

CoSMiLE UPDATE

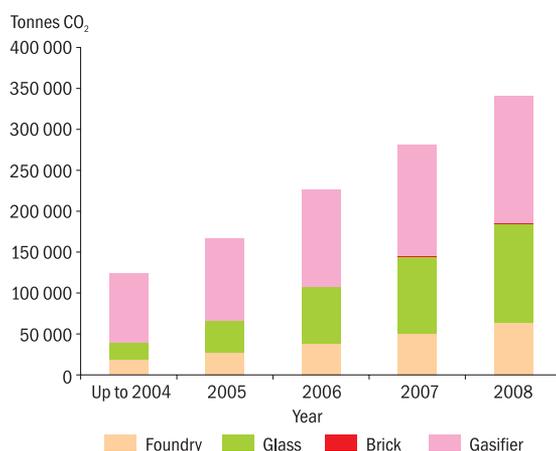
A platform for learning and action for small and micro enterprises

Editorial

With the coming of the year-end, it is time to take stock of the four-year partnership between TERI and SDC under the CoSMiLE umbrella. TERI launched the CoSMiLE initiative in 2005 with the support of SDC to further the efforts of the two organizations in the MSME (medium, small and microenterprise) sector. The specific focus has been on promoting clean energy efficient technologies and knowledge sharing to enhance the competitiveness of the enterprises and bring about a positive social change among the workers, entrepreneurs and other stakeholders. During the project, TERI and its partners were successful in promoting energy efficient technologies in a large number of enterprises, specifically in the foundry, glass, brick and biomass based industries - all over India. A few highlights of the efforts:

- Almost 60% penetration of the TERI designed recuperative pot furnace in the Firozabad glass cluster
- Enthusiastic response and ongoing adoption of TERI designed divided blast cupola in Rajkot foundry cluster
- Demonstration of biomass gasifiers for thermal applications in newer industries like sweet and savory making, bakeries and institutional cooking.
- Formation of community based group among firemen community covering around 20 000 firemen in 375 villages in eastern Uttar Pradesh.

The CoSMiLE interventions have achieved significant overall reductions in CO₂ emissions. To put the CO₂ emissions saved in perspective, they are equivalent to the total carbon sequestered annually from around 70 000 acres of pine or fir forests! Even more significant is the fact that a large number of MSME entrepreneurs have realized the importance of investing in cleaner technologies even though these are more capital intensive than conventional options.



TERI and SDC are now in the process of charting the course for the next phase of partnership. The focus will remain on knowledge sharing and capacity building among various stakeholders in the MSME sector and widening the reach and impact of the TERI-SDC partnership.

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The Energy and Resources Institute

Schweizerische Eidgenossenschaft
Confédération suisse
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Swiss Agency for Development and Cooperation SDC

Indo-UK study on technology transfer

TERI is participating in a UK-India collaborative project to study the barriers to the development and transfer of low carbon energy technologies between developed and developing nations. The project had its genesis at the meeting of G-8 nations in Gleneagles in July 2005, when many developing countries pressed for a new approach to international cooperation in the area of clean energy technologies. As a follow-up to this, the UK government and the Government of India set up the study, which is being carried out by three organizations:

(1) SPRU (Science and Technology Policy Research Unit), University of Sussex; (2) IDS (Institute of Development Studies), Sussex; and (3) TERI (The Energy and Resources Institute).

Phase-1 of the study was completed in 2006. It yielded insights into vital factors that influence the technology transfer process—for instance, the need for technological capacity building in the recipient nation, and the important role played by IPRs (intellectual property rights). The findings of Phase-1 were also presented at a side event during COP-12 (the 12th Conference Of the Parties) under the UNFCCC (United Nations Framework Convention on Climate Change), held in Nairobi in November 2006.



Energy-efficient pot furnace

Phase-2 of the project is currently under way. It builds upon the insights from Phase-1 to make recommendations and develop practical policy tools that will facilitate technology transfer. The focus is on three key areas.

- 1 Development of a taxonomy of barriers to low carbon technology transfer
- 2 Further work on IPRs, including the development of policies that could help overcome IPR barriers
- 3 Evolving recommendations and practical policy mechanisms that will foster joint RDD&D (research, development, demonstration and deployment) between developed and developing nations in relevant technologies.

Under Phase-2, specific case studies involving technology transfer have been selected for analysis. These include two successful technological interventions by TERI in the Indian MSME (medium, small and microenterprise) sector, namely, the glass industry in Firozabad (with the recuperative pot furnace) and the foundry industry (with the divided blast cupola). Both these interventions have involved transfer of technological know-how from UK partners to India. With regard to the MSME sector case study, the key findings are the following.

- The SME (small and medium enterprise) sector occupies a position of prominence in the Indian economy, contributing to more than 50% of the industrial production in value addition terms. The sector accounts for one third of the export and employs the largest manpower next to agriculture. SMEs mostly remain isolated from any technological developments that are taking place in their respective areas and hence continue using traditional and obsolete technologies that are invariably inefficient.
- Technology transfer to (recipient) Indian firms has involved not merely transfer of hardware and services, but also of technical knowledge, skills and know-how for operation and maintenance. This has

led to local capacity building of implementing partner (TERI) and intermediaries like consultants, fabricators and masons.

- There is a need to develop specific and focused RD&D programs for adoption of cleaner technologies among SMEs. This is important considering the fact that the SMEs, in general do not have the inherent financial as well as technical capacity to undertake research or adaptation activities that would help them improve their energy and environment performance.
- The foundry and glass projects had involved transfer of technologies developed in UK—DBC (Divided Blast Cupola) furnace for foundry industry by the BCIRA (British Cast Iron Research Association) and natural gas-fired pot furnace for glass industry by British Glass. The projects involved technology adaptation to local conditions, technology demonstration and capacity building of Indian project proponents.

On 28 November 2008, TERI and SPRU organized a stakeholder workshop to discuss the preliminary findings of Phase-2 of the project. The participants included Mr Fergus Auld, Head, Joint Climate Change & Energy Unit, DFID (Department for International Development), UK, Mr V P Joy, Joint Secretary, Ministry of Power, Government of India, and Ms Rajasree Ray, Deputy Secretary (Climate Change), Ministry of Environment and Forests, Government of India. The workshop included a roundtable discussion on addressing issues related to IPRs/ patents, and the potential for collaborative RDD&D initiatives. The interim findings of Phase-2 were also presented at a side event during COP-14, held from 1-12 December 2008 in Poznan (Poland).



Energy-efficient DBC

It is envisaged that the project findings would stimulate discussions at inter-governmental level on the need for greater technological cooperation between developed and developing countries to reduce greenhouse gas emissions and combat climate change.

Coimbatore foundry cluster: fresh interest in DBC

The Coimbatore foundry cluster in Tamil Nadu – one of the largest in India, with over 300 foundry units – is showing a new interest in the TERI-designed DBC. Traditionally, most units in this cluster used conventional coke-based cupolas for melting iron. In the absence of efficient pollution control systems, these units generated high levels of emissions. With increasingly stringent enforcement of pollution control norms in recent years, many of these units have switched over to electrical melting technologies, mainly the induction furnace.

Recently, however, the state power utilities have imposed severe restrictions on the use of electric power by the industrial sector. Industries now face load shedding of up to 40% of their maximum demand. The government has also imposed strict time limits on the use of electricity by the industrial units. With these restrictions on power usage and operational time, a majority of the foundries in Coimbatore have been forced to cut down production drastically—for instance, one unit operates its induction furnace for only 18 days in a month. At the same time, the foundry units are under enormous pressure to meet their market commitments.

Under these circumstances, the Coimbatore foundry entrepreneurs are considering reverting to coke-based melting technology as an option. However, with

Promoting energy-efficiency concepts in the MSME sector

TERI made a presentation on 'Energy efficiency improvement in engineering sector' on 4 December 2008 at Coimbatore. The meeting was organized jointly by CII and SIEMA (Southern India Engineering Manufacturers' Association). SIEMA represents and protects the interests of micro, small, medium and large-scale engineering industries in the region. It provides a platform to its members for sharing knowledge and best practices in manufacturing technologies. SIEMA is affiliated to various other industrial associations including the IIF (Institute of Indian Foundrymen) and COFIOA (Coimbatore Foundry and Industry Owners Association).

TERI also participated in an international conference on 'SME social responsibility and opportunities at the bottom of the pyramid' during 5–6 December 2008 at Kochi. The conference was jointly organized by ISED (Institute of Small Enterprises and Development); the Ministry of MSME, Government of India; and INSLED-India (International Network on Small and Medium Enterprises in Local Economic Development, set up by ISED). The event was attended by people from the MSME sector, financial institutions, and grassroots-level NGOs.

Emission standards for foundry cupolas

Cupola capacity (tonnes per hour)	Maximum permissible SPM (mg/Nm ³)
Less than 3	450
More than 3	150

SPM – suspended particulate matter

emission control remaining a major issue, they are also keen to identify and adopt pollution control technologies that will enable them to operate coke-based cupolas while meeting required environmental norms. In effect, the current scenario presents a major opportunity for promoting the TERI-designed DBC (to improve energy efficiency) and venturi scrubber (to reduce emissions) among Coimbatore foundry units.

In December 2008, the CII (Confederation of Indian Industry) provided TERI with an opportunity to showcase its clean, energy-efficient technologies for foundries in Coimbatore. Since 2002, the CII has been organizing a biennial conference titled 'National Foundry Conclave' to discuss issues of importance to the Coimbatore foundry industry. In view of

the present crisis being faced by the Coimbatore foundries, and recognizing the benefits that could accrue to units through adoption of the TERI-designed DBC and venturi scrubber system, the CII invited TERI to make a presentation on the topic 'Energy Saving' at the National Foundry Conclave 2008. The conference was organized during 4–5 December 2008 at Coimbatore. It was attended by around 200 representatives of the foundry industry from across India, and focused on the following themes: (1) energy; (2) environmental concerns and solutions; (3) technology; (4) foundry inputs; and (5) sharing of best practices.

TERI presented the salient features of the energy-efficient DBC and the venturi scrubber pollution control system, which have been successfully demonstrated and are being replicated in other foundry clusters. It also made a strong case for adoption of these technologies by the foundry units in Coimbatore, as they provide a clean, energy-efficient, and financially viable option to induction furnaces and other melting technologies based on electricity.

The impact of TERI's presentation can be judged by the fact that in December itself TERI has received a number of queries from

the cluster for technology adoption. One unit – CPC Pvt Ltd – has already signed up for installation of a DBC as well as a venturi scrubber system. Discussions with two more units are under way.

Awareness workshop on improved brick technology at Tirunelveli

As part of its ongoing initiative to promote the energy-efficient VSBK (vertical shaft brick kiln) technology among small-scale brick units, TERI and ITCOT Consultancy Services Ltd, Chennai jointly organized an awareness workshop on ‘Technology upgradation of brick industries in Tamil Nadu’ on 27 November 2008 at Tirunelveli, Tamil Nadu. The participants included Mr G Gnanasekar, General Manager, DIC (District Industries Centre); Mr L Kutti Raja, Assistant Director, MSME-DI (medium, small and microenterprise–Development Institute), Tirunelveli; Mr John Felix Fernando, Lead District Manager, Tirunelveli; around 150 entrepreneurs from the Tirunelveli and nearby brick clusters including members of the Sri Ganga Seva Sangam (the local brick cluster association); and representatives from DRDA (District Rural Development Agency).

TERI made a presentation on the features of the VSBK and its benefits as a small-scale, energy-efficient brick kiln that offers 20%–60% energy savings compared to traditional



Awareness workshop on VSBK, Tirunelveli

brick kilns. TERI also emphasized the potential offered by the VSBK to cut down on emissions. Discussions at the workshop focused on ways in which to enable Tirunelveli brick entrepreneurs to access and adopt the VSBK, and to obtain raw materials – specifically, coal – more easily. The following action points emerged from the discussions:

- At present, coal-based industries in Tamil Nadu mainly depend on imports from Indonesia. For the Tirunelveli brick-making cluster, it will be economical to access coal supply through Tuticorin port, which is nearby.
- The MSME-DI could facilitate transport of the coal from Tuticorin port to the Tirunelveli brick cluster.
- A CFC (Common Facility Centre) will be set up in Tirunelveli under the CDP (Cluster Development Programme) of the Ministry of MSME. It will provide the brick cluster with the infrastructure and services for research, development, and testing of materials and equipment related to brick manufacture.
- TERI will provide technical support and advisory services to those brick entrepreneurs in Tirunelveli who are keen to set up VSBKs.

Summit of firemen community organizations

The CoSMiLE NGO partners, PEPUS and Lokmitra, have been mobilizing the brick firemen community in eastern Uttar Pradesh under the banner of *sangathan* (collective) to foster solidarity and cooperative action.



Brick firemen summit, Kaurihar

From a humble beginning in two villages in the year 2000, the efforts of the project have spread to cover around 375 villages in the state. The *sangathan* has gained considerable strength in terms of both membership and influence.

In order to deliberate on the issues of formalizing the *sangathan* into some form of legal entity, and to decide upon its future leadership, PEPUS organized a summit of the firemen community—*Int Bhatta Karigaron ka Mahasammelan*—on 20 October 2008 at Kaurihar, Allahabad. Along with around 1200 members of the firemen community, the summit was attended by Mr Sunil Sahasarbudhey of Vidya Ashram, Varanasi; Mr Rakesh Mani Pandey, trade union leader from Hind Mazdoor Sabha, Lucknow; and Mr Nilesh and Mr Ajay of the Lucknow-based NGO ‘Find Your Feet’ (this NGO is supporting PEPUS in a programme to create and improve livelihoods among the firemen community).

During the summit, it was decided that the two *sangathans* that have been facilitated by PEPUS and Lokmitra in their respective areas of activity will henceforth function under a single name—‘*Int Bhatta Karigar Takniki Samaj*’—in order to synergize their strengths and initiatives. It was also decided that a committee will be set up to provide guidance and support to the *sangathans* on legal matters and related issues.

Power gasifiers for rural areas

Biomass gasification technology offers enormous potential for providing clean and affordable energy, particularly in stand-alone power generation for rural India. Indeed, this has been one of the focus areas of the CoSMiLE project. Recently, SDC has signed an MoU with NTPC (National Thermal Power Corporation Ltd) to promote biomass-based gasifier technology for power generation in rural areas.

Under the new phase of its partnership with SDC (from 2009 to 2011), TERI will support the SDC–NTPC initiative by contributing its technical expertise in the field of biomass gasification. A two-stage biomass



Biomass-based power gasifier

gasifier developed by DTU (Technical University of Denmark), with a capacity of 20–40 kilowatts, has been identified for adaptation to suit Indian conditions.

In December 2008, a Mission comprising representatives from DTU and Sorane SA, Switzerland, visited India, and along with the TERI team developed a ‘concept prototype’ of the proposed gasifier. As a next step, TERI will fabricate a prototype of the gasifier and test it at its Gual Pahari facility in Gurgaon, Haryana. After testing, the prototype will be modified as necessary, and the improved model will be taken for extensive testing at NTPC’s facility in Badarpur, near Delhi.

Once the gasifier has been optimized in terms of design and energy performance, it will be adapted to suit field conditions in rural India. Four villages will be identified for field-testing and adaptation in a participatory way.

Awareness programme on modern biomass technologies

TERI, in association with BVBCET (BV Bhoomaraddi College of Engineering & Technology), Hubli, and Phoenix Products, Belgaum, organized a one-day awareness

programme on 'Modern biomass technologies' in the BVBCET campus on 6 November 2008. The event included a technical session followed by an exhibition of different biomass-based technologies.

Among the participants were representatives from the DIC (District Industries Centre); KSFC (Karnataka State Financial Corporation), Dharwad; and faculty and students of BVBCET. TERI presented its successful interventions in the MSME sector under the CoSMiLE project. BVBCET shared its experiences while working with TERI to develop improved biomass-based technologies.

The highlight of the event was the exhibition, where live demonstrations were conducted of various biomass-based technologies developed by TERI, Phoenix Products, and ARTI (Appropriate Rural Technology Institute), Pune. The technologies included biomass gasifier-based cooking ovens, deep frying ovens, cook stoves for hotels, and water heaters. The event attracted over 300 visitors including entrepreneurs and representatives from small-scale industries and hotels, NGOs, schools, and colleges.

Firozabad success story

TERI has successfully designed and promoted clean, energy-efficient technology for glass melting pot furnace units in the Firozabad glass cluster. The salient features of the improved technology are: (1) top-fired gas-based pot furnace, and 2) modular waste heat recovery system (called recuperator) that reuses heat from flue gases to preheat



Cooking with biomass gasifier

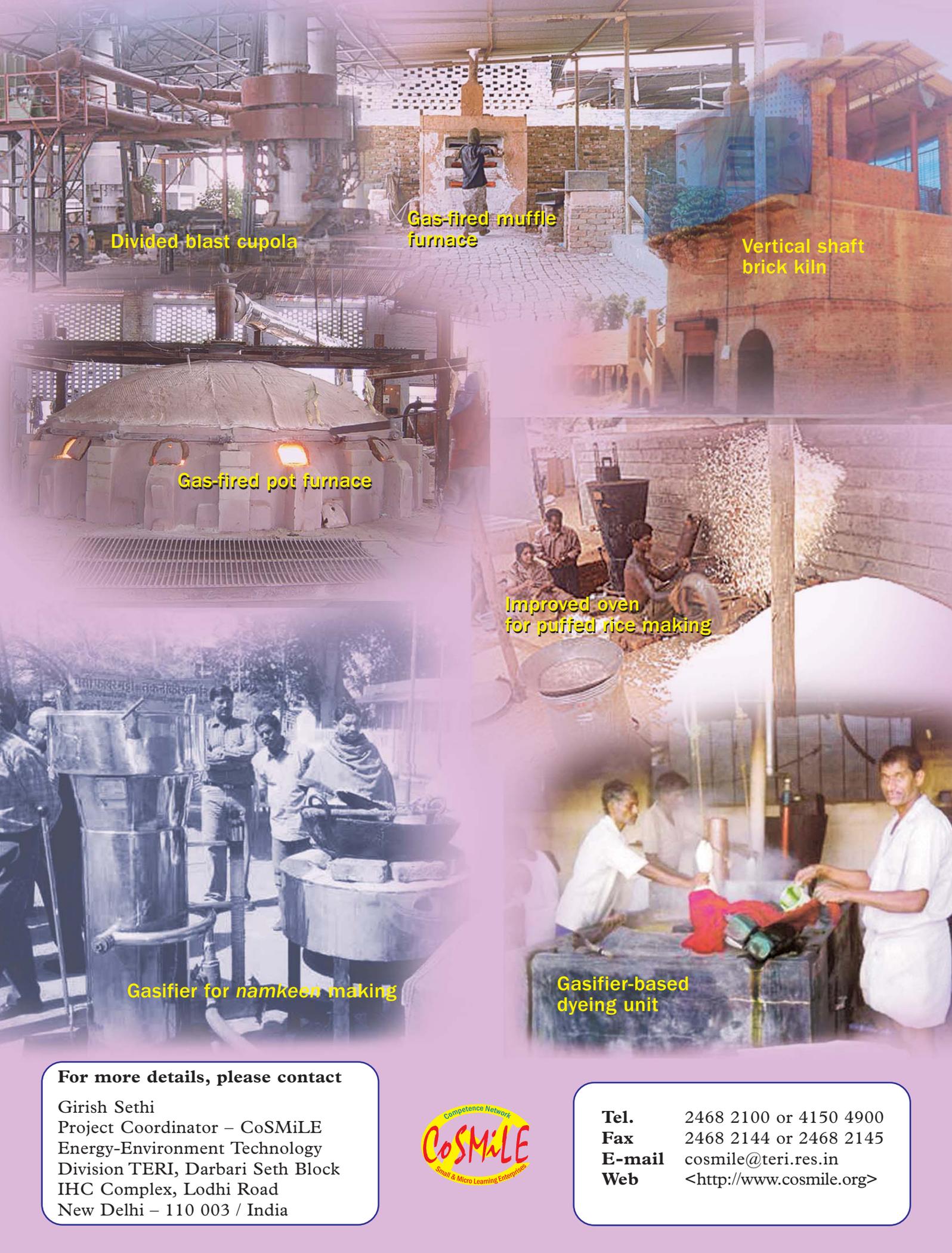
combustion air to about 500–600 °C.

While over 50% of the open-pot furnace units operating in Firozabad cluster have already switched over to the improved technology, Suhag Kanch Udyog has become the first

closed-pot furnace unit to adopt the TERI-designed technology. This closed-pot unit is located in the industrial area of Dholpura in Firozabad. The unit has a pot furnace with 12 closed (Japanese) pots for melting glass to produce mouth-blown glass items such as bottles and bulbs, pressed glass products like ashtrays, and coloured glass rods for making beads.

The proprietor of the unit, Mr Sachin Gupta, has adopted the TERI-designed technology stage by stage through careful financial planning. Earlier, Suhag Kanch Udyog operated a 'conventional' bottom-fired pot furnace. In 2007, Mr Gupta switched over to the energy-efficient top-fired pot furnace. Although he was aware of the benefits of the modular recuperator, he lacked financial resources to install the same. As an interim measure, he installed a simple, more affordable 'pipe recuperator' based on a local design. This heat recovery system was less efficient than the modular recuperator, but it brought a marginal fuel saving of 10%–15% compared to the conventional furnace system.

Around November 2008, Mr Gupta replaced the pipe recuperator with the TERI-designed modular recuperator. This has helped the unit in enhancing the fuel saving to about 30%–35% compared to the conventional furnace system. Mr Gupta expects to recover the cost of his modular recuperator in less than a year's time.



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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