

Improving the competitiveness of small and micro enterprises

Through

Enhanced energy efficiency

Higher productivity

Improved environmental performance

Innovative processes for techno-social integration



Competence Network for Small and Micro Learning Enterprises

A decade of interventions

Small and micro enterprises play a very important role in the Indian economy as they provide employment to millions of workers. The 11 million small-scale industries in the country account for nearly 40% of the gross value of output in the manufacturing sector and contribute to over 34% of the total exports from India. The sector faces several challenges related to inadequacies in capital, technology, and markets. There are a number of issues related to the development of small and micro enterprises – inefficient utilization of energy, shortage in the supply of cleaner fuels, environmental pollution caused due to inefficient combustion and clustering of units, and occupational health hazards due to poor working conditions.

Since 1994, TERI (The Energy and Resources Institute) and SDC (Swiss Agency for Development and Cooperation) have partnered to develop innovative solutions to energy, environment, and social issues of few energy-intensive small-scale industrial sectors. The sectors identified for interventions are the following.

- Grey iron foundries (cupolas and pollution control systems)
- Glass units (pot furnaces and muffle furnaces/pakai bhatti)
- Brick kilns (VSBK [vertical shaft brick kilns] and bull's trench kilns)
- Puffed rice-making
- Biomass-gasifier-based thermal applications (silk reeling, cardamom drying, food-processing units, and other sub-sectors)

In each of these sectors, demonstration units were set up to showcase energy-efficient and environment-friendly technological solutions. To spread awareness, TERI facilitated a few replication units in each of the sectors. The interventions also stressed on making the technological solutions more holistic by integrating the social concerns of the workforce.

TERI adopted a bottom-up approach and encouraged greater participation of industry associations in the decision-making process. This helped in integrating the concerns of local industry in the overall project design. The solutions were developed by pooling multidisciplinary competencies—local consultants, international experts, and grass-roots-level NGOs (non-governmental organizations).

The demonstrated technological solutions developed by TERI have improved energy efficiency significantly, and consequently reduced GHG (greenhouse gas) emissions to a great extent. The interventions have also resulted in increasing awareness on energy-efficient and environment-friendly technological options among a large number of small and micro enterprises located across the country. In addition, the new technologies have brought about a sea change in the pollution levels at worksite.

The interventions owe their success to a large number of stakeholders (local/international consultants, fabricators, masons, entrepreneurs, industry associations, and partner NGOs) who worked hand in hand with TERI. In order to build on the existing informal network of different stakeholders working in the small and micro enterprise sectors, TERI has launched a new initiative – CoSMiLE (*Competence network for Small and Micro Learning Enterprises*) – in 2005, with support from SDC.



Divided blast cupola in a foundry



Interaction between women SHGs and bankers for setting up a VSBK

Gas-fired muffle furnaces for bangle baking

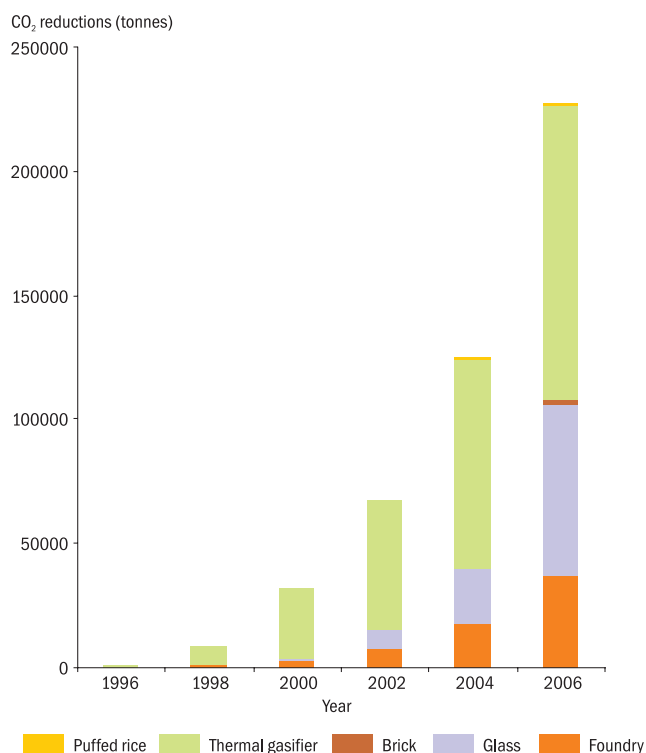


Molten metal being poured into moulds in a foundry



Resource-efficient technologies developed for energy-intensive small and micro enterprises

Sector/ application	Conventional technology	Improved technology	Key features
Foundry	<ul style="list-style-type: none"> Conventional cupola Wet cap, dry cyclone 	<ul style="list-style-type: none"> DBC (divided blast cupola) Venturi scrubber system 	<ul style="list-style-type: none"> Coke savings of 25%–65% Suspended particulate matter emissions brought below 70 mg/Nm³
Glass	<ul style="list-style-type: none"> Coal/natural gas-fired pot furnace Coal-fired muffle furnace 	<ul style="list-style-type: none"> Natural gas-fired pot furnace with recuperator Natural gas-fired muffle furnace 	<ul style="list-style-type: none"> Energy savings of 25%–50% Energy savings of 10%–15% Significant pollution reduction
Thermal gasifier applications	<ul style="list-style-type: none"> Direct burning of biomass and fossil fuels 	<ul style="list-style-type: none"> Gasifier-based furnaces for various end-use applications 	<ul style="list-style-type: none"> Energy savings of 35%–60%
Brick	<ul style="list-style-type: none"> BTKs (bull's trench kilns), down draft kilns, and clamps 	<ul style="list-style-type: none"> VSBK (vertical shaft brick kiln) Best operating practices in BTKs and draught kilns 	<ul style="list-style-type: none"> Energy savings of 20%–40% Energy savings of 10%–15%
Puffed rice	<ul style="list-style-type: none"> Conventional ovens 	<ul style="list-style-type: none"> Improved oven with heat recovery unit and dust arrestor 	<ul style="list-style-type: none"> Energy savings of 15%–45% Significant pollution reduction



Direct impacts of TERI interventions

- Number of replications – above 500
- Energy savings – over 55 000 tonnes of oil equivalent till 2006
- Cumulative CO₂ reduction – approximately 225 000 tonnes

In addition, the interventions have

- touched the life of at least 25 000 workers in about 500 locations across the country;
- made the workplace cleaner and safer through reduced drudgery and exposure to heat and pollutants; and
- created awareness on best operating practices and issues related to health and social security among small and micro enterprises.

Projected cumulative CO₂ reductions under CoSMiLE initiatives by 2008 is 400 000 tonnes

Biomass gasifier for food-processing unit



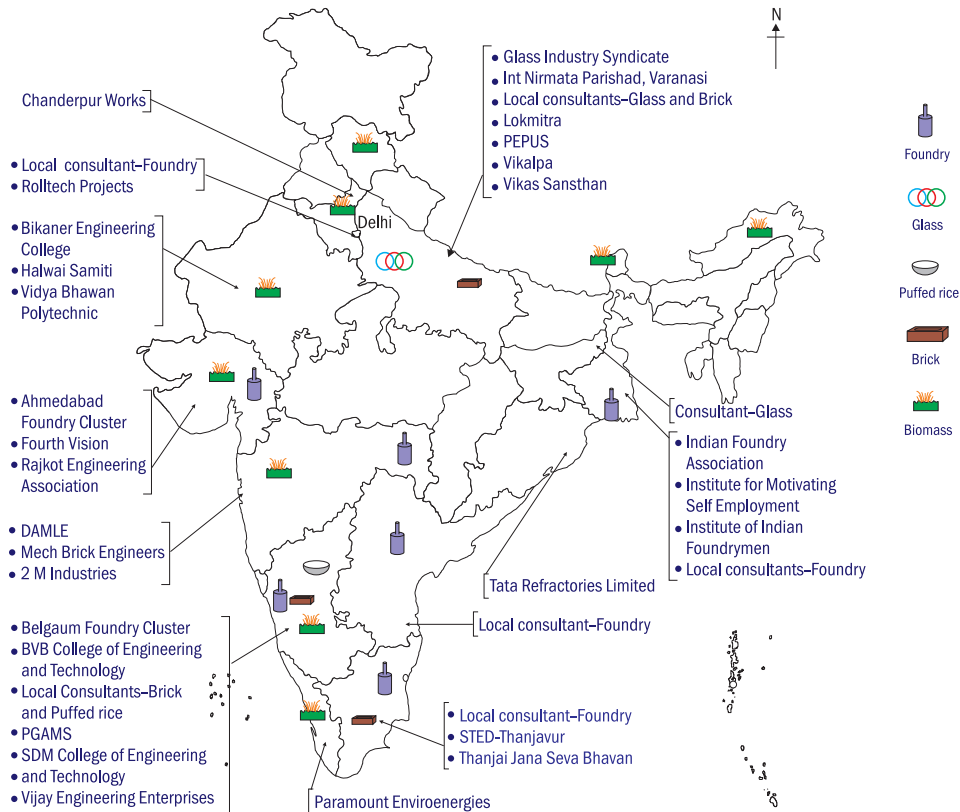
View of a bull's trench brick kiln



Implementation partners for technology dissemination

The interventions in small and micro enterprises had provided TERI opportunities to work with various stakeholders in different regions of the country. This has led to the formation of a large informal network of partners having a common interest in the widespread dissemination of the developed technologies. The current implementation partners of TERI in the project are listed below.

- **Industry associations** IIF (Institute of Indian Foundrymen), IFA (Indian Foundry Association), Glass Industry Syndicate, and INP (Int Nirmata Parishad)
- **Grass-roots NGOs** PEPUS (Paryavaran Evam Prodyogiki Utthan Samiti), Lokmitra, IMSE (Institute for Motivating Self Employment), Vikas Sansthan, OUTREACH, and Thanjai Jana Seva Bhavan
- **Academic institutions** SDM College of Engineering and Technology, BVB College of Engineering and Technology, and Bikaner Engineering College
- **Sectoral experts, local consultants, and resource persons**
- **International consultant** Sorane SA (Switzerland)



Geographical spread and consultative network of CoSMiLE

Policy-level dialogue partners

For creating an enabling policy environment, CoSMiLE provides a platform for interaction among industry, government, and other stakeholders. An indicative list of such dialogue partners is given below.

- Ministries at the national level, for example Ministry of Environment and Forests, Ministry of New and Renewable Energy, Ministry of Micro Small and Medium Industries, and Ministry of Science and Technology
- Other central and state government departments and local bodies
- Central Pollution Control Board and various state pollution control boards for example WBPCB and KSPCB
- Multilateral/bilateral development agencies and nationalized banks for example UNDP, UNIDO, SIDBI, and SBI
- NGOs like Development Alternatives, Gram Vikas
- Academic and research institutions

Biomass gasifier for silk reeling



Meeting of glass cooperative

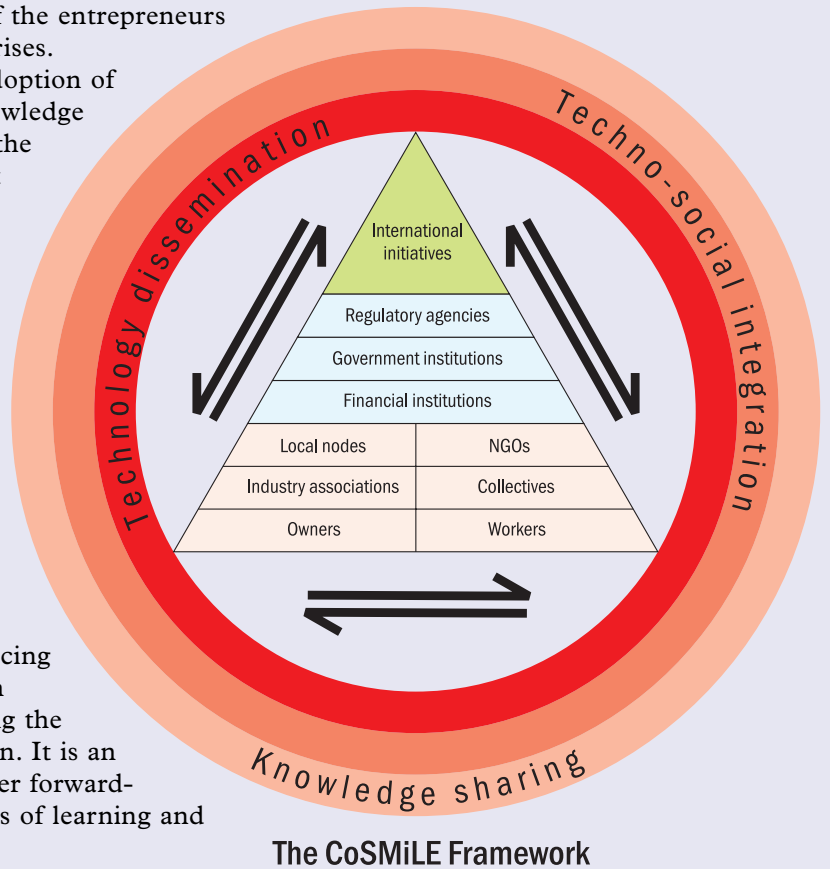


About CoSMiLE

The goal of CoSMiLE is to improve the economic, environmental, and social conditions of the entrepreneurs and workers of small and micro enterprises.

CoSMiLE focuses on increased adoption of resource-efficient technologies and knowledge sharing to enhance competitiveness of the targeted small and micro enterprises. It aims at the holistic development of the enterprises through techno-social integration, in a manner that the developed technologies benefit the workforce through improved working conditions and by providing better quality of life.

CoSMiLE is a dynamic and informal grouping of actors consisting of owners and workers of small and micro enterprises, service providers like masons, contractors, fabricators and local experts, and stakeholder institutions like industry associations, government departments, NGOs, financing institutions, and academic and research institutions. The common factor binding the network members is learning orientation. It is an open network and would always consider forward-looking enterprises and experts desirous of learning and sharing knowledge.



CoSMiLE services

- Identifying cleaner technologies and providing technical support for implementation of economically attractive, energy-efficient and environment-friendly technologies
- Mainstreaming technologies through capacity building and establishment of delivery chains
- Facilitating formation and strengthening of collectives within the informal sectors for enhanced livelihood opportunities
- Facilitating innovative TSI (techno-social integration) processes that would benefit/empower the workers and their families
- Establishing knowledge-sharing networks among communities of entrepreneurs, workers, service providers, and support institutions
- Providing platform for policy dialoguing through workshops, training programmes, and seminars
- Facilitating inclusion of cleaner production initiatives in the global climate protection framework
- Extending support to local initiatives (seminars, workshops, etc.) and providing platforms that would strengthen the CoSMiLE network
- Documentation and outreach activities for awareness generation and cross-learning

Site visit for pollution control board officials to a brick kiln unit



Puffed rice making unit in Karnataka



Support to small and micro enterprises

CoSMiLE provides direct support to enterprises for the adoption of the following technologies.

- DBC (divided blast cupola) for grey iron melting in foundries
- Pollution control systems for foundries
- Setting up of VSBK especially for disadvantaged/women groups and small entrepreneurs in the sector
- Energy-efficient pot furnaces for glass melting
- Natural gas-based muffle furnaces for bangle baking
- Improved versions for puffed rice making
- Biomass gasifiers for a wide variety of thermal applications
- New and promising technologies in other energy-intensive small and micro enterprises

The services include technical support in design, construction, fabrication, operation, and troubleshooting for adoption of cleaner technologies in small and micro enterprises.



Focus group discussion on South-South Cooperation



Experience sharing workshop at Thogur, Tamil Nadu

Focus regions/states

Foundry	All India level
Brick	Eastern Uttar Pradesh and South India
Glass	Firozabad (Uttar Pradesh)
Puffed rice	Karnataka
Thermal gasifiers	Rajasthan and Karnataka

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An awareness camp for foundry workers



Women preparing green bricks in machine



About TERI

A dynamic and a flexible organization with a global vision and a local focus, TERI was established in 1974. A unique developing country institution, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to helping shape the development of the Indian oil and gas sector; from tackling global climate change issues across many continents to enhancing forest conservation efforts among local communities, from advancing solutions to growing urban transport and air pollution problems to promoting energy efficiency in Indian industry, the emphasis has always been on finding innovative solutions to make the world a better place to live in. While TERI's vision is global, its roots are firmly entrenched in Indian soil. All activities in TERI move from formulating local and national-level strategies to suggesting global solutions to critical energy and environment-related issues.

The Energy–Environment Technology Division of TERI is directly involved in activities related to small and micro enterprises. It is primarily engaged in promoting efficient and optimal use of resources through development and diffusion of cleaner technologies, including renewable energy technologies.

About SDC

The SDC (Swiss Agency for Development and Cooperation) is Switzerland's International cooperation agency within the Swiss Foreign Ministry. The agency undertakes direct action, supports the programmes of multilateral organizations, and helps to finance programmes run by Swiss and international aid organizations in the following areas:

- Bilateral and multilateral development cooperation
- Humanitarian aid, including the SHA (Swiss Humanitarian Relief Unit)
- Cooperation with Eastern Europe

The aim of development cooperation is to alleviate poverty by helping people in partner countries to help themselves. Development activities focus on promoting economic and governmental autonomy, improving production conditions, helping to solve environmental problems, and providing better access to education, basic healthcare and culture for the most disadvantaged groups in society.

Bilateral development cooperation concentrates on 17 priority countries and six special programmes in Africa, Asia, and Latin America. Approximately 800 projects are currently in operation. At the multilateral level, SDC collaborates in particular with UN organizations, the World Bank, and regional development banks.



Divided blast cupola

Gas fired muffle furnace

Vertical shaft brick kiln



Gas fired pot furnace



Improved oven for puffed rice making



Gasifier for namkeen making



Gasifier based dyeing unit

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