

COUNTRY ANALYSIS BRIEFS

India

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Background

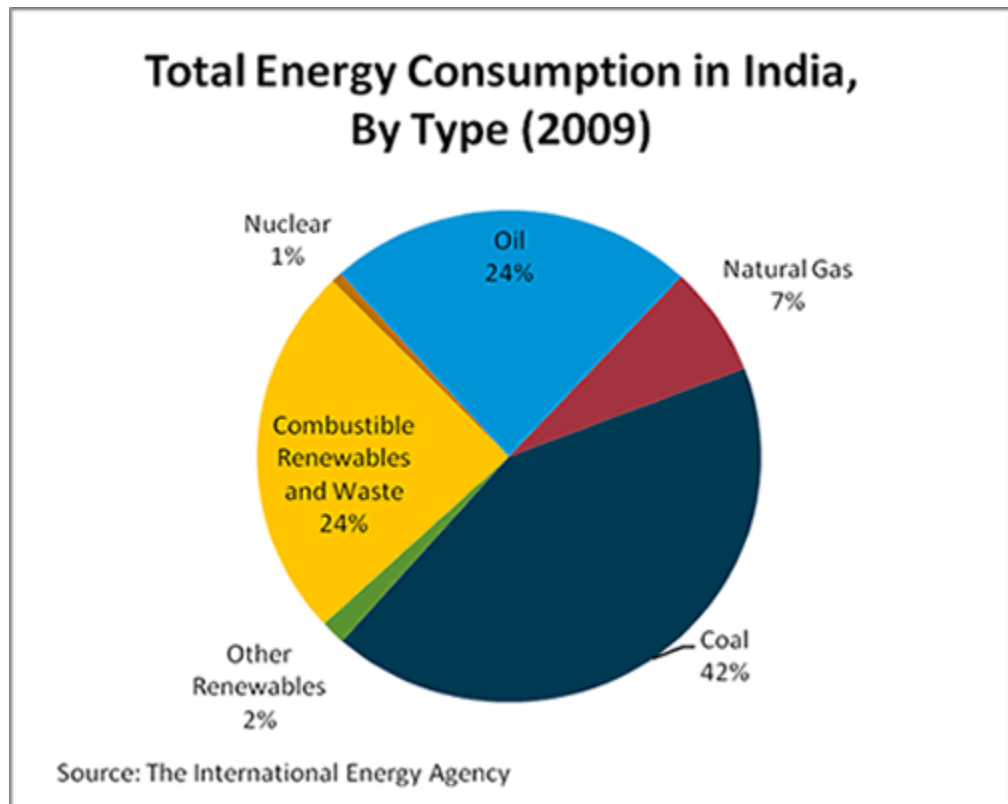
India boasts a growing economy, and is increasingly a significant consumer of oil and natural gas.

In 2009, India was the fourth largest energy consumer in the world, after the United States, China, and Russia. Despite a slowing global economy, India's energy demand continues to rise. As vehicle ownership expands, petroleum demand in the transport sector is expected to grow in the coming years. While India's domestic energy resource base is substantial, the country relies on imports for a considerable amount of its energy use.



According to the International Energy Agency (IEA), hydrocarbons account for the majority of India's energy use. Together, coal and oil represent about two-thirds of total energy use. Natural gas now accounts for a seven percent share, which is expected to grow with the discovery of new gas deposits.

Combustible renewables and waste constitute about one fourth of Indian energy use. This share includes traditional biomass sources such as firewood and dung, which are used by more than 800 million Indian households for cooking. Other renewables such as wind, geothermal, solar, and hydroelectricity represent a 2 percent share of the Indian fuel mix. Nuclear holds a one percent share.

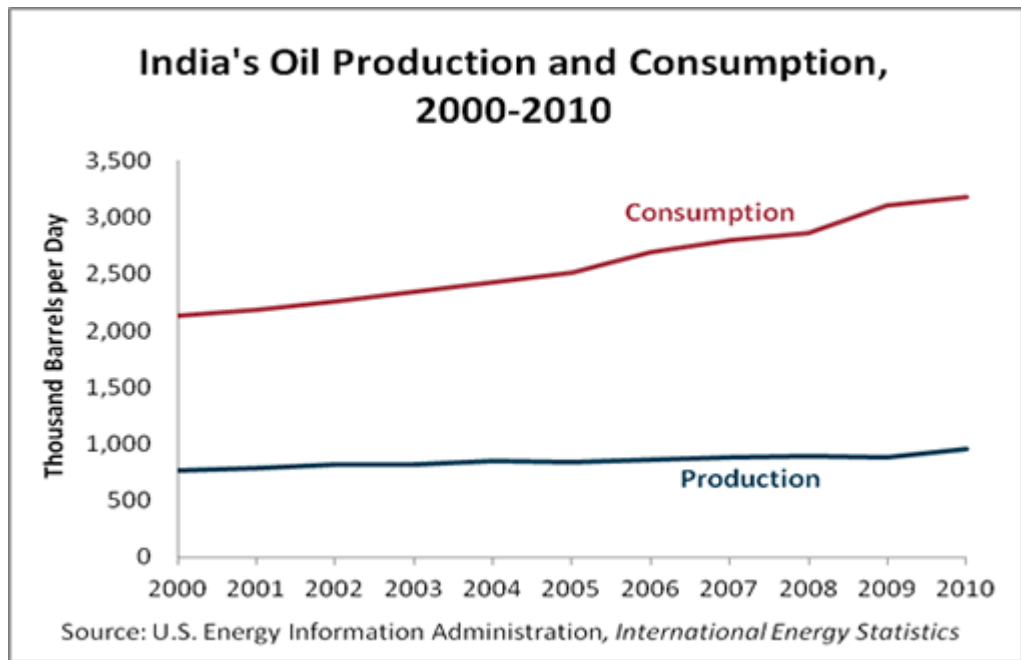


IEA data for 2009 indicate that electrification rates for India were 66 percent for the country as a whole. Ninety-four percent of the 404 million that do not have access to electricity live in rural areas, where electrification rates are approximately 50 percent.

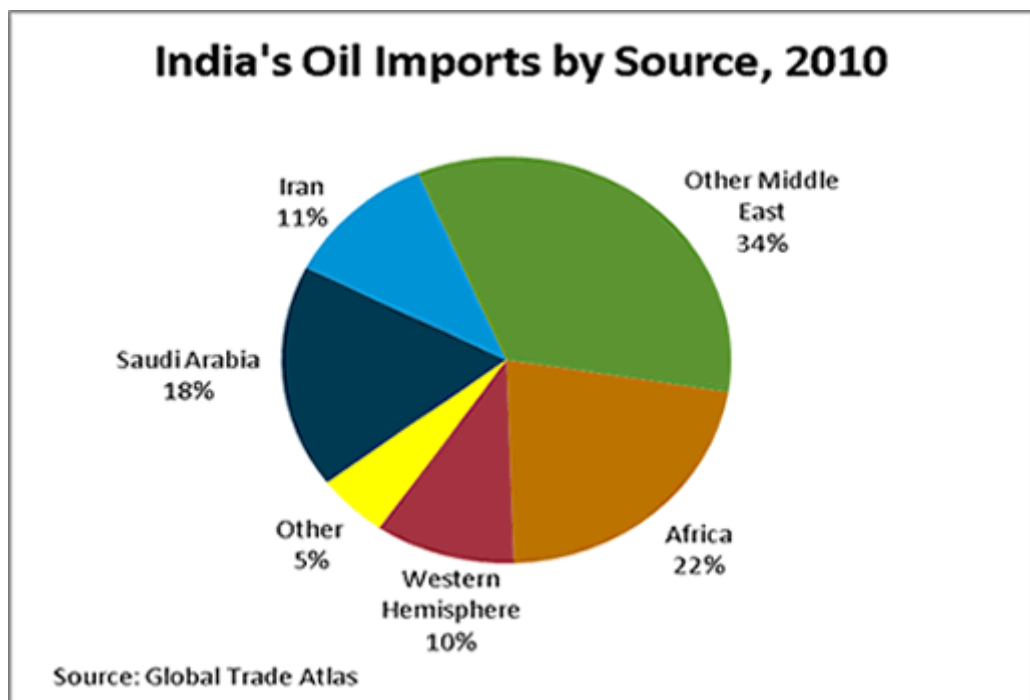
Oil

The Indian government continues to hold licensing rounds in an effort to promote exploration activities and boost domestic oil production.

According to *Oil & Gas Journal (OGJ)*, India had approximately 5.7 billion barrels of proven oil reserves as of January 2011, the second-largest amount in the Asia-Pacific region after China. India's crude oil reserves tend to be light and sweet. India produced roughly 950 thousand barrels per day (bbl/d) of total liquids in 2010, of which 750 bbl/d was crude oil. The country consumed 3.2 million barrels per day (bbl/d) in 2010.



The combination of rising oil consumption and relatively flat production has left India increasingly dependent on imports to meet its petroleum demand. In 2010, India was the world's fifth largest net importer of oil, importing more than 2.2 million bbl/d, or about 70 percent of consumption. A majority of India's crude oil imports come from the Middle East, with Saudi Arabia and Iran supplying the largest shares. Iranian oil's share of Indian imports has decreased in recent years, largely due to issues with processing payments.



Sector Organization

Though the government has taken steps in recent years to deregulate the hydrocarbons industry and encourage greater foreign involvement, state-owned enterprises predominate in India's oil sector. The largest player is state-owned Oil and Natural Gas Corporation (ONGC), which accounted for about three-quarters of India's oil production in 2009-2010. The role of private

companies in Indian oil production is increasing. The largest private actor in the oil sector is Reliance industries, India's largest company.

As a net importer of oil, the Indian government has policies aimed at increasing domestic exploration and production (E&P) activities. In an effort to attract oil majors with deepwater drilling experience and other technical expertise, the Ministry of Petroleum and Natural Gas created 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. Despite this, international oil and gas companies currently operate a small number of fields.

India's downstream sector is also dominated by state-owned entities. The Indian Oil Corporation (IOC) is the largest state-owned company in the downstream sector, operating eight of India's 21 refineries and controlling about three-quarters of the domestic oil pipeline transportation network. Government-run Oil marketing companies (OMC's) play a major role in the distribution of fuel. Reliance Industries opened India's first privately-owned refinery in 1999, and has gained a considerable market share in India's oil sector.

Exploration and Production

Most of India's crude oil reserves are located offshore, in the west of the country, and onshore in the northeast. Substantial reserves also exist in the Bay of Bengal and in Rajasthan state. India's largest oil field is the offshore Mumbai High field, located north-west of Mumbai and operated by ONGC. Block D6 in the Krishna-Godavari basin, a major gas play operated by Reliance Industries, began oil production in September 2008.

The ninth round of auctions under the NELP framework concluded in March 2011, attracting 74 bid for 33 of 34 blocks. Most of the interest in these assets came from Indian companies, which collaborated to achieve an advantageous position in the bidding. International oil companies only participated to a limited extent due to uncertainty about reserve levels. Despite these efforts to increase investment, India's limited resource base will cause production to remain relatively flat. In the *International Energy Outlook (IEO2011)*, EIA projects that Indian oil production will grow at an average annual rate of less than one percent through 2035.

In recent years, Indian national oil companies have increasingly looked to acquire equity stakes in E&P projects overseas. The most active company abroad is ONGC Videsh Ltd. (OVL), the overseas investment arm of ONGC. OVL conducts oil and natural gas operations in 15 countries. The company produces oil in Russia (Sakhalin Island), Sudan, Vietnam, Columbia, and Syria. In October 2011 the company announced that it aspires to expand its total production from current levels of about 150 thousand bbl/d to 560 thousand bbl/d by March 2014.

Downstream/Refining

According to *OGJ*, India had 4.0 million bbl/d of crude oil refining capacity at 21 facilities as of January 1, 2011. India has the fifth largest refinery capacity in the world. Reliance Industries' Jamnagar complex is the largest oil refining complex in the world, with a total capacity of 1.24 million bbl/d. This facility, which is located in northwest India to minimize transit costs from the Middle East, can process a wider variety of crude grades than older Indian refineries.

Due to expectations of higher demand for petroleum products in the region, further investment in the Indian refining sector is likely. The government would like to promote India as a competitive refining destination, and industry experts expect the country to be an exporter of refined products to Asia in the near future.

Refined Fuel Subsidies

While India's petroleum pricing mechanism is notionally benchmarked to international oil prices, the government subsidizes domestic prices of refined products. OMC's are compelled to sell products at prices below world market prices and accept "under-recoveries" (losses), which are born mostly by upstream national oil companies and the central government. These subsidies cost the Indian government more than \$20 billion per year.

India deregulated gasoline prices in 2010, but this has had relatively little impact on the subsidy bill, because gasoline represents a small share of product demand. Most of the support goes to kerosene, diesel fuel, and liquefied petroleum gas (LPG), which are used more widely by the country's economically disadvantaged classes. In June 2011, the government announced price increases for these fuels ranging from 9 to 20 percent. While this controversial policy is expected

to provide some temporary relief for OMC's, both demand for these subsidized products and India's subsidy burden are expected to grow in the near future.

Strategic Petroleum Reserve

India is constructing a strategic petroleum reserve (SPR) to shield the import-dependent country from potential supply disruptions. Three storage facilities, located near refining centers Visakhapatnam, Mangalore, and Padur, are scheduled to be completed by the end of 2012. They will hold close to 40 million bbl of oil, which represents about ten days of supply on a refinery-throughput basis.

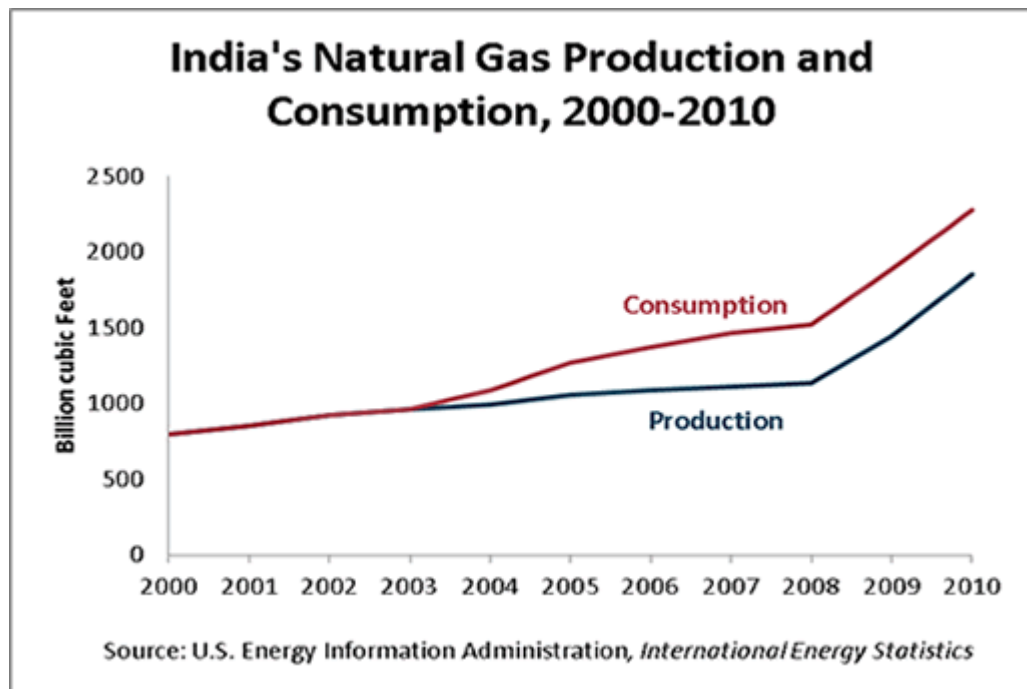
Natural Gas

Despite major new natural gas discoveries in recent years, India continues to plan on gas imports to meet its future needs.

According to *Oil and Gas Journal*, India had approximately 38 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2011. EIA estimates that India produced approximately 1.8 Tcf of natural gas in 2010, a 63 percent increase over 2008 production levels. The bulk of India's natural gas production comes from the western offshore regions, especially the Mumbai High complex, though fields in the Krishna-Godavari (KG) are increasingly important.

In 2010, India consumed roughly 2.3 Tcf of natural gas, more than 750 billion cubic feet (Bcf) more than in 2008, according to EIA estimates. Natural gas demand is expected to grow considerably, largely driven by demand in the power sector. The power and fertilizer sectors account for nearly three-quarters of natural gas consumption in India. Natural gas is expected to be an increasingly important component of energy consumption as the country pursues energy resource diversification and overall energy security.

Despite the steady increase in India's natural gas production, demand has outstripped supply and the country has been a net importer of natural gas since 2004. India's net imports reached an estimated 429 billion cubic feet (Bcf) in 2010.



Sector Organization

State-owned companies play a predominant role in India's gas sector, although their share of production is smaller than in the oil sector. ONGC accounted for about half of India's natural gas production in 2009-2010. Reliance Industries 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 KG basin. In June 2011, the Indian government approved a \$7.2 billion joint venture agreement between Reliance and BP that will focus on expanding offshore development.

Natural gas prices in India are regulated by the government. Administered Pricing Mechanism (APM) natural gas – gas produced from fields handed to ONGC and OIL by the Indian government – more than doubled in price in May 2010; from \$1.8/million (MM) Btu to \$4.2/MMBtu, although some customers still receive subsidies. Prices for privately produced gas, which are indexed to the price of oil, are slightly higher.

The Gas Authority of India Ltd. (GAIL) holds an effective monopoly on natural gas transmission and distribution activities. Although the transmission sector was opened to foreign investment in 2006, 80 percent of natural gas consumed in India was transported through GAIL's 4,100-mile trunk pipeline network. The company expects to double the size of this network by 2014. Reliance Industries is also investing heavily in the transmission sector to move its KG-basin gas to market.

Exploration and Production

Until 2008, the majority of India's natural gas production came from the Mumbai High complex in the northwest part of the country. Recent discoveries in the Bay of Bengal have shifted the center of gravity of Indian natural gas production.

In April 2009, production from Reliance Industries' Dhirubhai 1 and Dhirubhai 3 gas fields in the D6 block of the KG Basin has led to a massive expansion in domestic supply. The block holds estimated reserves of 11.5 Tcf. Of the nearly 1.4 Bcf/d of initial production, nearly half went to gas based power plants, the rest to fertilizer, LPG plants, and city gas distribution entities. After reaching a production peak of 2.8 Bcf/d in December 2009, Reliance decided in July 2010 to cap production of KG-D6 at 2.1 Bcf/d pending resolution of infrastructure and field maintenance problems. Industry analysts expect the BP-Reliance partnership to address these issues.

In addition to these new offshore finds, India plans to expand the development of unconventional gas resources. The country already produces some coalbed methane and seeks to expand these volumes soon. In addition, an EIA-sponsored study on world shale gas resources reports that India possesses 63 Tcf of technically recoverable shale gas resources. The country has yet to hold a licensing round for its shale gas blocks.

Natural Gas Imports

India's natural gas import demand is expected to 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

The Iran-Pakistan-India (IPI) Pipeline has been under discussion since 1994. The plan calls for a roughly 1,700-mile, 5.4-Bcf/d pipeline to run from the South Pars fields in Iran to the Indian state of Gujarat. A variety of economic, political, and security issues have delayed a project agreement.

Due to the uncertainties involving this pipeline, the Indian government's 11th Five Year Plan does not project any gas supply from this route or the following two discussed pipelines.

Turkmenistan-Afghanistan-Pakistan-India Pipeline

India has worked to join the Turkmenistan-Afghanistan-Pakistan Pipeline (TAP or Trans-Afghan Pipeline). With the inclusion of India, the project consists of a planned 1,050-mile pipeline originating in Turkmenistan's Dauletabad natural gas fields and transporting the fuel to markets in Afghanistan, Pakistan, and India. In 2010, India signed a framework agreement for the pipeline, which is envisioned to have a capacity of 3.2 Bcf/d, but work has not yet begun on the project.

Imports from Myanmar

The governments of India and Myanmar signed a natural gas supply deal in 2006, but disagreement arose over whether the pipeline should go through Bangladesh. In March 2009, Myanmar signed a natural gas supply deal with China sourced from a field invested in by GAIL and ONGC, putting any India-Myanmar pipeline deal in question.

Liquefied Natural Gas

India began importing liquefied natural gas (LNG) in 2004. In 2009, India imported 434 Bcf of LNG, nearly 65 percent of it from [Qatar](#), making it the sixth largest importer of LNG in the world.

Currently, India has two operational LNG import terminals, Dahej and Hazira. India received its first LNG shipments in January 2004 with the start-up of the Dahej terminal in Gujarat state.

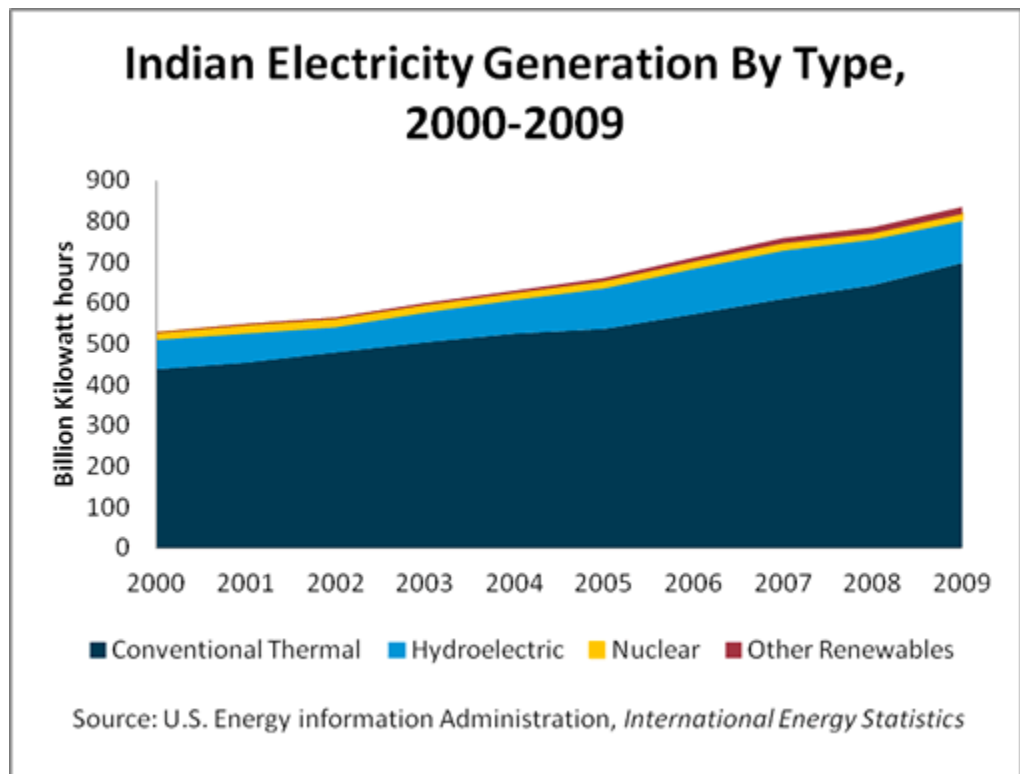
Petronet LNG, a consortium of state-owned Indian companies and international investors, owns and operates the Dahej LNG facility with a capacity of 6.5 million tons per year (mtpa) (975 Bcf/y). India's second terminal, Hazira LNG, started operations in April 2005, and is owned by a joint venture of Shell and Total. The facility has a capacity of 3.6 mtpa (488 Bcf/y). New terminals at Kochi and Dabhol are scheduled to come online in 2012.

Demand for LNG will only expand to the extent that domestic production plans fall short of stated goals. Further, plentiful and cheap domestic gas that sells at a discount to imported LNG makes the international spot market a marginal option and complicates negotiations for long-term supply contracts.

Electricity

India currently suffers from a major shortage of generation capacity.

In 2008, India had approximately 177 gigawatts (GW) of installed electric capacity and generated 761 billion kilowatt hours. Conventional thermal sources produce more than 80 percent of India's electricity. Hydroelectricity, nuclear power, and other renewable sources account for the remainder. India also imports marginal amounts of electricity from Bhutan and Nepal and has signed an agreement to begin importing power from Bangladesh.



Electricity Shortages

India suffers from a severe shortage of electricity generation capacity. According to the World Bank, roughly 40 percent of residences in India are without electricity. In addition, blackouts are a common occurrence throughout the country's main cities. Further compounding the situation is that total demand for electricity in the country continues to rise and is outpacing increases in capacity. Additional capacity has failed to materialize in India in light of market regulations, insufficient investment in the sector, and difficulty in obtaining environmental approval and funding for hydropower projects. In addition, coal shortages are further straining power generation capabilities. In order to address this shortfall, the Indian government continues to work towards adding capacity.

In the *IEO2011*, EIA projects that electricity consumption in India will grow at an average rate of 3.3 percent per year through 2035. To meet this growth, India will have to expand their current generation capacity by 234 GW.

Conventional Thermal Power Generation

Conventional thermal-generated power accounted for more than 80 percent of electricity in India in 2008. Coal predominates, generating roughly 70 percent India's power. India is both the third-largest consumer and third-largest producer of coal in the world. India's domestic coal is low in quality – this renders coal-fired power generation relatively inefficient and necessitates imports of metallurgical coal for steel-making. The country imports considerable quantities of coal (83 million tons or 11 percent of total consumption in 2010).

Natural gas, which was primarily to offset the seasonality of hydroelectricity, is now becoming an increasingly important power generation fuel. Capacity additions and increasingly abundant domestic natural gas are causing this expansion. In the *IEO2011*, EIA projects that the share of natural gas in India's power generation mix will expand from 11 percent in 2008 to 16 percent in 2035.

Nuclear Power Generation

The Indian government continues to focus on the development of nuclear power to meet its power generation targets. Although India is not a party to the Nuclear Nonproliferation Treaty (NPT), its 2005 nuclear cooperation deal with the United States, known as the "123 Agreement", allows for civil nuclear trade between the U.S. and India. This agreement will facilitate India's goal of increasing India's installed nuclear power generation capacity to 20 GW by 2020. India currently operates 20 nuclear reactors, which represent 4.4GW of generation capacity. The country is building another six reactors that will more than double this.

Hydropower and Other Renewables

As part of India's goal of diversifying its sources of electric power generation and increasing the country's capacity, the government also plans to increase the use of hydroelectric power. International organizations such as the World Bank are providing funding for a variety of hydroelectric projects around the country. However, lack of reliability and environmental and land-use concerns surrounding construction may make it difficult to capitalize fully upon this domestic energy resource.

While India holds the potential for developing other renewable power sources, such as geothermal, solar, and wind power, cost concerns and an underdeveloped transmission and distribution network will likely hinder their expansion.

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](#)

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

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

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

[ONGC Videsh](#)

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

[Reliance Industries Ltd](#)

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