

**REPORT ON
LOW-CARBON AND ENVIRONMENTAL GOODS & SERVICES IN
INDIA**

Environmental Technologies in India

India has a market value of € 213 billion in low-carbon and environmental goods & services (LCEGS) with a 6% share of the € 3,400-billion global market.

The Government of India has passed significant legislation since the mid-1980s to increase the awareness of pollution and safety issues related to the industrialization of the nation. Since July 1991, when the Indian Government launched an ambitious program to liberalize the economy, the projected growth and continued industrialization of the Indian market has attracted much attention. However, as more than 1 billion people consume more energy, build more homes, and use more vehicles, environmental degradation will accompany the benefits of industrial development.

This scenario creates potential opportunities for environmental technologies for waste management, recycling, non-conventional energy etc. Till recently, the environmental goods & services sector used to refer to solutions for air, noise & marine pollution, land & water contamination, environmental analysis & consultancy, and waste management & recycling. Now it also includes renewable energy technologies like hydro, wave & tidal power, geothermal, wind & biomass, and emerging low-carbon activities like reduced emissions from the transport & construction sector, nuclear energy, energy management, carbon capture & storage and carbon finance.

Some of the important environmental sectors discussed here in terms of potential of business:

- Water Supply & Waste Water Treatment
- Solid Waste Management
- Air & Noise Pollution
- Environmental Goods and Services
- Renewable Energy
- Clean Development Mechanism and Carbon abatement technologies

Water and Waste Management

The population of urban India is growing fast. Services to manage that growth are, however, lagging. Ensuring the provision of services such as water and waste management is critical to avoid staggering socio economic costs both now and in the future.

Water supply and sanitation is a state subject. The Ministry of Urban Development is the central nodal agency, but its role is limited to defining norms for the sector and providing guidelines and technical assistance to states. Other Central bodies that directly or indirectly influence the sector include the Ministry of Environment and Forests, the Ministry of Health and Family Welfare and the Central Pollution Control Board.

At the state level, the provision of services is undertaken by four institutional set ups – state water boards, municipal corporations or urban local bodies, city water boards and public health and engineering departments.

Water Supply & Waste Water Treatment:

The gap between waste water generation and treatment has visibly amplified over the previous 15 years. Increasing urbanization and industrialization have resulted in a sharp increase in wastewater generation. Urban local bodies (ULBs) or water boards vested with the wastewater management function are deficient in financial and technical expertise. This has resulted in incomplete and improper wastewater treatment in most urban areas. Unclear policy perspectives

and unmetered, uncontrolled water supply in most Indian cities have further compounded the problem.

The level of urbanization increased substantially from 217 million in 1991 to 285 million in 2001 (according to the 2001 Census), representing a decadal growth of around 31 percent. This has put wastewater service delivery under tremendous pressure. Further, the existing sewage treatment plants are too inefficient to meet the growing demand.

An analysis of water supply, wastewater generation, collection and treatment during the last four decades indicates that wastewater generation nearly quadrupled between 1978-79 and 2005-06. Despite the fact that treatment capacity has increased by two and a half times, the gap of untreated volume has increased drastically.

As per the assessment made by the Central Pollution Control Board, around 29,129 million litres per day(mld) of wastewater was generated in 2005-06 in class I cities* and class II towns* which together constitute nearly 70 percent of the urban population. Wastewater treatment capacity is around 6,190 mld, which accounts for a mere 21 percent of the wastewater generated.

Many companies in India have capabilities of designing and executing the project for treatment, disposal and reuse of different types of industrial waste water. Also the technologies are available for treatment of sewage and its recycling. However, the capabilities are lacking for treatment and restoration of large water bodies, like rivers and lakes. Some of the modern treatment technologies like Membrane Bio-reactor (MBR) are also not very popular in India, considering the higher cost.

**Note: Class 1 city: town with population one million and above*

Size class 2 town: town with population 50,000 to less than one million

Size class 3 town: town with population less than 50,000

Solid Waste Management

There are major issues with regard to municipal, hazardous and industrial waste management. A high rate of urbanisation has led to very high production of solid waste. Local governments tend to spend most of their resources on collection (60-70 per cent) and significantly less on final disposal (>5 per cent). However, managing waste is currently severely constrained.

Indian consultants have acquired good capabilities in waste recycling and use of material. However, the technologies like waste to energy, bio-methnation is still lacking in India where foreign assistance is required. Also, the capability in handling electronic waste is lacking. Considering that the four major metropolitan cities, New Delhi, Mumbai, Chennai, and Kolkata, each produce an average of 4,000 tons of solid waste per day, this sector offers a good potential for investment by foreign countries. It is the responsibility of the Municipal corporations to develop comprehensive solid waste management programs for their cities. Legislations have come for Hazardous waste and Biomedical Waste Management and Handling (2003). Newer technologies are needed to handle such waste. It has been estimated that presently, only 10 percent of the hospitals in India have medical waste treatment facilities, such as incinerators. The Municipal Corporations are seeking alternative technology for medical waste treatment and management.

Air & Noise Pollution

Industrialization and urbanization have resulted in a profound deterioration of India's air quality. India's most severe environmental problem, come in several forms, including vehicular emissions and untreated industrial smoke. Apart from rapid industrialization, urbanization has resulted in the emergence of industrial centers without a corresponding growth in civic amenities and pollution control mechanisms. There are critical levels of air pollution in West Bengal, Gujarat, Bihar, Pondicherry, Madhya Pradesh, and Rajasthan There are many laboratories/ agencies, which have strong capabilities for air and noise monitoring in India. However, the capabilities like source

apportionment, acoustic modeling etc are still very limited to some organizations like NEERI (National Environmental Engineering Research Institute). This capability needs strengthening, vis-à-vis modeling and mapping of the zone, city etc.

Environmental Goods and Services/ Environmental Consultancy:

The environmental consultancy services in India flourished after EIA (Environment Impact Assessment) Notification 1984. Indian environmental consultants have expertise in areas like environmental quality monitoring and testing services (basic level), EIA study for regulatory clearance (involving pollution control), dust pollution control system, water pollution control (Waste water treatment system, water conservation and recycling), greenbelt development, converting solid waste to useful materials, recycling of wastes surveys of terrestrial and aquatic flora and fauna, water harvesting system, acoustic treatment system (basic level), and EMS.

Many consultancy services have their own laboratories for environmental analysis, whereas, about 50% of the environmental consultants associate with independent laboratories for the environmental analysis. A good number of accredited laboratory facilities are available like SGS, Netel Chromatograph etc.

Indian environmental consultants are weak in areas like gaseous pollution control system, colour removal and control system in dye / pulp & paper, EIA study of river valley, nuclear power and infrastructure projects, technology for remediation of contaminated site, marine pollution control, survey of marine flora and fauna, survey of biodiversity, strategic EIA, municipal waste management, treatment and disposal of electronic waste, biomedical waste management, emission estimates and factors, source apportionment, environmental education and training, technology for restoration of water quality and environmental economics.

Renewable Energy

India has been rapidly developing its renewable energy market, especially wind energy and biomass, and there is significant remaining potential to develop more capacity. This is illustrated below.

Renewable Energy – Estimated potential and cumulative achievement as on 31.03.2008

Sources/Systems	Estimated potential	Cumulative achievement
Grid-interactive renewable power (A)		
Biomass Power (Agro residues)	16,881 MW	605.80 MW
Wind Power	45,195 MW	8,757.40 MW
Small Hydro Power (up to 25 MW)	15,000 MW	2,180.84 MW
Cogeneration-bagasse	5,000 MW	800.83 MW
Waste to Energy	2,700 MW	55.75 MW
Solar Power	—	2.12 MW
Sub Total (A)	84,776 MW	12,402.74 MW
Distributed renewable power (B)		
Biomass/ Cogeneration (non bagase)	—	95.00 MW
Biomass Gasifier	—	99.79 MW
Energy Recovery from Waste	—	26,70 MW
Solar PV Power Plants & Street Lights	—	7.72 MW
Aero-Generators/Hybrid Systems	—	0.72 MW
Total (B)	—	229.93 MW
Total (A) + (B)	—	12,632.67 MW
Remote Village Electrification	—	3985 village, 1142 hamlet

Rural and Decentralised Energy

Family Type Biogas Plants (nos)	12 million	4.015 million
Home Lighting System	—	402,938 nos
Solar Lantern	—	670,059 nos
SPV Pumps	—	7,148 nos
Solar Water Heating – Collector Area	—	2.30 mln sqm
Solar Cookers	—	6.34* lakh
Wind Pumps	—	1,342 nos

Other Programmes

Energy Parks	—	503 nos
Akshay Urja Shops	—	269 nos
Battery Operated Vehicle	—	270 nos

Source: Ministry of New and Renewable Energy (2008) Annual Report 2007-08, * — as of February 2008

Clean Development Mechanism (CDM) and Carbon abatement technologies

India's strict legislation is steering industries towards adopting more modern technologies. Industrial companies in India are already investing in cleaner technologies, creating business opportunities particularly in process water treatment, energy efficiency and material utilization in the chemical, paper and steel industries. Prevention of industrial hazardous waste, as well as its utilization and handling are also promising fields for business. India offers excellent opportunities for emissions trading and for various technology producers that could help create emission reductions for India. Most of the Climate change issues are addressed by International Firms like PWC, E&Y. This is because of their accreditation with IPCC as they are only able to certify their achievable/ demonstrable Emission Reduction (CER). This is a potential area where Indian organizations are looking for training and capacity building.

Market Entry Options

India has implemented extensive market liberalisation and economic reforms. FDI of up to 100 per cent is allowed in most sectors/activities, including the manufacture of pollution control equipment, sewage, refuse and consultancy services. Domestic firms are engaged in both joint venture and long-term strategic partnerships with international companies.

The possible market entry strategies are summarized below:

Route to market	Comment
Export	India is a net importer of energy
Foreign direct investment (FDI)	Liberal FDI policies.
Joint venture (JV)	Indian Government encourages firms to seek foreign partners on Build-Own-Operate (BOO) models.