

COUNTRY ANALYSIS BRIEFS

India

Last Updated: January 2007

Background

India boasts a growing economy, and is increasingly a significant consumer of oil and natural gas.

The Indian economy continues to show impressive economic growth. The country's real gross domestic product (GDP) grew at an impressive rate of 9.1 percent during the first half of fiscal 2006 (April – September 2006), after growing by 8.7 percent in fiscal 2005. Together with the country's impressive growth, India has also become a significant consumer of energy resources. According to EIA estimates, India was the fifth largest consumer of oil in the world during 2006.

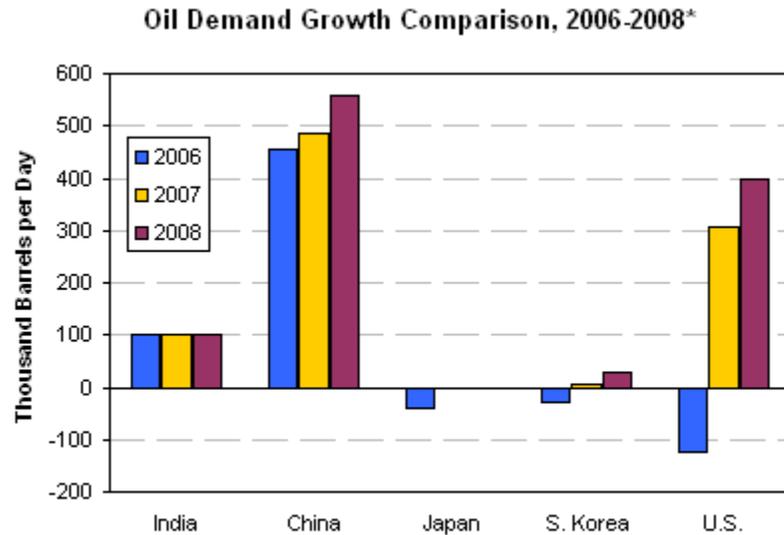


Oil

India is a growing net importer of oil.

According to *Oil & Gas Journal (OGJ)*, India had 5.6 billion barrels of proven oil reserves as of January 2007, the second-largest amount in the Asia-Pacific region (behind China). India's crude oil reserves tend to be light and sweet, with specific gravity varying from 38° API in the offshore Mumbai (Bombay) High field to 32° API at other onshore basins. Much of India's crude oil reserves are located off the western coast (Mumbai High) and in the northeast of the country, although substantial undeveloped reserves are located in the offshore Bay of Bengal and in Rajasthan state.

The combination of rising oil consumption and fairly stable production levels leaves India increasingly dependent on imports to meet consumption needs. In 2006, the country produced an average of 846,000 barrels per day (bbl/d) of total oil liquids, of which 77 percent, or 648,000 bbl/d, was crude oil. During 2006, India consumed an estimated 2.63 million bbl/d of oil. EIA estimates that India registered oil demand growth of 100,000 bbl/d during 2006. EIA forecasts suggest the country will experience similar gains during 2007 and 2008.



Source: EIA *Short-Term Energy Outlook* (Jan. 2007)

*2006 is estimate,
2007-08 is forecast

Sector Organization

India's oil sector is dominated by state-owned enterprises, although the government has taken steps in recent years to deregulate the hydrocarbons industry and encourage greater foreign involvement. India's state-owned Oil and Natural Gas Corporation (ONGC) is the largest oil company, and also the country's largest company overall by market capitalization. ONGC is the dominant player in India's upstream sector, accounting for roughly three-fourths of the country's oil output during 2006, according to Indian government estimates.

As a net importer of oil, the Indian government has introduced policies aimed at increasing domestic oil production and oil exploration activities. As part of this effort, the Ministry of Petroleum and Natural Gas crafted the New Exploration License Policy (NELP) in 2000, which for the first time permits foreign companies to hold 100 percent equity ownership in oil and natural gas projects. However, to date, only a handful of oil fields are being operated by foreign firms.

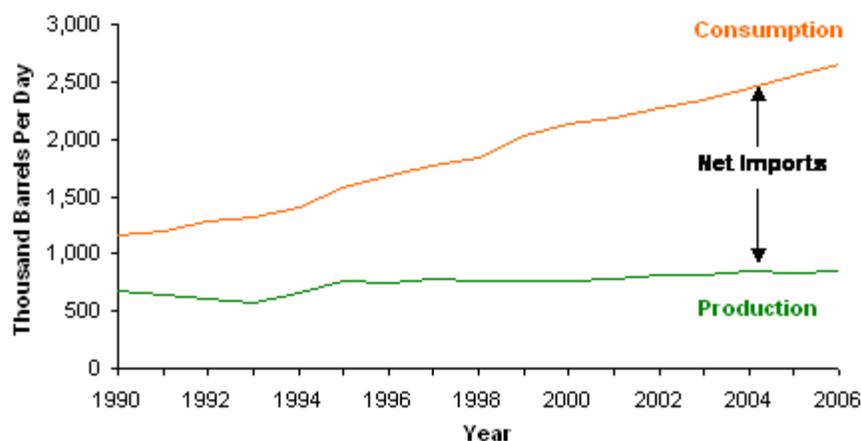
India's downstream sector is also dominated by state-owned entities, although private companies have increased their market share in recent years. The Indian Oil Corporation (IOC) is the largest state-owned company in the downstream sector, operating 10 of India's 17 refineries and controlling about three-quarters of the domestic oil transportation network. Reliance Industries, a private Indian firm, opened India's first privately-owned refinery in 1999, and has gained a considerable market share in India's oil sector.

Exploration and Production

To help meet growing oil demand, India has promoted various exploration and production (E&P) projects over the last several years in an effort to boost domestic oil production.

The Indian government has held several licensing rounds under the NELP framework in an effort to promote E&P activities and boost domestic oil production.

India's Oil Production and Consumption, 1990-2006*



Source: EIA, *International Energy Annual 2004*;
Short-Term Energy Outlook (Jan. 2007)

*2006 is estimate

The primary mechanism through which the Indian government has promoted new E&P projects has been the NELP framework. Between 2000 and 2005, the government awarded 110 oil and natural gas concessions in five separate licensing rounds. The sixth bidding round (known as NELP-VI) recently concluded, with 52 exploration blocks awarded. As in previous rounds, ONGC and other Indian national oil companies (NOCs) fared very well. ONGC secured a total of 25 exploration blocks, often in consortia with other Indian NOCs. The privately-owned Reliance Industries secured seven deepwater blocks in the Krishna-Godavari and Mahanadi basins, which are considered to be some of India's most promising offshore hydrocarbon basins. The government is expected to formally sign Production Sharing Contracts (PSCs) for the 52 blocks in early 2007. Notably absent on the list of bidders for the NELP-VI are international oil majors. The Indian government was keen to attract oil majors to utilize their vast deepwater experience and other technical expertise. Some industry publications suggest that the Indian government will now move to an open acreage system, in which domestic and international oil companies can apply for available E&P projects at any time, rather than licensing rounds.

Overseas E&P

In recent years, Indian NOCs have looked to acquire equity stakes in E&P projects overseas. The most active company is ONGC Videsh Ltd., the overseas investment arm of ONGC. As of January 2007, ONGC Videsh holds interests in 25 oil and natural gas projects in 15 countries, spanning Africa, Asia, Latin America, and the Middle East. One of ONGC Videsh's most high profile investments is its share in the Greater Nile Petroleum Operating Company (GNPOC), which has engaged in E&P work in Sudan since 1997. ONGC Videsh acquired a 25 percent equity stake in the company in 2003, with the balance held by the China National Petroleum Company (CNPC, 40 percent), Petronas (30 percent), and the Sudan National Oil Company (Sudapet, 5 percent). The GNPOC acreage in Sudan holds proved crude oil reserves of more than one million barrels, and current production levels from the 8 main GNPOC fields exceeds 300,000 bbl/d. In addition to the upstream activities, the GNPOC companies operate a 935-mile crude oil pipeline that pumps oil to Port Sudan for export (see the [Sudan Country Analysis Brief](#) for more information).

ONGC Videsh also holds a 20 percent stake in the ExxonMobil-led consortium that operates the Sakhalin-I project in Russia. According to company estimates, the oil fields associated with Sakhalin-I hold recoverable crude oil reserves of 2.3 billion barrels. Production at Sakhalin-I started in October 2005, and is expected to reach 250,000 bbl/d in early 2007. Oil from the Sakhalin-I project will be piped westward to the DeKastri terminal on the Russian mainland for export, while some crude oil will also be pumped into Russia's domestic pipeline system for local consumption (for more information, see the [Sakhalin Island Analysis Brief](#) and the [Sakhalin-I Project Website](#)).

Downstream/Refining

According to OGJ, India had 2.25 million bbl/d of refining capacity at 17 facilities as of January

2007. Only one refinery, Reliance Petroleum's plant at Jamnagar, is wholly owned by a private company. The Jamnagar facility is Reliance Petroleum's only current refinery, but it is India's largest, with a capacity of 660,000 bbl/d. Reliance Petroleum is currently constructing a second facility at the Jamnagar site, which is expected to have a capacity of 580,000 bbl/d when completed in 2008. When finished, Jamnagar will be the largest refining complex in the world. IOC is the largest state-owned player in India's refining sector, with 620,000 bbl/d of refining capacity at 7 plants. The company announced expansion plans in October 2006 that call for doubling its refining capacity by 2012.

Refined Fuel Subsidies

Beginning in 2002, the Indian government introduced some measures aimed at deregulation in the downstream oil sector. Private refiners may now directly market some of their own petroleum products to their customers. Additionally, the government phased out the Administered Price Mechanism (APM) on oil products in 2002, replacing it with the new Market Determined Price Mechanism (MDPM). However, while the MDPM is notionally benchmarked to international oil prices, the Indian government continues to heavily subsidize domestic fuel prices for consumers. The combination of high international crude oil prices and low domestic fuel rates has led some new refinery proposals to have an overt export focus, such as Reliance Petroleum's second Jamnagar facility. In February 2006, the Indian government issued a one-time relief subsidy of \$1.3 billion to domestic refiners that faced financial difficulties due to capped fuel prices. In June 2006, the government also pushed through a small domestic fuel price increase, although rates remain well below competitive international levels.

Strategic Petroleum Reserve

Indian officials have declared that the country intends to develop a strategic petroleum reserve (SPR). To date, plans have been approved for the construction of storage tanks with 36.7 million barrels of crude oil storage capacity, with several sites near Mangalore on the east coast being considered. Construction at the planned storage sites is expected to begin in early 2007. To date, the government has not reached a decision on when to fill the country's SPR tanks, or how large to build the reserves. The SPR project is being led by the Indian Strategic Petroleum Reserve Corporation Ltd., which is part of Oil Industry Development Board, a state-controlled organization that manages loans and grants to the oil industry.

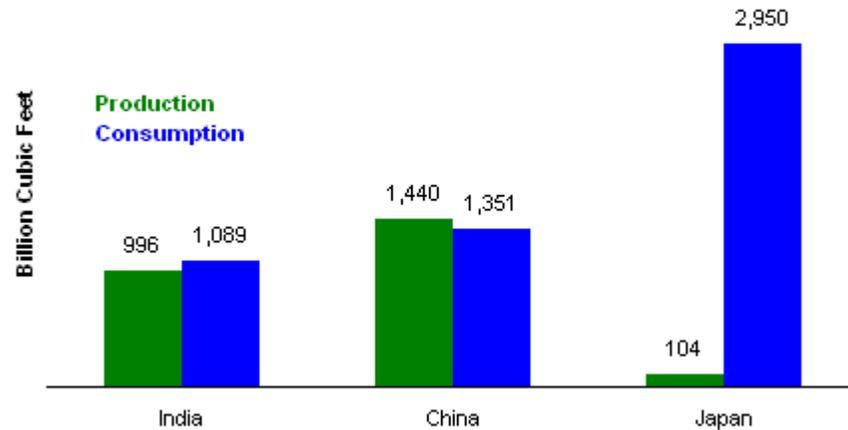
Natural Gas

Despite major new natural gas discoveries in recent years, India is considering large-scale imports via pipelines and LNG terminals to help meet growing demand.

According to OGI, India had 38 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2007. The bulk of India's natural gas production comes from the western offshore regions, especially the Mumbai High complex. The onshore fields in Assam, Andhra Pradesh, and Gujarat states are also major producers of natural gas. According to EIA data, India produced 996 billion cubic feet (Bcf) of natural gas in 2004.

India imports small amounts of natural gas. In 2004, India consumed 1,089 Bcf of natural gas, the first year in which the country showed net natural gas imports. During 2004, India imported 93 Bcf of liquefied natural gas (LNG) from Qatar.

Select Asia-Pacific Natural Gas Production and Consumption, 2004



Source: EIA *International Energy Annual 2004*

Sector Organization

As in the oil sector, India's state-owned companies account for the bulk of natural gas production. ONGC and Oil India Ltd. (OIL) are the largest companies by production volume, while some foreign companies participate in upstream developments in joint-ventures and production sharing contracts (PSCs). Reliance Industries, a privately-owned Indian company, will also have a greater role in the natural gas sector in the coming years, as a result of a large natural gas find in 2002 in the Krishna Godavari basin.

The Gas Authority of India Ltd. (GAIL) holds an effective monopoly on natural gas transmission and distribution activities. In December 2006, the Minister of Petroleum and Natural Gas issued a new policy that allows foreign investors, private domestic companies, and national oil companies to hold 100 percent equity stakes in pipeline projects. While GAIL's monopoly in natural gas transmission and distribution is not guaranteed by statute, it will continue to be the leading player in the sector because of its existing natural gas infrastructure (in 2004, GAIL piped 88 percent of the natural gas consumed in India).

Exploration and Production

There have been several large natural gas finds in India over the last five years, predominantly in the offshore Bay of Bengal. In December 2006, ONGC announced that it had found an estimated 21 to 22 Tcf of natural gas in place at the KG-DOWN-98/2 block off the coast of Andhra Pradesh in the Krishna Godavari basin. On the same day, ONGC announced another find in the Mahanadi basin off the coast of Orissa state, with an estimated 3 to 4 Tcf in place. Neither of these finds has been certified, but could potentially raise India's natural gas reserve levels significantly. The discoveries also fit into the recent trend of large upstream developments in the Bay of Bengal, especially in the Krishna Godavari basin. State-owned Gujarat State Petroleum Corporation (GSPC) holds an estimated 20 Tcf of natural gas reserves in place at the KG-OSN-2001/3 block in the Krishna Godavari area. Reliance Industries recently secured government approval for the commercial development of the D-6 block in the Krishna Godavari basin, which holds 9 Tcf of recoverable natural gas reserves (14.5 Tcf total reserves in place). Under the development plan for the D-6 block, Reliance and its equity partner Niko Resources will spend \$5.2 billion to bring the first natural gas to the market in 2009. At its peak, the D-6 block is expected to supply 2.8 Bcf/d of natural gas, which would more than double the country's current production level.

Despite these large natural gas finds, most analysts expect natural gas demand in India to outstrip new supply in the years ahead. Indian natural gas consumption has risen faster than any other fuel over the last five years. ONGC has worked to maximize its recovery rate at the Mumbai High structure, which supplies the bulk of the country's natural gas at present. BG International and Reliance Industries are also jointly working to expand production at the Tapti, Panna, and Mukti fields in the Mumbai High basin. The companies currently produce 300 million cubic feet per day (MMcf/d) at these three fields, although they have not announced a target production level for

the expanded project plans.

Natural Gas Imports

Analysts expect that India's natural gas import demand will increase in the coming years. To help meet this growing demand, a number of import schemes including both LNG and pipeline projects have either been implemented or considered.

Iran-Pakistan-India Pipeline

India has considered various proposals for international pipeline connections with other countries. One such scheme is the Iran-Pakistan-India (IPI) Pipeline, which has been under discussion since 1994. The plan calls for a roughly 1,700-mile, 2.8-Bcf/d pipeline to run from the South Pars fields in Iran to the Indian state of Gujarat. While Iran is keen to export its abundant natural gas resources and India is in search of projects to meet its growing domestic demand, a variety of economic and political issues have delayed a project agreement. Indian officials have made it clear that any import pipeline crossing Pakistan would need to be accompanied by a security guarantee from officials in Islamabad. Apart from security concerns, tripartite talks in December 2006 fell apart over natural gas pricing disputes. Both Indian and Pakistani officials refused Iran's proposed price of \$8.00 per million Btu (MMBtu), stating that they would not pay more than \$4.25/MMBtu (see the [Iran](#) and [Pakistan Country Analysis Briefs](#) for more information).

Turkmenistan-Afghanistan-Pakistan-India Pipeline

India has worked to join onto the Turkmenistan-Afghanistan-Pakistan Pipeline (TAP, and sometimes referred to as the Trans-Afghan Pipeline). The TAP project consists of a planned 1,050-mile pipeline originating in Turkmenistan's Dauletabad-Donmex natural gas fields and transporting the fuel to markets in Afghanistan, Pakistan, and possibly India. India was invited to join the TAP project in February 2006, and is expected to announce its formal entry into the scheme in late January 2007, at which point it would be known as the TAPI project. Initial plans for the TAPI call for the line to have a capacity between 2 – 3 Bcf/d at an estimated cost of \$3.3 billion. While India has publicly promoted this scheme while negotiations with Iran have slowed, the TAPI project faces a variety of hurdles. India has concerns about the security of the proposed line, which would traverse unstable regions in Afghanistan and Pakistan. Furthermore, a recent review of the TAPI project raised doubts that Turkmen natural gas supplies are adequate to meet its proposed export commitments (see the [Afghanistan Country Analysis Brief](#) and [Central Asia Regional Brief](#) for more information).

Imports from Myanmar

A third international pipeline proposal envisions India importing natural gas from Myanmar. In March 2006, the governments of India and Myanmar signed a natural gas supply deal, although a specific pipeline route has yet to be determined. Initially, the two countries planned to build a pipeline that would cross Bangladesh. However, after indecision from Bangladeshi authorities over the plans, India and Myanmar have studied the possibility of building a pipeline that would terminate in the eastern Indian state of Tripura and not cross Bangladeshi soil.

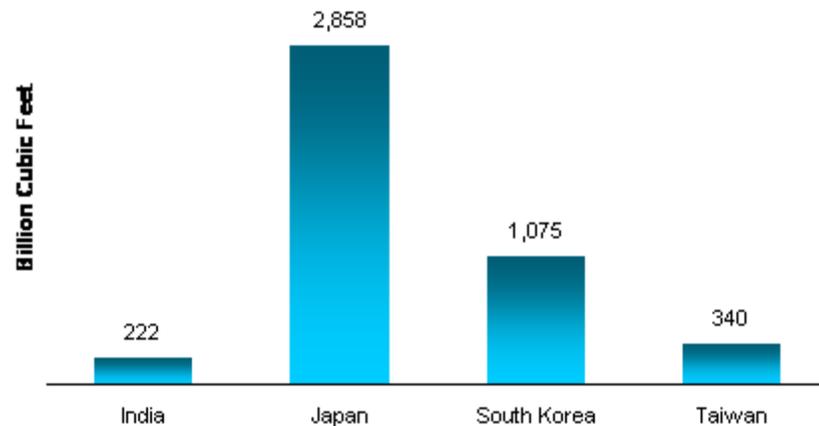
Domestic Transmission System

While there are various proposals under discussion for natural gas import schemes into India, there are concerns that India's limited domestic transmission network will constrain natural gas consumption. Currently, much of GAIL's domestic transmission system is concentrated in the country's natural gas production centers, and there is little interconnection between regions. GAIL has announced an ambitious long-term plan to increase its transmission network from roughly 1,900 miles to 6,200 miles to establish a National Gas Grid. However, there are only a handful of actual expansion projects planned for the next few years.

Liquefied Natural Gas

Currently, India has two LNG import terminals, with several others that are planned or proposed. India started receiving LNG shipments in January 2004 with the start-up of the Dahej terminal in Gujarat state. According to EIA data, India imported 93 Bcf of LNG in 2004, reaching 222 Bcf in 2005. Petronet LNG, a consortium of state-owned Indian companies and international investors, owns and operates the Dahej LNG facility. The Dahej terminal has a capacity to handle 5 million metric tons per year (MMt/y, or about 975 Bcf/y) of LNG imports. Petronet LNG is also building a second LNG receiving terminal at Kochi, which is expected to have a capacity of 2.5 MMt/y (488 Bcf/y) when completed in 2009. India's second LNG terminal started operations in April 2005 near Surat in Gujarat state. The facility is owned by Hazira LNG, a joint venture of Shell and Total. The facility has an initial throughput capacity of 2.5 MMt/y, with the option of expanding that to 5 MMt/y in the future.

Select Asia-Pacific LNG Imports, 2005



Source: EIA, *Natural Gas Monthly* (August 2006);
CEDIGAZ *Natural Gas in the World, Trends and Figures 2005*

There are several other planned or proposed LNG facilities in India. A 5-MMt/y LNG processing plant in Dabhol was originally scheduled to come online in 2001, but was subsequently delayed after former owner Enron declared bankruptcy. In 2005, the Ratnagiri Gas and Power Company purchased the Dabhol Power Company in an effort to revive the project. The Dabhol site is currently operating a power plant and an LNG regasification unit, but the LNG receiving terminal is not scheduled to begin operations until 2009. Several other companies are studying possible LNG import sites throughout India. However, these plans will largely depend on which, if any, natural gas import pipelines are completed.

Profile

Country Overview

Prime Minister	Manmohan Singh (since 22 May 2004)
Location	Southern Asia, bordering the Arabian Sea and the Bay of Bengal, between Burma and Pakistan.
Independence	15 August 1947 (from UK)
Population (July 2006 est.)	1,095,351,995

Economic Overview

Currency/Exchange Rate (23 January 2007)	1 USD = 44.14 Indian Rupees
Inflation Rate (2006E)	5.6%
Gross Domestic Product (2006E)	\$889.3 billion
Real GDP Growth Rate (2006E)	8.5%
Unemployment Rate (2006E)	12.2%
External Debt (2006E)	\$156.8 billion
Exports (2006E)	\$196.3 billion
Exports - Commodities	textile goods, gems and jewelry, engineering goods, chemicals, leather manufactures
Exports - Partners (2005E)	US 16.7%, UAE 8.5%, China 6.6%, Singapore 5.3%, UK 4.9%, Hong Kong 4.4%
Imports (2006E)	\$205.6 billion
Imports - Commodities	crude oil, machinery, gems, fertilizer, chemicals
Imports - Partners (2005E)	China 7.3%, US 5.6%, Switzerland 4.7%
Current Account Balance	-\$13.3 billion

(2006E)

Energy Overview

Minister of Petroleum and Natural Gas	Shri Murli Deora
Proven Oil Reserves (January 1, 2007E)	5.6 billion barrels
Oil Production (2006E)	846,000 barrels per day, of which 77% was crude oil.
Oil Consumption (2006E)	2.63 million barrels per day
Crude Oil Distillation Capacity (January 1, 2007E)	2.25 million barrels per day
Proven Natural Gas Reserves (January 1, 2007E)	38 trillion cubic feet
Natural Gas Production (2004E)	996 billion cubic feet
Natural Gas Consumption (2004E)	1,089 billion cubic feet
Recoverable Coal Reserves (2003E)	101,903 million short tons
Coal Production (2004E)	443.7 million short tons
Coal Consumption (2004E)	478.2 million short tons
Electricity Installed Capacity (2004E)	131.4 gigawatts
Electricity Production (2004E)	630.6 billion kilowatt hours
Electricity Consumption (2004E)	587.9 billion kilowatt hours
Total Energy Consumption (2004E)	15.4 quadrillion Btus*, of which Coal (53%), Oil (33%), Natural Gas (8%), Hydroelectricity (5%), Nuclear (1%), Other Renewables (0%)
Total Per Capita Energy Consumption ((Million Btu)E)	14.5 million Btus
Energy Intensity (2004E)	4,205.2 Btu per \$2000-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2004E)	1,112.8 million metric tons, of which Coal (67%), Oil (27%), Natural Gas (6%)
Per-Capita, Energy-Related Carbon Dioxide Emissions ((Metric Tons of Carbon Dioxide)E)	1 metric tons
Carbon Dioxide Intensity (2004E)	0.3 Metric tons per thousand \$2000-PPP**
Environmental Issues	deforestation; soil erosion; overgrazing; desertification; air pollution from industrial effluents and vehicle emissions; water pollution from raw sewage and runoff of agricultural pesticides; tap water is not potable throughout the country; huge and growing population is overstraining natural resources
Major Environmental Agreements	Antarctic-Environmental Protocol, Antarctic-Marine Living Resources, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands, Whaling

Oil and Gas Industry

Organization	Petroleum: Oil and Natural Gas Corporation (ONGC); Oil India Ltd. (OIL); Indian Oil Corporation (IOC); Reliance Industries (private). Natural Gas: Gas Authority of India Ltd (GAIL)
Major Oil/Gas Ports	Oil - Bombay, Cochin, Haldia, Kandla, Madras, Vizag; LNG – Hazira, Dahej
Foreign Company Involvement	BG International, BP, Cairn Energy, Marubeni, Niko Resources, Petronas, Shell

Major Refineries (capacity, bbl/d)

Reliance Petroleum: Jamnagar (660,000). IOC: Koyali (185,100), Mathura (156,000), Panipat (120,000). Mangalore Refinery and Petrochemicals Ltd: Mangalore (180,000). Hindustan Petroleum Corporation: Vishakapatnam (164,250), Mahul (132,000). Kochi Refineries Ltd: Ambalamugal (152,000). Chennai Petroleum Corporation: Madras (130,660). Bharat Petroleum Company Ltd: Mahul (120,000).

* 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.

Links

EIA Links

[EIA - Country Information on India](#)

U.S. Government

[CIA World Factbook - India](#)

[U.S. State Department Background Notes on India](#)

[U.S. Embassy in India](#)

Foreign Government Agencies

[India's Ministry of Petroleum and Natural Gas](#)

[India's Department of Commerce](#)

[India's Ministry of External Affairs](#)

Oil and Natural Gas

[Gas Authority of India Ltd \(GAIL\)](#)

[Indian Oil Corporation \(IOC\)](#)

[Oil and Natural Gas Corporation \(ONGC\)](#)

[ONGC Videsh](#)

[Oil India Ltd \(OIL\)](#)

[Reliance Industries Ltd](#)

Sources

Asia Pulse

Associated Press

BBC

Business Standard

CIA World Factbook 2005

Dow Jones Newswires

Economist Intelligence Unit

Energy Economist

Financial Times

Gas Matters Today Asia

Global Insight Asia Economic Outlook

The Hindu

Hindustan Times

IHS Energy

India Today

International Gas Report

Lloyd's List

Oil and Gas Journal

Petroleum Economist

Petroleum Intelligence Weekly

Reuters

The Press Trust of India

The Statesman

Times of India

U. S. Energy Information Administration

World Gas Intelligence

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