

COUNTRY ANALYSIS BRIEFS

Iran

Last Updated: August 2006

Background

Iran's economy is heavily reliant on oil exports and even though the country is earning high oil export revenues, gasoline import costs are also rising rapidly.



Iran's economy relies heavily on oil export revenues, with such revenues representing around 80-90 percent of total export earnings and 40-50 percent of the government budget. Strong oil prices the past few years have boosted Iran's oil export revenues and helped Iran's economic situation. For 2005, Iran's real GDP increased by around 6.1 percent. Inflation is running at around 16 percent per year, though unofficial estimates place the figure at 40-50 percent. Iran's oil export revenues have increased steadily, from \$32 billion in 2004, to \$45.6 billion in 2005, with 2006 estimates at \$46.9 billion.

Despite higher oil revenues, Iranian budget deficits remain a chronic problem, in part due to large-scale state subsidies on foodstuffs and gasoline. Thus, the country's parliament (the Majlis) decided in January 2005 to freeze domestic prices for gasoline and other fuels at 2003 levels. In March 2006, parliament reduced the government's gasoline subsidy allocation for FY2006/07 to \$2.5 billion, compared with a request of \$4 billion and costs of over \$4 billion for imports last year. As of July 2006, the Iranian government is still debating how to handle gasoline subsidies. NIOC has said it has used nearly all of its \$2.5 billion budget for gasoline imports, but legislators have stated their opposition to providing the additional \$3.5 billion necessary to pay for imports through the end of the fiscal year, in March 2007 (see [Oil section](#) for more on this subject).

Another problem for Iran is the lack of job opportunities for the country's young and rapidly growing population. Unemployment in Iran is around 11 percent, but is significantly higher among young people. Iran is attempting to diversify its economy by investing some of its oil revenues in other areas, including petrochemicals production. In 2004, non-oil exports rose by a reported 9 percent. Iran also is hoping to attract billions of dollars worth of foreign investment to the country through creating a more favorable investment climate by reducing restrictions and duties on imports and creating free-trade zones. However, there has not been a great deal of progress in this area. Foreign investors appear to be cautious about Iran, due to uncertainties regarding its future direction under new leadership, as well as the ongoing international controversy over the country's nuclear program.

In June 2005, Iran held Presidential elections in which the conservative mayor of Tehran, Mahmoud Ahmadinejad, won a surprise victory. Ahmadinejad succeeded Mohammad Khatami, a moderate reformist, who had been President since August 1997. Ahmadinejad ran on a populist platform and pledged to share Iran's oil wealth more broadly and to reduce the nation's income gap between rich and poor. However, policies implemented in the economic realm since President Ahmadinejad took office are cited by analysts as responsible for high (unofficial) inflation rates, depressed housing and stock markets, and rising unemployment. According to FACTS, reduced confidence in the Iranian economy and the ongoing dispute with the international community has combined to cause an estimated \$50 billion of capital to flow out of Iran in the last year.

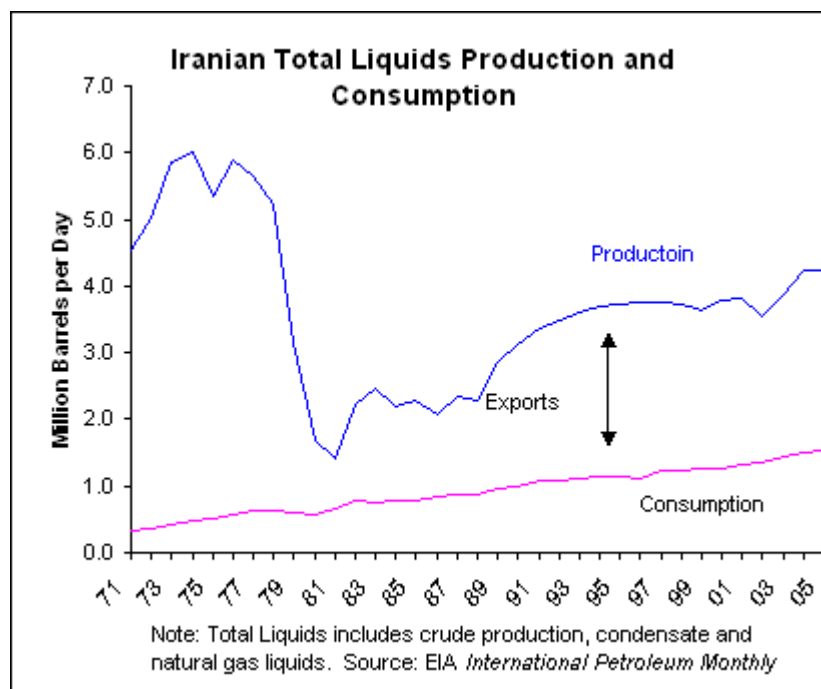
Sanctions

Sanctions originally imposed in 1995 by President Clinton have been continually renewed by President Bush, citing the "unusual and extraordinary threat" to U.S. national security posed by Iran. The 1995 executive orders prohibit U.S. companies and their foreign subsidiaries from conducting business with Iran, while banning any "contract for the financing of the development of petroleum resources located in Iran." In addition, the U.S. Iran-Libya Sanctions Act (ILSA) of 1996 (renewed for 5 more years in July 2001) imposes mandatory and discretionary sanctions on non-U.S. companies investing more than \$20 million annually in the Iranian oil and natural gas sectors. The ILSA terminates on August 5, 2006, unless renewed by Congress.

Oil

Iran is OPEC's second largest oil producer and holds 10 percent of the world's proven, conventional world oil reserves.

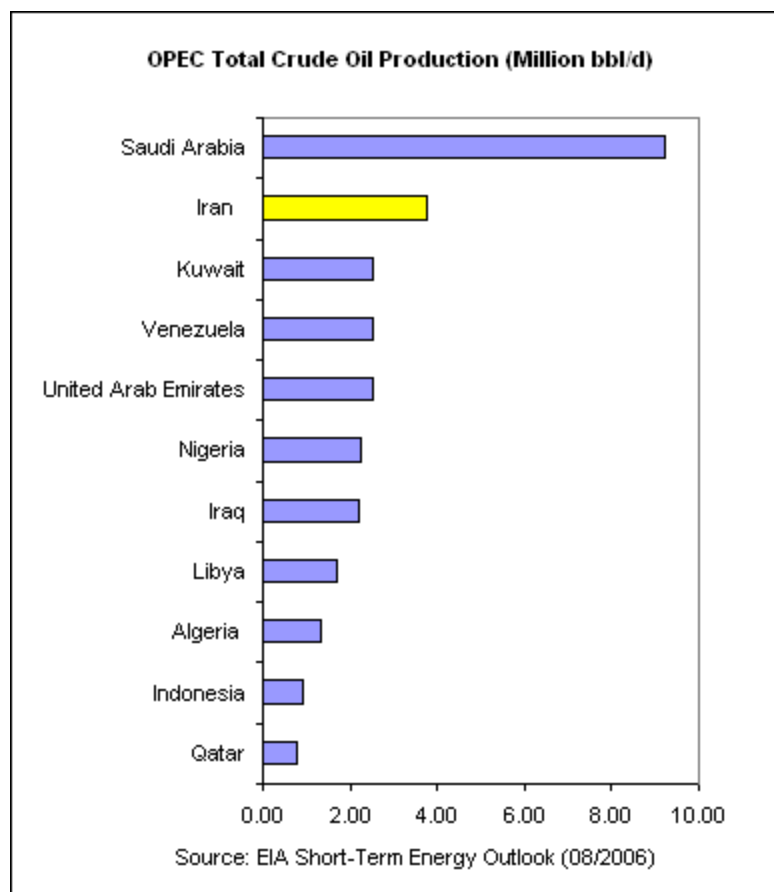
According to the *Oil and Gas Journal*, as of January 1, 2006, Iran held 132.5 billion barrels of proven oil reserves. This figure, which includes recent discoveries in the Kushk and Hosseineih fields of Khuzestan province, means Iran holds roughly 10 percent of the world's total proven reserves. The vast majority of Iran's crude oil reserves are located in giant onshore fields in the southwestern Khuzestan region near the Iraqi border. Overall, Iran has 40 producing fields – 27 onshore and 13 offshore (see table below for major fields). Iran's crude oil is generally medium in sulfur and in the 28°-35°API range.



Iran currently has crude oil production capacity of around 3.8 million bbl/d. If foreign investment is available, this level could increase to 5 million bbl/d by 2010.

During 2005, Iran produced about 4.24 million bbl/d of total liquids. Of this, 3.94 million bbl/d is crude oil, roughly 5 percent of world crude production. Iran's current sustainable crude oil production capacity is estimated at 3.8 million bbl/d, which is around 310,000 bbl/d below Iran's latest (July 1, 2005) OPEC production quota of 4.110 million bbl/d. (Please see EIA Short-Term Energy Outlook "[Table 3a. OPEC Oil Production](#)") Through the first half of 2006, the EIA places Iran's crude oil production at 3.75 million bbl/d. Iran's domestic oil consumption, 1.5 million bbl/d in 2005, is increasing rapidly as the economy and population grow. Iran subsidizes the price of oil products heavily, which contributes to rising domestic consumption.

Iran's existing oilfields have a natural decline rate estimated at 8 percent onshore and 10 percent per year offshore. The fields are in need of upgrading, modernization, and enhanced oil recovery (EOR) efforts such as gas reinjection. Current recovery rates are just 24-27 percent, compared to a world average of 35 percent. Iran also needs to increase its search for new oil, with only a few exploration wells being drilled in 2005.

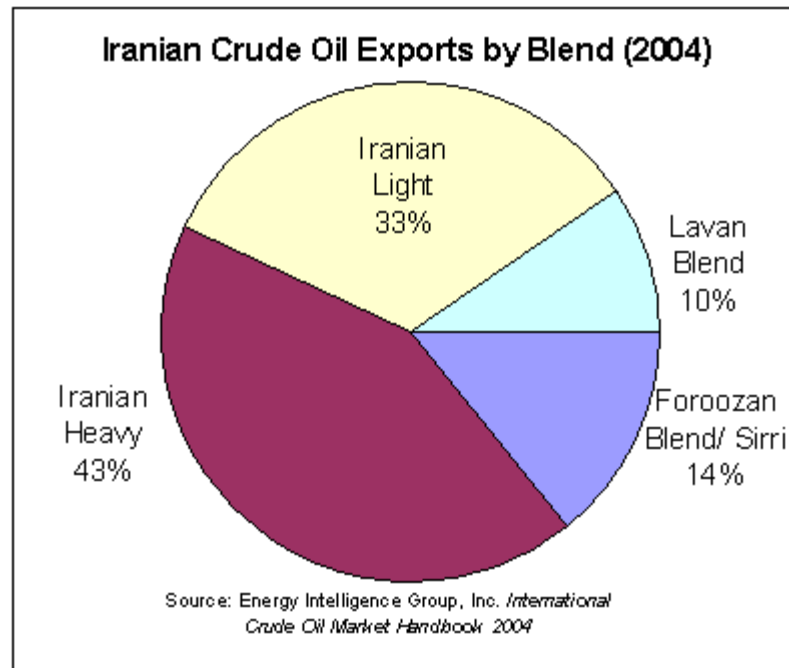


With sufficient investment, Iran could increase its crude oil production capacity significantly. The country produced 6 million bbl/d of crude oil in 1974 but has not come close to recovering to that level since the 1978/79 Iranian revolution. Still, Iran has ambitious plans to increase oil production to more than 5 million bbl/d by 2010, and 8 million bbl/d by 2015. The country will require billions of dollars in foreign investment to accomplish this.

Exports

Iran exports roughly 2.5 million bbl/d of oil, of which roughly 130,000 bbl/d is part of crude swap programs with Turkmenistan and Kazakhstan.

Currently, Iran exports around 2.5 million bbl/d of oil, of which OECD countries import 60 percent (or 1.6 million bbl/d). Iran's main export blends include Iranian Light (34.6° API, 1.4 percent sulphur); Iranian Heavy (31° API, 1.7 percent sulphur); Lavan Blend (34°-35° API, 1.8-2 percent sulphur); and Foroozan Blend/Sirri (29-31° API).



Crude Swaps

Iran's desire to become a player on the Caspian oil front has led it to push forward in the area of oil "swaps." This arrangement involves the delivery of Caspian oil to refineries, via the Caspian port town of Neka in northern Iran, for local consumption (See map below). An equivalent amount of Iranian oil is then exported through Persian Gulf terminals such as Kharg Island. Shippers normally pay a "swap fee" of \$1.50-\$2.00 per barrel, with swaps handled by Naftiran Intertrade Co. (Nico), the Swiss-based trading arm of NIOC. Crude swaps have increased rapidly in recent months, with a July 2006 report by the Oil Export Terminals Company placing the level at 130,000 bbl/d. As recently as June 2006, Abdolrahman Kheylai, Manager of NIOC's Neka Oil Products Export Terminal, stated that average daily Caspian exports to Iran were about 117,000 bbl/d, consisting mainly of Turkmen and Kazakh oil. The surge in crude swaps is attributed to higher oil prices and the increased willingness of the Caspian Sea littoral states to offer oil in the form of direct sales.

Currently, from Neka, just over 40,000 bbl/d of import oil is sent to Tehran by the existing 180,000-bbl/d capacity Neka-Tehran pipeline, and roughly 80,000 bbl/d is sent to Tebriz. Eventually, Iran hopes to upgrade its facilities in order to greatly expand oil swaps capacity first to 370,000 bbl/d and then to 500,000 bbl/d. Iran further intends to increase storage capacity at the terminal from 1.5 million barrels to 2.5 million barrels. As a further part of Iran's efforts to compete on costs with the 1-million-bbl/d Baku-Tbilisi-Ceyhan (BTC) pipeline, Mr. Kheylai reported that Iran plans to build a submerged turret offshore oil loading terminal in the Caspian Sea. The technology offers a flexible and cost-effective solution for mooring of vessels applied as shuttle tankers or storage vessels. Mr. Kheylai stated that while currently 7,000 deadweight (dwt) tankers can bring Caspian oil to Neka, the new turret will be able to service up to 63,000 dwt tankers.

In July 2005, Iran and Iraq signed an MOU on a swap agreement involving construction of a 24-mile, 350,000-bbl/d oil pipeline from Basra to the Abadan refinery in southwestern Iran. In exchange, Iran would ship refined products back to Iraq. In addition, Iran could allow Iraq to export crude through the Kharg Island terminal and to import refined products through the Iranian port of Bandar Mahshahr. One potential problem with this deal revolves around the ability of the Abadan refinery to process Basrah Light in significant volumes. Another problem is Iran already faces a severe shortfall in its own domestic gasoline supplies, making additional exports of gasoline difficult.

Export Terminals

Iran exports crude oil via four main terminals: Kharg Island (by far the largest), Lavan Island, Sirri Island (reopened on April 13, 2003 for the first time since 1988, when it was damaged by an Iraqi air raid), and Ras Bahregan. Refined products are exported via the Abadan and Bandar Mahshahr terminals. Many Iranian oil export terminals were damaged during the Iran-Iraq War,

but all have been rebuilt. Iran operates OPEC's largest oil tanker fleet, comprising roughly 29 ships, including Very Large Crude Carriers (VLCCs). The fleet is run by the National Iranian Tanker Company, which is a subsidiary of NIOC. In 2003, Iran commissioned six vessels for Caspian routes, to promote Iran's position as a transit option for regional crude, along with 12 LNG tankers.

Top Ten Iranian Crude Oil Export Destinations (Thousand bbl/d)				
Rank	Reporting Country	2003	2004	2005
1	Japan	685,034	630,462	570,604
2	China	247,235	263,446	284,830
3	South Korea	171,563	173,144	195,654
4	Italy	194,055	188,033	193,935
5	France	115,209	128,892	142,811
6	Netherlands	130,214	138,751	139,246
7	Turkey	138,683	114,217	138,873
8	South Africa	118,695	189,613	134,646
9	Taiwan	167,003	138,518	125,031
10	Greece	88,781	115,533	105,236
	Reporting Total	2,056,472	2,080,609	2,030,866
	OECD Pacific			728,320
	OECD Europe			826,584

Source: Global Trade Information Services, Inc., Global Trade Atlas, July, 2006.

Upstream Projects

State-owned National Iranian Oil Company (NIOC)'s onshore field development work is concentrated mainly on sustaining output levels from large, aging fields. Roughly 60 percent of Iran's oil production comes from fields more than half a century old, with some dating back to the first oil discoveries in the Middle East. Consequently, EOR programs are underway at a number of fields, including Marun and Karanj.

Map of Major Iranian Energy Projects and Pipelines



In February 2004, a Japanese consortium led by Inpex signed a final agreement on the \$2 billion Azadegan oilfield development project. Azadegan was discovered in 1999, representing Iran's largest oil discovery in 30 years. It is located onshore in the southwestern province of Khuzestan, a few miles east of the border with Iraq. Reportedly, Azadegan contains proven crude oil reserves of 26 billion barrels, but the field is also considered to be geologically complex, making the oil more challenging and more expensive to extract. In January 2001, the Majlis approved development of Azadegan by foreign investors using the so-called "buyback" model (see below). Inpex, which has no upstream experience of its own, has brought in Total on the project for its technical expertise. Initial production of medium-sour crude oil from Azadegan could come in 2009, ramping up to 160,000 bbl/d by 2012 and 250,000 bbl/d by 2014/15. At its peak, Azadegan production could account for as much as 6 percent of Japan's oil imports. However, little forward progress has been made on Azadegan, including the lack of an operating agreement with NIOC. In September 2005, Iran sharply criticized Japan for the slow progress. Japan maintains that further clearing of mines leftover from the Iran-Iraq war is needed for work to go forward and that because of an increase in the price of field development tools, notably steel, the contract should be revised. Iran claims the field is 96 percent clear of mines and has threatened to develop the field themselves if a final agreement is not reached by September 2006.

In February 2001, NIOC announced the discovery of a very large offshore oil field, named Dasht-e Abadan, in shallow waters near the port city of Abadan. According to a top NIOC official, Dasht-e Abadan could contain reserves "comparable" in size to Azadegan.

Since 1995, NIOC has made several other sizable oil discoveries, including Darkhovin onshore oilfield. Located near Abadan, which contains low sulfur, 39° API crude oil. In late June 2001, Eni signed a \$1 billion, 5 1/2-year buyback deal to develop Darkhovin, with the added incentive of a limited risk/reward element that linked payment to production capacity. Darkhovin came online at 50,000 bbl/d in July 2005, with production expected to reach 160,000 bbl/d in 2007.

Another oil discovery in western Iran was made recently by Norsk Hydro, the Anaran field, which contains reserves of 2 billion barrels. According to Norsk Hydro, Anaran could produce more than 100,000 bbl/d of oil, possibly starting in 2010. Lukoil is a minority partner in the field. Reportedly, development of Anaran is complicated by the need to clear landmines in the area.

Major Iranian Oil Fields (est. production, bbl/d)	
Onshore	Offshore
Agha Jari (200,000 bbl/d)	Abuzar (140,000 bbl/d)
Ahwaz-Asmari (700,000 bbl/d)	Dorood (130,000 bbl/d, to increase to 180,000 bbl/d)
Bangestan (around 245,000 bbl/d current production, with plans to increase to 550,000 bbl/d or more)	Salman (100,000 bbl/d, to increase to 150,000 bbl/d)
Bibi Hakimeh (130,000 bbl/d, to increase to 175,000 bbl/d)	Sirri A&E (95,000 bbl/d)
Gachsaran (480,000 bbl/d, to increase to 600,000 bbl/d)	Soroush/Nowruz (87,000 bbl/d)
Karanj-Parsi (250,000 bbl/d)	
Marun (520,000 bbl/d, to increase to 600,000 bbl/d)	
Pazanan (35,000 bbl/d)	
Rag-e-Safid (180,000 bbl/d)	

NIOC also would like to develop five oil and natural gas fields in the Hormuz region: Henjam A; the A field near Lavan Island; the Esfandir field near Kharg Island; and two structures near the South Pars natural gas and condensate field. Iran and Oman have discussed the possibility of joint development of the Henjam A field. According to NIOC, the five Henjam fields hold an estimated 400 million barrels of oil and have a production potential of 80,000 bbl/d. Other Iranian oil fields slated for increased development include Doroud, Nosrat, Farzam, and Salman.

As a further part of Iran's expansion efforts, in May 2006, the head of Petroleum Engineering and Development Company (PEDEC), Mehdi Bazargan, said that Iran will tender the development of 10 additional oilfields in its oil-rich southern provinces, including the Parsi, Shadgan, Pazenan, Gachsaran, Karanj, Northern Azadegan, Jofair, Marun, and Mansuri fields. According to Mr. Bazargan, the development of the fields will require roughly \$7 billion dollars of investment.

Storage Capacity

In June 2006, NIOC Managing Director Gholamhossein Nozari said that crude oil storage capacity at Kharg Island, the country's largest export terminal, had been increased over the past six years from 7 million barrels to 12 million barrels. He added that Iran has begun a \$218 million expansion program to raise the terminal's storage capacity to 22 million barrels. According to Mr. Nozari, Iran's immediate aim should be to increase storage capacity to 10 - 15 days worth of exports, and in the longer term to 30 - 35 million barrels.

In April 2006, the *Fars News Agency* reported that NIOC planned to begin construction during 2006 of strategic crude oil storage tanks in a number of producing regions, with a total capacity of 10 million barrels. Construction costs are estimated at \$1.165 billion. NIOC had previously announced plans to construct 15 crude oil storage tanks at the following locations: four tanks at Ahwaz with total capacity of 2 million barrels of crude oil; three tanks at Omidiyeh with total capacity of 3 million barrels; six tanks at Goureh with total capacity of 4 million barrels; one 500,000 barrel tank on Sirri Island; and one 500,000 barrel tank at Bahregansar.

Foreign Investment/Buybacks

Iran utilizes buyback contracts as a means of involving foreign companies in the country's oil sector without violating its constitutional prohibitions on concessions or direct equity stakes.

The Iranian constitution prohibits the granting of petroleum rights on a concessionary basis or direct equity stake. However, the 1987 Petroleum Law permits the establishment of contracts between the Ministry of Petroleum, state companies and "local and foreign national persons and legal entities." Buyback contracts, for instance, are arrangements in which the contractor funds all investments, receives remuneration from NIOC in the form of an allocated production share, then transfers operation of the field to NIOC after a set number of years, at which time the contract is completed.

The first major project under the buyback investment approach became operational in October 1998, when the offshore Sirri A oil field, then-operated by Total and Malaysia's Petronas, began production at 7,000 bbl/d. The neighboring Sirri E field began production in February 1999, with production at the two fields expected to reach 120,000 bbl/d. Under the 1995 agreement, as the two fields came on stream, the National Iranian Oil Company (NIOC) gradually took over as operator after five years; but TOTAL will still be involved in the operations until its investment has

been fully recovered.

In March 1999, France's Elf Aquitaine (now Total) and Italy's Eni were awarded a \$1 billion contract for a secondary recovery program at the offshore, 1.5-billion-barrel Doroud oil and natural gas field located near Kharg Island. The program is intended to boost production from around 136,000 bbl/d to as high as 205,000 bbl/d. Total is operator of the project, with a 55 percent share, while Eni holds the other 45 percent. In April 1999, Iran awarded Elf a buyback contract to develop the offshore Balal field, which was turned back over to NIOC in January 2003 when the field reached its contract designated level of 40,000 bbl/d. Eni is also involved, with a 38.25 percent stake. The field, which contains some 80 million barrels of reserves, started producing in early 2003 with currently has output of 40,000 bbl/d.

On March 18, 2005, a contract to develop the giant Bangestan field was awarded to Petro Iran Development Co., after having been delayed several times since 2001. Bangestan contains an estimated 6 billion barrels of oil reserves and produces about 158,000 bbl/d of oil, but the field is one of the oldest in the country, requiring investment and technological applications to compensate for natural decline. While development of Bangestan could cost \$3 billion over 10 years, and aims to raise output to 600,000 bbl/d, currently production at the field has dropped by roughly 50 percent from peak levels and may drop a further 50 percent due to lack of gas re-injection.

In May 2002, Iran's Oil Ministry signed a \$585 million buyback contract with NIOC subsidiary Petroliran to develop the Foroozan and Esfandiar offshore oilfields. Currently producing 40,000 bbl/d, Petroliran is expected to increase production at the fields to 65,000 bbl/d. The two oilfields straddle the border with Saudi Arabia's offshore Lulu and Marjan fields.

The Cheshmeh-Khosh field, which previously had been awarded to Spain's Cepsa for \$300 million, was re-awarded in January 2004 to state-owned Central Iranian Oil Fields Company (CIOFC). In December 2003, Cepsa and OMV withdrew from lengthy negotiations after a reported failure to agree on development costs and buyback terms. It remains possible, however, that Cepsa and OMV could still be involved at Cheshmeh-Khosh in some way. The objective is to raise crude production at the field from 40,000 bbl/d currently to 80,000 bbl/d within four years.

In late May 2002, Canada's Sheer Energy became the first foreign company since Eni's Darkhovin deal to reach agreement to develop the Masjed-I-Suleyman, or MIS, field. Sheer's goal was to boost MIS production from 4,500 bbl/d to 20,000 bbl/d at the historic field, which, discovered in 1908, peaked at 130,000 bbl/d in the 1930s. However, the company was replaced by China's CNPC, which bought the subsidiary of Sheer working on MIS. CNPC began work on the field in June 2005. (Note: for more on Chinese involvement in Iran's Yadavaran field, please see the [Natural Gas](#) section below).

The buyback system has drawbacks for both sides: by offering a fixed rate of return (usually around 15-18 percent), NIOC bears all the risk of low oil prices. If prices drop, NIOC has to sell more oil or natural gas to meet the compensation figure. At the same time, companies have no guarantee that they will be permitted to develop their discoveries, let alone operate them. Finally, companies find the short terms of buyback contracts unfavorable.

In response, Iran has considered revisions to buyback terms, including extending the length of contracts and allowing for continued involvement of oil companies after the field is handed over to NIOC. However, these proposals have been controversial and generally have not moved forward. In early December 2005, incoming Iranian oil minister Kazem Vaziri declared he would review buyback terms with the intent to make them more attractive to foreign investors. While modest changes have been made, such as increases in the number of years of buybacks and additional incentives for E&P projects, political opposition continues to prevent any sizeable reforms. The last major buyback left is the Eni-led development of the onshore Darkhovein oil field, which is due to reach its targeted plateau of 160,000 bbl/d by the end of 2006.

Offshore Developments

Iran plans extensive oil development of its offshore areas.

The Doroud 1&2, Salman, Abuzar, Foroozan, and Sirri fields comprise the bulk of Iran's offshore oil output. Iran plans extensive development of existing offshore fields and hopes to raise its offshore production capacity significantly.

In late 2001 and early 2002, Shell brought part of the \$800 million Soroush-Nowruz development online. The two fields are located offshore, about 50 miles west of Kharg Island, and contain estimated recoverable reserves of around 1 billion barrels of heavy oil (20° API). The heaviness and high sulfur content (3 percent) of the oil has made marketing Soroush-Nowruz oil difficult; in 2005 and again in the second quarter of 2006, Iran reportedly diverted Soroush-Nowruz production into storage rather than try to sell the oil at a steep discount. In addition, production has been limited to 27,000 bbl/d at Nowruz and 60,000 bbl/d at Soroush, despite goals of 57,000 and 65,000 bbl/d, respectively. In an attempt to sell more of Nowruz/ Soroush crude, NIOC has recently begun blending the crude with South Pars condensate. The combined batch is then being fed into the Bandar Abbas refinery for domestic consumption. In July 2006, Iran reported that it had processed 2 million barrels of Soroush and Nowruz crudes at Bandar Abbas. In May 2006, NIOC secured a 60,000 bbl/d term contract for Nowruz/ Soroush crude with India's Reliance.

Another area believed to have significant potential is offshore near Bushehr, where Iran claimed in July 2003 to have discovered three fields with potential reserves of 38 billion barrels of oil. In March 2004, the Iranian Offshore Oil Company (IOOC) awarded a \$1.26 billion contract for recovery of NGLs and natural gas from Soroush, Nowruz, Foroozan, and Abuzar to Japan's JGC Corporation. Ethane from the gas will feed an ethylene complex at the Kharg petrochemical complex. Elsewhere, in May 2004, Brazil's Petrobras signed a 3-year, \$32-\$34 million deal to develop the Tousan fields of the Persian Gulf.

Caspian Sea Region

Iran has no oil or natural gas production in the Caspian Sea, in part due to unresolved maritime borders.

Aside from acting as a transit center for other countries' oil and natural gas exports from the Caspian Sea, Iran has potentially significant Caspian reserves of its own. Currently, Iran has no oil or natural gas production in the Caspian region. In early 2004, a 3-D seismic survey of the southern Caspian was conducted by Iran's Oil Survey Co.; the work yielded a number of potentially prospective blocks, including Blocks 6, 7, 8 and 29. In June 2006, Masoud Jahdi, Director of the state-run Caspian Sea Exploration Company, stated that Iran has completed 3D seismic work of 1,550 sq mile of the sea, and a further 11,580 sq miles has been swept in 2D surveys. According to a 1998 study by Eni, Shell and KEPCO, the Iranian sections of the Caspian Sea have significant potential. A tender for exploration is expected to follow after the seismic work is complete. Among the foreign firms that have indicated their interest in the area are Statoil, Norsk Hydro, Petrobras, Petronas and CNOOC.

At the present time, Iran continues to maintain that regional treaties signed in 1921 and 1940 between Iran and the former Soviet Union, which call for joint sharing of the Caspian's resources between the two countries, remain valid. Iran has rejected all unilateral and bilateral agreements on the utilization of the Sea. As such, Iran is insisting that either the Sea should be used in common, or its floor and water basin should be divided into equal (20 percent) shares. Under the so-called "condominium" approach, the development of the Caspian Sea would be undertaken jointly by all of the littoral states. However, using the equidistant method of dividing the seabed on which Kazakhstan, Azerbaijan, and Russia have agreed, Iran would only receive about 12-13 percent of the Sea. As yet, no agreement has been reached among all Caspian Sea region states on the legal status of the area.

Refining

Iran has a shortage of refining capacity to produce gasoline, resulting in the need for significant levels of gasoline imports.

According to *Oil and Gas Journal*, Iran has a combined capacity of 1.64 million bbl/d. Major refineries include: Abadan (400,000-bbl/d capacity); Isfahan (265,000 bbl/d); Bandar Abbas (232,000 bbl/d); Tehran (225,000 bbl/d); Arak (150,000 bbl/d); and Tabriz (112,000 bbl/d). Gasoline demand is forecasted to be growing at around 11.4 percent per year. Iran plans to increase its refining capacity to 2.54 million bbl/d by 2010. One goal of this expansion is to allow Iran's refineries to process a heavier crude slate, while decreasing the fuel oil cut. Currently, Iran's refineries produce around 30 percent heavy fuel oil and just 16 percent gasoline. In addition, diesel sulfur levels are slated for a major reduction from 500 parts per million to 50 ppm by 2010, requiring significant additional hydrotreating capacity.

The National Iranian Oil Refining and Distribution Company (NIORDC) plans to begin construction work as early as September 2006 on three units aimed at increasing gasoline production from the Isfahan refinery. Currently, technical proposals are being reviewed for the construction of three units: a 32,000 bbl/d continuous catalytic reformer (CCR) unit; a 27,000 bbl/d isomerization unit; and a 62,000 bbl/d hydrotreater. Construction is expected to cost \$300 million. NIORDC is negotiating with bidders to reduce construction time from 36 months to 30 months.

In June 2004, Japan's JGC reached an agreement with Iran to expand Arak to 250,000 bbl/d by 2009. In addition, in 2005 it was announced that a new 180,000-bbl/d-capacity refinery is being planned for Abadan. Bandar Abbas is being expanded in several phases and is on schedule to meet goals of adding around 250,000 bbl/d of capacity by 2010. Two planned grassroots refineries include a 225,000-bbl/d plant at Shah Bahar and a 120,000-bbl/d unit on Qeshm Island. Under Iranian law, foreign companies are permitted to own no more than 49 percent of Iranian oil refining assets.

Iran plans to boost capacity at its northern refineries at Arak, Tebriz, and Tehran in order to process additional Caspian oil. In August 2003, a \$500 million tender was issued to upgrade the Tehran and Tabriz refineries in order to handle 370,000 bbl/d of high sulfur Caspian crude. This follows a \$330 million project, completed by a Sinopec-led consortium in late 2003, to expand storage at Neka and to upgrade the Tehran and Tabriz refineries.

Gasoline Imports

Iran has imported refined products since 1982, and these imports have been increasing rapidly. Currently, gasoline costs less than 40 cents per gallon in Iran, far below international levels, contributing to a rapid (8-10 percent per year) growth rate in gasoline consumption. In addition, the country imports around one-third of its gasoline. In volume terms, Iran is the second largest importer of gasoline in the world after the United States. In 2005, Iran imported 150,000 bbl/d out of total consumption of 400,000 bbl/d. For 2006, *FACTS* estimates Iran will consume 462,000 bbl/d of gasoline and import 188,000 bbl/d, or roughly 41 percent of total consumption. According to *Petroleum Argus*, around 60 percent of this comes from European oil trader, Vitol, with another 15 percent coming from India's 600,000-bbl/d Reliance refinery. However, although Iran imports large amounts of gasoline, it is an overall net petroleum products exporter due to its large gross exports of residual fuel oil.

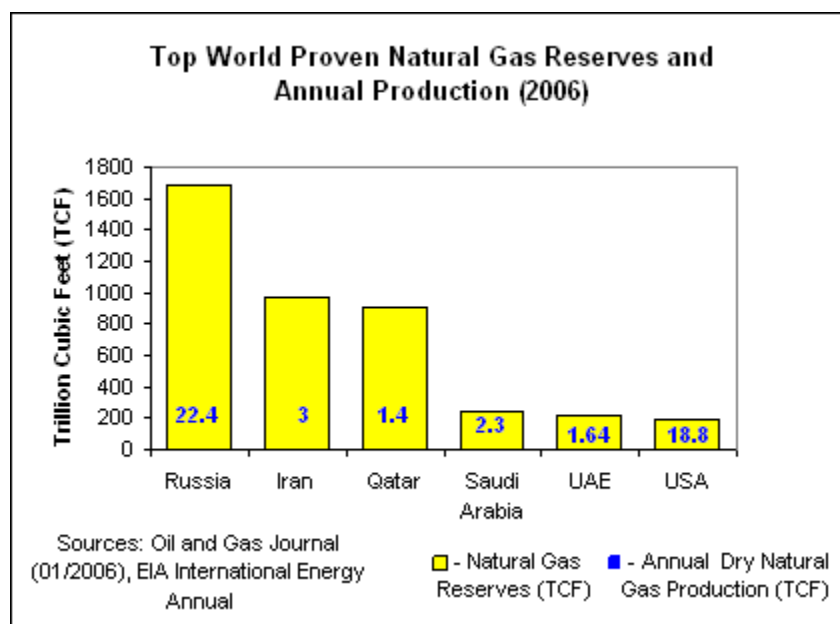
Through the summer of 2006, there was heated debate among Iranian politicians as to how to balance expanding gasoline needs and the corresponding increase needed for gasoline subsidies. NIOC has said it has used nearly its entire \$2.5 billion budget for gasoline imports but legislators have stated their opposition to providing the additional \$3.5 billion necessary to pay for imports through the end of the fiscal year, in March 2007. Options put forward for addressing the issue included ceasing gasoline imports in September 2006 when many contracts expire and rationing gasoline, or implementing a two-tier price system whereby each car is allotted 2.5-3 liters a day at the subsidized price of 8.7 cents per liter, with consumption beyond that at 60-65 cents per liter.

Going forward, *FACTS* reports that Iran will complete construction of three 120,000 bbl/d condensate splitters by 2009. The facilities will produce an estimated 200,000 bbl/d of gasoline. Along with other projects, it is possible that Iran will cease being a gasoline importer by 2010.

Natural Gas

Iranian natural gas consumption is growing fast, but so is natural gas production.

According to the *Oil and Gas Journal* (01/2006), Iran contained an estimated 970 trillion cubic feet (Tcf) in proven natural gas reserves, making it the world's second largest reserves and surpassed only by Russia. Around 62 percent of Iranian natural gas reserves are located in non-associated fields and have not been developed. According to *Global Insight*, major non-associated gas fields include: South Pars (280-500 Tcf of gas reserves), North Pars (50 Tcf) and Kangan-Nar (23.7 Tcf). In 2005, according to provisional Cedigas data, Iran had marketed production of 3.5 Tcf of natural gas and consumed 3.6 Tcf of gas.



Despite the fact that domestic natural gas demand is growing rapidly, Iran has the potential to become a significant natural gas exporter due to its large reserves. Natural gas treatment and processing plants include Kangan-Nar, Aghar-Dalan, Ahwaz, Marun-4, Bid Boland, and Asaluyeh. In March 2004, Iran signed a \$1.2 billion contract with a consortium of two foreign and two domestic companies to gather associated gas from the Nowruz, Soroush, Hendijan and Behregansar fields that was previously flared or re-injected.

Currently, natural gas accounts for nearly half of Iran's total energy consumption, and the government is planning to invest billions in coming years to increase this share. The price of natural gas to residential and industrial consumers is state-controlled at extremely low prices, encouraging rapid consumption growth and replacement of fuel oil, kerosene and LPG demand.

Iran has been involved in a border dispute with Kuwait and Saudi Arabia over demarcation of the border through the northern Persian Gulf continental shelf. This region contains the 7-13-Tcf Dorra natural gas field, which Iran had begun drilling in early 2000, but stopped after complaints by Kuwait. Saudi Arabia and Kuwait, which do not recognize Iran's claims to Dorra, signed a bilateral agreement in July 2000 on dividing up the field equally between the two countries.

South Pars

The South Pars offshore natural gas field is being developed in 28 phases, and is aimed at supplying gas for domestic consumption, reinjection into oil fields, and export.

Iran's largest natural gas field is South Pars, a geologic extension of Qatar's 900-Tcf North Field (See [Major Iranian Energy Projects and Pipelines Map](#) in [Oil Section](#)). South Pars was first identified in 1988, and current estimates are that South Pars contains 280 Tcf or more of natural gas reserves, and over 17 billion barrels of liquids reserves. Sales from South Pars could earn Iran as much as \$11 billion per year over 30 years, according to Iran's Oil Ministry.

Development of South Pars is Iran's largest energy project, already having attracted over \$15 billion in investment, but development has been delayed by various problems - technical (i.e., high levels of mercaptans - foul-smelling sulfur compounds - in the South Pars natural gas), contractual issues (i.e., controversy over buyback arrangements), politics, etc.

Iran's condensate production from South Pars is currently 200,000 bbl/d, and by 2010, South Pars could be producing condensates of more than 500,000 bbl/d. According to FACTS, Inc., total condensate production from South Pars **phases 1-14** is expected to reach 1 million bbl/d by 2015.

According to Global Insight, each of the 28 phases is set to produce almost 1 billion cubic feet per day. By 2006, five phases (1-5) were onstream, producing 3.2 billion cubic feet per day (Bcf/d) of natural gas. A further five phases are due onstream by 2007 with combined output of at least 10 Bcf/d. The government has called for 16 phases to be onstream by 2010 in order to keep pace

with Qatari exploitation of the linked North Field, which could run down the reserve base. Development of the various phases will likely allow the government to reach marketed natural gas production targets by 2010 of up to 28.2 Bcf/d.

One important use for South Pars production will be reinjection for enhanced oil recovery. Total natural gas reinjection needs from South Pars are forecast by FACTS at 8-10 Bcf/d by 2010-2012. South Pars natural gas also is intended for domestic consumption and for export, by pipeline and also possibly by liquefied natural gas (LNG) tanker.

South Pars Development Plan

Phase 1, developed by Petropars, came onstream in November 2004. Phase 1 involves production of 900 million cubic feet per day (Mmcf/d) of natural gas for the domestic grid, plus 40,000-45,000 bbl/d of condensate.

In February 2003, Oil Minister Zanganeh officially inaugurated **Phases 2 and 3** of South Pars development, which began to come onstream in March 2002. A consortium led by Total developed the project at a cost of approximately \$2 billion. Currently, phases 2 and 3 are producing around 2.8 Bcf/d of natural gas, plus 80,000 bbl/d of condensates. Twin undersea pipelines carry gas from South Pars to onshore facilities at Asaluyeh.

Phases 4 and 5, estimated to cost \$1.9 billion each, are being handled by Eni and Petropars, and involve construction of onshore treatment facilities at the port of Bandar Asaluyeh. These two phases began coming online in October 2004 and are ultimately expected to produce around 2 Bcf/d of natural gas, 80,000-90,000 bbl/d of condensates, plus ethane, sulfur, liquefied petroleum gas (LPG), and petrochemicals.

Phases 6-8, are being handled by Petropars and Norway's Statoil, which signed an agreement in October 2002. The phases were due on stream by the summer of 2006 at a cost of \$2.7 billion. Assessments now suggest the productivity of the 3 phases could potentially be 30% more than expected with each phase yielding 1.3 Bcf/d (instead of 1 Bcf/d) and condensate output per phase could reach 50,000-52,000 bbl/d. However, this expansion in productivity has not yet been approved and the whole project is facing delays because of platform and pipeline construction issues. This is due to delays in both offshore work and the lack of progress in building a pipeline from Asaluyeh to Agha Jari. Meanwhile, a pipeline is likely to bring some volumes of natural gas from South Pars Phase 1 to Phases 6-8 to provide enough natural gas for a sweet natural gas pipeline to Asaluyeh to go forward. Because of the above issues, it is now expected that one phase will be operational by early 2007, with the full three phases operational by end 2007 or early 2008.

The original plan was for the project's natural gas to be transported via the planned \$235 million IGAT-5 pipeline to the Agha Jari oilfield for injection as part of enhanced oil recovery efforts. NIOC is to take over as operator when development is finished.

Phases 9 and 10, being developed by South Korea's LG Engineering and Construction Corp., are expected to supply 2 Bcf/d to the domestic market, originally by 2007, plus around 80,000 bbl/d of condensate production. However, it appears at least one and half years behind schedule. In January 2005, a foreign subsidiary of Halliburton Co. reportedly reached agreement on helping develop Phases 9 and 10, along with local partner Oriental Kish.

Iran's Minister of Petroleum Kazem Vaziri signed a contract in June 2006 under which the Islamic Revolutionary Guard Corps (IRGC) will build the IGAT-7 natural gas trunkline, to take natural gas from Asaluyeh to Iranshahr and also to the Pakistani border. The IGAT-7 line is planned to deliver natural gas from Phases 9 and 10 of the South Pars gas field.

Bids on **Phase 11**, which is slated for LNG export, were opened in March 2003. In April 2004, Total was selected to enter into final negotiations on the \$1.2 billion project, while Petronas reportedly withdrew in May 2005. In addition, China National Petroleum Corp (CNPC) is negotiating for a 10 percent stake, and India's ONGC is reportedly interested as well. Phase 11 is slated to produce 2 Bcf/d of natural gas and 80,000 bbl/d of condensate under a buyback contract, possibly beginning in 2010.

Phase 12 was awarded to Petropars in 2006. The allotted structure comprises 3 Bcf/d of total

production, with 1 Bcf/d for domestic use and 2 Bcf/d for a potential LNG project, with 120k bbl/d of condensate. Thus far, the LNG upstream project has made little progress and Phase 12 would at best come onstream in 2012 or 2013.

Meanwhile, in December 2005, Iran signed a contract with the Royal Dutch Shell Company and Spanish company Repsol on developing the downstream section of **Phase 13**, which is slated for LNG export (2 Bcf/d) and LPG production (80,000 bbl/d) starting in 2010. According to Shell, a final investment decision on the project has been delayed until late 2007. **Phase 14** of South Pars is slated for gas-to-liquids (GTL) development, with Statoil and Shell reportedly interested.

In January 2005, **Phases 15-16** of the South Pars project were initially awarded to a consortium of international and domestic companies led by Norway's Aker Kvaener. Subsequently, they were re-tendered and awarded to a consortium led by Ghorb, a domestic engineering company. The two phases are expected to cost \$2 billion to develop. They are expected to produce 2 Bcf/d of natural gas for domestic use, plus 80,000 bbl/d of condensate and 133 million cubic feet per day of LNG for export. **Phases 17 and 18** of South Pars are expected to produce 2 Bcf/d of natural gas. A service contract has been awarded to three Iranian companies: IDRO (43 percent), IOEC (25 percent), and IOEC (32 percent). All natural gas will go to the domestic grid. Tenders for **Phases 19-22** have been released but there are some questions on natural gas availability. Estimated output is 3.5 Bcf/d of natural gas for domestic use. Prequalification tender closed April 2006. The project is expected to be developed through a joint venture including IDRO and a foreign company, with costs are estimated at \$3 billion.

Other Natural Gas Development

Iran likely will face stiff competition for LNG customers, particularly given the fact that many other LNG suppliers (Oman, Qatar, the UAE) are already players, having locked up much of the Far East market. U.S. sanctions also mean that Iran is limited to non-U.S. liquefaction technology, which is significant as most LNG plants use processes developed by U.S. companies. Currently, Iran has no LNG facilities.

In addition to South Pars, Iran's long-term natural gas development plans may involve the 48-Tcf North Pars field (a separate structure from South Pars); the 6.4-Tcf, non-associated Khuff (Dalan) reservoir of the Salman oil field (which straddles Iran's maritime border with Abu Dhabi, where it is known as the Abu Koosh field); the 800-Bcf Zireh field in Bushehr province; the 4-Tcf Homa field in southern Fars province; the 14-Tcf Tabnak natural gas field located in southern Iran; the onshore Nar-Kangan fields, the 13-Tcf Aghar and Dalan fields in Fars province, and the Sarkhoun and Mand fields. In September 2003, President Khatami inaugurated the first phase of Tabnak development, along with a related gas processing plant and a combined cycle power facility.

The dual Aghar-Dalan field development has been one of National Iranian Gas Company's recent successful natural gas utilization projects. Natural gas from both fields is processed at a \$300 million facility at the Dalan field, which is also the location of a 40 megawatt (MW), natural-gas-fired power plant. Most of the treated natural gas from the Dalan processing plant is carried through a 210-mile pipeline for re-injection in Marun and other oil fields in Khuzestan province.

Natural Gas Trade

With its enormous natural gas reserves, Iran is looking to export large volumes of natural gas. Besides Turkey (see below), potential customers for Iranian natural gas exports include: Ukraine, Europe, India, Pakistan, Armenia, Azerbaijan, Georgia, Taiwan, South Korea, and China. Exports could be via pipeline and/or LNG tanker, with possible LNG export terminals at Asaluyeh or Kish Island. For more on these regional pipelines, see the [Southeastern Europe](#) and [Caucasus](#) Regional Analysis Briefs.

In late January 2002, Iran and Turkey officially inaugurated a much-delayed natural gas pipeline link between the two countries, following several years of delays. Exports of Iranian natural gas to Turkey could reach 960 million cubic feet per day by 2007. There are questions, however, whether Turkish demand will grow rapidly enough to absorb this volume of natural gas from Iran, in addition to natural gas slated to be supplied by Russia, Algeria, and Nigeria.

Iran is aiming for large-scale natural gas exports to Europe via Turkey. In March 2002, Greece and Iran signed a \$300 million agreement which calls for extending the natural gas pipeline from Iran to Turkey into northern Greece. After that, gas could be transported to Europe via Bulgaria and possibly Romania. A memorandum of understanding (MOU) was signed on this possibility in

January 2003, and a joint working group set up in October 2003. Alternatively, gas could be transported via an undersea pipeline to Italy, where gas demand is expected to grow rapidly in coming years. A deep water option could be extremely expensive, however, making an overland route more likely. In July 2005, Iran and Ukraine signed a MOU on the supply of up to 2.74 Bcf/d per year of Iranian natural gas to Ukraine.

In May 2004, Armenia and Iran agreed on a long-term deal, under which Iran will supply a total of 1.3 Tcf of natural gas to Armenia over 20 years starting in 2007, in exchange for electricity supplies from Armenia. As part of the deal, the two countries are building an 85-mile gas pipeline at a cost of more than \$200 million. Construction finally began in early 2005 on the long-awaited Iranian portion of the Iranian-Armenian pipeline financed by Iranian Bank of Export and Development. According to the agreement, the construction must be completed by January 1, 2007. Initially, Armenia will receive 38 Bcf per year (1.08 million cubic meters per year) with plans to double the volume of imports by 2019. In exchange, Armenia will provide Iran with 3 kilowatts of electricity per cubic meter of gas. For more on this pipeline, see EIA's [Caucasus Regional Analysis Brief](#).

China has expressed interest in LNG imports from Iran. In October 2004, Iran signed a \$100 billion, 25-year contract with China's Sinopec for the production and export of LNG to that country of possibly 1.3 Bcf/d, plus construction of a refinery for natural gas and development of the Yadavaran oilfield. Under terms of the deal, Sinopec would have rights to purchase half of Yadavaran's 300,000-bbl/d peak oil output over the 25-year contract period. However, Iran also received bids on Yadavaran from other foreign companies, so the field's status is not completely clear.

Iran is also looking to export natural gas to Kuwait, most likely via pipeline from South Pars. In March 2005, Iran and Kuwait signed a preliminary MOU for natural gas sales, possibly 300 Mmcf/d for 25 years starting in 2007. The gas would be used for power generation and water desalination. Negotiations had stalled after the election of Mahmoud Ahmadinejad, but Qatar's decision in mid-2006 to release to other projects natural gas earlier promised to Kuwait has required Kuwait and Bahrain to again seek Iranian natural gas. At that time, Kuwait and Iran had edged close to firming up an initial agreement signed in 2000. This deal would supply roughly 35-40 percent of Kuwait's natural gas needs. Roughly three-quarters of the contract was worked out during those negotiations, and the parties were generally ready to continue, as the two countries had already agreed on the price and on the seasonal flow of supply.

Aside from natural gas exports, Iran also has discussed importing natural gas from Azerbaijan, and already imports some natural gas from Turkmenistan. This natural gas is for use in Iran's northern areas, far from the country's main natural gas reserves in the south. In December 1997, Turkmenistan launched the \$190 million Korpezhe-Kurt Kui pipeline to Iran, the first natural gas export pipeline in Central Asia to bypass Russia. According to terms of the 25-year contract between the two countries, Iran will take between 177 Bcf and 212 Bcf of natural gas from Turkmenistan annually, with 35 percent of Turkmen supplies allocated as payment for Iran's contribution to building the pipeline.

Nabucco

In January 2004, Austria's OMV signed an MOU with the National Iranian Gas Export Co. (NIGEC) on possible cooperation regarding the proposed \$5 billion Nabucco natural gas pipeline from Iran through Turkey to Austria. The Nabucco project, launched in 2002, entails the construction of a pipeline from the Caspian Sea region to Western Europe, bypassing Russia. Negotiations concerning the Nabucco project between the natural gas companies of five countries-- Bulgaria's Bulgargas, Romania's Transgas, Turkey's Botas, Hungary's MOL, and Austria's OMV-- concluded in June 2006, when Nabucco Company Pipeline Study Group was formed to undertake construction of the natural gas pipeline network. Though source natural gas for this project has not been decided upon, construction of the 1,760-mile, \$5.8 billion pipeline is set to begin in 2008 and end in 2011. It will have an annual capacity of 170-480 Bcf. For more on this pipeline, see EIA's [Southeastern Europe Regional Analysis Brief](#).

Iran-Pakistan-India Natural Gas Export

Although India and Iran in 1993 signed an MOU on an overland natural gas pipeline, a variety of economic and political issues to date have blocked completion of a feasibility study. Meanwhile, in February 2002, Iran and Pakistan signed an MOU on a pre-feasibility study for a possible 1,600-mile, \$3-\$4 billion natural gas pipeline from southern Iran to southeastern Pakistan and on to India. Australia's BHP Billiton is the main foreign backer of the idea. Iran is offering to cover 60

percent of the construction costs of the pipeline. Pakistan could earn about \$200-\$500 million annually in transit fees from the pipeline and also would be able to purchase natural gas from the pipeline.

Given a thaw in India-Pakistan relations over the past couple of years, the pipeline idea has recently gained interest. Indian officials have stated that the plan could be considered if Pakistan can provide security guarantees for the \$3 billion project. Two other options would be a pipeline serving only Pakistan, or separate pipelines for Pakistan and India. There also has been discussion of extending the pipeline to China. In September 2005, India and Pakistan agreed to seek third-party verification of Iran's natural gas reserves before proceeding with the pipeline project.

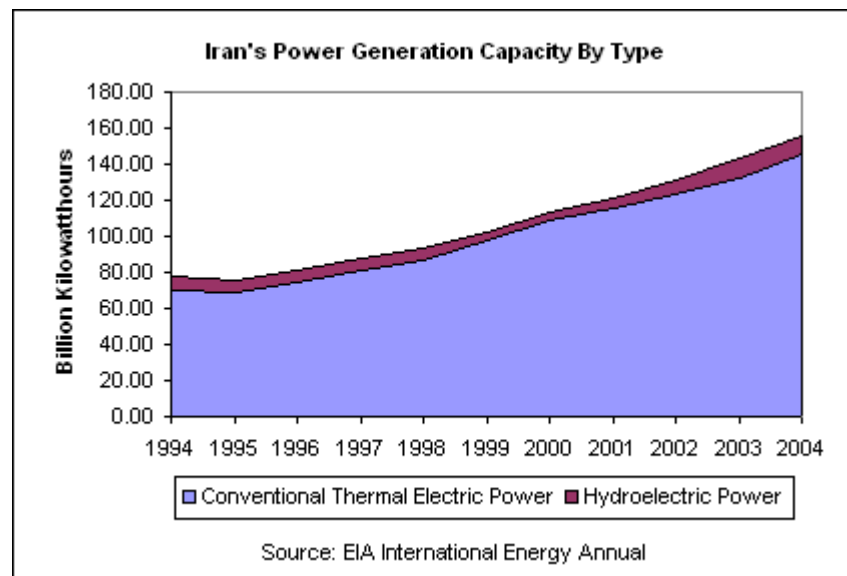
However, pricing is an issue for the proposed pipeline as India is reportedly willing to pay at most \$4.25/ million British Thermal Units (mnBtu), while Iran wants \$7.20/mnBtu. India and Pakistan have together proposed to import roughly one-third of the total natural gas considered for export by Iran. Iran has put forward a natural gas pricing formula wherein the natural gas price is linked to Brent crude oil with an escalating cost component of around 3 percent annually. Both India and Pakistan oppose this formula and instead have insisted on having a floor and a ceiling.

Another possibility would involve LNG exports to India. In January 2005, Gas Authority of India Ltd. (GAIL) and the National Iranian Gas Export Corp. signed a 25-year deal with Iran for delivery of 5 million tons per year of LNG starting in 2009-10. In addition, NIOC offered Indian companies service contracts towards developing the Yadavaran and Jufeyr oilfields. Combined, India's shares in the two oil fields will produce 90,000 bbl/d. Iran reportedly will build three LNG plants at Assaluyeh, using South Pars natural gas as a feedstock. If successful, LNG exports most likely would flow to Dahej, in the western Indian state of Gujarat and/or Cochin in the southwest. India's state-owned Oil and Natural Gas Corp. (ONGC) has an option for 20 percent of Yadavaran, plus 100 percent of Jufeyr. However, in July 2006, the proposed Iran-India LNG agreement stalled due to pricing issues. The 2005 agreement reportedly included a maximum price of \$3.25/mnBtu, whereas Iran has since changed its price to \$5.10/mnBtu. The stalemate in the LNG negotiations has implications in Iran's upstream oil sector, given that the deal is tied to Indian participation in Iran's Yadavaran and Jufeyr oilfields.

Electricity

Iran's electricity demand is increasing rapidly, meaning that the country needs to invest billions of dollars in new generating capacity.

As of 2004, Iran had installed power generation capacity of about around 34.3 gigawatts (GW). Of this total, over three-quarters was natural gas-fired, with the remainder either hydroelectric (7 percent) or oil-fired. For 2005, Iranian power generation capacity is expected to reach 36 GW).



Sector Organization

Although the government has considered privatization, at present Iran's power sector is run by the state-controlled Tavanir organization. Power plant construction is handled by the Iran Power Development Company (IPDC), a wholly owned subsidiary of Tavanir. Eventually, Tavanir may be

broken up into smaller companies as part of a privatization package. In addition to power generation, Tavanir also is responsible for electrical transmission. Iran has three main power distribution networks: 1) the Interconnected Network, which serves all of Iran except for remote eastern and southern areas, using 440-kV and 230-kV transmission lines; 2) the Khorassan Network, which serves the eastern Khorossan province; and 3) the Sistan and Baluchistan Network, which serves the remote southeastern provinces of Sistan and Baluchistan. The government goal is to join these three networks into one national grid. Currently, around 94 percent of Iran's rural population has access to electricity.

Recent Capacity Additions

With power demand growing rapidly (7-9 percent annually; to 145 billion kilowatt hours in 2005), Iran is building significant new generation capacity, with the goal of adding 18 GW over the next five years. As a result of significant state investment in this sector, a number of new power plants (mainly hydroelectric and combined cycle) have come online in recent years.

Hydro

Currently, the largest hydropower projects are the 2,000-megawatt (MW) Karun 3 plant (in March 2005, President Khatami inaugurated two, 250-MW units at this project), the 2,000-MW Godar-e Landar facility, and a 1,000-MW station in Upper Gorvand. In July 2006, Abbas Aliabadi, Director of Iran Power and Water Resources Development Company, announced that Iran plans to add 6.4 GW of hydroelectric power generating capacity over the next five years. Aliabadi said that 550 MW of new capacity was expected to be brought online in the current Iranian year (21 March 2006 to 20 March 2007) via additions of new units at the Karoun-3, Lourak, Yasouj and Menj hydropower stations. The additions will raise Iran's hydropower capacity from 4.8 GW in 2005 to 11.2 GW by 2011.

Natural Gas-Fired

New thermal projects include two 1,040-MW combined cycle plants in the South, a 1,300-MW combined cycle plant at Arak, a 1,000-MW facility in Bandar Abbas, and a 1,000-MW combined cycle plant being built by the Tehran Regional Electricity Company (TREC) in Qom. This latter project is significant, as it is being privately financed and built by a regional - as opposed to national - company. The plant is expected to be completed in 2007. In May 2004, a 494-MW gas-fired power plant was inaugurated in Abadan. In January 2006, it was reported that Iran is to build a 1,000-MW gas power plant in the western province of Khorramabad. Construction work is planned to start by the end of the current Iranian fiscal year and will be completed within four years.

Build-Operate-Transfer (BOT) Projects

Iran has received offers for investment in the form of loans and build-operate-transfer (BOT) contracts, but progress has been slow. BOT contracts allow the investing company to build and operate the generating facility for a period of 15-20 years, after which time the plant is turned over to the Energy Ministry. Negotiations have taken place with international energy firms on expansion plans for power plants at Bandar Abbas, Shaid Rajai, Alborz, Ramin, and Kerman.

In June 2006, Iran's first BOT power plant became fully operational, when the last of six 159MW open cycle gas turbine generating sets comprising the Chehelsotun power plant in South Isfahan were brought online. The 950MW gas-fired plant, the first to be completed in Iran under a BOT agreement, was developed by a 50:50 joint venture between the Iranian investment house IHAG and local power contractor Mapna. The first unit at the Chehelsotun plant was brought online in 2005.

In addition to BOT plants, Iran has attempted to promote a build-own-operate (BOO) model for the 2,000-MW, Zanjan 1-4 independent power project (IPP). In September 2004, the BOO plan was dealt a setback due to a lack of bidders, and may be re-bid. Overall, Iran is planning 5,800 MW of BOT projects and 7,000 MW of BOO projects.

International Trade

Overall, in 2004, Iran imported around 2.2 billion kilowatthours (Bkwh) per year, up from 1.5 Bkwh in 2003,, and exported just under 1.9 Bkwh. Iran trades electricity with Afghanistan (exports to the western part of the country), Armenia (exports and imports), Azerbaijan (exports and imports), Pakistan, Turkey and Turkmenistan (exports and imports). In April 2003, Iran said that it would be willing to supply Iraqi cities with electricity as well. In December 2004, a protocol was reached on synchronizing the power grids of Iran, Azerbaijan, and Russia, with 500 MW being exchanged

beginning in 2006. In August 2004, Turkmenistan began power exports to Iran via a new transmission line (Sarahs). Annual exports of 375 million kilowatt-hours, worth \$7.5 million, are expected. This line adds to previous electric export capacity from Turkmenistan to Iran via the Balkanat-Gonbad line started up in June 2003. Another line is to be constructed in the short-term, bringing total power exports from Turkmenistan to Iran to 2.4 billion kilowatt-hours per year.

Environment

Iran's position as a major producer and consumer of fossil fuels has caused numerous environmental problems.

Given its heavily energy-centered economy, environmental issues in Iran generally have ranked as a relatively low priority. However, ongoing and severe air pollution in urban areas have highlighted the need to improve Iran's environmental record. The rush to develop oil and natural gas resources in the Caspian Sea makes oil pollution in the Caspian a real environmental threat.

Huge increases in energy consumption over the past 20 years have contributed greatly to pollution levels as Iran's carbon emissions have nearly tripled over the same time span. Large numbers of old, inefficient cars on the road lacking catalytic converters account for much of the country's air pollution. Energy prices are kept artificially low in Iran through heavy state subsidies, resulting in highly inefficient and polluting consumption patterns. In addition, Iran's abundance of fossil fuel resources has tended to discourage the country's incentive to shift to cleaner alternative energy sources for its energy needs.

Profile

Country Overview

Chief of State	Supreme Leader Ayatollah Ali Hoseini-Khamenei
Head of Government	President Mahmud Ahmadinejad
Location	Middle East, bordering the Gulf of Oman, the Persian Gulf, and the Caspian Sea, between Iraq and Pakistan
Independence	1 April 1979 (Islamic Republic of Iran proclaimed)
Population (2005E)	68,017,860
Languages	Persian and Persian dialects 58%, Turkic and Turkic dialects 26%, Kurdish 9%, Luri 2%, Balochi 1%, Arabic 1%, Turkish 1%, other 2%
Religion	Shi'a Muslim 89%, Sunni Muslim 9%, Zoroastrian, Jewish, Christian, and Baha'i 2%
Ethnic Group(s)	Persian 51%, Azeri 24%, Gilaki and Mazandarani 8%, Kurd 7%, Arab 3%, Lur 2%, Baloch 2%, Turkmen 2%, other 1%

Economic Overview

Minister of Economic Affairs & Finance	Davud Daneshjafari
Currency/Exchange Rate (08/08/2006)	Iranian Rials (IRR) 9,162=\$1
Inflation Rate (2005E)	16%
Gross Domestic Product (GDP, 2005E)	\$181.2
Real GDP Growth Rate (2005E)	6.1%
Unemployment Rate (2004E)	11.2%
External Debt (2005E)	\$16.94 billion
Exports (2005E)	\$55.42 billion
Exports - Commodities	petroleum 80%, chemical and petrochemical products, fruits and nuts, carpets
Exports - Partners (2004E)	Japan 20%, China 9.9%, Italy 6.3%, South Africa 6.3%, Taiwan 4.8%, Turkey 4.7%, South Korea 4.7%, France 4.3%, Netherlands 4.3%
Imports (2005E)	\$42.5 billion
Imports - Commodities	industrial raw materials and intermediate goods, capital goods, foodstuffs and other consumer goods, technical services, military supplies
Imports - Partners	Germany 13%, France 8.9%, Italy 8%, China 7.7%, UAE 6.4%, South Korea 6.3%, Russia

(2004E)	4.9%
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Current Account Balance (2005E)	\$8.179 billion
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Energy Overview

Minister of Oil	Kazem Vaziri
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Proven Oil Reserves (January 1, 2006E)	132.5 billion barrels
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Oil Production (2006E)	4,152.9 thousand barrels per day, of which 92% was crude oil.
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Oil Consumption (2005E)	1,596.1 thousand barrels per day
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Crude Oil Distillation Capacity (2006E)	1,451 thousand barrels per day
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Proven Natural Gas Reserves (January 1, 2006E)	971.2 trillion cubic feet
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Natural Gas Production (2004E)	3 trillion cubic feet
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Natural Gas Consumption (2004E)	3 trillion cubic feet
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Recoverable Coal Reserves (2003E)	461.9 million short tons
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Coal Production (2004E)	1.1 million short tons
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Coal Consumption (2004E)	1.7 million short tons
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Electricity Installed Capacity (2004E)	34.3 gigawatts
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Electricity Production (2004E)	155.7 billion kilowatt hours
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Electricity Consumption (2004E)	145.1 billion kilowatt hours
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Total Energy Consumption (2004E)	6.4 quadrillion Btus*, of which Natural Gas (49%), Oil (48%), Hydroelectricity (2%), Coal (1%), Nuclear (0%), Other Renewables (0%)
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Total Per Capita Energy Consumption (2003E)	87.6 million Btus
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Energy Intensity (2004E)	10,280.2 Btu per \$2000-PPP**
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Environmental Overview

Energy-Related Carbon Dioxide Emissions (2003E)	372 million metric tons, of which Oil (52%), Natural Gas (42%), Coal (1%)
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Per-Capita, Energy-Related Carbon Dioxide Emissions (2003E)	5.4 metric tons
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Carbon Dioxide Intensity (2004E)	0.6 Metric tons per thousand \$2000-PPP**
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Environmental Issues	air pollution, especially in urban areas, from vehicle emissions, refinery operations, and industrial effluents; deforestation; overgrazing; desertification; oil pollution in the Persian Gulf; wetland losses from drought; soil degradation (salination); inadequate supplies of potable water; water pollution from raw sewage and industrial waste; urbanization
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Major Environmental	party to: Biodiversity, Climate Change, Desertification, Endangered Species, Hazardous
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Agreements	Wastes, Marine Dumping, Ozone Layer Protection, Wetlands signed, but not ratified: Environmental Modification, Law of the Sea, Marine Life Conservation
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Oil and Gas Industry

Organization	The Ministry of Petroleum (MoP) has overall responsibility for the country's energy sector. The MoP has four subsidiaries which function autonomously for the most part, but ultimately report to the Ministry: 1) National Iranian Oil Company (NIOC) - oil and gas exploration and production, refining and oil transportation; 2) National Iranian Gas Company (NIGC) - manages gathering, treatment, processing, transmission, distribution, and exports of gas and gas liquids; 3) National Iranian Petrochemical Company (NPC) - handles petrochemical production, distribution, and exports; and 4) National Iranian Oil Refining and Distribution Company (NIORDC) handles oil refining and transportation, with some overlap to NIOC. The National Iranian Offshore Oil Co. (IOOC) is in charge of offshore oil fields in the Persian Gulf. The National Iranian South Oil Fields Co. (NIOC South) is in charge of onshore oilfields in southern Iran. Pars Oil & Gas Co. (POGC) is in charge of the offshore North and South Pars gas fields. Khazar Exploration & Production Co. is in charge of Iran's Caspian Sea sector. Also, the National Iranian Tanker Company (NITC) controls the second largest fleet of tankers in OPEC.
Major Oil/Gas Ports	Kharg Island, Lavan Island, Sirri Island, Ras Bahregan
Foreign Company Involvement	BG, BHP, Bow Valley, BP, Eni, Gazprom, Lukoil, OMV, Petronas, Royal Dutch/Shell, Sheer Energy, Sinopec, Statoil, Total
Major Oil Fields (production, bbl/d)	Agha Jari, Ahwaz, Bangestan, Bibi Hakimeh, Darkhovin, Doroud, Gachsaran, Mansouri (Bangestan), Marun, Masjid-e Soleiman, Parsi, Rag-e-Safid, Soroush/Nowruz
Major Natural Gas Fields (production, Bcf/d)	South Pars, North Pars, Khuff, Zireh, Tabnak, Nar-Kangan, Aghar, Dalan, Sarkhoun, Mand
Major Pipelines (capacity, Mmcf/d)	The 780-mile, 40/42-inch IGAT-1 trunkline transports associated gas from Khuzestan area oilfields to consumption centers in the north; the 56-inch, \$1.5 billion, 880-mile IGAT-2 line transports non-associated gas from the Kangan and Nar fields on the Persian Gulf coast near Bandar Taheri; the \$500 million, 56-inch, 300-mile IGAT-3 pipeline, which would run from South Pars to Tehran, is under construction. Evaluation also has begun on a possible IGAT-4 line from South Pars to industrial northern Iran and IGAT-5 from South Pars to the onshore Agha Jari oilfield.
Major Refineries (capacity, bbl/d)	Abadan (400,000), Isfahan (265,000), Bandar Abbas (232,000); Tehran (225,000), Arak (150,000), Tabriz (112,000), Shiraz (40,000), Kermanshah (30,000), Lavan Island (20,000)

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power. The renewable energy consumption statistic is based on International Energy Agency (IEA) data and includes hydropower, solar, wind, tide, geothermal, solid biomass and animal products, biomass gas and liquids, industrial and municipal wastes. Sectoral shares of energy consumption and carbon emissions are also based on IEA data.

**GDP figures from OECD estimates based on purchasing power parity (PPP) exchange rates.

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