

# INDIA

## Country at a glance

- Population: 1.22 billion (2010) [1]
- Total area: 3,287,263 sq. km [2]
- Carbon emissions per capita: 1.33 metric tons (2010) [3]
- Energy consumption per capita: 6.57 MWh (2010) [4]
- Percentage of global carbon emissions: 5.37% (2010) [3]



Aralvaimozhy railway station with a view of Muppandal wind farm *Permission under CC BY-SA 2.5 commons.wikimedia.org/wiki/File:Aralvaimozhy\_station.jpg*

### Wind-farms reaching out to villages in India

Wind-farms are becoming a common sight in many rural parts of India. Muppandal windfarm is one of the many projects that has improved living standards in nearby villages

**Table 1 Breakdown of energy use, electricity and heat generation, 2010**

unit	Primary energy sourced within country		Energy imports minus exports	Primary energy used within the country <sup>(a)</sup>			Electricity Generation <sup>(b)</sup>		Heat Generation <sup>(c)</sup>	
	ktoe	%	ktoe	ktoe	GWh	%	GWh	%	GWh	%
Coal, including brown coal & peat	244,527	47	47,305	288,359	3,353,612	42	653,005	68	0	0
Oil fuels	42,847	8	123,367	162,261	1,887,093	23	26,441	3	0	0
Natural gas	42,428	8	10,295	52,723	613,168	8	117,789	12	0	0
Nuclear	6,845	1	0	6,845	79,608	1	26,266	3	0	0
Hydroelectric	9,840	2	0	9,840	114,445	1	114,424	12	0	0
Biofuels and waste	170,177	33	0	170,177	1,979,164	25	2,057	0	0	0
Solar photovoltaics	2	0	0	2	23	0	23	0	0	0
Solar thermal	292	0	0	292	3,396	0	0	0	0	0
Tide, wave and ocean	0	0	0	0	0	0	0	0	0	0
Wind	1,712	0	0	1,712	19,915	0	19,911	2	0	0
Geothermal	0	0	0	0	0	0	0	0	0	0
Electricity (imported)	0	0	477	477	5,549	0	0	0	0	0
Sub total Renewables	182,024	35	0	182,024	2,116,942	26	136,415	14	0	0
<b>Totals</b>	<b>518,671</b>	<b>100</b>	<b>181,444</b>	<b>692,689</b>	<b>8,055,973</b>	<b>100</b>	<b>959,916</b>	<b>100</b>	<b>0</b>	<b>0</b>

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

Notes:

Standard conversion used is 1 ktoe = 11.63 GWh

(a) Sum of energy sourced within country, energy imports minus exports, international marine and aviation bunkers and stock change flows.

(b) Includes all electricity generation, including any exported.

(c) Does not include electrical heating. Includes waste heat recovery from electricity generation plants.

**Table 2 Breakdown of transport fuel use, 2010**

(in ktoe)	Total transport mix	%	Domestic aviation	Road	%	Rail	Pipeline transport	Domestic navigation	Non-specified (transport)
Oil products	51,857	93	1,623	46,335	95	2,595	0	1,290	13
Natural gas	2,301	4	0	2,301	5	0	0	0	0
Biofuels and waste	182	0	0	182	0	0	0	0	0
Electricity	1,151	2	0	0	0	1,151	0	0	0
Sub total Renewables	182	0	0	182	0	0	0	0	0
<b>Total</b>	<b>55,491</b>	<b>100</b>	<b>1,623</b>	<b>48,818</b>	<b>100</b>	<b>3,746</b>	<b>0</b>	<b>1,290</b>	<b>13</b>

Source: Based on World Energy Statistics and Balances Database 2012, "World Energy Balances." © OECD/IEA, 2012.

## Stand on climate change

India ratified the Kyoto Protocol on 26 August 2002 and it was entered into force on 16 February 2005.

## National climate change programmes

During COP15 in Copenhagen in 2009, India's environment minister reconfirmed India's goal to reduce carbon emissions per unit of GDP by 20% to 25% below 2005 levels by 2020 [5]. India has also revealed that it is spending over 2.6% of its gross domestic product (GDP) to deal with challenges relating to climate change mitigation.

India is ranked the third largest GHG emitter in the world. In June 2008, India's Prime Minister released India's first National Action Plan on Climate Change (NAPCC). The NAPCC presents policies to alleviate climate change while addressing developmental challenges. It is also noted that public policy on climate change is guided by the need to eradicate poverty and develop economically. This will be done through eight national missions listed below:

- National Solar Mission is spearheaded by the Ministry of New and Renewable Energy
- National Mission for Enhanced Energy Efficiency (NMEEE) to be implemented by the Ministry of Power and Bureau of Energy Efficiency [6]
- National Mission on Sustainable Habitat to be implemented by the Ministry of Urban Development
- National Water Mission to be implemented by the Ministry of Water Resources. The Mission receives an additional funding of INR 28,651 crores (USD 6.14 billion), divided between the Centre and States [7]
- National Mission for sustaining the Himalayan Ecosystem
- National Mission for a "Green India" to be implemented by the Ministry of Environment and Forests from 2011 – 2022 [8]
- National Mission for Sustainable Agriculture (NMSA) to be implemented by the Ministry of Agriculture
- National Mission on Strategic Knowledge for Climate Change is spearheaded by the Ministry of Science and Technology. A mission document was released in July 2010 and details include ten different mission deliverables that focus on training, research and development and data collection methodologies to improve the field of climate change studies [9].

The following measures and actions were also undertaken on a sectoral-based approach. They are -

### Residential-Service sector:

- Under NMEEE, promotion of the Programme of Activities (PoA) of CDM will be carried out to accelerate energy efficiency measures by leveraging CDM by reducing transaction costs
- Under NMEE, an Energy Efficiency Platform will be created to overcome barriers to financing energy efficient projects and create an energy efficient market. A Framework for Energy Efficient Economic Development (FEEED) will also be set up. Both initiatives will help build capacity building of banks and financial institutions
- Funds of more than INR 7.5 crores/annum, from the budget of the government will be allocated to monitor NMEEE

- As part of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), approximately INR 39000 crore has been sanctioned for infrastructure projects mainly focused on improving drainage and sewerage facilities in many parts of India. This is part of the National Mission on Sustainable Habitat [10]
- Under the National Mission for Green India, providing livelihood for about 3 million households has been listed as a mission deliverable. This will be achieved through adopting fuel wood efficiency and alternative energy devices
- The Ministry is implementing a programme to provide financial support for electrification of remote un-electrified census villages through small hydropower systems, biomass gasification based electricity generation systems or solar systems [11]

#### Industrial sector:

- Specific Energy Consumption (SEC) targets will be assigned to various energy intensive sectors
- Promotion of trading of Energy Saving Certificates to consumers who exceed SEC targets
- Total savings are expected to be 9.78 mtoe and 26.21 mt of GHG emissions in the first three years of implementing NMEE in various energy intensive sectors

#### Transport sector:

- INR 394721 lakhs worth of funds have been released for projects related to improving roads, flyovers, mass rapid transport systems and other urban transport. This contributes to 27% of overall cost estimations in partial fulfillment of JNNURM for the transport sector [12]
- As part of the National Mission on Sustainable Habitat, better urban planning and modal shift to public transport are being planned. The aim is to make long term transport plans to facilitate the growth of medium and small cities in such a way that ensures efficient and convenient public transport
- The National Capital Region Planning Board prepared an “Integrated Transportation Plan-2032” that connects Delhi, Sonapat and Panipat via a regional rapid transit system in length of 111.2 km [13]
- The Ministry of Urban Development issued an official notification of rules and regulations governing the operations and maintenance of Bangalore Metro Railway in 2011 [14]

#### Agriculture sector:

- Under the National Water Mission, comprehensive data on water resources was to be collected by 2011. The information was to be made available in the public domain by 2012
- Plans have been made to promote citizen and state action for water conservation, augmentation and preservation
- Plans to increase water use efficiency by 20%. This includes benchmarking studies for urban water use, water audits in irrigation and promoting water efficient techniques such as drip irrigation systems
- As part of NMSA, four areas have been identified as focus areas [15]
  - Dry land agriculture
  - Risk management
  - Access to information
  - Use of biotechnology

#### Forestry sector:

- 5 million hectares of forest cover will be improved in quality and 5 million hectares of new forest cover will be created through reforestation efforts
- Decentralized forest governance to allow local governments at the village level or small town level to play an increased role in forest development agency
- The centrality of Forest Rights Act (FRA) 2006 as part of Green India Mission
  - FRA compliance has been made a precondition for release of funds to implementation agencies

Energy sector:

- Part of the National Solar Mission, the Jawaharlal Nehru National Solar Mission was launched in January 2010. It received INR 4337 crore (USD 900 million) for its first phase. With the received funds, the JNNSM plans to install 20,000 MW of solar power by 2022
- A potential of 12 million family type biogas plants have been identified in India. The central subsidy for such a plant is provided by the National Biogas and Manure Management Programme [16]
- The broad based Wind Power Programme of the Ministry aims to catalyze commercialization of grid interactive wind power. 233 potential sites have been identified. India now ranks 5th in the world after USA, Germany, China and Spain in grid connected wind power installations [17]
- Small Hydro Power Programmes have an estimated potential of over 15000 MW. The Ministry for New and Renewable Energy aims to harness 50% of this energy over the next 10 years. Most of this potential lies in the Himalayan states

#### Ministries involved in climate change/energy policy making:

Ministries involved	Web links
Ministry of Urban Development	<a href="http://urbanindia.nic.in/">urbanindia.nic.in/</a>
Institute of Urban Transport (India)	<a href="http://www.iutindia.org/">www.iutindia.org/</a>
Ministry of Water Resources	<a href="http://wrmin.nic.in/">wrmin.nic.in/</a>
Ministry of Environment and Forests	<a href="http://envfor.nic.in/">envfor.nic.in/</a>
Ministry of Agriculture	<a href="http://agricoop.nic.in/">agricoop.nic.in/</a>
Ministry of Science and Technology	<a href="http://www.dst.gov.in/index.htm">www.dst.gov.in/index.htm</a>
Ministry of New and Renewable Energy	<a href="http://www.mnre.gov.in/">www.mnre.gov.in/</a>

#### Education institutes involved in climate change/energy policy making:

Education Institutes involved	Web links
India Climate Portal	<a href="http://www.indiaclimateportal.org/">www.indiaclimateportal.org/</a>
India Environment Portal	<a href="http://www.indiaenvironmentportal.org/">www.indiaenvironmentportal.org/</a>
Centre for Science and Environment	<a href="http://cseindia.org/">cseindia.org/</a>

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