

## Energy in India

### Energy research, energy technology:

The shortage of energy in India (2007/2008: approximately 10%; at peak times about 15%) is one of the biggest challenges for the country's development. India's primary energy consumption is currently (2008) covered using the following sources: 35% biomass (mostly wood), 35% coal, 23% oil and 4% gas. The efforts of the Indian government in the field of energy research and technology, although great, are not nearly sufficient. R&D expenditure in the field of energy currently only makes up about 8% of India's overall spending on research and technology.

### Nuclear energy:

The Indian government's nuclear weapons tests marked a new phase in the country's nuclear policy. India is also working on developing its civil **nuclear energy** programme so as to become independent from other countries. In fact, India's research and development activities in the area of nuclear energy use have the ultimate aim of making the entire fuel cycle – from uranium mining to nuclear waste management – independent from other countries.

The closed fuel cycle – i.e. reprocessing spent fuel elements and using the plutonium obtained in this way in fast-breeder nuclear reactors – is mainly intended to produce weapons-grade material for the Indian nuclear weapons programme. The same is true of the operation of research reactors. The two oldest Indian research reactors are currently being refitted. In addition, a new research reactor for the production of plutonium is to be built at the atomic research centre BARC near Mumbai.

A broad research programme on the use of radiation sources and isotopes in agriculture, medicine and research is already underway. The main supporters of this programme are the atomic research centre BARC and the Indian Agricultural Research Institute IARI.

### Renewable Energies:

The fact that India has a separate Ministry of New and Renewable Energy Resources (old name: Ministry of Non-Conventional Energy Sources; MNES) underlines the political importance given to research, development and applications in this area. However, the focus of the activities funded by MNES is not on research, but on the development, production and dissemination of new, non-conventional energy technologies. In June 2007, renewable energy (capacity: >10 GW) accounted for approximately 7% of India's total energy production. This share is to be increased to 10% of energy production by 2010 and 20% by 2020. The greatest progress so far has been made in the use of **wind power**, which now amounts to approximately 70% of India's renewable energy. India has become the world's third-largest producer of wind power and the fourth-largest exporter of wind turbines. The Indian company SUZLON Energy bought a majority stake (86.5%) in the former Hamburg-based wind power company Repower Systems on 1 June 2007. At the time, this was the third-largest cross-border takeover by an Indian company of all time. Small **hydroelectric power** plants (up to 25 MW) contribute a further 20%, and **combined heat and power generation** and **biomass** (mainly wood firing) are responsible for another 20% (2007)

of India's renewable energy production. The Indian government supports this development through financial incentives as well as training and information programmes.

In addition, there is a (small) **solar energy** programme. With only 2 MW, the contribution of solar energy to India's renewable energy production is very small. MNES provides financial support for several pilot projects in the area of photovoltaics. However, there is room for improvement when it comes to transferring the findings from these pilot projects to practical application. Indian companies are second only to the U.S. in the production of solar cells. Moreover, MNES has launched a pilot programme to support energy generation from **biomass**.

### **German-Indian energy dialogue:**

The governments of Germany and India have agreed to engage in a **dialogue on energy** as part of their **strategic partnership**. On the German side, the BMZ, BMU and BMWi are involved (so far). Together with Anna University in Chennai, the Helmholtz Association carried out a workshop on the subject of "Major Aspects of Energy Research in India and Germany: The challenges for the future" on 20 and 21 June 2007. The Helmholtz Association also signed an MoU with Anna University on the intensification of cooperation in the area of energy research on 30 October 2007.

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