October 2004

Background | Oil | Natural Gas | Electricity | Environment | Profile | Links

India

The Republic of India (India), the world's sixth largest energy consumer, plans major energy infrastructure investments to keep up with increasing demand--particularly for electric power. India also is the world's third-largest producer of coal, and relies on coal for more than half of its total energy needs.

Note: information contained in this report is the best available as of October 2004 and can change.

BACKGROUND

India's economic growth is continuing its recovery from a slowdown that took place in 2002, which was mainly attributable to weak demand for manufactured exports and the effects of a drought on agricultural output. Real growth in the country's gross domestic product (GDP) was 4.0% for 2002, surging to 8.2% in 2003 and a projected 6.4% for 2004 and 6.2% for 2005 (the Indian fiscal year for economic statistics begins on April 1.) In addition to strong economic growth, India has made substantial progress toward a reduction of political tensions with Pakistan, restoring trade and travel links, and resuming high-level contacts between the two governments.

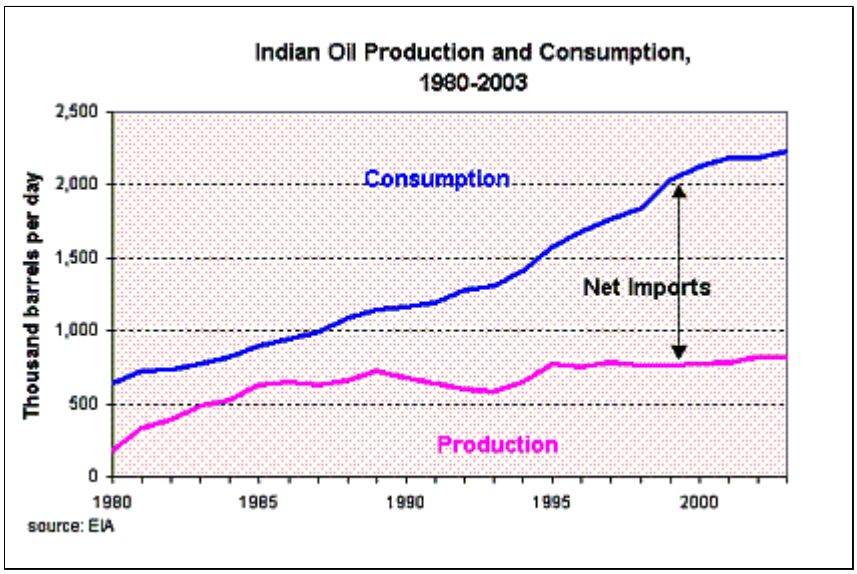
After many years of pursuing economic policies based on import substitution and state ownership of key industries, India's government embarked on a series of economic reforms in the mid-1990s. The reforms included a relaxation of restrictions on foreign ownership in some sectors, and privatization of some industrial enterprises. After the most recent parliamentary elections, which took place in April and May 2004, a new government led by the Congress party was sworn in under the leadership of Prime Minister Manmohan Singh. While the new government has taken some symbolic steps away from the economic policies of the previous Bharatiya Janata Party (BJP)-led government, such as abolishing the Ministry of Disinvestment, the process of economic reforms is expected to continue, but possibly at a slower pace. In the energy sector, the largest impact has been the abandonment of full privatization of the state-owned petroleum sector, while reforms in the electric utilities sector under the Electricity Act of 2003 are continuing.

India has implemented a series of policy changes since the mid-1990s to encourage foreign investment. Tariffs on imported capital goods have been lowered, and in some cases eliminated (such as equipment for large scale power generation projects). Restrictions on foreign ownership have been relaxed, though there has been discussion of reinstating a few of them in key sectors. Previously, foreign ownership usually had been limited to a minority ownership stake. Annual foreign direct investment (FDI) in India has hovered in the range of $3-$5 billion over the last several years, compared to roughly $40-$50 billion per year of FDI in China.

India has had a longstanding territorial dispute with Pakistan over the ownership of Kashmir, which has led to a tense relationship between the two countries since the partition of British India in 1947. After a large-scale mobilization of military forces along their border during most of 2002, tensions eased somewhat late in the year, and both sides pulled back most of their forces from the border in phased withdrawals during 2003. Further confidence-building measures on both sides have taken place since then, and a nuclear "hotline" between the two governments is planned. India's rivalry with Pakistan has direct relevance to the country's energy sector, as it impedes plans for regional natural gas and/or oil pipelines (i.e., from Iran or Central Asia).

OIL

Oil accounts for about 30% of India's total energy consumption. The majority of India's roughly 5.4 billion barrels in oil reserves are located in the Mumbai High, Upper Assam, Cambay, Krishna-Godavari, and Cauvery basins. The offshore Mumbai High field is by far India's largest producing field, with current output of around 260,000 barrels per day (bbl/d). India's average oil production level (total liquids) for 2003 was 819,000 bbl/d, of which 660,000 bbl/d was crude oil. India had net oil imports of over 1.4 million bbl/d in 2003.



Future oil consumption in India is expected to grow rapidly, to 2.8 million bbl/d by 2010, from 2.2 million bbl/d in 2003. India is attempting to limit its dependence on oil imports somewhat by expanding domestic exploration and production. To this end, the Indian government is pursuing the New Exploration Licensing Policy (NELP), first announced in 1997, which permits foreign involvement in exploration, an activity long restricted to Indian state-owned firms. While the initial response to the 1999 tender was disappointing, with no bids received from the major multinational oil companies (causing an extension of the deadline for submission of bids), India proceeded with the award of 25 oil exploration blocks in early January 2000. The largest winner in the bidding round was India's domestic Reliance Industries, in partnership with independent Niko Resources of Canada, which received 12 blocks. British independent Cairn Energy, Russia's Gazprom, the U.S. firm Mosbacher Energy, and Geopetrol of France were all awarded single blocks in partnership with Indian firms. India's state-owned Oil and Natural Gas Corporation (ONGC) was awarded eight blocks, three of which it will hold in partnership with other public-sector Indian firms. A second round of bidding, with a total of 25 blocks offered, concluded in March 2001. Sixteen of the blocks have been awarded to ONGC, and four blocks to Hardy Oil of the United

Kingdom, in partnership with India's Reliance Petroleum. The others were either awarded to smaller independent firms or failed to receive bids. As with the first round, no bids were received from major international oil companies. Bids for the third round were received in August 2002, with a total of 27 blocks offered. Awards under this third round were made in February 2003, with domestic Indian firms receiving most of the blocks. Reliance Industries received nine offshore blocks, one adjacent to the Krishna-Godavari Basin. ONGC was awarded 13 blocks, five offshore and eight onshore. The Gujarat State Petroleum Corporation received one. Blocks offered during the fourth round in 2003 received relatively little foreign interest. Awards for 15 blocks were made in February 2004, with 14 going to ONGC and one going to Reliance Industries. A sixth round of bidding opened in August 2004.

Low drilling recovery rates are a major part of the oil supply problem for India. Historically, recovery rates have averaged only around 30% in currently producing Indian oilfields, well below the world average. It is hoped that allowing foreign investment will bring in technology that is not available to Indian state firms, thereby increasing overall recovery rates. ONGC currently is undertaking a project to increase recovery rates in the Bombay High offshore field and several others as well, aiming to boost the overall recovery rate for its production assets from 28% to 40%.

One area which has shown promise is western Rajasthan. Cairn Energy (UK) has been drilling in the area since 2001, and has reported several successful wells in 2004. The Mangala field has been estimated to contain as much as 320 million barrels of recoverable reserves, and the “N-A” field has estimated recoverable reserves of 80 million barrels. Cairn is continuing exploration in the area, and is planning to bring the field into production by 2007, with an expected volume of 60,000 to 100,000 bbl/d.

In February 2002, BG purchased a 30% stake in the Panna, Mukta, and Tapti offshore oil and gas fields, which had previously been held by Enron. A dispute between BG and ONGC (which owns a 40% interest in the fields) over which firm would operate them was resolved in February 2003 with a "joint operatorship agreement." Reliance Industries holds the other 30% stake.

Downstream/Refining

For most of the 1990s, India imported a large quantity of refined products, lacking the refining capacity to keep up with growing demand. In 1999, refinery construction allowed India to close the gap. At the end of 2003, India had a total of 2.1 million bbl/d in refining capacity, an increase of 970,000 bbl/d since 1998. The largest single addition was Reliance Petroleum's huge Jamnagar refinery, which began operation in 1999. It has since reached its full capacity of 540,000 bbl/d. Jamnagar sells its products through three of the state-owned firms, and is in the process of building a retail network of its own, which is expected to include 2,000 retail outlets by the end of 2005.

Another major downstream infrastructure development is the construction of pipelines being undertaken by Petronet India, a company created by an agreement in 1998 between India's state-owned refineries. This construction is expected to add 500,000 bbl/d to India's current 325,000 bbl/d capacity for pipeline transportation of refined products. Pipelines between refineries and major urban centers are replacing rail cars as the main mode of transportation in India.

While state firms still control retail gasoline sales, several multinationals have entered the Indian lubricants market, which was deregulated five years ago. Firms such as Shell, ExxonMobil, and Caltex currently hold over one-third of the market. While these operations are relatively small, they are seen as allowing the majors to study the Indian market, establish brand recognition, and prepare for the eventual deregulation of the Indian retail petroleum products sector. Still, a requirement that foreign firms invest at least $400 million before entering the downstream market has served to limit

their entry into petroleum products retailing. Shell met this requirement in early 2004, and intends to open a few retail outlets beginning in 2005.

Industry Restructuring and Price Deregulation

The Indian government officially ended the Administered Pricing Mechanism (APM) for petroleum product prices in April 2002. Prior to this deregulation, the Indian government had tried to offset the effects of price changes in crude oil by maintaining an Oil Pool Account, which was to build financial reserves when crude oil prices fell and release them back as increased subsidies when crude oil prices rose. In practice, though, the April 2002 reforms have not completely removed government influence on petroleum product prices. Subsidies have been maintained on some products, such as kerosene, which is commonly used as a cooking fuel by low-income households in India. State-owned downstream companies also still must submit proposed price changes to the Ministry of Petroleum and Natural Gas for approval. This has, in practice, limited movements in retail prices in response to fluctuations in world oil prices.

The previously planned sell off of government stakes in Hindustan Petroleum (HPCL) and Bharat Petroleum (BPCL) appear unlikely to move forward in the near future. The policy of the new Congress-led government is to avoid most further privatizations of public companies which are making a profit. The new Congress-led government has reportedly been considering a restructuring of state-owned assets in the petroleum sector, which would consolidate IOC, ONGC, HPCL, and BPCL into two vertically-integrated major oil companies. No final decision has yet been made on such a restructuring.

India is planning to set up a strategic petroleum reserve equal to 15 days of the country's oil consumption. The state-owned refiner Indian Oil Corporation (IOC) is likely to take the lead in the development of the reserve, which would be paid for by the Indian central government by means of a tax on petroleum product sales.

NATURAL GAS

Indian consumption of natural gas has risen faster than any other fuel in recent years. From only 0.6 trillion cubic feet (Tcf) per year in 1995, natural gas use was nearly 0.9 Tcf in 2002 and is projected to reach 1.2 Tcf in 2010 and 1.6 Tcf in 2015. A major development in December 2002 was the announcement by Reliance Industries of its discovery of a large amount of natural gas in the Krishna-Godavari Basin offshore from Andhra Pradesh along India's southeast coast. New reserves from this find are estimated at about 7 Tcf. Reliance reported another find offshore from Orissa in June 2004, with estimated reserves of 1 Tcf. Cairn Energy also reported natural gas finds in late 2002 offshore from Andhra Pradesh as well as Gujarat, which contain reserves estimated at nearly 2 Tcf. The main market impacts from the new finds will be on India's east coast, which currently lacks extensive natural gas infrastructure.

Even with these new reserves, India's domestic natural gas supply is not likely to keep pace with demand, and the country will have to import much of its natural gas, either via pipeline or as liquefied natural gas (LNG). While EIA's current forecast in the International Energy Outlook 2004 predicts a 4.8% annual growth rate in natural gas consumption, this reflects a substantial downward revision from previous forecasts, which had projected consumption of as much as 2.7 Tcf per year by 2010. Problems with financing LNG import projects have dimmed some of the previous prospects for explosive growth in natural gas consumption in India, and helped to revive interest in pipeline import options. Financial problems in the power sector, the main consumer of natural gas, also have had a negative effect.

Most of India's current natural gas production takes place in the Mumbai High basin and the state of

Gujarat. Current projects include enhancing natural gas production at the Tapti fields in Gujarat and recovering previously flared natural gas at the Mumbai High oilfield.

India is investing heavily in the infrastructure required to support increased use of natural gas. Gas Authority of India Limited (GAIL), a government-owned entity, is in the process of doubling the throughput capacity on its main Hazira-Bijaipur-Jagdishpur (HBJ) Pipeline. Work on the capacity expansion began in 2002, and will eventually raise the capacity of the line from about 1.1 billion cubic feet per day (Bcf/d) to 2.1 Bcf/d. GAIL also plans a new distribution network in West Bengal and a pipeline which would connect Calcutta with Chennai. Shell has signed a memorandum of understanding with the state government of Uttar Pradesh in northern India for the development of a natural gas distribution infrastructure.

India's Foreign Investment Promotion Board (FIPB) had approved 12 prospective LNG import terminal projects in the mid-to-late-1990s, but it was never considered likely that all would be built in the near future, as their combined capacity would have exceeded even the most optimistic demand projections. The Indian government froze approvals of new LNG terminals in 2001, and payment problems at the Enron-backed Dabhol Power Plant in Maharashtra led many to question the financial viability of some of the LNG import projects. Reforms currently being undertaken in the electric power sector may eventually change this situation.

The largest state sector projects are to be conducted by Petronet, a joint venture between ONGC, IOC, the Gas Authority of India Ltd. (GAIL), the National Thermal Power Corporation (NTPC), and Gaz de France. Each of the state firms owns a 12.5% stake, the Gujarat state government owns a 5% stake, and the rest is owned by private investors, including a 10% stake held by Gaz de France Petronet plans two import terminals, one at Dahej and the other at Cochin. The import terminal at Dahej began operation earlier this year, receiving India's first cargo of LNG on January 30, 2004. The Dahej terminal had major advantages over some of the other proposed projects, because it is tied in with the main state-owned natural gas company, GAIL, and the existing HBJ pipeline network. Petronet is scheduled to start construction on its second terminal, at Kochi in Kerala state, in late 2005. Shell also has begun construction of its LNG import terminal at Hazira in Gujarat, and has contracted for LNG supplies from Oman. The facility is scheduled to begin operation in November 2004. Like the Petronet Dahej terminal, it is to be linked into existing natural gas pipelines.

The Dabhol LNG terminal was nearly finished at the time construction was halted in June 2001, and it will likely be completed eventually, since construction was about 90% completed. Two American firms involved in the project, General Electric and Bechtel, purchased Enron's 65% stake in the project. At present, international arbitration is still pending over the financial terms of the project, mainly involving the government guarantees, and it is unclear when work on completing the facility will begin.

In the wake of the problems with Dabhol, firms backing several other LNG projects pulled out of India in the second half of 2001. Dhaksin Bharat Energy, a consortium including CMS Energy and Unocal, also announced the cancellation of its planned LNG project at Ennore. Total has suspended further action on its planned LNG import terminal at Trombay. These LNG projects were cancelled largely in response to the Indian government's decision not to extend sovereign payment guarantees to power projects which were to have been among the import terminals' largest customers. Another proposed project in Andhra Pradesh on India's east coast may be jeopardized by cheaper natural gas supplies which will become available once Reliance Industries new offshore finds are developed. The BP-led consortium backing the project has switched the proposed location from Kakinada to Krishnapatnam, about 250 miles to the south.

Aside from LNG imports, imports of natural gas by pipeline may eventually play a role in satisfying India's gas needs. One possibility would supply India with natural gas from Iran's huge South Pars field via a pipeline, either subsea or through Pakistan. Iran has discussed the proposal with India and Pakistan. Australia's Broken Hill Proprietary (BHP) is the main foreign backer of the idea. An offshore route bypassing Pakistan also has been studied. Pakistan had said in early 2001 that it would allow supplies to cross its territory, and Iran would bear the contractual responsibility for assuring gas supplies to India. With the thaw in India-Pakistan relations over the last year, the idea is again gaining some interest. Supplies of LNG from Iran might also be an option in the future, and IOC has opened discussions with the National Iranian Oil Company (NIOC) on a possible LNG export deal.

Another possible import route would link the natural gas reserves of Bangladesh into the Indian gas grid. Current proven reserves of natural gas in Bangladesh are at least 14 Tcf, but the foreign firms involved in natural gas exploration in Bangladesh, which includes Unocal, believe that reserves are higher. Shell, which backs exports to India, has estimated Bangladeshi natural gas reserves at 38 Tcf, and a study by the U.S. Geological Survey put the country's probable reserves at 32 Tcf. Bangladesh has been reluctant to approve exports to India, however, until all questions about reserves and its domestic supply have been resolved. After years of delays, Unocal effectively shelved the project in March 2004.

Finally, a new natural gas find in Burma also has attracted interest as a potential source of supply for India. Indian companies ONGC and GAIL own a total of 30% equity in the reserves, and Bangladeshi officials stated in June 2004 that they would be willing to consider a pipeline running across Bangladeshi territory from Burma to West Bengal in India, provided agreement could be reached on terms and transit fees.

India's government has been considering reforms in its natural gas pricing mechanism, which is currently set by the government. Deregulation has been delayed several times, and buyers of natural gas from private sources such as the LNG terminal at Dahej pay prices much higher than those purchasing from the state-owned suppliers. With the shortage of natural gas and willingness of some consumers to pay more, deregulation would likely lead to higher prices if implemented.

COAL

Coal is the dominant commercial fuel in India, satisfying more than half of India's energy demand. Power generation accounts for about 70% of India's coal consumption, followed by heavy industry. Coal consumption is projected in the International Energy Annual 2004 to increase to 430 million short tons (Mmst) in 2010, up from 359 million short tons (Mmst) in 2000. India is the world's third largest coal producer (after China and the United States), so domestic supplies satisfy most of the country's coal demand. Indian coal generally has a high ash content and low calorific value, so most coking coal must be imported. Major Indian coal fields are found in Bihar, West Bengal, and Madhya Pradesh.

The Indian government controls almost all coal production, which has been plagued by low productivity, distribution problems, and an increasing loss of domestic market share to higher quality, less expensive imports. Nearly all of India's 390 mines are under Coal India Ltd. (CIL), which accounts for about 90% of the country's coal production. Current policy allows private mines only if they are "captive" operations which feed a power plant or factory. The current government has called off plans for further coal-sector liberalization in the face of strong opposition from labor unions.

ELECTRICITY

India is trying to expand electric power generation capacity, as current generation is seriously below peak demand. Although about 80% of the population has access to electricity, power outages are common, and the unreliability of electricity supplies is severe enough to constitute a constraint on the country's overall economic development. The government had targeted capacity increases totaling 100,000 megawatts (MW) over the next ten years. As of January 2002, total installed Indian power generating capacity was 120,000 MW.

The drive to increase the country's generating capacity, along with the general trend toward economic liberalization in India in the 1990s, led to much interest among foreign investors in setting up Independent Power Producers (IPPs) in India. While dozens of projects were approved, most of the largest projects were stalled by delays in regulatory approvals and in some cases failure to secure adequate financing. India's state electricity boards (SEB's), which run the power distribution infrastructure and own most current generating capacity, are in very poor financial shape, with many of them technically insolvent. One reason is the sale of power at subsidized rates, which does not cover costs (particularly in the agricultural sector). Other problems include the high level of transmission and distribution losses and widespread power theft. Since the SEBs would be the main purchasers of power from IPP projects, resolving their financial problems is critical to attracting the capital necessary to ensure the country an adequate supply of electric power.

In July 1998, the Indian government announced an easing of rules related to foreign investment in the power sector. Proposals for investments up to 15 billion rupees (about $350 million) involving up to 100% foreign equity now will be approved automatically. Such approval will be given for investments in generation or distribution from hydroelectric, coal, lignite, oil, or gas power plants, but not for nuclear plants and associated distribution networks. The earlier policy had allowed for only up to 74% foreign equity. Still, the financial problems of the SEBs have prevented substantial foreign investment from flowing into India's electric power sector.

From the mid-to-late 1990s, India's government approved a large number of "mega-projects," defined as plants with capacity of more than 1,000 MW for thermal plants and more than 500 MW for hydroelectric plants, from the mid-to-late-1990s, but project approvals have often not led to construction. The 740-MW initial phase of the Dabhol LNG-fired power plant began operation in May 1999, and Phase II, which would add 1,440-MW of capacity, is about 90% complete. Payment problems with the Maharashtra State Electricity Board (MSEB), however, prompted Enron-backed Dabhol Power Corporation (DPC) to serve notice of breach of contract on MSEB in May 2001. Construction on Phase II was halted in June 2001. General Electric and Bechtel have acquired Enron's 65% stake in the project adding to the 10% they each owned prior Enron's bankruptcy. International arbitration over the financial settlement of the Dabhol issue is pending, and it remains unclear when action will be taken to resume output of electricity and complete the construction of Phase II. Given that it is near completion, however, it is likely to be finished and operational at some point. The new Congress-led government has given additional high-level attention to resolving the Dabhol issue, constituting a “Group of Ministers” to meet regularly to coordinate policy.

Due to financial problems of the SEBs, a large number of foreign firms cancelled or delayed power generation projects in India between 1999 and 2001. Most new generating capacity in India in the last three years has been financed with domestic capital, or with the help of international financial instututions (IFIs) such as the Asian Development Bank (ADB). The Electricity Act of 2003 was designed to remedy many of the problems besetting India's power sector, and to attract capital back to large-scale power generation projects. The Act envisioned the unbundling of SEB assets into generation, transmission, and distribution companies, and the eventual privatization of these assets. Access is to be opened up to the SEBs transmission grids, allowing power producers to sell directly

to large industrial consumers. Also included is a one-time financial bailout of the SEBs, which packaged their $7 billion in debts to the federal-level National Thermal Power Corporation (NTPC) into bonds at concessionary interest rates. The new Congress-led government which took office in May 2004 remains committed to power sector reform, though implementation of some aspects of the program may slow down. A June 2004 deadline for open access to transmission lines was delayed.

ENVIRONMENT

The twin issues of population growth and urbanization present a major challenge to India's environment. A combination of increased vehicular ownership and untreated industrial smoke has created a hazardous air pollution problem in India's booming metropolises, and continued urbanization is raising the risks to human health. Several of India's largest cities are ranked among the most polluted in the world. An inability to implement and enforce policies geared to mitigate smog and other sources of air pollution has only exacerbated the problem.

Owing to population growth and economic development, India's energy consumption has been increasing at one of the fastest rates in the world. India's heavy reliance on coal has mean that the country's carbon emissions are rising at a similar rate. India is a a non-Annex I country under the United Nations Framework Convention on Climate Change, meaning it is not obligated to reduce its emissions of carbon and greenhouse gases (GHG). Although India recognizes the importance of reducing these harmful emissions, the Indian government also places a high priority on its economic development, and India's carbon emissions are projected to continue to rise in the coming decade.

The industrial production that has driven India's economic growth has also prevented the country from lowering its energy intensity (energy consumption per dollar of gross domestic product, GDP), while continued dependence on coal for the purpose of electricity generation means that India has one of the highest levels of carbon intensity (carbon emissions per dollar of GDP) in Asia. The Indian government is increasingly turning to renewable energy, however, to meet the country's growing energy consumption needs. Despite goverment-promoted plans to increase the use of more environmentally-friendly energy sources like solar power and hydroelectricity, the environmental outlook for India looks negative unless Indian policymakers can tackle the problem of providing increasing amounts of energy to a rapidly growing populace in an environmentally-sustainable fashion.

Sources for this report include: Business Line; Business Standard; CIA World Factbook 2004; Dow Jones News Wire service; Economist Intelligence Unit; Financial Express; Financial Times; Global Insight Asia Economic Outlook; The Hindu; Hindustan Times; India Today; Oil and Gas Journal; Petroleum Economist; Petroleum Intelligence Weekly; Press Trust of India wire service; Sify.com; The Statesman; Times of India; U.S. Energy Information Administration; World Gas Intelligence.

COUNTRY OVERVIEW

President: Abdul Kalam (since July 26, 2002)
Prime Minister: Manmohan Singh (since May 22, 2004)
Independence: August 15, 1947 (from the United Kingdom)
Population (07/04E): 1.1 billion (2 nd most populous country)
Location/Size: Southern Asia/3.3 million square kilometers 1.3 million square miles), one-third the size of the United States
Major Cities: New Delhi (capital), Mumbai (Bombay), Calcutta, Chennai (Madras), Hyderabad, Bangalore, Ahmedabad
Languages: Hindi, 17 other official languages, English
Ethnic Groups: Indo-Aryan (72%), Dravidian (25%), Mongoloid, other (3%)
Religions: Hindu (81%), Muslim (12%), Christian (2.3%), Sikh (1.9%), and other (2.5%)

ECONOMIC OVERVIEW

Currency: Rupee
Exchange Rate (6/23/04): US$1 = 46.3 rupees
Gross Domestic Product (GDP, FY2003E): $560 billion
Real GDP Growth Rate (FY2003E): 8.3% **(FY2004E):** 6.4%
Inflation Rate (FY2003E): 3.8% **(FY2004E):** 4.8%
Current Account Balance (FY2003E): $1.7 billion
Major Trading Partners: United States, Japan, United Kingdom, Germany, Russia
Merchandise Trade Balance (FY2003E): -$13.9 billion
Merchandise Exports (FY2003E): $56.3 billion
Merchandise Imports (FY2003E): $70.2 billion
Major Export Products: Gems and jewelry, engineering goods, clothing, cotton textiles, leather and leather manufactures, iron ore, chemicals, software
Major Import Products: Petroleum and petroleum products, machinery, iron and steel, edible oils, chemicals, fertilizers
Monetary Reserves (FY 2003, non-gold): $98.9 billion
External Debt (FY2003E): $113.3 billion
NOTE: FY (Fiscal Year) (FY 2003 April 1, 2003 to March 31, 2004)

ENERGY OVERVIEW

Energy-Related Ministries: *Coal*—Manmohan Singh (held by Prime Minister); *Petroleum and Natural Gas*—Mani Shankar Aiyar; *Electric Power*—P.M. Sayeed
Proven Oil Reserves (1/1/04E): 5.4 billion barrels
Oil Production (2003E): 819,000 barrels per day (bbl/d), of which 660,000 bbl/d was crude oil
Oil Consumption (2003E): 2.2 million bbl/d
Net Oil Imports (2003E): 1.4 million bbl/d
Crude Oil Refining Capacity (1/1/04E): 2.1 million bbl/d
Natural Gas Reserves (1/1/04E): 30.1 trillion cubic feet (Tcf)
Natural Gas Production (2002E): 883 Bcf
Natural Gas Consumption (2002E): 883 Bcf
Recoverable Coal Reserves (2001E): 93.0 billion short tons
Coal Production (2002E): 393 million short tons (Mmst)
Coal Consumption (2002E): 421 Mmst
Net Coal Imports (2002E): 28 Mmst
Electric Generation Capacity (1/1/02E): 120 gigawatts (GW), including 90 GW thermal, 26 GW hydro, 3 GW nuclear
Electricity Generation (2002E): 547 billion kilowatthours (84% conventional thermal; 12% hydro; 3% nuclear)

ENVIRONMENTAL OVERVIEW

Minister for Environment and Forest: A. Raja
Total Energy Consumption (2002E): 14.0 quadrillion Btu* (3.4% of world total energy consumption)
Energy-Related Carbon Dioxide Emissions (2002E): 1,026.2 million metric tons of carbon dioxide (4.2% of world total carbon dioxide emissions)
Per Capita Energy Consumption (2002E): 13.3 million Btu (vs U.S. value of 339.1 million Btu)
Per Capita Carbon Dioxide Emissions (2002E): 0.27 metric tons of carbon dioxide (vs U.S. value of 5.5 metric tons of carbon dioxide)
Energy Intensity (2002E): 5,255 Btu/thousand $ (vs U.S. value of 9,348 Btu/thousand $)**
Carbon Dioxide Intensity (2002E): 0.39 metric tons of carbon dioxide/thousand $ (vs U.S. value of 0.55 metric tons/thousand $)**

Fuel Share of Energy Consumption (2002E): Coal (54.5%), Oil (34.7%), Natural Gas (6.5%)
Fuel Share of Carbon Dioxide Emissions (2002E): Coal (68.0%), Oil (27.1%), Natural Gas (4.6%)
Status in Climate Change Negotiations: Non-Annex I country under the United Nations Framework Convention on Climate Change (ratified November 1st, 1993). Not a signatory to the Kyoto Protocol.
Major 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 rapidly growing population is overstraining natural resources.
Major International Environmental Agreements: A party to the Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Nuclear Test Ban, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands and Whaling.

* 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 CIA Factbook estimates based on purchasing power parity (PPP) exchange rates.

ENERGY INDUSTRY
Organization: *Petroleum* - Oil and Natural Gas Corporation (ONGC), Oil India Ltd. (OIL), Indian Oil Corporation (IOC); *Natural Gas* - Gas Authority of India Limited (GAIL); *Coal* - Coal India Limited (CIL)*; Electric Power* - National Thermal Power Corporation (NTPC), National Hydroelectric Power Corporation, State Electricity Boards
Major Oil Terminals: Bombay, Cochin, Haldia, Kandla, Madras, Vizag
Major Oil Refineries (1/1/04 capacity): Reliance-Jamnagar , 540,000 bbl/d, Koyali-Gujarat, 185,100 bbl/d; Mangalore, 180,000 bbl/d, Mathura-Uttar Pradesh, 156,000 bbl/d; Mahul-Bombay (Bharat Petroleum), 120,000 bbl/d; Madras, 130,660 bbl/d, Mahul-Bombay (Hindustan Petroleum), 111,700 bbl/d
Major Pipelines:*Oil*--Salaya-New Delhi, Barauni-Digboi, Kandla-Bhatindu (products); *Natural Gas*--Hazira-Bijapur-Jagdishpur (HBJ)

LINKS

For more information from EIA on India, please see:
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