

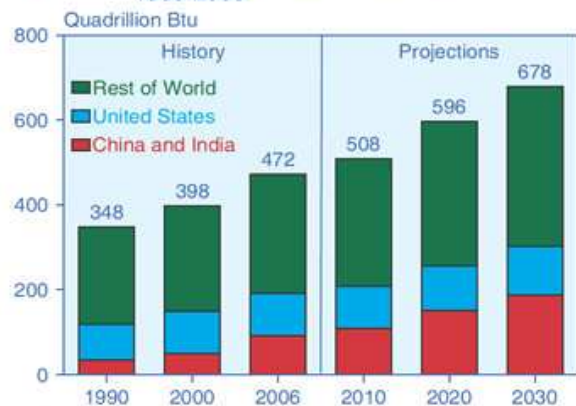
CONSULATE GENERAL OF INDIA SAN FRANCISCO

ENERGY – INDIA'S POWERHOUSE

A. OVERVIEW

India's economic rise has led to an increase in energy demand. The energy demand has grown by an average of 3.6% per annum over the past 30 years. Today India is the world's 6th largest energy consumer, accounting for 3.4% of global energy consumption. More than 50% of India's commercial energy demand is met through the country's vast coal reserves. In March 2009, the installed power generation capacity stood at 147,000 MW while the per capita power consumption stood at just 612 kWh, about one-third of the global average. The Indian government has set a target to add 78,000 MW of installed generation capacity by 2012. The total demand for electricity in India is expected to exceed 950,000 MW by 2030.

Marketed Energy Use by Region, 1990-2030



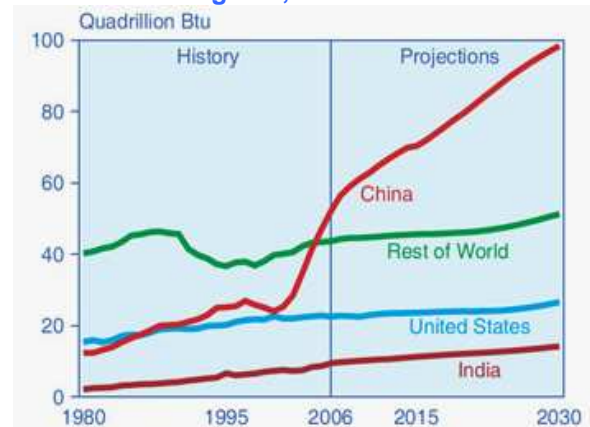
Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 2006* (June-December 2008), web site www.eia.doe.gov/iea. **Projections:** EIA, *World Energy Projections Plus* (2009).

About 76% of the electricity consumed in India is generated by thermal power plants, 21% by hydroelectric power plants and 3% by nuclear plants. In recent years, India has also invested heavily in renewable sources of energy such as wind energy, solar power, bioenergy, waste-to-energy, etc.

India is the world's 3rd largest coal producer. India produces 527.228 million short tons of coal. Coal is by far the largest source of energy

in India. India is looking at other sources of cleaner fuels for its huge future energy demands.

Coal Consumption in Selected World Regions, 1980-2030



Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 2006* (June-December 2008), web site www.eia.doe.gov/iea. **Projections:** EIA, *World Energy Projections Plus* (2009).

Nuclear power is the 4th largest source of electricity in India after thermal, hydro and renewable sources of electricity.¹ As of 2008, India has 17 nuclear power plants in operation generating 4,120 MW while 6 other plants are under construction and are expected to generate an additional 3,160 MW.

India has signed nuclear deals with several countries including the US while the framework for similar deals are being prepared for other countries like France, UK and Canada. India now envisages to increase the contribution of nuclear power to overall electricity generation capacity from 4.2% to 9% within 25 years.²

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http://cea.nic.in/power_sec_reports/Executive_Summary/2008_12/27-33.pdf

² <http://www.business-standard.com/india/news/slowdown-not-to-affect-indias-nuclear-plans/19/57/53400/on>

The International Atomic Energy Agency (IAEA) and International Thermonuclear Experimental Reactor Organization (ITER) signed an agreement of cooperation on 13th October 2008 to enhance research on fusion, India and the US are among the member nations together with China, EU, Japan, Russian Federation and South Korea.³ This could be the energy source of the future as it has the promise of unlimited, clean, safe, renewable and commercially available energy from nuclear fusion.⁴

B. Bilateral Developments

President Bush signed the legislation on the Indo-US nuclear deal approved by the US Congress into law, now called the US-India Nuclear Cooperation Approval and Non-proliferation Enhancement Act on 8th October, 2008. **The agreement was signed by India's External Affairs Minister and his counterpart US Secretary of State on 10th October, 2008.** This paved the way for India to source nuclear energy technology and equipment from USA by opening the door to investment in the country's nuclear energy sector.

On 28th May, 2009 Nuclear Power Corporation of India Ltd. (NPCIL) and Westinghouse Electric Company (WEC), USA signed a Memorandum of Understanding (MOU) for starting discussions on Techno-Commercial aspects of AP Reactors in India. The signing of this MOU is another milestone in engagement of NPCIL and WEC for preparing the contract and related details of setting up of multiple AP1000 Reactors in India.⁵

NPCIL signed MOU with General Electric-Hitachi (GEH) USA for setting up of Advanced Boiling Water Reactors in India on 20th March, 2009.⁶

A Joint Indo-US Workshop on "Scalable Nanomaterials for Enhanced Energy Transport, Conversion and Efficiency" was organized from August 19 to 21, 2008 at Jawaharlal Nehru Centre for Advanced

Scientific Research (JNCASR) and the John F Welch Technology Centre campus of General Electric in Bangalore, India. The primary sponsors of this workshop were the Indo-US Science and Technology Forum and the main participating organizations JNCASR, Purdue University of West Lafayette, USA and GE Global Research. The workshop brought together leaders from Indian and US institutions to highlight the most promising approaches in harnessing the power of nanotechnology in energy-related research.⁷

The Berkeley-India Joint Leadership on Energy and the Environment (BIJLEE) brings together researchers from Berkeley Lab and UC Berkeley, including its College of Engineering, and other US and Indian Universities, institutions and corporations to develop energy-efficient and renewable energy technologies. BIJLEE will conduct R&D initially in the areas of energy-efficient buildings, electricity systems, energy analysis, energy conversion and storage devices and systems, information technology, forestry and renewable energy.⁸

A MOU, which was the first of its kind between energy regulators in India and the US was signed in December 2007 by the Maharashtra Electricity Regulatory Commission, Berkeley Lab, California ENERGY Commission and California Public Utilities Commission. The main thrust was to find ways to meet a significant portion of Maharashtra's electricity growth through energy efficiency. The MOU laid the groundwork for an exchange of expertise between the parties and for embarking on joint research activities to explore policies on energy efficiency, demand-side management, renewable energy development, innovative electricity regulation, and integrated resource planning, among other areas. Incentive programs that drive the adoption of compact fluorescent lamps, efficient industrial processes, solar water heaters and energy-efficient refrigerators, electric motors, and irrigation pumps were being considered.

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<http://www.iaea.org/newsCenter/PressReleases/2008/pra200816.html>

⁴ <http://www.energy.gov/news/3666.htm>

⁵ http://www.npcil.nic.in/pdf/28may09_press.pdf

⁶ http://www.npcil.nic.in/pdf/news_23mar09.pdf

⁷ <https://nanohub.org/resources/5514/>

⁸ <http://ies.lbl.gov/node/399>

C. Recent Developments

India's External Affairs Minister and US Secretary of State in a joint statement issued on 20th July, 2009 in India, pledged to intensify collaboration on energy security and climate change. They would focus efforts on increasing energy efficiency, renewable energy and clean energy technologies through the India-US Energy Dialogue and a Global Climate Change Dialogue. Both sides also agreed to launch a process of bilateral scientific and technological collaboration to support the development, deployment and transfer of transformative and innovative technologies in areas of mutual interest including solar and other renewable energy, clean coal and energy efficiency, and other relevant areas.

During the recent visit of US Secretary of State, Hillary Clinton the two governments also signed agreements and announced commitments including on Energy and Climate Change working groups to continue successful energy dialogue and begin discussions on actions to address the challenge of global climate change.

On 19th July, 2009, at the ITC Green Center in India, US Secretary of State said that the US government had also established a new program at the State Department that would link some of the US West Coast cities with Indian cities to help transfer clean energy technology.

Building on the India-US Civil Nuclear Initiative, India and US will begin consultations on reprocessing arrangements and procedures, as provided in Article 6 (iii) of the 123 Agreement for Peaceful Nuclear Cooperation between India and the US. As part of the two governments' continuing cooperation in civilian nuclear energy, the Government of India pledged to designate two nuclear energy sites in India for development by US companies.

On 12th January, 2009, at Petrotech-2009, Asia's biggest biannual Oil and Gas Industry event, India's Petroleum and Gas Minister, Murli Deora said that India has of late adopted an integrated energy policy that would enable it to fuel economic growth and meet the larger human development goals by choosing fuels that are socially and economically desirable. The policy envisages an energy mix that focuses on augmenting the domestic energy resource base

and increasing efficiency while strategizing India's stakes in energy assets overseas.⁹

The US hosted the 2nd meeting of the US-India Civil Nuclear Energy Working Group at Idaho national Laboratory on 28-30 April, 2009. This was the first meeting held by the Working Group since entry into force of the India-US peaceful nuclear cooperation agreement. The Director of India's Strategic Planning Group in the Department of Atomic Energy jointly chaired the meeting with US Acting Assistant Secretary for Nuclear Energy in The US Department of Energy.

D. Upcoming Events

- A. **ITPO is organizing Enviro Tech and Energy Tech twin shows on environment and energy technologies during 11-14 December, 2009 to be held at New Delhi.** Energy Tech aims at helping accelerate the growth of the energy sector in India and assist in achieving the target, "Energy Independence" and Power for All by 2012. Enviro Tech would focus on the environment related issues by showcasing products and technologies to the entrepreneurs, policy makers and other related to this field and to create awareness amongst the common men. For further information please see : www.envirotechindia.com and www.energytechindia.com.

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<http://www.andhranews.net/Business/2009/January/12-India-adopts-integrated-83619.asp>