

8. Industry and Energy

Enhancing economic growth, is the most important imperative crucial for India's progress and industrial activity is key for this. It is important to serve the triple-bottom line (TBL) of economic, environmental and social welfare through mutually supportive ways. Towards this, several Indian industries have adopted environmental management systems and corporate reporting is also becoming increasingly visible.

It is equally important to prevent any further degradation of soils, water systems and the gaseous environment, due to industrial waste run-offs, emissions and other residuals, through integration of eco-efficient production systems.

The small-scale sector in India has played a very important role in meeting the needs of the large-scale firms and even caters to the global market in terms of chemicals and chemical-intermediates. Resource optimization and waste minimization have to be principal focal areas of capacity building that will help to maintain competitive advantages.

Rapid and effective remediation of contaminated resource systems should be supported by enforcement of other preventive approaches, including drastic reduction of wastes at source.

Appropriate market-based instruments that will provide incentives for improved environmental performance, will be useful vehicles for transitioning to cleaner production regimes.



Learnings and Perspectives

8.1 Industrial Production Systems

It is important to recognize that while India's economic growth over the last twenty years has been quantified as 163 per cent, the total increase in pollution generation has been approximately 475 per cent, with industrial pollution alone accounting for 247 per cent.

- Sector and process-specific assessments for identifying cleaner production (CP) opportunities have to be carried out and production systems appropriately reoriented to minimize waste at source.
- Value addition to the significantly large quantities of wastes generated

can help minimize resource loss. These two options are readily implementable and do not call for large investments in newer technologies.

- A suitable mix of market based instruments (MBIs) as a strong disincentive for pollution generation, and clearly defined incentives for CP have to be evolved to complement the legislative framework.
- Appropriate zoning and industrial siting that help optimize eco-industrial networking opportunities, aimed at smoothening environmental impacts, have to be employed in emerging industrial clusters.

Source: Ministry of Finance (2002)

| Industry | 1990-91 | 2000-01 |
|-----------------------|----------------|----------------|
| Cement | 48.4 | 99.5 |
| Finished steel | 13.5 | 29.3 |
| Sugar | 12.1 | 15.5* |
| Fertilizers | 9.0 | 14.7 |
| Paper and paper board | 2.1 | 3.1 |
| Caustic soda | 1.0 | 1.6 |
| Aluminium | 0.5 | 0.6 |

* Figure is for 1998-99

- Management Information Support Systems (MISS) have to be developed with empirical evidences on the linkages between environmental loads and impacts on a location and sector-specific basis. Such a MISS will be useful in demonstrating the diversity and intensity of negative externalities and reinforce judicial intervention in forcing transitions to CP regimes. An equally important spin-off will be an understanding of limitations

of production systems, reflected in the quality and quantity of wastes generated. Such an understanding can guide the development of cleaner technologies and their assessment.

- The Indian public sector needs to catch up with such emerging trends as corporate social responsibility and total quality management systems.
- Disaster mitigation and improving on-site working conditions are integral parts of enhancing productivity.
- Education and capacity building of the community to monitor impacts, and contribute to participatory environmental protection, including greater support for ecofriendly products, have to be given utmost importance in reinforcing consultative forms of management.
- A well defined policy framework that invites foreign direct investments (FDIs) only on/through technologies that are not energy-material-waste intensive can substantially reduce environmental loads source and help leapfrog into clean-technology regimes.

8.2 End-of-pipe Treatment and Remediation

- Rapid and comprehensive containment and treatment of wastes should be given utmost attention to prevent accumulation of wastes and any further contamination of sinks. Such containment and treatment efforts have to dovetailed with at-source reduction of wastes. Reducing levels of

environmental contamination and perturbations will be useful indicators of such interventions.

- Technology transfers in areas of advanced waste treatment must be guided by a comprehensive assessment of the appropriateness of technologies that can help rapidly treat the large quantities of heterogeneous wastes generated out of pollution-intensive processes being employed in the country. Suitably adapted waste-treatment systems that can transform/decompose recalcitrant wastes are the need of the hour. Technology adaptation therefore becomes a very important focus.

8.3 Hazardous Waste Management

- Strict adherence to legislated transport, storage, treatment and disposal requirements has to be enforced to prevent wanton dumping in non-designated areas, to prevent further contamination of waters/soils.
- It is very important to ensure that waste-recycling facilities are indeed functioning optimally and that such systems receive only compatible wastes through imports. The problem of treatment and disposal of complex hazardous wastes gets further compounded when inadequate and inappropriate waste recycling/value addition techniques are employed.

8.4 Emissions Reduction and Alternative Energy Systems

- Improving performance of production systems through improved energy efficiency has clear implications for reducing emissions. It is important to examine the linkages between emission reduction and the implications for economic growth, which has to duly integrate compensation for loss in welfare. Cumulative carbon emission reduction targets are preferable to annual targets in this context.

It is important to recognize that while India's per capita consumption of energy is low, energy efficiencies are also low. Process-based constraints on energy systems modulate demand and the efficiencies of energy output. Accordingly, more energy-efficient technologies and advanced fuel systems with near-zero emissions need to be promoted. Eco-industrial networking applications that maximize heat/thermal energy-based output in industrial areas needs to be actively promoted.

- India's participation in bilateral/multilateral/global framework of environmental action relating to energy efficiency and related abatement of greenhouse gas emissions should be guided by only such considerations that do not compromise India's competitive and equity related advantages. In this context, tradable quotas and equal allocation of global environmental space are critical.



“Rural energy planning, renewable energy and development of technology for increasing the efficiency of energy use are crucial for forest conservation and reduction of indoor air pollution.”

Abhijit K. Baruah
Multi-stakeholder
Consultation

- Promoting clean technologies, and reducing energy demand are likely to minimize local pollution and even reduce carbon emissions.
- As part of one of the world’s largest renewable energy programmes, in India approximately 3.27 million biogas plants, 3,38,000 biomass based chulhas and 5,90,000 sq. meter solar energy collector area, apart from 5,15,000 solar cookers have been installed. About 1450 projects have been approved in areas of renewable energy development that is expected to help generate 1650 MW and help 935 metric tons coal replacement. Experiences gained over the last two decades in India in the area of renewables—wind power, small hydro power systems, biomass-fired plants and solar photovoltaic systems—need to be upscaled to respond to emerging needs of sustainable development.
- Several fiscal incentives and subsidies including energy buy back have been devised. The Renewable Energy Plan 2012 sets out to meet nearly 10 per cent energy demand with renewables. The integrated rural energy programmes are also aimed at holistic empowerment of stakeholders. Meeting energy needs of all segments of the population in order to support growth is a high priority imperative for the country. Inter-institutional links have to be strengthened towards securing the social goals of sustained access to energy.



While innovating man must inevitably interfere with environment systems, it is upto the scientists, to see the way by which man will reap both short-term and long-term benefits from these innovations.

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