and North America are crowded out of the market in order to provide further export opportunities.

Ethylene Capacities By Region 2014 Forecast



Source: BMI

China should see its share of the global total rise by 2.4 percentage points (pp), but the rest of the Asia Pacific region will only see a 0.3pp increase. Another region set to raise its global profile is South America, with significant new capacity set to come online in Brazil and Venezuela. Brazilian petrochemicals giant **Braskem** is seeking to dominate production in the region and become a serious player on the international petrochemicals market. The company is ramping up capacity, including a world-scale ethylene JV with **Pequiven** in Venezuela. South America's share of the global total should rise from 3.9% to 5.5% due to an increase in capacity totalling 4.36mn tpa. However, the economic downturn led to a revision of investment programmes in South America with the JV to be delayed by two years to 2013-2014. **Dow Chemical** and **Petrobras** have also moved back their planned petrochemical projects by one year, to 2012 and 2013 respectively.

Global Oil Products Price Outlook

Driving Slowly

Although products market conditions improved in the first quarter of 2010, the higher prices and wider refining margins should not be interpreted as the beginnings of a sustained recovery. The absolute increases in products demand outside key developing countries cannot support improved fundamentals. Extended refinery downtime on the part of more astute operators has distorted the picture, along with unusual weather factors. With inventories still alarmingly high, the outlook remains challenging. The rest of the year is likely to be characterised by continuing stock surpluses and narrow refining margins. Demand growth, particularly for jet and diesel, needs to be strong and sustained if the products markets are to stage a convincing recovery. Otherwise, rising crude costs and weak product demand imply more misery.

Toyota problems aside, the automotive industry faces a tough time ahead as scrappage schemes become a fond memory. It is unlikely to be a good year in terms of vehicle sales, while existing car, truck and aeroplane owners will be tempted to use them less thanks to higher fuel costs. Demand destruction seen in 2008 may be about to re-appear as pump prices soar and corporate and consumer incomes remain under pressure.

The US-based Energy Information Administration (EIA) forecasts that regular-grade gasoline retail prices will average US\$2.92 per gallon during the summer, up from US\$2.44/gallon in the equivalent period of 2009. This is an increase of nearly 20% that will anger most motorists and could dampen enthusiasm for long journeys during the so-called 'driving season'. Those owners of sports utility vehicles (SUVs) who did not take advantage of 2009's 'cash for clunkers' programme may still want to switch to economic hybrids or sub-compacts, as the EIA predicts US pump prices exceeding US\$3/gallon at times during the driving season. Summer diesel averaging US\$2.97/gallon in 2010 will not please truck drivers either, as they paid only US\$2.46/gallon in the summer of 2009.

The EIA states that, during this summer season, motor gasoline consumption will increase by just 0.5% over the 2009 level. This modest improvement compares unfavourably with the summer of 2009, which saw a 0.9% bounce in demand thanks largely to a US\$1.37/gallon year-on-year (y-o-y) fall in gasoline prices. This year's predicted US\$0.50 increase may prove conservative, and the demand estimate could prove optimistic.

Total US gasoline stocks at the onset of the driving season (using April 1 as the start-date) were 224mn barrels (bbl), according to EIA data. This is 7mn bbl above the April 1 2009 level and 11mn bbl above the five-year average for the same date. Subdued demand bodes ill for the US inventory trend. US distillate inventories are projected to start the summer season at 143.1mn bbl, almost matching 2009's record 143.6mn bbl, and 24mn bbl above the previous five-year average.

US refining margins widened in March, with those on the Gulf Coast averaging almost a dollar more than the US\$5.18/bbl seen in February. In Europe, refining economics also improved compared with earlier months, and margins for Brent crude in Rotterdam rose from US\$2.75/bbl in February to almost US\$3.30/bbl in March. In Asia, refining margins gained more than in the Atlantic Basin, with Singapore Dubai crude margins soaring from US\$1.35 to US\$3.73/bbl in March.

April prices and margins appear to be holding up but the return of refining capacity from maintenance during May could boost supply, and the ongoing addition of Asian capacity could weaken the local as well as global market. If gasoline demand is subdued in the summer, hampered by ample stocks, we are likely to see a return to margin misery for most refiners.

Revised Forecasts

BMI estimates that the global wholesale price for premium unleaded gasoline was US\$87.61/bbl in Q110. This compares with US\$81.41/bbl in Q409. Gasoline prices in Q110 were up 68% from US\$52.22/bbl in the equivalent period of 2009. For 2010 as a whole the **BMI** assumption for gasoline is an average of US\$96.83/bbl, with the price expected to peak in July at more than US\$105/bbl. We forecast the overall y-o-y rise in 2010 gasoline prices at 38%.

In Q110 gasoil averaged US\$84.12/bbl, based on a composite global price. This represents a y-o-y rise of almost 54%. For 2010 as a whole we forecast an average price of US\$92.45/bbl, probably peaking in December 2010 at more than US\$100/bbl. The full-year outturn represents a 37% increase from the 2009 level.

Jet prices averaged US\$86.37/bbl in Q110, using the composite for New York, Singapore and Rotterdam. The y-o-y increase was just over 52%, with jet lagging behind the gain in gasoil prices. Quarter-on-quarter (q-o-q) the Q110 increase was just 3.6%. For full-year 2010 we forecast US\$95.58/bbl, up from US\$70.66/bbl in 2009.

Table: Oil Product Price Assumptions, Q409-Q410 (US\$/bbl)

Gasoline	Q409	Q110e	Q210f	Q310f	Q410f
Rotterdam premium unleaded	82.09	87.78	102.31	102.95	99.21
NY Harbour unleaded	81.66	86.59	100.46	103.74	102.76
Singapore premium unleaded	80.48	88.45	94.55	100.37	92.83
Global average	81.41	87.61	99.11	102.35	98.27
Gasoil					
Rotterdam	80.92	83.77	92.93	97.59	97.82
Mediterranean	81.27	83.81	91.8	96.70	97.26
Singapore	81.79	84.77	90.91	97.82	94.26
Global average	81.33	84.12	91.88	97.37	96.45
Jet/kerosene					
Rotterdam	83.40	86.01	96.89	99.86	100.82
NY Harbour	83.90	87.90	96.56	102.92	105.59
Singapore	82.75	85.20	91.50	98.26	95.41
Global average	83.35	86.37	94.98	100.35	100.61

e/f = estimate/forecast. Source: BMI

In 2009 naphtha was a surprisingly robust performer among the major refined products, gaining 92% between January and December. In Q110 naphtha averaged US\$79.30/bbl, compared with US\$73.44/bbl in Q409 and US\$42.83/bbl in Q109. We put the 2010 average naphtha price at US\$82.46/bbl, up 39% y-o-y. Thanks to the stirring of petrochemicals demand in Asia, naphtha looks set to be the star performer in 2010.

Looking further ahead, we see gasoline prices rising further to US\$99.17/bbl in 2011 and stabilising at around US\$105/bbl from 2012. Gasoil is expected to climb to US\$94.69/bbl in 2011, reaching a plateau of just over US\$100/bbl from 2012. The price of jet is forecast to average US\$97.88/bbl in 2011 before levelling out at just under US\$104/bbl from 2012.

Table: Oil Product Price Data And Forecasts, 2007-2014 (US\$/bbl)

Gasoline	2007	2008	2009	2010f	2011f	2012f	2013f	2014f
Rotterdam premium unleaded	75.75	100.12	70.60	98.06	100.43	106.34	106.34	106.34
NY Harbour unleaded	78.75	102.54	69.70	98.39	100.76	106.69	106.69	106.69
Singapore premium unleaded	74.98	102.64	70.21	94.05	96.32	101.99	101.99	101.99
Global average	76.49	101.77	70.17	96.83	99.17	105.00	105.00	105.00
Gasoil								
Rotterdam	77.02	122.62	68.74	93.03	95.27	100.88	100.88	100.88
Mediterranean	77.69	121.75	69.13	92.39	94.62	100.19	100.19	100.19
Singapore	77.03	119.53	69.01	91.94	94.16	99.70	99.70	99.70
Global average	77.24	121.30	68.96	92.45	94.69	100.26	100.26	100.26
Jet/kerosene								
Rotterdam	81.13	126.61	70.81	95.89	98.21	103.99	103.99	103.99
NY Harbour	82.48	127.13	71.18	98.24	100.62	106.53	106.53	106.53
Singapore	79.17	121.11	69.99	92.59	94.83	100.40	100.40	100.40
Global average	80.93	124.95	70.66	95.58	97.88	103.64	103.64	103.64

f = BMI forecast. Source: 2000-2006 historical data: EIA. 2007/2008 historical data: IEA

Gulf Regional Overview

The Gulf Cooperation Council (GCC) has gas reserves totalling 41,983bn cubic metres (bcm) and in 2008 produced 257.77bcm. Approximately 70% of the region's gas output is consumed locally, with the rest, 75.24bcm, exported to Asia mainly, elsewhere in the Middle East, Europe and the US. Regional gas consumption is being fuelled by rising demand for electricity, particularly during summer months, and increased use in downstream sectors such as petrochemicals. Gas is also used for enhanced oil recovery at mature oilfields in order to boost oil output. At the same time, countries with significant exportable surpluses – Qatar, Oman and the UAE – are developing liquefied natural gas (LNG) facilities that enable more economical transport over distances that are well out of reach of any existing or planned pipeline network. For intraregional gas supplies, some GCC member governments are developing a major pipeline network, the Dolphin project, to pipe gas to petrochemical and LNG facilities as well as power plants. However, surging domestic demand for gas has effectively led to a cap on further LNG projects, with no announced plans for new capacity after 2012. The UAE is particularly vulnerable to a gas supply deficit during summer months, forcing it to rely on supplies from Qatar until it improves its use of its largely undeveloped offshore sour gas fields.

At the end of 2008, the GCC's oil reserves totalled 496.3bn barrels, 39.4% of the world total. Saudi Arabia has the largest total oil reserves in the Gulf, with 53.2% of the regional total, followed by Kuwait (20.5%), the UAE (19.7%), Qatar (5.5%), Oman (1.1%) and Bahrain (0.02%). The GCC dominates the global crude market, contributing 22.6% to 2008's world output with 18.75mn b/d produced. With its large reserves, Saudi Arabia leads output with production at 10.85mn b/d in 2008, while the UAE and Kuwait produced 2.98mn b/d and 2.78mn b/d respectively. However, OPEC policy and a relatively high level of quota adherence led to downturn in 2009's regional supply. Output is overwhelmingly orientated towards exports, with GCC crude consumption at just 3.20mn b/d in 2008 and refined oil consumption totalling 2.16mn b/d. Most GCC crude output is exported rather than refined.

In 2008, the GCC's refining capacity totalled 4.37mn b/d, of which 49% was in Saudi Arabia, 21% in Kuwait and 17% in the UAE. The remaining 13% was in Bahrain, Qatar and Oman. Refinery output amounted to 3.92mn b/d, of which 2.51mn b/d was exported. Local refined oil consumption totalled 2.16mn b/d. However, Gulf countries are increasingly dependent on imports for high quality fuels. This, along with the desire to add value to crude, means governments are placing a greater emphasis on significantly increasing their domestic refining capacity in the coming years. The Gulf's refining capacity is forecast to expand by 2.46mn b/d by 2014.

Governments in the Persian Gulf have sought to add value to the abundance of gas and oil and diversify their economies through encouraging investment in a massive expansion of petrochemicals production. With competitively priced and easily accessible feedstock, the GCC members have their eyes on the

rapidly expanding Asian markets, particularly China and India. As such, the Gulf is playing a major role as a petrochemical production hub as the industry shifts from west to east.

Despite the global financial crisis, the GCC's banking sectors remain robust, having been swelled with liquidity following the record high oil prices of 2008 and providing plenty of finance availability, bolstered by generous tax incentives. Gulf countries are expected to account for about 20% of the world's ethylene production in 2010, compared to 8% in 2008-2009 – half of all new ethylene projects being developed in the world are located in the region. Saudi Arabia accounts for about 63% of total investment in the region, while Qatar is second with a 14% share. Bahrain is the only GCC state with no petrochemicals facilities and no plans for any. There are 1,969 chemicals and petrochemicals related companies operating in the Gulf region, employing approximately 155,000 workers. The GPCA has forecast that the region will account for 40% of total global petrochemical production within 10 years but has also warned that this would bring fresh challenges to the region's producers in terms of the need to secure more feedstock.

The rapid rise of olefins output in the Gulf region is significantly affecting the global market, particularly during an economic slowdown when prices are already weak. The upside of the economic slowdown is the freeze, and in some cases decline, in the cost of petrochemicals plant construction, which accelerated rapidly from 2002 to 2008 during the construction boom in the Gulf. A scarcity of raw materials, labour and engineering expertise has plagued the regional petrochemicals industry, leading to project delays. Some olefins complexes' costs had increased nearly fourfold since 2002.

A downturn in construction has freed resources and given the petrochemicals industry more negotiating leverage over costs of planned projects. On the downside, there is a danger in overreliance on Asian markets, where there is moderation in growth as they expand their own domestic petrochemicals capacities, contributing to the risk of global overcapacity. The greatest uncertainties come from China, which is massively expanding capacity between 2010 and 2012, potentially leading to a decline in cracker operating rates to 80-85% – widely regarded as the breakeven point for most petrochemicals producers. Gulf producers will be hoping that capacities in Europe and North America are crowded out of the market to provide further export opportunities.

Table: Announced Ethylene Crackers In The Gulf

Company	Country	Location	Capacity (tpa)
Abu Dhabi Polymers (Borouge)	UAE	Ruwais	600,000
Al-Jubail Petrochemical (Kemya)	Saudi Arabia	Jubail	810,000
Arabian Petrochemical (Petrokemya)	Saudi Arabia	Jubail	800,000
Arabian Petrochemical (Petrokemya)	Saudi Arabia	Jubail	800,000
Arabian Petrochemical (Petrokemya)	Saudi Arabia	Jubail	830,000
Equate Petrochemical	Kuwait	Shuaiba	850,000
Jubail Chevron Phillips (JCP)	Saudi Arabia	Jubail	300,000
Jubail United Petrochemical Company (JUPEC)	Saudi Arabia	Jubail	1,450,000
Qatar Chemical (Q-Chem)	Qatar	Mesaieed	500,000
Qatar Petrochemical Company (Qapco)	Qatar	Mesaieed	720,000
Rabigh Refining and Petrochemical (Petro-Rabigh)	Saudi Arabia	Rabigh	1,300,000
Saudi Ethylene and Polyethylene Company (SEPC)	Saudi Arabia	Jubail	1,000,000
Saudi Petrochemical (Sadaf)	Saudi Arabia	Jubail	1,300,000
Saudi Yanbu Petrochemical (Yanpet)	Saudi Arabia	Yanbu	860,000
Saudi Yanbu Petrochemical (Yanpet)	Saudi Arabia	Yanbu	920,000
The Kuwait Olefins Company (TKOC)	Kuwait	Shuaiba	850,000

Source: Chemical Week, BMI

Iran Market Overview

While the petrochemicals industry in Iran dates back over 40 years, the industry only began to flourish in the mid-1990s. The country is the 60th largest producer and exporter of petrochemicals in the world but if existing expansion plans proceed as expected, the sector could eventually replace the oil industry as the country's top foreign currency earner.

The **National Petrochemical Company** 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).

Most of the new production capacity involves foreign companies, either as partners and technology providers or for engineering, procurement and construction (EPC) contracts. However, the Guardian Council of the Constitution (GC) has blocked the use of foreign capital in national projects.

Iran is the world's fourth largest PE producer and the second largest propylene and PVC producer. It is expected to become the largest producer of both the latter products over the next 2-3 years.

The Iranian petrochemical industry has a number of competitive advantages, chiefly the easy availability of gas for feedstock and the large size of the domestic market. Iran's petrochemicals chain is diversifying and labour is highly skilled and relatively cheap. However, the more nationalist policies of President Mahmoud Ahmadinejad's administration, which took office in August 2005, have made a priority of protecting local firms at the expense of foreign investors, with the reversal of the liberalisation measures introduced under Mohammad Khatami. Firms such as **Khatam al-Anbia** (Ghorb), which are associated with the Revolutionary Guards, are awarded an increasing number of contracts in the petrochemicals industry.

Iran's increasing global political isolation has led to a reduction in business from international contractors and banks, making it difficult to secure technology and finance for projects. The lack of sufficient local expertise in technology is causing delays in project implementation. In April 2007, completion of a 300,000tpa high-density polyethylene (HDPE) joint venture involving **PTT Chemical**, NPC, **Itochu Corporation** and **Siam Cement** was delayed by six months from its original completion date of May 2008. The deferral came after the government decided to delay its project to supply raw materials to the US\$240mn JV for six months.

The US\$225mn Mehr petrochemical high-density polyethylene in Assaluyeh (Siam Cement, 38%; NPC, 40%; Itochu, 12%; PTT Chemical, 10%) was also reported to be delayed by six months in April 2008 due to management problems, although the government has denied the problems exist and insists the project – which will manufacture 300,000tpa of PE – was on schedule. NPC subsidiary **Bandar Imam**

Petrochemical Company (BIPC) also delayed the completion of its cracker expansion to early 2008. The expansion was due to be completed in 2005, with production capacity rising from 100,000tpa to 311,000tpa. In January 2007, planning managers at **Arya Sasol** – a JV between NPC and South Africa’s **Sasol** that includes a 1mn tpa ethane cracker, a 300,000tpa MD/HDPE and 300,000tpa low-density polyethylene (LDPE) project – announced that the project was behind schedule due to a lack of human resources and primary materials. In January 2008, after another delay, plant managers said that the 300,000tpa LDPE plant would start up in March 2008 and the 300,000tpa HDPE/MDPE swing plant would open in June 2008.

The delays were attributed to ‘technical factors’. The PE plants will source ethylene feedstock from Arya Sasol’s cracker, which achieved full-spec production in December 2007. Ethylene from the Arya Sasol cracker is also being fed into **Farsa Chemicals**’ 400,000tpa monoethylene glycol (MEG) unit, **Pars Petrochemical**’s 600,000tpa styrene monomer facility and other neighbouring plants in Assaluyeh. Such 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.

Table: Iran’s Olefins Capacity, 2009

Product	Company	Location	Capacity, tpa
Ethylene	Amir Kabir Petrochemical	Bandar Imam Khomeini	520,000
Ethylene	Arak Petrochemical	Arak	320,000
Ethylene	Arya Sasol Polymers	Assaluyeh	1,000,000
Ethylene	Bandar Imam Petrochemical	Bandar Imam Khomeini	430,000
Ethylene	Jam Petrochemical	Assaluyeh	1,320,000
Ethylene	Marun Petrochemical Co	Bandar Imam Khomeini	1,100,000
Ethylene	Tabriz Petrochemical	Tabriz	136,000
Propylene	Amir Kabir Petrochemical	Bandar Imam Khomeini	260,000
Propylene	Arak Petrochemical	Arak	125,000
Propylene	Bandar Imam Petrochemical	Bandar Imam Khomeini	118,000
Propylene	Jam Petrochemical	Assaluyeh	305,000
Propylene	Marun Petrochemical	Bandar Imam Khomeini	200,000
Propylene	Tabriz Petrochemical	Tabriz	56,000

Source: BMI

Table: Iran Polymer Capacity, 2009

Product	Company	Location	Capacity (tpa)
HDPE	Amir Kabir Petrochemical	Bandar Imam Khomeini	140,000
HDPE	Arak Petrochemical	Arak	85,000
HDPE	Bandar Imam Petrochemical	Bandar Imam Khomeini	60,000
HDPE	Marun Petrochemical Co	Bandar Imam Khomeini	300,000
LLDPE	Amir Kabir Petrochemical	Bandar Imam Khomeini	300,000
LLDPE	Arak Petrochemical	Arak	75,000
LLDPE	Arya Sasol Polymers	Assaluyeh	0
LLDPE	Tabriz Petrochemical	Tabriz	120,000
LDPE	Arya Sasol Polymers	Assaluyeh	375,000
LDPE	Bandar Imam Petrochemical	Bandar Imam Khomeini	100,000
LDPE	Laleh Petrochemical	Bandar Imam Khomeini	300,000
PP	Arak Petrochemical	Arak	90,000
PP	Bandar Imam Petrochemical	Bandar Imam Khomeini	50,000
PP	Jam Polypropylene	Assaluyeh	300,000
PP	Marun Petrochemical	Bandar Imam Khomeini	300,000
PP	Navid Zar Chemie	Bandar Imam Khomeini	160,000
PP	Polynar	Tabriz	50,000
PP	Regal Petrochemical	Mahshahr	90,000
PVC	Abadan Petrochemical	Abadan	60,000
PET	Shahid Tondgooyan Petrochemical	Bandar Imam Khomeini	130,000
PET	Shahid Tondgooyan Petrochemical	Bandar Imam Khomeini	180,000

Source: BMI

There is a high risk associated with the controversies over Iran's nuclear programme. Speaking at the National Petrochemical and Refiners Association petrochemical conference in March 2007, former US ambassador to the UN John Bolton said Iran's nuclear programme would have a negative impact on the petrochemical sector. 'The risk of a nuclear Iran is not just about the adverse impact on the petroleum markets but the proliferation risk that would impact even greater,' he said, highlighting to the sharp rise in oil prices following the capture of British navy personnel in the disputed Shatt al-Arab waterway in April 2007. Sanctions would heighten risk associated with investment in Iran. Investors with an exposure to the American market are cautious, mindful of the US' moves to enforce its own sanctions on Iran and the

possibility of international sanctions. Asian investors with little or no exposure to the US are showing greater interest in the sector.

Table: Iran's Cracker Capacity, 2006-2014 ('000 tpa)

	2006	2007	2008	2009	2010f	2011f	2012f	2013f	2014f
NPC, Arak	320	320	320	320	320	320	320	320	320
NPC, Tabriz	136	136	136	136	136	136	136	136	136
NPC, Bandar Imam	430	430	430	500	500	500	500	500	500
Amir Kabir, B. Imam (Olefins 6)	520	520	520	520	520	520	520	520	520
Marun PC, B. Imam (Olefins 7)	500	500	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Arya Sasol, B. Assaluyeh (Olefins 9)	na	na	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Jam Pchem, B. Assaluyeh (Olefins 10)	na	na	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Ilam (Olefins 13)	na	na	na	na	na	na	na	na	500
Kharg Island	500	500	500	500	500	500	1,000	1,000	1,000
Arvand Petrochemical (Olefins 8)	na	na	na	na	na	na	1000	1000	1000
Morvarid Petrochemicals	na	na	na	na	na	na	500	500	500
Total	2,406	2,406	5,306	5,376	5,376	5,376	7,376	7,376	7,876

f = forecast; na = not available; NB Figures for end of calendar year. Source: NPC, BMI, World Cracker Report

Impact Of Pricing Mechanism

Subsidised domestic prices are a major challenge for the industry. Despite the government's insistence that the difference between the two prices should not be too great, domestic levels are often half those achievable in international markets, meaning the sector has incurred substantial losses.

As long as this system persists, producers will continue to lobby the government to change the mechanism. However, allowing prices to reflect true market conditions would be politically unpalatable, despite the fact that the industry needs to keep revenues as high as possible to fund the massive expansion in production capacity over the next 10 years. The populist policies of the Ahmadinejad administration mean a change to the pricing mechanism is even more unlikely than before. Regardless of the controversy, some Iranian industrialists are lobbying for a relaxation of price controls. Managers of **Shiraz Petrochemical** said in May 2007 that the reform of prices would improve the competitiveness and quality of petrochemicals on the Iranian market and would remove middlemen. The company has little to fear from a more competitive environment, having received ISO 9,000 and ISO 14,000 certificates and it uses the EFQM Excellence Model. NPC managing director Gholam Hossein Nejabat said the liberalisation of petrochemical prices would make the market transparent.

Industry Trends And Developments

The Iranian petrochemicals industry has 81 companies, of which 51 are in the private sector. The privatisation of **NPC** subsidiaries is set to lead to a further 19 firms going into private hands, with new regulations requiring the NPC share in any firm does not exceed 20%.

At the 2008 Iran Petrochemical Forum (IPF), NPC president Gholam Hossein Nejaboof, who is also the Deputy Minister of Petroleum, said Iran could become the world's largest petrochemicals producer by 2025. Ali Divandari, CEO of **Mellat Bank**, which specialises in project finance in the energy sector, said such an ambition would require investment of US\$65bn-70bn, including the combined outlays of US\$30bn in NPC's five-year plans up to 2015. Projects being implemented under the NPC's fourth five-year plan have already secured US\$12.5bn of investment, although progress is slow. Another \$17.5bn will be spent until 2014, Divandari said. According to Divandari, Iran's petrochemicals exports will grow from US\$5.9bn in 2007 to US\$20.0bn by 2015. In 2007, exports accounted for nearly two-thirds of output. In that time, petrochemicals capacity is due to rise from an estimated 47mn tpa in 2008 to 73mn tpa by 2015. The Oil Ministry has set targets aiming for the annual production of 12mn tonnes of ethylene, 8.5mn tonnes of urea, 4mn tonnes of aromatics and 10mn tonnes of polymer by the year 2015. Total petrochemical production capacity is forecast to rise to 68mn tpa, nearly twice the level achieved in 2008. However, a key challenge for growth is securing investment and financing for the expansion, particularly as new regulations prohibit the NPC from contributing more than 20% to any project, at a time when Iran is facing international sanctions, which have negatively affected its risk outlook.

NPC is aiming to become the largest petrochemical producer in the Middle East by 2024, overtaking **Sabtic** of Saudi Arabia. It has a number of hurdles to overcome, namely international sanctions and the fragmentation of the company through spinning off and privatising 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.

In order to help fund these developments, the **Export Development Bank of Iran** (EDBI) and the NPC struck a deal in April 2010 for the latter to receive EUR300mn of investment through the offering of currency certificates of deposit on international markets. The notes are being offered in one, two and three-year maturities, with interest rates of 5.0%, 6.2% and 7.5% respectively. Under the budget for the current Iranian year, which started on March 21 2010, NPC is permitted to sell up to EUR2bn of currency participation notes. The offer was authorised in the FY09/10 budget that called for the issuance of currency participation notes to satisfy the currency requirements of the NPC. The move is intended to get around the problem of financing from foreign banks, which as a result of the global financial crisis and

Iran's increasing isolation are unwilling to finance the development of the Iranian petrochemicals industry.

Privatisation

In April 2010, the Ministry of Petroleum announced that work was under way on the privatisation of the refining sector. Minister of Petroleum Masoud Mir Kazemi told MNA that 'all petrochemical units and refineries' will be shifted to private hands. Privatisation is being carried out under the terms of Article 44 of the Iranian constitution, which requires 80% of the country's state-owned companies to be sold. The target date for the completion of the NPC's privatisation is 2014, with the subsidiaries **Tabriz Petrochemical**, **Khorasan Petrochemical** and **Shiraz Petrochemical** set to be the first to be sold. It has already divested **Razi Petrochemical** (in Bandar Imam Khomeini, which was sold to Turkey's **Gubre Fabrikalari**), **Abadan Petrochemical**), **Arak Petrochemical**, **Esfahan Petrochemical**, **Kharg Petrochemical** (on Kharg Island), **Farabi Petrochemical** (Bandar Imam Khomeini) and **Iran Carbon** (Ahwaz). NPC will retain a 20% stake in the privatised petrochemicals companies, while 40% will be turned into 'justice shares' that are ostensibly allocated to the poor through provincial cooperatives, 35% will be floated on the Tehran Stock Exchange (TSE) and 5% will be allocated to petrochemicals industry personnel. In June 2009, the Iran Privatisation Organisation began offering 33.09% of shares of the **Petrochemical Industries Investment Company** (PIIC), equal to 602.17mn shares, on the TSE.

BMI believes the privatisation programme is a poor compromise between economic liberalisation and the supposedly redistributive policies of the Ahmadinejad administration. Floating a minority stake on the TSE 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. Moreover, the spinning off of NPC's assets into smaller units will lead to fragmentation, adding complexity to the production chain in an industry that is already overregulated. This will ultimately undermine Iran's competitiveness against regional rivals such as Saudi Arabia, which is benefiting from foreign capital and expertise, where larger petrochemicals firms are aiming to become global suppliers and investors. By splitting up NPC, Iran is stunting the growth potential of its subsidiaries and they will be worth less as individual units than as part of a larger organisation.

Sanctions And The Petrochemicals Sector

There are considerable risks to our growth outlook, including continued economic mismanagement and the rising possibility of international sanctions. Iran's ability to reach its objectives depends on the country's ability to maintain foreign participation in the sector to provide technology and investment. Increasing isolation due to growing international concern over Iran's nuclear programme has led to a reduction in business from international contractors and banks, making it difficult to secure technology and finance for projects. The lack of sufficient local expertise in the necessary technology is causing delays in project implementation.

The move towards sanctions on Iran, in relation to the government's nuclear programme, has raised the prospect of restriction on investment and trade in the Iranian petrochemicals industry. In October 2007, the US extended its unilateral sanctions targeting the Revolutionary Guards and more than 20 Iranian companies, banks and individuals, as well as the Ministry of Defence. Under the new measures, the American authorities have the ability to freeze the assets of these organisations, as well as the right to prohibit any US citizen or organisation from doing business with the Revolutionary Guards. The Revolutionary Guards are not an entirely military body – about 30% of its operations are business-related, generating an estimated IRR2bn in annual revenues. The designation of the group as terrorists by the US government could theoretically lead to the prosecution of any private firm or individual conducting business with Iranian firms covered by the US sanctions, including those in which the Revolutionary Guards have a stake. US sanctions have targeted Iran's largest state-owned banks: **Melli**, Mellat and **Saderat**. All financial transactions between a US citizen or private organisation with the three banks have been embargoed. The sanctions are in addition to the Iran Sanctions Act (ISA), which places financial sanctions on any non-US firm investing over US\$20mn in Iran. The UN Security Council has also imposed sanctions on individuals and industrial firms involved in manufacturing ballistic missiles and technology for the nuclear industry under Resolutions 1737 and 1747. In the US, the 2007 Iran Counter-Proliferation Act, intended to make investment in Iran's energy sector by international companies even more difficult, was passed by the House Foreign Affairs Committee, but it may be watered down and its passing slowed in the Senate, barring a major rift erupting with Iran in the interim.

The prospect of an expansion of punitive measures by the UN Security Council since 2007 raises the risk premium for international financing, with borrowing rates now 15% or more, compared with 2% in the pre-sanctions era, forcing Iranian industry to rely heavily on borrowing from the central bank. While countries such as China and Russia have been less reticent in their interest in Iran's energy industry, European companies that have so far resisted disinvestment are becoming increasingly conscious of expanding operations. In the petrochemicals sector, most foreign input comes from engineering and construction contracts, although there are a number of foreign JVs in the pipeline. However, NPC doesn't plan to tap international financial markets for funding new projects. About 70% is likely to come from governmental organisations with the rest provided by the private sector. This will make the petrochemicals sector less exposed to adverse policies in the international financial sector but will depend on high levels of liquidity in the Iranian banking system, which in turn relies on high oil prices. Even then, it is doubtful that petrochemical projects will achieve the necessary finance. Any downturn in oil prices at a time of tightened sanctions could lead to the postponement of some large petrochemical projects.

Increased external risk has created problems not only for investment, but also for trade, with an increasing number of commercial banks becoming wary of facilitating trades in Iranian petrochemicals, with buyers and sellers of Iranian cargo facing a reduction in the number of banks willing to help complete deals. For example, Indonesian MEG producer **PT Polychem** can no longer take delivery of ethylene cargos from

Iran as its bank, **HSBC**, will not facilitate purchases. In most cases, petrochemicals companies have maintained existing supply contracts, while reviewing new ones. In the case of foreign JVs involving NPC, such as the Philippine polyethylene producer **NPC Alliance Corporation** (formerly Bataan Polyethylene), ethylene supplies continue unabated.

West Ethylene Pipeline

The development of the petrochemical sector in western Iran will rely heavily on the completion of the 2,400km West Ethylene Pipeline, which will supply ethylene to 11 downstream complexes along its route and will have a throughput capacity of 2.8mn tpa. The pipeline will be supplied by the Gachsaran Olefins 8 complex, which is due onstream in 2013 with capacity of 1mn tpa of ethylene, and the Kavyan Olefins 11 complex, which will consist of two 1mn tpa ethylene plants, scheduled to be onstream in 2010.

In the first four months of the 2008/09 Iranian year, about US\$25mn was invested in the pipeline. By July 2008, five years since building started, it was 52% complete. Total investment in the project has been estimated at US\$1.5bn, with completion slated for 2009/10. Given the length of time it has taken to complete just half the project and the possibility of financial problems, **BMI** believes the project's completion could be further delayed, putting the expansion of the Iranian petrochemical sector in jeopardy.

Under plans revised in June 2008, the pipeline will be controlled by two holding companies: **Bakhtar Petrochemical Holding**, which will control a 2,200km stretch of the pipeline linking Assaluyeh in the south of Iran to Mahabad in the north; and **Dena Region Holding**, which will take responsibility for the south-eastern spur of the line. The Bakhtar section will serve seven downstream facilities, six of which will be owned by Bakhtar, and one, a vinyl acetate monomer (VAM) (140,000tpa) and ethylene vinyl acetate (EVA) (45,000tpa) complex in Hamedan, will be controlled by an as yet known company. Other plants served by the Bakhtar line include a 300,000tpa LDPE plant at Andimeshk, a 300,000tpa HDPE/LLDPE plant at Khoramabad in Lorestan, a 300,000tpa LDPE plant at Sanandaj in Kurdistan, a complex at Miandoab consisting of ethylene vinyl chloride and polyvinyl chloride plants, each with capacity for 300,000tpa, and a 300,000tpa HDPE/LLDPE plant at Mahabad.

Dena Region Holding will take responsibility for the south eastern branch of the line. Dena will control four downstream complexes, which will receive ethylene from the Gachsaran Olefins 8 complex, with ethylene production of 1mn tpa when it goes online in 2013. These will include a 300,000tpa HDPE/LLDPE plant at Kazeroon, a 300,000tpa HDPE plant at Mamasani, a 300,000tpa HDPE plant at Dehdasht and a 300,000tpa HDPE plant at Boroujen in Charmahal va Bakhtiari. Supplies from Gachsaran will be supplemented by the two 1mn tpa crackers at the Kavyan Olefins 11 complex – which were scheduled to come online in 2009 but could take until 2012 – with the option of taking feedstock from the 500,000tpa cracker at the Morvarid complex, which was also scheduled for completion in 2009.

NPC

NPC is seeking more foreign JV partners to reach its targets and is in talks with Turkey's **Petkim** and Russia's **Sibur**. After visiting sites at Assaluyeh and Mahshahr, Sibur chair Dmitry Konov said that the company 'is quite ready to have a 50% share in an Iranian petrochemical project'. Petkim is discussing an investment in the Mahabad petrochemical complex and in a 1.65mn tpa methanol plant and a PE plant at Assaluyeh. Petkim has signed a preliminary contract with NPC to establish a methanol and PE complex in Iran. The facility will have a capacity of 300,000tpa, while the methanol plant will have a capacity of 1.65mn tpa. Costs have not been announced, but it will be a 50:50 JV.

In June 2009, NPC held an inauguration ceremony for **Mehr Petrochemical**, a JV in which **Itochu**, **Siam Cement** and **PTT Chemical** have a combined 60% stake, with NPC owning the remaining 40%. The complex at Assaluyeh is designed to produce 300,000tpa of HDPE. The complex, which began production in May 2009, produced 43,000 tonnes in its first three months of operations, of which 37,000 tonnes was exported generating US\$41mn of income. It is one of NPC's major projects implemented through a US\$230mn JV by the domestic private sector and foreign investors.

In March 2009, **Haldor Topsoe** said it was awarded the contract to provide process technology and other services for two world-scale methanol plants to be built at Assaluyeh, in which NPC has a stake. The units are scheduled to start up in 2013. **Marjan Petrochemical Company** and **Kimiaye Pars** will each build identical 1.6mn tpa plants and will issue invitations to local contractors to bid for the complexes. Each plant will cost US\$500mn. A total of six methanol plants are due to be constructed.

In December 2008, the Jam Petrochemical Complex (JPC), the world's largest ethylene production unit, was officially opened. The US\$2.2bn complex is based in Assaluyeh and has an ethylene production capacity of 1.32mn tpa. In addition, it has capacities of 306,000tpa of propylene, 600,000tpa of HDPE/LLDPE, 300,000tpa of PP and 443,000tpa of monoethylene glycol. The complex is owned by the **Social Insurance Investment Company** (25.8% stake), Iran's **Retirement Fund Investment Company** (24.5%) and NPC (49.7%). Construction began in 2000, but completion has been repeatedly delayed and the complex was brought online three years behind schedule, with the original date for completion end-2005. The causes of the delays included lack of funds and a shortage of skilled labour. The HDPE/LLDPE swing plant was started in Q108, but had to source ethylene feedstock from the Arya Sasol cracker until the Jam ethylene cracker came online. The MEG unit, part of the Jam complex, was being fed by the 1mn tpa Arya Sasol cracker pending the start-up of the Jam cracker. Delays to the Arya Sasol cracker, which came online in August 2007, led to the delays at downstream units.

In June 2008, NPC appointed **Linde** to carry out preliminary engineering work for a proposed Olefins 12 complex at Assaluyeh. This will involve projecting cost estimates for the **Persian Gulf Petrochemicals** project, which is scheduled to come online in 2014. In November 2008, NPC announced that it would

exclude polymer production from the project and would reduce the planned production capacity of ethylene from 1.8mn tpa to 600,000tpa and propylene from 900,000tpa to 350,000tpa. The ethylene and propylene produced by Olefins 12 would instead be used by NPC to feed other derivative projects. Downstream facilities would include HDPE and PP plants with capacities of 300,000tpa each, with surplus ethylene and propylene to be sold to other plants in Iran or exported. The involvement of Linde in Olefins 12 should help allay anxieties raised by the cancellation in mid-2006 of Linde's earlier contract for the Kavyan Petrochemical Olefins 11 complex in favour of **Technip**. Since then, NPC has struggled to recover the confidence of foreign investors, who are forced to spend up to US\$2mn to bid for a tender.

The final stage of the company's US\$325mm fourth methanol project is also due to come onstream at the time of writing and will have the potential to produce 1.65mn tpa of methanol, almost doubling the country's output. According to the Iranian government, Iran was responsible for 5.3% of the world's methanol production in 2007. This should increase to 10.1% when the No 4 project is completed. NPC awarded the engineering and supply contract for the project located in Assaluyeh to Germany's **Lurgi Oel Gas Chemie** and Iran's **Petrochemical Industries Design and Engineering Company (PIDEC)** in 2000. However, the NPC's methanol facilities were beset with power cuts to gas feedstock shortages during the cold winter.

In March 2008, **Laleh Petrochemical** – a JV of Iran's NPC, Sabic Europe and Iran's **Poushineh Industrial Group** – began production at its 300,000tpa LDPE project at Bandar Imam. The start-up of the LDPE plant had been delayed several times due to technical problems. Ethylene feedstock for the plant comes from **Marun Petrochemical's** 1.1mn tpa cracker. NPC's Marun cracker, as well as NPC affiliate **Amir Kabir Petrochemical's** 520,000tpa cracker – both located at Bandar Imam in Khuzestan province – restarted production in January 2008 after month-long outages. Technical problems at the central utilities units at Bandar Imam, which caused two outages, were mostly resolved by Q208, but the crackers and their derivative units had yet to achieve full output by March.

One of NPC's two 350,000tpa PTA lines operated by the subsidiary **Shahid Tondgouyan** company was shut in January 2009 and is not expected to return to production until the end of April, after 'mechanical problems' led to a *force majeure*. Although supplies to downstream units within Iran were not expected to be disrupted, the company stated that exports would be affected for January and beyond. It is thought that the PTA line could have been affected by an explosion, but company officials have refused to comment.

In July 2007, Ahmadinejad and Venezuelan President Hugo Chávez broke ground on a joint petrochemical complex in Assaluyeh. When completed in 2011, the plant will produce more than 1.6mn tpa of methanol. NPC has a 51% stake in the US\$1.4bn JV, while Venezuela will have a 49% stake. Iran-Venezuelan ties have been cemented by large-scale projects in the oil, petrochemicals and autos sectors. Iran aims to use the petrochemical partnerships to access markets in Latin America.

A new ethylene plant at the Morvarid petrochemical complex on Kharg Island was expected to be commissioned by the end of December 2006, but is now unlikely to come online until 2009 or 2010. Run by a unit of NPC, it will produce 550,000tpa of MEG, 50,000tpa of diethylene glycol (DEG), and 3,000tpa of tri-ethylene glycol (TEG). Over 160,000tpa of output will be exported, with the remainder used as feedstock for the adjacent olefin plant.

NPC has said it will build more new ethylene derivative plants. While nine were announced, some appear to be still in the planning stages. All will use feedstock supplied by the domestic inland ethylene pipeline, whose capacity is being expanded from 1.5mn tpa to 2.8mn tpa. The government hopes that the new plants will create jobs in several areas of the country that have high unemployment levels.

The Gachsaran complex will produce 500,000tpa of MEG, 50,000tpa of DEG, and 3,500tpa of TEG, and 100,000tpa of high purity ethylene oxide (EO). Output will be used mainly in downstream units to be set up at the same site adjacent to the ethylene glycol (EG)/EO facilities. A contract was awarded to a consortium of **Mitsui Engineering & Shipbuilding** of Japan and **Petrochemical Industries Design & Engineering Co** of Iran which calls for the provision of licence, basic and detailed engineering, procurement and supply of equipment, erection, construction, pre-commissioning, commissioning, start-up and performance tests. The plant will use **Shell** technology and is in the province of Kohgiluyeh and Boyer-Ahmad. It will be run by **Bakhtar Petrochemical**. The plant's feedstock includes 328,000tpa of ethylene supplied from the West Ethylene Pipeline, and 368,000tpa of oxygen from the existing complex.

The Kordestan plant will produce 300,000tpa of LDPE in various grades for domestic consumption and export. The plant will be based on **Basell's** Polyolefin Lupotech Technology. It will be located at Sanandaj, Kordestan province, north west Iran. A consortium consisting of **Tecnimont** of Italy and **PIDEC** of Iran has been awarded the engineering, procurement, construction and commissioning (EPCC) contract to construct the facility. This covers grant of licence, basic and detailed engineering, supply of equipment and materials, construction, erection, pre-commissioning, commissioning, start-up and performance tests. The plant will consume 303,000tpa of ethylene as feed, which will be supplied by the 11th olefin plant through the West Ethylene Pipeline. It will also use 1,000tpa of propylene sourced locally. In November 2006, during a visit to the region, President Ahmadinejad said the development of the complex would be fast-tracked so as to help support the local economy as soon as possible.

Mahabad Petrochemical will consist of a 300,000tpa swing linear low-density polyethylene (LLDPE)/HDPE plant and a 30,000tpa butene-1 unit. A consortium consisting of Italy's **Tecnimont** and **Nargan** of Iran will build the plant. The LLDPE/HDPE facility will be based on **Basell Spherilene** technology and the butene-1 technology will be provided by **Axens** of France. The contract calls for the supply of process technologies, engineering equipment and materials, technical assistance during construction, commissioning and start-up. **Nargan** will supply part of the detailed engineering and locally

made materials and equipment. The Mahabad plant will consume 324,000tpa of ethylene and is owned by Bakhtar. The plants are part of the NPC's Olefins-11 project.

Kermanshah Polymer will produce 300,000tpa of HDPE of different grades based on Basell advanced catalysts. It will use 305,000tpa of ethylene and 5,000tpa of butene-1 as feed, with the latter supplied by Mahabad Petrochemical. The EPCC contract for the facility has been awarded to a consortium of **Uhde** of Germany and **Sazeh** of Iran. It covers provision of licence, basic and detailed engineering, procurement and supply of equipment, construction, pre-commissioning, commissioning, start-up and test-runs. The plant is wholly owned by Bakhtar Petrochemical.

Pars Petrochemical

The Pars Petrochemical Zone was established in 1998 and surrounds the South Pars gas field, the world's largest, with an estimated 14tcm of gas and 18bn bbl of condensates. So far, the **National Iranian Oil Company** (NIOC) has scheduled a 24-phase development programme. Phases 1-3 and the first of phases 4-5 are onstream, while phases 6-10 are being built and negotiations are continuing to select contractors for the remaining phases. The average cost for each phase has been estimated at about US\$1bn. A second phase of petrochemical projects for South Pars was outlined in May 2006, with a total of US\$14bn worth of investment. Projects would include production of ammonia/urea, methanol and aromatics.

Technical problems have left **Farsa Petrochemical's** 400,000tpa MEG plant in Assaluyeh indefinitely shut down. The plant had attempted several start-ups in 2007, with the most recent failed attempt in February 2008. The plant's failure has been blamed on a number of problems including equipment, feedstock supply and the weather. By mid-2008 engineers had brought the plant online.

President Ahmadinejad and Venezuelan President Chávez inaugurated the Nouri Petrochemical Complex in June 2007, the world's largest aromatics project, although there is no Venezuelan input into the project. The complex had changed its name from Borzouyeh Petrochemical 4th Aromatics Complex in honour of the late Mohammad Nouri, a former managing director of the complex. It has a production capacity of 1.28mn tpa of paraxylene, orthoxylene, and benzene as well as 3.18mn tpa of by-products. The complex took six years to build, cost an estimated US\$913mn and has a capacity of 4.4mn tpa. Feedstock in the form of gas condensate will be sourced from South Pars 1-3, Jam and other projects. Once fully operational, the complex will produce 430,000tpa of benzene, 750,000tpa of paraxylene, 100,000tpa of ortho-oxylenes and 3.5mn tpa of associated products. Around half will be exported, NPC says.

There are several global petrochemical projects being commissioned by the **Pars Petrochemical Company**, an NPC subsidiary. Pars' complex includes a C2+ recovery and fractionation plant, a 645,000tpa ethyl benzene unit, a 600,000tpa styrene monomer (SM) plant and a 250,000tpa PS unit. Pars is also expected to produce 1.6mn tpa of ethane, 980,000tpa of propane, 570,000tpa of butane, 86,000tpa of mixed C5+, 14,000tpa of toluene and 6,000tpa of benzene. It is to consume 19.78mn tpa of natural gas

to be sourced from the South Pars gas field, 470,000tpa of benzene supplied by **Borzuyeh** and **Buali Sina** and 175,000tpa of ethylene supplied by the nearby Arya Sasol Petrochemical Complex.

Table: NPC Recent/Planning Stage Projects In The Pars Special Economic Zone

Project/company	Ownership	Products/capacity, '000tpa	Feedstock amount	Feedstock source
Ethane recovery, styrene and PS plants, Pars Petrochemical	NPC 100%	Ethane (1,600), styrene (367), PS (250), propane (980), butane (570), mixed C5+(86)	Natural gas (76mcm/y), benzene (470,000tpa), ethylene (175,000tpa)	Pars Oil & Gas, Buali Sina & Borzuyeh PC complexes, Arya Sasol Polymer
4 th aromatics, Borzuyeh Petrochemical	NPC 100%	Benzene (430), PX (750), OX (100), light/heavy ends (680/2,000)	Condensate (4.4mn tpa), pyrolysis gasoline (270)	Phases 1-3 of South Pars, Jam and other projects
12 th olefin, NPC (was due onstream 2008)	NPC 100%	Ethylene (1,100), propylene (466), LLDPE/HDPE (300), EGs (730), PP (300), butadiene (277), benzene (220), mixed xylene (128)	Condensate (3mn tpa), heavy ends (2.46mn)	Phases 4-5 of South Pars, heavy ends from aromatics 3 and 4
3 rd PTA, NPC (due onstream 2008)	NPC 100%	PTA (600)	PX (400), acetic (25)	Borzuyeh PC, Fanavaran
Mehr Petrochemical HDPE, NPC (onstream July 2009)	NPC 40%, foreign JV 60%	HDPE (300)	Ethylene (310)	Jam PC

Source: BMI, NPC, Petroenergy Information Network

Table: JV NPC Projects Planned, In Progress Or Completed In Petrochemical SEZ And Pars SEZ

Project/ownership	Products/capacity, 000tpa	Feedstock amount	Feedstock source
6 th olefin. Amir Kabir Petrochemical – Petchem SEZ NPC (69%), Iranian retirement & social security (15% each)	Ethylene (520), propylene (148), HDPE (140), LLDPE/HDPE (300), LDPE (300)	Ethane (233,000tpa) and butane (117,000tpa), raffinate (409,000tpa), light ends (350,000tpa), ethylene (233,000tpa)	Bandar Imam, Buali Sina, Marun
7 th olefin, Marun Petrochemical – Petchem SEZ NPC, Petroleum Ministry retire/welfare fund (20%) Pooshineh Polymer (5%)	Ethylene (1,100), propylene (200), HDPE (300), PP (300), EGs (443), EO (50), C3+ (168)	C2+ (3.8mn m3/d), butene-1 (5,000tpa), oxygen 299,000tpa, propylene (95,000tpa)	NIOC, import (later butane-1 from Jam PC), Fajr PC, import propylene
8 th olefin, Arvand Petrochemical – Petchem SEZ (1) NPC (60%), Petroleum retire/welfare fund (40%) (Expected onstream 2009)	Ethylene (1000), PVC (suspension, 300), PVC (emulsion, 40), liquid chlorine (570), EDC (885), VCM (340), caustic soda (635), EGs (610), MEG (600)	C2 (1.2mn tpa)	Bid Boland project No.2
PVC, Ghadir Petrochemical – Petchem SEZ Petrochemical Industries Investment Co (PIIC, 90%), Bandar Imam Petrochemical (10%)	PVC (120), VCM (150)	EDC and ethylene	na

Table: JV NPC Projects Planned, In Progress Or Completed In Petrochemical SEZ And Pars SEZ

Project/ownership	Products/capacity, 000tpa	Feedstock amount	Feedstock source
9 th olefin, Arya Sasol Polymer – Pars Special Economic/Energy Zone NPC (50%), Sasol Polymers (50%)	Ethylene (1000), MD/HDPE (300), LDPE (300)	Ethane (1.27mn tpa), propylene (4,200tpa), propane (5600tpa), hexane (870tpa)	Pars Petrochemical, propylene imports and later from Jam PC, Pars PC, hexane imports and later from Jam
10 th olefin, Jam Petrochemical – Pars (2) NPC (53%), Social security (24%), retirement (23%)	Ethylene (1,300), propylene (300), HDPE/LLDPE (300), HDPE (300), PP (300), EGs (443), alpha olefins (200), butadiene 1&3 (115)	Light ends (680,000tpa) & raffinate (380,000tpa) & condensate (83,000tpa), C2 (1.2mn tpa), C5+ (91,000tpa)	Borzuyeh PC, C2 from Pars PC and Parisan Project and South Pars Oil & Gas
11 th olefin*, NPC – Pars NPC (75%), Petroleum retire/welfare fund (25%) (Expected onstream 2008)	Ethylene (1,200), HDPE (300), LLDPE/HDPE (300), EGs (700), styrene (600)	Ethane (1.5mn tpa), benzene (477,000tpa), oxygen (481)	All from 4,5,9,10 phases of South Pars
LDPE, Laleh Petrochemical – PC SEZ NPC (45%), Sabic Euro Petrochemicals (30%), Pooshineh Baft (25%)	LDPE (300)	Ethylene (306,000tpa) & propylene (5%)	Marun PC
Isocyanates, Karoon Petrochemical – PC SEZ NPC (40%), Chematur (30%), Hansa Chemie (30%)	TDI (40), MDI (40)	Chlorine (60,000tpa), CO (24,000tpa), benzene (26), toluene (25), nitric acid (35)	Bandar Imam PC Fanavaran PC, Buali Sina PC, Imam & Esfahan PC, acid imports and Shiraz PC then later from Karoon PC
3 rd methanol, Fanavaran Petrochemical – PC SEZ NPC (52%), Social security (17%), Petroleum retire/welfare fund (15%), retire org (16%)	Methanol (1,000)	Natural gas (861mcm/y), C02 (330,000tpa)	NIGC, Razi and Marun Petrochemical complexes
4 th methanol, Zagros Petrochemical – Pars NPC (52%), Alyaf Morvarid & Pooshineh Industrial (33%), Petroleum min retire/welfare fund (15%)	Methanol (1,650)	Natural gas (188,000 cubic metres/h), oxygen (2mcm/d)	Pars Oil & Gas, Mobin PC
6 th methanol, Zagros Petrochemical – Pars NPC (52%), Alyaf Morvarid and Pooshineh Industrial (33%), Petroleum Min retire/welfare fund (15%)	Methanol (1,650)	Natural gas (1.5mcm/d), oxygen (960,000tpa)	Pars Oil & Gas, Mobin PC
4 th ammonia/urea (Assaluyeh-1), Pardis Petrochemical – Pars NPC (49%), Ghadir Investment Co (51%)	Ammonia (680), urea (1,080), ammonium sulphate (10)	Natural gas (640mcm/y)	Pars Oil & Gas
6 th ammonia/urea (Assaluyeh-2), Pardis Petrochemical – Pars NPC (49%), Ghadir Investment Co (51%)	Ammonia (680), urea (1.08mn), ammonium sulphate (10)	Natural gas (670mcm/y)	Pars Oil & Gas

Table: JV NPC Projects Planned, In Progress Or Completed In Petrochemical SEZ And Pars SEZ

Project/ownership	Products/capacity, 000tpa	Feedstock amount	Feedstock source
Hamadan PVC, Hegmataneh Petrochemical – Hamadan NPC (33%), private sector (57%), <i>Industrie Generali SA</i> (10%)	PVC suspension (680), PVC compound (9)	VCM (36,000tpa)	Imports and Ghadir Petrochemical

SEZ = Special Economic Zone; * Status unclear. Source: BMI

Iran-Turkey Relations

Turkish firms are seeking to make acquisitions in Iran, which is emerging as one of the world's largest petrochemicals producers. The Iranian government plans to privatise a number of petrochemicals companies. The current privatisation programme involves an initial public offering (IPO) of 5% of the firms being privatised. Once 5% is public, firms can establish a market price from which further offerings can be based.

In February 2008, the Turkish fertiliser firm **Gubre Fabrikalari** said it had won the approval of the Iranian government to buy the country's state-owned **Razi Petrochemical Company** (RPC). Gubre Fabrikalari has a 50% stake in a consortium, which offered US\$679mn for the acquisition. RPC is the largest producer of ammonia, urea, fertilisers, sulphuric acid, sulphur and the only producer of phosphoric acid and DAP in Iran.

Iran-Indonesia Relations

Indonesia and Iran are moving towards closer cooperation in the oil and petrochemicals industries. In March 2008, Iran and Indonesia signed their first JV agreement for the Hengam Complex in Iran, which will manufacture fertiliser, urea and ammonia. The JV investment is estimated to cost US\$726mn, with **PT Pusiri** of Indonesia and **Hengam Petrochemical Company** each funding 50% of the project. The production capacity of this unit, which is located in Assaluyeh, is 1.7mn tpa of urea and ammonia. The project will take four years to implement.

Iran and Indonesia have agreed to jointly construct a refinery and petrochemicals plant in the South East Asian country. The construction of the 30,000b/d refinery will cost US\$5bn-6bn. The two sides also agreed on the joint construction of a factory for producing gas condensates in the southern Iranian city Bandar Abbas. The deal is expected to significantly increase Iran and Indonesia's trade volume, which currently stands at US\$410mn annually.

Industry Developments – Related Industries

At the end of 2009, Iran had six large refineries with around four smaller facilities of less than 100,000b/d. Estimates of refining capacity vary wildly owing to the lack of reliable data from the country. The OGJ World Refining Survey said that as of January 2010, Iran has nine refineries with a total capacity of 1.45mn b/d, while the BP Statistical Review of World Energy (June 2008), on which **BMI**'s forecasts are based, put capacity significantly higher at 1.83mn b/d.

In order to meet rising domestic demand for fuels (gasoline demand is growing at around 9% per annum), Iran plans to increase its refining capacity. One goal of this expansion is to allow Iran's refineries to process a heavier crude slate. In February 2010, the government indicated that it plans to build seven oil refineries in the country by 2013, doubling the country's total to 14. The new refineries, which will be operated by **National Iranian Oil Refining and Distribution Company** (NIORDC), will meet domestic demand and provide excess output of oil products for export. Two refineries, Persian Gulf Star and Hormoze, will be built at Bandar Abbas; the Caspian refinery will be constructed at Neka in the north of the country; the Khozestan refinery will be built at Abadan; the Pars refinery will be constructed at Shiraz; the Anahita refinery at Kermanshah; and the Shariar refinery at Tabriz.

BMI is sceptical as to whether many of these refineries will be onstream on schedule. While we see scope for increases in capacity over the coming years, we believe that the Persian Gulf Star refinery is the only project with a realistic chance of coming onstream by 2015. We see capacity increasing from an estimated 2010 level of 1.9mn b/d to 2.25mn b/d by 2014. Longer term, however, there is scope for capacity to continue to increase to 2.9mn b/d by 2020, although this could depend upon continued levels of investment as well as the role of international sanctions.

The other potential wildcard in the refining sector is China, which has been touted as a potential investor in several refining projects. A report in the Iranian oil ministry's Shana news service in 2009 claimed that a number of memorandums of understanding on refining projects were signed during a visit to Beijing by an Iranian delegation headed by NIORDC managing director Nureddin Shahnazizadeh. The agreements were said to include one calling for Chinese investment of US\$2-3bn in the Abadan and Persian Gulf Star refineries. China could also have an impact on Iranian refining projects through refined product exports, which could decrease the pressure on Iran to construct its own facilities. In September 2009, Chinese state-owned oil companies started selling gasoline via intermediaries to Iran, reported the Financial Times. According to the report, Chinese companies are supplying 30,000-40,000b/d to Iran, making up about a third of the country's total gasoline import needs.

Business Environment

Petrochemicals Business Environment Ratings

Table: Middle East And Africa Petrochemicals Business Environment Ratings

	Limits of potential returns			Risks to realisation of returns			Petrochemicals rating	Rank
	Petrochems market	Country structure	Limits	Market risks	Country risk	Risk		
Saudi Arabia	83.3	67.2	77.7	60.0	69.5	66.6	74.4	1
Qatar	60.0	55.4	58.4	85.0	71.7	75.7	63.6	2
UAE	53.3	69.1	58.8	70.0	65.6	67.0	61.3	3
Kuwait	46.7	74.9	56.5	40.0	72.8	63.0	58.5	4
Iran	73.3	47.6	64.3	10.0	52.8	40.0	57.0	5
Israel	33.3	78.8	49.2	70.0	68.7	69.1	55.2	6
South Africa	43.3	57.4	48.3	80.0	57.6	64.3	53.1	7
Egypt	43.3	53.8	47.0	40.0	63.1	56.2	49.7	8
Turkey	40.0	48.0	42.8	75.0	47.1	55.5	46.6	9
Algeria	23.3	49.6	32.5	40.0	55.4	50.8	38.0	10
Nigeria	10.0	29.1	16.7	20.0	47.0	38.9	23.3	11

Scores out of 100, with 100 the highest. Source: BMI

Iran's overall business environment is unattractive in a regional context. While long-term economic risk is moderate, the political risk is above average. The state benefits from a high reserves-to-production ratio (RPR) thanks to vast and largely untapped oil and gas reserves. There is a restrictive licensing regime for international oil companies (IOCs) and significant state control/ownership in the upstream segment. IOC involvement is limited, restricted by the risk of UN/US sanctions resulting from the nuclear energy dispute and accusations of Iranian involvement in terrorism. This has had a deleterious impact on downstream industries which, delayed due to engineering problems, has restricted access to international financial markets, placed high risk premiums on borrowing and led to problems with feedstock supplies. **BMI's** method of risk-scoring in the petrochemicals sector comprises dynamic scores that reflect on future growth as well as current capacities and the size of the internal market, along with investment risk assessments of the political, economic and regulatory environments. This quarter, Iran has maintained its fifth-place rank with 57.0 points, due to continuing expansion in petrochemicals capacities. With the state sector dominating the petrochemicals industry, Iran's Market Risks score is low, with high levels of economic and political risk pulling down its score. In order for an improved score and ranking, Iran needs

a more positive political risk outlook and a breakthrough in terms of the regulatory regime. This looks unlikely on a short to medium-term view.

Limits Of Potential Returns

This rating is a composite of the domestic Petrochemicals Market score and the Country Structure score, which assesses physical, financial and trade infrastructure. In this category, Iran scores 64.3 points, the second highest in the region after Saudi Arabia. A poor regulatory and investment environment is counter-balanced by internationally significant hydrocarbons reserves.

In terms of Iran's Petrochemicals Market rating, which measures our combined scores for current capacity in ethylene and polymer production as well as five-year growth projections for cracker capacities, Iran's strong position and highly dynamic growth in this category means in regional terms it comes second in this rating with 73.3 points. At present, Iran accounts for 12% of the Middle East's petrochemical output, but aims to reach 34% by the end of the 20-year Outlook Plan (1995-2015), with 98mn tonnes output, of which 75% will be exported. By 2024, Iran is expecting to capture 36% of the total petrochemicals production in the Middle East, which will be 6% of the total world production of petrochemicals. Iran wants to produce 70mn tpa of petrochemicals by 2015 – a substantial increase on the 30mn tpa currently. NPC has outlined plans to invest US\$12.3bn in 27 petrochemicals projects as part of the fifth five-year socioeconomic development plan (2010-2015). If this target is met, the country will become one of the top two petrochemical producers in the Gulf. However, BMI is doubtful that it will achieve these targets in the current political environment. Nevertheless, Iran will maintain its position as the region's second largest petrochemicals producer over the next five years.

The Country Structure rating comprises BMI's scores for financial and physical infrastructure and trade bureaucracy. In this category, Iran scores a poor 47.6 points and remains the worst performing country in the region. Iran's largest banks are subject to sanctions by the US government, while the economy is heavily protected with high tariffs and price controls.

Risks To Realisation Of Returns

This rating comprises the ratings for Market Risks and Country Risk, weighted towards Market Risks. In this category, Iran scores just 40.0 points, down 1.0 point since the previous quarter.

Iran's Market Risks rating measures the regulatory environment of the petrochemical sector. Iran scores a woeful 10.0 points in this category. State-owned 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 are having a deleterious impact on the progress of existing projects, with producers finding it difficult to tap international financial markets, forge partnerships with petrochemicals majors and import specialist equipment.

In terms of its Country Risk rating, which covers the long-term economic, financial and political risks, as well as the structure of the economy, Iran scores well below the regional average for its regulatory environment, with 52.8 points, 1.5 points less than in the previous quarter due to increased investor wariness, which has resulted in a decline in long-term external and financial market scores. Market economics is not as entrenched within the system as in other regional states, reflecting the innate conservatism and desire for centralisation of the religious hierarchy. Uncertainty will continue to dominate Iranian politics as tensions over Tehran's nuclear ambitions persist and the domestic power struggle between the different factions of the political landscape continue. We do not anticipate any robust punitive action being taken against Tehran and as such believe that uncertainty, diplomatic efforts and the US financial squeeze on the Iranian economy will continue. Political uncertainty, imprudent economic policymaking and increasing dependence on oil to fund the president's spending splurge will continue to hurt the Iranian economy, and we do not expect a major shift in policy under the current administration. The headline figures remain positive. The current account will stay in positive territory and real GDP growth remains robust, but both are heavily dependent on the inflow of oil revenues. While other oil states are reaping record windfalls and diversifying thanks to record crude prices, Iran has been running historically high budget deficits.

Industry Forecast Scenario

The petrochemicals industry has become an important aspect of Iran's non-oil economy and the basis of the country's economic diversification. About 40% of non-oil exports totalling US\$6.5bn were from the petrochemicals industry in FY09/10. Ordinarily this would attract foreign investment, but Iran's increasing political isolation and economic problems have made the country a risky prospect for petrochemicals majors and financiers. As with upstream sectors, an increasing number of foreign companies are abandoning the petrochemicals industry, fearing the risks posed by the sanctions against Iran. Western European firms are being followed by companies from Russia, which has been regarded as less hostile to Iran than the US. Russian companies such as oil and gas trader **Vitol** and oil company **Lukoil** have suspended work in Iran because of Western economic pressure and signs of growing impatience in Moscow with Tehran over its stance on its nuclear programme. This will have an impact on investment prospects for petrochemicals in terms of joint ventures and the security of feedstock availability.

BMI estimates that Iranian petrochemicals output totalled around 30mn tonnes in 2009/10, an increase of 13% y-o-y. Output has been lifted by increased capacity and domestic demand faring better than expected, although exports are unlikely to have reached the targets the government had set. Ethylene exports from Iran plunged in 2009 to about 450,000 tonnes from 700,000 tonnes in 2008. Nevertheless, weaknesses remain and **BMI** estimates that Iran's petrochemical output in 2009/10 was below the 80-85% capacity utilisation rate we consider financial sustainable.

Growth in output correlates with a recovery in real credit growth, although consumption is kept artificially high through massive state subsidies. High levels of government debt will have an impact on the economy, with the inevitable reduction in subsidies leading to a collapse in domestic demand. Economic sanctions and an unsustainable fiscal position will force some sort of adjustment in the government finances in the near future. The economy is estimated to have grown by just 1.6% in 2009/10, well below the government's target of 8.0%. Real GDP growth is not expected to return to the levels seen in the recent oil boom for many years to come with rates at 3-4% over the next 10 years. As such, the problems facing the petrochemicals industry have simply be delayed rather than resolved and slower rates of growth are expected.

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 verging on fantasy. 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.

A US\$25bn investment outlay is planned for 2010/11 to help meet these targets with the beginning of the construction of 46 new petrochemicals projects adding 50mn tpa to capacity. Twenty-nine projects are underway at the cost of US\$18bn, adding 22.5mn tpa to current production capacity. In Q110, NPC commissioned six petrochemical complexes at Bandar Assaluyeh, including a complex with capacity for 645,000tpa of ethyl benzene and 600,000tpa of styrene belonging to NPC subsidiary **Pars Petrochemical**; a 1.65mn tpa methanol complex owned by **Zagros Petrochemical**; and a 245,000tpa butadiene plant operated by **Jam Petrochemical**. Several new jetties at the Pars petrochemical port at Assaluyeh were also completed, bolstering its position as one of the major specialised ports in the Middle East for exporting petrochemical products. It has capacity to export 35mn tpa of liquid and solid products.

International sanctions stemming from Iran's nuclear programme will continue to preclude any significant uptick in foreign investment in the petrochemicals industry, undermining Iran's goal of using foreign capital and expertise in the expansion of the industry. The prospects for Iran being able to attract substantial FDI inflows over the coming years remain poor, although they have never been great and, as with other areas of the economy, the petrochemicals industry will continue to suffer from chronic underinvestment. The UN, US and EU sanctions relating to Iran's nuclear programme, which target key sectors of its economy such as oil, gas and petrochemicals, will keep potential investors away, particularly from the West. However, the door remains open for investors from China and Russia, although these may not have sufficient capital to make up for the decline in Western investment and they are also keen to develop their own domestic capacities. In addition, in September 2009, an EU investigation into unfair trading practices led to threats of antidumping tariffs against Iranian PET production. Although PET represents only a small share of Iranian petrochemicals exports, there is concern that more products will be affected by EU tariffs if they are found to be flouting European anti-dumping rules.

The Ministry of Petroleum has set targets for annual production of 11.5mn tpa of ethylene and 11.5mn tpa of polymer. **BMI** forecasts that by 2014, ethylene capacity will total 7.88mn tpa, with other capacities including 7.06mn tpa of PE and 1.29mn tpa of PP. LDPE will contribute 43% of the 3.7mn tpa expansion in the PE sector, followed by HDPE (33%) and LLDPE (24%). The growth in the importance of LDPE in the Iranian petrochemical industry goes against global market trends that increasingly favour LLDPE as a substitute. LLDPE possess a higher tensile strength than LDPE, but with lower thickness and greater transparency than HDPE. LLDPE is steadily eroding LDPE market share as it allows lower gauges that can reduce costs for many applications. Consequently, **BMI** anticipates a gradual fall in LDPE demand, undermining the profitability of Iranian LDPE production.

Areas where Iran is falling behind are the vinyls and styrenes segments. With PVC capacity set to reach just 700,000tpa and PS capacity of only 250,000tpa by 2014, Iran risks becoming more dependent on imports. However, with PVC and PS prices likely to come under pressure, at least over the next 2-3 years, **BMI** does not believe the markets in these petrochemical products will be strong enough to justify export-

orientated production, which is the industry's chief motivation for expansion. However, **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.

The fall in oil prices will have varying effects on the Iranian petrochemical industry. New cracker capacity is utilising ethane from the country's gas resources. As oil prices diminish, so do naphtha prices, bringing them more into line with the price of ethane, which was significantly lower than naphtha in 2008 when oil prices rocketed to record levels. Consequently, Iranian petrochemicals producers will find the export market increasingly competitive at a time of economic downturn. On the upside, Iran's development of gas fields and the depreciation of the rial should give the Iranian petrochemical industry a competitive edge on export markets.

Investor wariness will not just affect on 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.

Table: Iran's Petrochemicals Industry, 2006-2014 ('000 tpa, unless otherwise stated)

	2006	2007	2008	2009e	2010f	2011f	2012f	2013f	2014f
Oil production, '000 b/d	4,282	4,322	4,325	4,175	4,200	4,250	4,300	4,450	4,500
Oil consumption, '000 b/d	1,693	1,693	1,730	1,675	1,725	1,786	1,839	1,894	1,951
Oil exports, '000 b/d	2,589	2,629	2,595	2,500	2,475	2,464	2,461	2,556	2,549
Gas production, bcm	109	112	116	125	142	155	165	190	210
Gas consumption, bcm	109.	1,13.0	118	117	125	132	142	148	154
Gas exports, bcm	0.0	-1.1	-1.3	8.0	17.0	23.0	23.0	41.6	55.7
Refining capacity, '000 b/d	1,737	1,822	1,832	1,900	2,000	2,000	2,000	2,000	2,250
Ethylene capacity	2,406	2,406	5,306	5,376	5,376	5,376	7,376	7,376	7,876
Propylene capacity	na	na	na	1,300	1,340	1,430	1,870	1,960	2,410
Benzene capacity	na	na	na	1,090	1,090	1,090	1,090	1,090	1,390
Toluene capacity	na	na	625	625	625	625	625	625	825
Butadiene capacity	na	na	125	240	240	240	240	240	240
Styrene capacity	na	na	0	95	695	695	695	695	1,295

Table: Iran's Petrochemicals Industry, 2006-2014 ('000 tpa, unless otherwise stated)

	2006	2007	2008	2009e	2010f	2011f	2012f	2013f	2014f
ABS capacity	na	na	90	90	90	90	290	290	290
Styrene butadiene rubber capacity	na	na	90	90	90	90	90	90	90
Xylenes capacity	na	na	1,410	1,590	1,590	1,590	1,590	1,590	1,690
Ethylbenzene capacity	na	na	100	100	100	100	100	100	100
Ethylene dichloride capacity	na	na	360	360	700	700	700	1,260	1,260
Ethylene glycol capacity	na	na	850	950	950	1,950	1,950	1,950	1,950
Ethylene oxide capacity	na	na	770	870	870	1,770	1,770	1,770	1,770
HDPE capacity	na	na	885	1,485	1,485	1,785	1,785	2,385	2,685
LDPE capacity	na	na	775	775	775	775	2,075	2,375	2,375
LLDPE capacity	na	na	1,095	1,095	1,095	1,095	1,395	1,995	1,995
PE capacity	1,420	1,555	2,755	3,355	3,355	3,655	5,255	6,755	7,055
PP capacity	310	440	1,040	1,040	1,040	1,040	1,040	1,040	1,290
Vinyl acetate capacity	na	na	30	30	30	180	180	320	320
Vinyl chloride monomer capacity	na	na	140	290	630	630	630	930	930
PVC capacity	na	na	60	60	400	400	400	700	700
PS capacity	na	na	0	0	250	250	250	250	250
Polyethylene terephthalate	na	na	310	310	705	705	705	705	705
Methanol capacity	na	na	na	5,345	5,345	5,345	8,865	11,505	14,705
Ammonia capacity	na	na	2,230	2,910	4,250	4,930	4,930	6,365	6,365
Urea capacity	na	na	3,290	5,470	6,330	7,405	7,405	10,620	10,620

e/f = BMI estimate/forecast; na = not available/applicable. Source: NPC, BMI, World Cracker Report, CMAI (PE/PP annual growth rates)

Macroeconomic Outlook

More Upbeat Growth Outlook For FY10/11

The Iranian economy has passed through the bottom of the economic cycle, though in line with our outlook for the global economy as a whole, we expect the recovery to be relatively weak. The oil sector will remain critical; our oil price forecasts for the coming years inform our more sanguine outlook.

After two years of poor growth, we project the Iranian economy to rebound in FY10/11 (note: Iranian years start/end in March). Given that official real GDP data are way out of date – the most recent figures are for the first half of FY08/09, effectively Q208 and Q308 – we base our view that Iran has passed through the bottom of its economic cycle and that growth is now on an upward trajectory on a number of other factors. Indeed, robust global oil prices, rising real credit growth and (relatively) low domestic inflation should all have positive repercussions.

That said, we do not expect the domestic recovery to be particularly strong: after coming in at an estimated 1.6% in FY09/10, we forecast real GDP growth to rise to 3.4% and 3.7% in FY10/11 and FY11/12 respectively. We highlight that our projection for real growth to average 3.5% per annum over the course of our five-year forecast period (out to FY14/15) is considerably less than the average annual expansion of 5.6% recorded between FY03/04 and FY07/08 during the global oil boom. It is also far lower than the nearly 8% annual growth target that Tehran announced in January 2010 (with few supporting details) for the next five years (FY10/11-FY14/15).

Oil Sector Remains Crucial

Iran was the fourth-largest crude oil producer in the world in 2008 (according to the BP Statistical Review of World Energy, June 2009), and in FY07/08, the oil sector accounted for 27.0% of nominal GDP. We see oil output remaining almost flat over the forecast period. This means that the sector will hardly directly contribute to real GDP growth, and will see its share of nominal GDP fall steadily over the next five years. Nonetheless, hydrocarbons will remain Iran's most important industry for the foreseeable future, with oil being Iran's principal export, typically accounting for 80-85% of total goods export revenues, a proportion we do not expect to fall appreciably over the coming years. Moreover, these revenues account for over 50% of the central government's total budgetary income. Our relatively bullish oil price forecasts therefore bode well for Iran's economic growth prospects.

We see the OPEC Basket averaging US\$83/bbl and US\$85/bbl in 2010 and 2011 respectively, and thereafter, we see US\$90/bbl as its longer-term equilibrium price. As oil export revenues are recycled into the wider economy through the banking system and via government spending, the hydrocarbon sector will continue to be an indirect driver of economic expansion.

Robust oil prices will drive solid banking sector deposit growth over the coming years, allowing for increased loan growth. This will consequently support investment growth. In addition, higher oil prices will give the government scope to continue pursuing an expansionary fiscal policy. True, even when we were pencilling in lower oil prices, we still expected Tehran to spend heavily. Nonetheless, higher oil

prices will place (even) fewer constraints on this expansionary fiscal policy, and will mean that the government's 'rainy day' Oil Stabilisation Fund (OSF) may take longer to run dry (as we expect it to do eventually).

Loan Growth (Slowly) Recovering

The latest banking sector data support our view that the economy is on the road to recovery, although this may not be apparent at first glance. Indeed, total bank credit growth came in at 11.8% y-o-y in August 2009 (the latest data available at the time of writing), only marginally above the 2009 low of 10.4% recorded in May. This is extremely sluggish by historical standards: between 1998 and mid-2008, credit growth was typically in the 30-35% y-o-y range, peaking at 40.4% in July 2007. Real GDP growth came in at 7.8% in FY07/08 during the height of this bank loan book expansion; the rapid collapse in credit growth since then mirrors the slowdown in the domestic economy.

In spite of the fact that nominal credit growth was still subdued in August, when we strip out consumer price growth to give real credit growth, there are some grounds for mild optimism. Real credit growth came in at -1.1% y-o-y in August, up from a nadir of -9.7% in December 2008, and could well have moved into positive territory in H209 for the first time since July 2008. This pick up in real credit growth should lead to increased real investment growth, supporting a recovery in the overall economy as we move into 2010.

Lower Inflation Underpins Outlook

One of the most important factors underpinning our growth outlook is that some semblance of price stability has returned to the domestic economy. Consumer price inflation (CPI) came in at a multi-year low of 7.4% y-o-y in November and December 2009, and though we do see it moving into the double-digits in 2010, we nonetheless do not expect a return to the very high inflation rates of nearly 30% witnessed in 2008. Relatively stable prices (by Iranian standards) will provide a platform for improved economic growth.

We illustrate the deleterious effects of high CPI by reference to recently released real GDP data. In Q208 and Q308, at the height of the oil price spike, the Iranian economy expanded by just 3.5% and 1.1% in each quarter. This marks a significant slowdown from the 7.8% real GDP growth recorded in FY2007/08. Looking at GDP by expenditure, the main culprit of the slowdown in economic growth in FY2008/09 was private consumption, which has historically accounted for around 45% of nominal GDP. In Q208 and Q308, real private consumption growth came in at 2.4% and -7.1% respectively. In our view, this slowdown is clear evidence of the impact of high inflation rates – CPI averaged 25.3% and 27.7% y-o-y in Q208 and Q308 respectively.

Now that inflation has eased considerably, the prospects for private consumption growth have improved considerably. True, the slowing economy has largely been responsible for this disinflation, meaning that it might seem strange to consider this slowdown a 'positive' with regards to future private consumption growth prospects. However, for the economy to rebound it was essential for inflation to be brought back down to manageable territory (low double digit inflation rates are the norm in Iran).

Subsidy Cuts Could Hold Back Recovery

The corollary to the above analysis is that if the government managed to push through its proposed subsidy cutting programme, which is by no means guaranteed, the economic recovery that we are pencilling in could falter. Currently being held up in parliament, if approved, the proposals could increase the cost of living for many (if not most) Iranians. This would force Iranian consumers to spend a higher proportion of their incomes on basic goods whose prices had previously been kept artificially low. As a result, the plan would likely put a brake on real private consumption growth.

On the other hand, any attempt by the government to rein in the budget deficit, which we forecast to come in at 6.8% of GDP in FY10/11, before steadily dropping to a still sizeable 3.6% of GDP by FY14/15, is positive. A major reason behind the government's poor financial position is that state subsidies consume around US\$90-100bn annually (over 30% of GDP). They also encourage wasteful overconsumption. For example, gasoline prices in Iran are among the cheapest in the world.

In our view, such extensive subsidies on gasoline are not justifiable by Iran's macroeconomic fundamentals. We estimate that in FY2009/10, Iran's GDP per capita was US\$4,556, putting it in 75th position of the 152 countries we collect data for. More rational pricing of currently subsidised goods would, in theory, lead to a more efficient allocation of resources through the economy, and could in turn raise the level of potential GDP growth in Iran. Moreover, if the OSF does indeed run dry at some stage in the near future, the government will likely have to resort to domestic borrowing to finance its fiscal shortfalls. Such a course of action could crowd out private investment.

Political Turmoil Risks

Historical precedent suggests that if the ongoing, though sporadic, political protests against Ahmadinejad's government were to increase in size over the coming months and quarters, economic activity could be disrupted, impacting real GDP growth. In FY78/79, real GDP contracted by 7.5% as gradually intensifying popular protest over the course of the year impeded economic activity and eventually led to removal of the Shah close to the end of the fiscal year. The scale of the current protests is most likely too small to have much of an effect on real growth, but if they were to escalate in a similar manner to thirty years ago, the short run effects on growth could be comparably negative.

A year after the Shah fell in 1979 the economy contracted by a further 7.1% in real terms. The advent of the Islamic Republic led to considerable foreign investment outflows from the country. However, if the opposition was ultimately successful in ushering in a more liberal and democratic government, the impact on real GDP growth could, by contrast, be positive, especially if a new government set about mending its relations with the international community.

Further Risks To Outlook

There are both upside and downside risks to our real GDP projections stemming from our oil price forecasts. Furthermore, if the standoff between the West and Iran over the latter's nuclear programme is resolved peacefully then the various sanctions against Iran could be rescinded. This could lead to a large increase in much needed foreign investment into Iran's oil and gas sector, potentially boosting output

levels - and, as a result, real GDP growth rates. Harsher sanctions would place downside risks on our growth forecasts; though considering that existing measures have typically restricted FDI inflows to less than 2% of gross fixed capital formation, their impact on headline growth would likely be small.

Table: Iran Economic Activity, 2007-2014

	2007	2008	2009e	2010f	2011f	2012f	2013	2014
Nominal GDP, IRRbn ¹	2,654,948	3,252,626	3,371,147	3,971,422	4,600,719	5,370,612	6,165,853	6,957,017
Nominal GDP, US\$bn ¹	286.3	340.0	338.0	390.4	439.1	497.6	554.6	607.6
Real GDP growth, % y-o-y ¹	7.8	1.7	1.6	3.4	3.7	3.7	3.5	3.2
GDP per capita, US\$ ¹	3,952	4,638	4,556	5,199	5,782	6,480	7,142	7,737
Population, mn, January- December year ²	72.4	73.3	74.2	75.1	75.9	76.8	77.7	78.5
Unemployment, % of labour force, end of period ³	11.9	12.5	14.0	13.5	13.0	12.5	12.0	12.0

NB Iranian calendar year (begins March) used, unless otherwise stated; e/f = BMI estimate/forecast. Source: ¹ Central Bank of Iran, BMI; ² IMF/BMI; ³ Statistical Centre of Iran

Company Profiles

Karoon Petrochemical Company

Overview

Karoon Petrochemical Company (KRNPC) was the first international 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 80,000tpa 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 (US\$462.19mn). It will be responsible for marketing the plant's output in Europe.

In March 2009, the first phase of the KRNPC complex was completed, adding 180,000tpa of basic petrochemical production capacity.

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National Petrochemical 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.

Strategy And Projects

NPC is investing more than US\$25bn in the petrochemical sector in FY06/07-10/11. The second unit of the fourth methanol plant in the Zagros Petrochemical Complex in Pars opened in March 2007. The plant will produce 1.65mn tpa of methanol. Building on an ammonia and urea production project was due to begin in Shiraz in H107. The work is due to take three years, but no costs have been given.

The Bandar Imam Maroun Olefins-7 expansion project came online in August 2006. The project raised ethylene capacity from 550,000tpa to 1.1mn tpa. Once fully commissioned, the plant will produce 300,000tpa of PE, 300,000tpa of PP, 440,000tpa of ethylene glycol and 83,000tpa of benzene pyrolysis, ethylene oxide and heavy propane. In December 2006, production was suspended at the Olefin-7 cracker due to a cut in the supply of gas feedstock amid severe cold weather and high domestic consumption. The Maroun cracker came back online in January 2007, but was only operating at 65% of capacity. The move to restrict feedstock supplies during cold weather came despite assurances by NIGC to maintain supplies to petrochemicals plants. The cuts were just the latest in a series of problems for Olefin-7, which had been due to come online in July 2008, but was delayed until end-November due to technical difficulties.

A new ethylene plant at the Morvarid petrochemical complex on Kharg Island was to be commissioned, but has yet to open. Run by a unit of NPC, it will produce 550,000tpa of MEG, 50,000tpa of DEG, and 3,000tpa of TEG. Over 160,000tpa of output will be exported, with the remainder used as feedstock for the adjacent olefin plant.

NPC has announced that it will now build more new ethylene derivative plants. While nine were announced originally, some appear to be still in the planning stage. All will use feedstock supplied by the domestic inland ethylene pipeline, whose capacity is currently being expanded from 1.5mn tpa to 2.8mn tpa. The government hopes the new plants will create jobs in several areas of the country that have high unemployment levels.

NPC brought its Ghadir urea/ammonia facility onstream in June 2006. Located in the Pars Special Economic/Energy Zone at Assaluyeh, the plant will produce 680,000tpa of ammonia and 1,075,000tpa of urea in its first phase. The Pars Oil & Gas Company will supply natural gas feedstock. NPC has a 49% stake in the facility, with the remaining 51% owned by Ghadir Investment.

Key Statistics

- Annual sales volume: US\$5.0bn (FY04/05e) US\$2.019bn (FY03/04)
- Net profit: US\$468mn (FY03/04)
- No. of employees: 19,371 (2002)
- Established: 1964

Key Personnel

- Chair/Minister of Petroleum: Gholam Hossein Nozari
- President/Vice-chair: Gholam Hossein Nejabat
- Managing director, PIDMCO: Hossein Aghaee
- Managing director, NPC International: Mohammad Hadi Rahbari
- Production control director: Reza Afshin

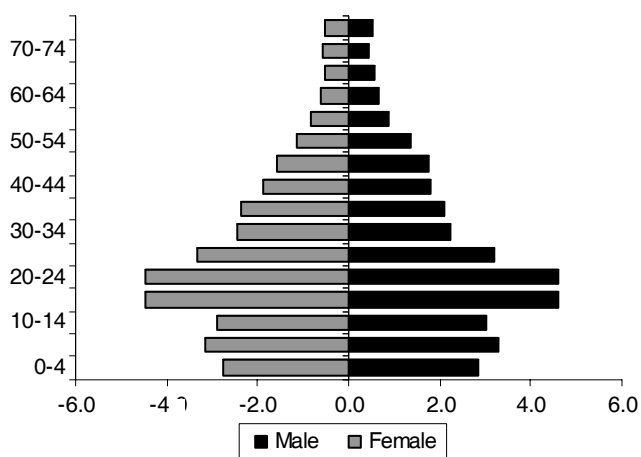
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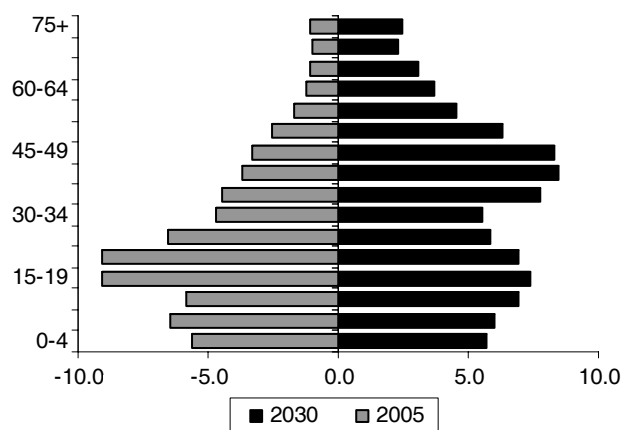
Country Snapshot: Iran Demographic Data

Section 1: Population

Population By Age, 2005 (mn)



Population By Age, 2005:2030 (mn, total)



Source: UN Population Division

Table: Demographic Indicators, 2005-2030

	2005	2010f	2020f	2030f
Dependent population, % of total	31.3	30.4	31.0	28.9
Dependent population, total, '000	21,133	21,985	26,185	26,373
Active population, % of total	68.6	69.5	68.9	71
Active population, total, '000	46,336	50,311	58,060	64,778
Youth population*, % of total	26.6	25.8	25.2	20.4
Youth population*, total, '000	17,948	18,658	21,283	18,611
Pensionable population, % of total	4.7	4.6	5.8	8.5
Pensionable population, total, '000	3,185	3,327	4,902	7,762

f = forecast; * Youth = under 15. Source: UN Population Division

Table: Rural/Urban Breakdown, 2005-2030

	2005	2010f	2020f	2030f
Urban population, % of total	68.1	71.2	74.0	77.9
Rural population, % of total	31.9	28.8	26.0	22.1
Urban population, total, '000	47,315	52,891	62,376	70,972
Rural population, total, '000	22,200	21,392	21,868	20,183
Total population, '000	69,515	74,283	84,244	91,155

f = forecast. Source: UN Population Division

Section 2: Education And Healthcare

Table: Education, 2002-2005

	2002/03	2004/05
Gross enrolment, primary	103	111
Gross enrolment, secondary	82	81
Gross enrolment, tertiary	22	24
Adult literacy, male, %	na	83.5
Adult literacy, female, %	na	70.4

Gross enrolment is the number of pupils enrolled in a given level of education regardless of age expressed as a percentage of the population in the theoretical age group for that level of education; na = not available. Source: UN Educational, Scientific and Cultural Organization (UNESCO)

Table: Vital Statistics, 2005-2030

	2005	2010f	2020f	2030f
Life expectancy at birth, males (years)	68.8	70.1	71.6	73.4
Life expectancy at birth, females (years)	71.7	73.4	75.3	77.4

f = forecast; Life expectancy estimated at 2005. Source: UNESCO

Section 3: Labour Market And Spending Power

Table: Employment Indicators, 1996-2005

	1996	1997	1998	1999	2000	2005
Economically active population, '000	16,027	na	na	na	na	22,317
– % change y-o-y	na	na	na	na	na	na
– % of total population	25.3	na	na	na	na	32.1
Employment, '000	14,572	na	na	na	na	19,760
– % change y-o-y	na	na	na	na	na	na
– male	12,806	na	na	na	na	15,959
– female	1,765	na	na	na	na	3,801
– female, % of total	12.1	na	na	na	na	19.2
Total employment, % of labour force	90.9	na	na	na	na	88.5
Unemployment, '000	na	na	na	na	na	2,556
– male	na	na	na	na	na	1,780
– female	na	na	na	na	na	776
– unemployment rate, %	na	na	na	na	na	11.5

na = not available. Source: International Labour Organization (ILO)

Table: Consumer Expenditure, 2000-2012 (US\$)

	2000	2007	2008	2009e	2010f	2012f
Consumer expenditure per capita	2,362	2,162	2,658	3,224	3,818	5,202
Poorest 20%, expenditure per capita	602	551	678	822	974	1,327
Richest 20%, expenditure per capita	5,894	5,394	6,631	8,043	9,526	12,979
Richest 10%, expenditure per capita	7,961	7,286	8,957	10,864	12,866	17,531
Middle 60%, expenditure per capita	1,772	1,622	1,993	2,418	2,863	3,902
Purchasing power parity						
Consumer expenditure per capita	2,669	4,948	5,694	na	na	na
Poorest 20%, expenditure per capita	681	1,262	1,452	na	na	na
Richest 20%, expenditure per capita	6,660	12,344	14,207	na	na	na
Richest 10%, expenditure per capita	8,996	16,673	19,190	na	na	na
Middle 60%, expenditure per capita	2,002	3,711	4,271	na	na	na

e/f = BMI estimate/forecast; na = not available. Source: World Bank, BMI

Table: Average Annual Manufacturing Wages, 2000-2012

	2000	2006	2007	2008	2009e	2010f	2012f
Local currency	10,410,312	24,342,505	29,240,218	35,708,738	42,178,448	48,975,926	64,895,361
Wage growth, % y-o-y	24.1	13.8	20.1	22.1	18.1	16.1	14.1
US\$	5,900	2,654	3,170	3,767	4,312	4,871	6,159

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

Glossary Of Terms

Table: Glossary Of Petrochemicals Terms

ABS	acrylonitrile-butadiene-styrene	MTBE	methyl tertiary butyl ether
AN	acrylonitrile	NOC	national oil company
AS	acrylonitrile styrene	OX	orthoxylyene
bbf	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

BMI Methodology

How We Generate Our Industry Forecasts

BMI's industry forecasts are generated using the best-practice techniques of time-series modelling. The precise form of time-series model we use varies from industry to industry, in each case being determined, as per standard practice, by the prevailing features of the industry data being examined. For example, data for some industries may be particularly prone to seasonality, meaning seasonal trends. In other industries, there may be pronounced non-linearity, whereby large recessions, for example, may occur more frequently than cyclical booms.

Our approach varies from industry to industry. Common to our analysis of every industry, however, is the use of vector autoregressions. Vector autoregressions 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.

It must be remembered that human intervention plays a necessary and desirable part of all our industry forecasting techniques. Intimate knowledge of the data and industry ensures we spot structural breaks, anomalous data, turning points and seasonal features where a purely mechanical forecasting process would not.

Chemicals And Petrochemicals Industry

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, mainly ethylene, but also propylene, polypropylene, polyethylene and so forth. Government, company and third-party sources are used

- Specific company and/or government capacity expansion projects aimed at increasing the number and/or size of crackers and downstream processing facilities.

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), polyolefin (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 etc.

Cross Checks

Whenever possible, we compare government and/or third party agency projections with the reported 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 ultimately 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.

Business Environment Ratings

BMI's Petrochemicals Business Environment Rating has three objectives. First, we have defined the risks rated in order to accurately capture the operational dangers to companies operating in this industry globally. Second, we have, where possible, identified objective indicators. Finally, we have used **BMI's** proprietary Country Risk Ratings (CRR) in a nuanced manner in order to ensure that only the aspects most relevant to the industry have been included. Overall, the ratings system – which integrates with those of all industries covered by **BMI** – offers an industry-leading insight into the prospects/risks for companies across the globe.

Conceptually, the ratings system divides into two distinct areas, with the indicators included in each area stated below:

Limits Of Potential Returns

Evaluation of sector's size and growth potential in each state, and also broader industry/state characteristics that may inhibit its development.

Risks To Realisation Of Returns

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.

Indicators

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

Table: Petrochemicals Business Environment Indicators And Rationale

Limits of potential returns	Rationale
Market structure	
Cracker capacity, current year	Objective measure of sector size
Cracker capacity, 2011	Forecast of sector development
Downstream capacity, current year	Objective measure of domestic demand
Country structure	
Financial infrastructure	Rating from BMI's Country Risk Rating (CRR) to denote ease of obtaining investment finance. Poor availability of finance will hinder company operations across the economy
Trade bureaucracy	Rating from CRR. Low trade restrictions are essential for this export-based industry
Physical infrastructure	Rating from CRR. Given size of manufacturing units, sector development requires strong supporting power/water/transport infrastructure

Table: Petrochemicals Business Environment Indicators And Rationale**Risks to realisation of returns****Market risk**

Industry regulatory environment Subjective evaluation against BMI-defined criteria. This indicator evaluates predictability of operating environment

Country risk

Structure of economy Rating from CRR, to denote health of underlying economic structure, including 7 indicators such as volatility of growth; reliance on commodity imports, reliance on single sector for exports

Long-term external economic risk Rating from CRR, to denote vulnerability to external shock – principal cause of economic crises

Long-term external financial risk Rating from CRR, to denote vulnerability of currency/stability of financial sector

Institutions Subjective rating from CRR, to denote strength of bureaucracy and legal framework. Also evaluates level of corruption

Long-term political risk Rating from CRR, to denote 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 weight has been adopted.

Table: Weighting Of Indicators

Component	Weighting
Limits of potential returns	70%, of which
Petrochemicals market	65%
Country structure	35%
Risks to realisation of returns	30%, of which
Market risk	30%
Country risk	70%

Source: BMI

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