VOLUME 4
ISSUE 3
September 2009

A platform for learning and action for small and micro enterprises

Editorial

The construction sector is an important part of the Indian economy, contributing around 6.3% of the GDP. Bricks form one of the major construction materials used in our country; India ranks second in the world in brick production, next only to China, producing an estimated 140 billion bricks annually. Most of the brick kilns are small units located as clusters in rural and peri-urban areas.

Brick kilns use traditional technologies for brick-making, and depend largely on manual labour. They provide a vital source of employment for millions of migrant workers during the dry season. The brick industry is also resource-intensive and high on emissions; each year, brick units in India consume about 500 million tonnes of top soil, 24 million tonnes of coal, and huge quantities of biomass.

Energy cost accounts for over 40% of production cost of a brick. There is considerable potential to improve the energy efficiency of brick-making (and thereby improve productivity and reduce the resource intensity and emissions of brick kilns). For this, it is necessary to develop a comprehensive framework to promote resource efficient production and construction methods and thereby create the right incentives for the brick industry to produce better bricks with low embodied energy and use less clay. Use of 'Resource Efficient Bricks' (REBs) in place of traditional solid bricks can lead to significant reduction in cooling/heating loads in buildings as they offer better insulation properties. For instance, a house made of REBs and using three air-conditioners can achieve energy savings of 5% to 7%.

As a step towards promoting REBs in the country, TERI has recently initiated a project titled 'Energy efficiency improvements in Indian brick industry' in association with the MoEF (Ministry of Environment and Forests) and with the support of UNDP (United Nations Development Programme) and GEF (Global Environment Facility). The project focuses on facilitating (1) technology upgradation that promotes semi-mechanization in the brick sector for production of REBs; (2) market access for such new REB products; (3) access to bank finance for technology adoption by the brick kiln units; and (4) capacity building of the various stakeholders such as brick kiln entrepreneurs, workers, architects, builders, owners and financial institutions.

TERI has planned to initiate interventions in all major brick producing regions across the country. These include Punjab, Karnataka, Gujarat, Uttar Pradesh and other north-east region. In each region, the project will collaborate with relevant stakeholder organizations to establish Local Resource Centres (LRCs) in different clusters. These LRCs will provide technological and other necessary support services for brick kilns in their technology upgradation endeavours.

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Assessment of Village Energy Security Programme

TERI has been assisting the MNRE (Ministry of New and Renewable Energy) in implementation of the pilot phase of the VESP (Village Energy Security Programme) in India, under the World Bank supported project entitled 'Biomass for sustainable development' (see CoSMiLE Update 4[2], June 2009). Launched in 2004, the VESP is a community based initiative that aims at providing clean, affordable energy in rural areas—home to around 70% of India's population. The focus has been on finding ways for villages—particularly those located in remote rural areas that are unlikely to be provided grid electricity in the near future—to achieve energy security based on locally available renewable energy sources (preferably biomass). Till now, 81 test projects under VESP have been sanctioned, of which 41 have been commissioned in eight different states. As one of four regional consultants, TERI has facilitated the implementation of 21 VESP test projects in Assam and West Bengal. As the national consultant till June 2009, TERI has developed the prototype village energy plan, community operations manual and monitoring framework for the entire project.

TERI has now conducted an assessment of around two-thirds of all the operational test projects in order to review the performance, impacts and lessons of the VESP test phase. This exercise will help in formulating recommendations for a larger operational programme to strengthen and scale up the dissemination of sustainable biomass energy technologies in rural areas. A few highlights of the assessment exercise are summarized below.

Biomass based power gasifier operating in Mahishakada village, Orissa

Project implementation

The test projects (most of which are small biomass gasifer-based systems for power generation) have been implemented primarily in remote rural areas where the people are very poor, and have little access to basic amenities or income generation opportunities. As such, the people usually lack the motivation to improve their developmental status on the basis of the improved energy services; this poses the greatest challenge in implementation and sustaining the projects. Hence, the success of a test project depends on the ability of the PIA (project implementing agency) to mobilize and involve the local community in the project activities from the inception stage itself.

Under each VESP project, the PIA has interacted closely with the local community to form a VEC (Village Energy Council), which forms the core of the energy service delivery model. The VEC plays the role of stand-alone producer, distributor and supplier of electricity; it also collects electricity charges and resolves disputes in case any arise.

The VEC usually consists of 9–13 members, of whom 50% are women. The assessment reveals that projects implemented by NGOs are generally more successful than those implemented by state agencies. This is probably because the NGOs have been engaged with the village communities even before the inception of VESP; hence, they are better able to mobilize the villagers to participate in the project, and to explore and utilize the possibilities for income generation created by dependable electricity supply (See Box 1).

Capacity building

Experience shows that the key to sustaining the improved energy technologies beyond the project duration lies in finding innovative ways by which the local people—particularly the youth—are encouraged to learn and

BOX 1 Integrating ideas for sustainability

Bhalupani is a small village with 44 households in Mayurbhanj district, Orissa. Under VESP, an NGO named Sambandh has helped install a biomass gasifier-based power generation system in the village. As part of an earlier watershed programme, Sambandh had promoted SHGs (self-help groups) in Bhalupani who produce cup-plates (donapattas) from saal leaves. Now, eight donapatta machines with a total load of 2 kW have been connected to the power generation system. Also, a 6 kW honey processing unit has been set up in Bhalupani with support from the Integrated Tribal Development Agency, Orissa; the unit is managed by the Women Federation of the Bhalupani Gram Panchayat. Thus, the power generation unit has spurred income generation activities in Bhalupani; while the electricity charges paid by the SHGs and Women Federation ensure the financial sustainability of the power plant.

BOX 2 Building local skills and support systems

In Jambupanu and Dawania villages (Madhya Pradesh), TERI has built the capacities of the local operators from the pre-installation stage to the commissioning of the biomass-based power generation systems. In addition, TERI has entered into an annual maintenance contract with a local diesel engine mechanic to provide assistance to the system operators as and when needed. These initiatives have enabled the operators to run the systems for an average of over 20 days per month.

In Chhattisgarh, CREDA (Chhattisgarh Renewable Energy Development Agency) involved a local gasifier manufacturer to place trained technicians in the villages for providing 'handholding' support to the local operators in operation and maintenance of gasifiers and engine. The technicians stayed in the villages for the whole of the first month, two weeks in the second month and a week during the third month.

develop new skills through capacity building in understanding and operating the new energy systems. This helps build confidence among the people, and fosters a willingness in them to pay for regular and reliable electricity. (see Box 2).

Learnings and recommendations

Many VESP projects have proved to be success stories. At the same time, the project experiences have revealed a number of challenges that need to be tackled at village level to ensure the sustainability of the project interventions:

- Low concentration of electricity demand (making distribution expensive and difficult)
- Low economic activity (implying low demand for electricity)
- Difficulty on the part of users to pay for electricity
- Difficulty in operation and maintenance due to remote location
- Limited technical knowledge of VEC members
- Weak fuel supply chain linkages

A biogas unit operating in Orissa

In order to upscale the VESP and similar decentralized rural electrification projects, the following measures are recommended:

- Non-electrified but less remote villages should be selected based on a 'cluster' approach. Depending on the proximity of the villages, the feasibility should be explored for setting up a higher capacity

A house electrified with biomass gasifier in village Kumnedin, Orissa

power plant with a local mini-grid covering a number of villages, rather than several smaller systems.

- There should be flexibility and versatility in technology selection and sizing, including renewable energy-based hybrid options. The sizing should not be based on population but on demand. Higher capacity systems are expected to provide economies of scale, and could cater to higher future demands for electricity.
- To meet the technology requirements for the upscaled VESP and other rural energy projects, a favourable environment will be required to encourage new manufacturers/ suppliers to test and promote various models of biomass gasifier systems, SVO engines and biogas systems.

Power gasifier operating in village Dicholi, Maharashtra

- Maximizing the load is a crucial factor for the financial viability of the power system. In most projects implemented in remote areas, the capacity utilization factor is low, affecting the economic viability of the power systems. Operational sustainability can be achieved either by maintaining high collection efficiency, or by exploring additional revenue options through the introduction of productive loads with possibly higher tariffs depending on the enhanced profitability.
- Other service delivery models such as ESPs (energy service providers) or private developers, energy cooperatives and BOOM (Build-Own-Operate and Manage) could also be explored in such projects. State-level NGOs that are implementing rural development/ community development programmes could be involved as 'active partners' so as to develop synergy with the NGOs' existing programmes and ensure sustainability.

Promoting biomass gasifiers in Belgaum industrial cluster

Biomass gasifier-based systems are becoming increasingly attractive for replacing the use of fossil fuels like diesel, kerosene and LPG (liquefied petroleum gas) for various thermal applications in industries. This is because the prices of fossil fuels have increased much more rapidly than those of biomass over the past decade. However, in order to promote large-scale adoption of gasifier-based systems, it is important to establish sustainable fuel supply linkages and strong local delivery mechanisms.

TERI has identified the Belgaum industrial cluster, in Karnataka, as having considerable potential for promoting biomass gasifiers for thermal applications. The district of Belgaum generates about 750 000 tonnes of surplus biomass annually (mainly agro-residues). The district is also rich in forests, which provide around 200 tonnes of firewood daily. Many industries in Belgaum have expressed their keenness to adopt biomass gasifier systems. They include non-ferrous metal processing, food processing, and chemical industries.

In 2007, TERI identified a potential manufacturer (Phoenix Products) for promoting biomass gasifier systems in the Belgaum industrial cluster. This firm specializes in biomass-based hot water generation systems, and has been licensed to fabricate TERI-designed gasifiers. The proprietor of the firm was provided with extensive training in design, fabrication, installation and maintenance of gasifiers, including quality control aspects. TERI has further identified a local service provider, Vikas Bhutki, to procure firewood from the forest department auctions, process it into wood chips of suitable size, and supply the wood chips to the industries for use as fuel in gasifiers. With this service infrastructure in place, the project has been successful in promoting biomass gasifiers in the Belgaum cluster. Five gasifier systems have already been installed: two in food processing units and three in non-ferrous (aluminium dross melting and billet heating) industries.

These newly installed systems are yielding significant savings in fuel costs. For instance, SPM Extrusion (P) Ltd, an aluminium billet-based industry, was earlier consuming about 120 litres of diesel daily (annual diesel costs of about one million rupees). With the adoption of a new 20 kg per hour biomass gasifier system of TERI design (costing about 0.1 million rupees), the unit now spends only about 0.42 million rupees per year on fuel, (that is, wood chips), providing a simple payback period of 2–3 months on the gasifier system cost.

This intervention has not only enabled reduction in fossil fuel usage and increased profits for entrepreneurs; it has also generated additional employment opportunities through the establishment of biomass fuel supply linkages. Encouraged by the benefits being reaped by these gasifier-based units from large savings in fuel costs, several other industrial units in Belgaum have expressed interest in adopting biomass gasifier systems. An important development in this initiative is that the DIC (District Industries Centre), a government body, is now keen to work with TERI in promoting biomass gasifiers in other industrial clusters in the region.

'Training of trainers' for promoting improved brick-making practices

As a vital component of the intervention in the brick sector in eastern Uttar Pradesh, efforts are being made by TERI to enhance the technical skills and capacities of the brick firemen and master firemen through participatory technical training programmes, the first of which was organized in 2006. A total of six training programmes were conducted till July 2009, covering over 250 firemen. These one-day programmes were usually conducted at a single location in eastern Uttar Pradesh, to which the participant firemen came from their villages. Under this approach, the reach of the training programmes was limited by the sheer number of firemen and the spread of their villages across eastern Uttar Pradesh.

To overcome this challenge, from August 2009 onwards the project has changed its technical training strategy in two vital aspects:

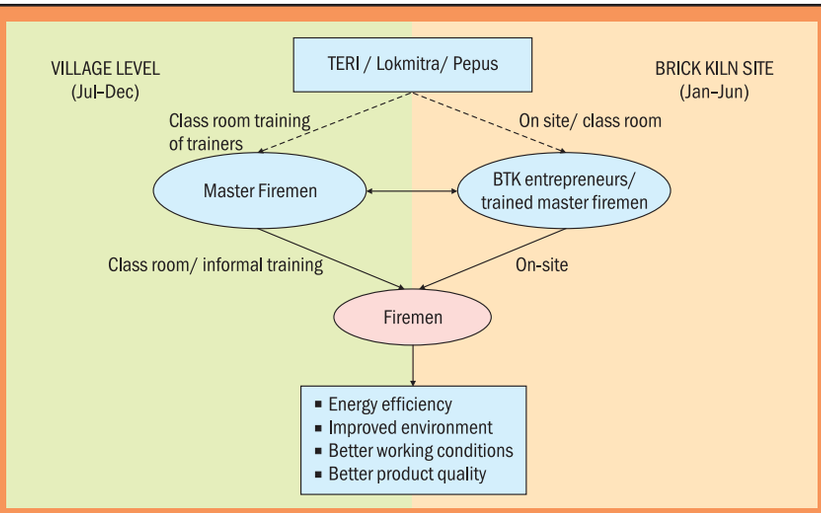
- Instead of focusing on firemen, the training programmes will henceforth focus primarily on carefully selected master firemen, that is, the most reputed and experienced firemen among the community, to whom other firemen turn for advice and guidance. The idea is that these 'train-the-trainer' programmes will enable master firemen to pass on and spread the knowledge and expertise that they acquire much more effectively—because of their already-established credibility among the firemen community, and the large number of firemen with whom each master fireman interacts.
- The train-the-trainer programmes will comprise two phases during August 2009 to June 2010. In the first phase, participatory classroom training sessions will be organized at the master firemen's villages (rather than at a single remote location as earlier) during the 'off' season (August–December 2009) when the brick kilns are closed and most of the firemen and master firemen are available in their villages. In the second phase, on-site training sessions will be organized at the kiln sites during the

coming brick-making season (January–June 2010).

The key to the success of this strategy lies in identifying master firemen who show willingness to share their technical expertise with other master firemen and with firemen. After extensive interactions with the firemen community during June–August 2009, the two partner NGOs (Lokmitra and PEPUS) have identified about 200 master firemen who appear to fit this profile. In the first phase of the training of trainers, a total of eight classroom training programmes have been held for these 200-odd master firemen.

This 'two-phase training strategy' is expected to maximize the opportunities for the trained master firemen to share their technical knowledge with the firemen—both in the villages and at the kiln sites. The outcome will

Date	Village	Block, District
24 August	Dewanganj	Sanghipur, Pratapgarh
25 August	Salon	Salon, Rae Bareilly
26 August	Lalganj	Lalganj, Pratapgarh
27 August	Achleshwar	Harchandpur, Rae Bareilly
7 September	Patna	Kaurihar, Allahabad
8 September	Andhiyari	Kaurihar, Allahabad
9 September	Aanapur	Kaurihar, Allahabad
10 September	Deverpatti	Bihar, Pratapgarh



Two-phase training structure for brick firemen

A class-room training session with master brick firemen

A small-scale bathroom-fitting unit in Mohali industry cluster, Punjab

be wider adoption of best operating practices at the kiln sites, leading to improved energy efficiency and better working conditions for the firemen and master firemen.

Promoting business development services for MSME cluster development

SIDBI (Small Industries Development Bank of India) is implementing a project supported by the World Bank, DFID, GTZ and KFW to assist MSME cluster development in India through the promotion of BDS (business development services). TERI has been identified as a facilitating agency by SIDBI for two MSME engineering clusters: (1) Mohali–Panchkula–Chandigarh (tri-city engineering cluster), mainly comprising steel fabrication, fasteners, and machining units; and (2) Rajkot, consisting of foundry and pump-set units. The total duration of the project is 32 months, starting from March 2009. The objective of the project is to design and implement strategies in each cluster to:

- develop the market for BDS
- strengthen access to BDS providers
- help BDS providers in the clusters to become self-sustainable.
- develop the clusters as 'role models' for other similar clusters in the country.

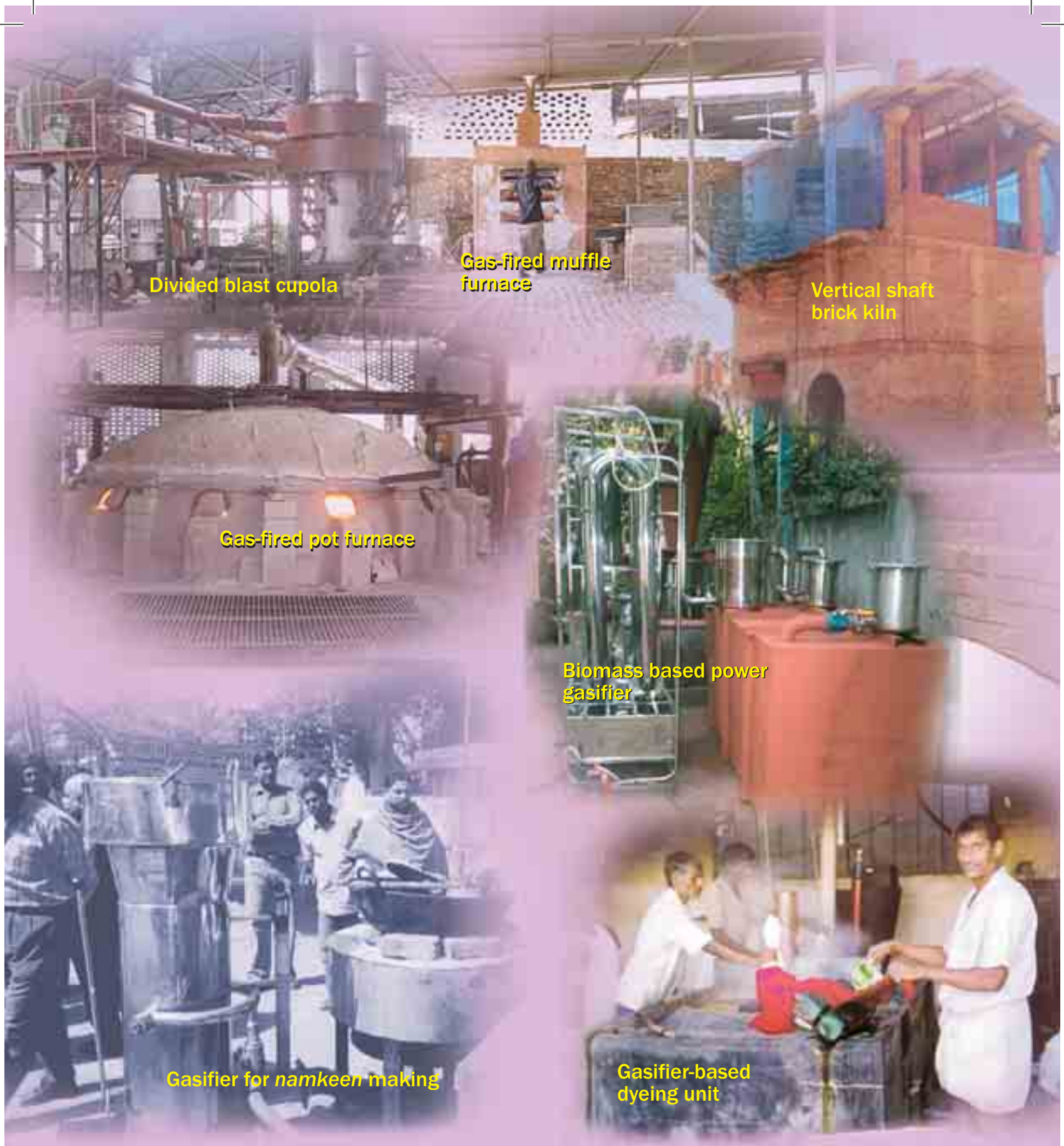
The project focuses on market-based development of the clusters through the strengthening of various BDS providers. The types of BDS providers include technical experts; cluster development agents; financial institutions; relevant local, state and national level government departments; suppliers and manufacturers; and other related organizations/institutions.

TERI undertook a mapping of both the clusters using a 'who does–who pays' matrix in order to enable a deeper understanding of the dynamics in these clusters. Detailed diagnostic studies of the clusters were also carried out using Participatory Appraisal of Competitive Advantage (PACA)/ Value Chain Analysis. Following these exercises, TERI prepared a Prioritized Action Plan based on SWOT (strengths, weaknesses, opportunities and threats) analyses of various BDS providers. This is expected to help in identifying strategies for strengthening the BDS and establishing economies of scale for their operation.

TERI is sensitizing BDS providers and MSME units through capacity building programmes and exposure visits. Around 10 to 15 such events are planned for each cluster up to March 2010. The first few programmes have already been held in Chandigarh and in Rajkot clusters. Other activities planned under the project include:

- Development of information dissemination tools such as web portal, BDS directory, periodic newsletter and case studies
- Strengthening international networking and linkages with corporate sector

TERI has also facilitated the constitution of a CCC (Cluster Coordination Committee) in each cluster that would help in planning and implementation of the project interventions and providing advisory support services. The CCC comprises all key stakeholders in the cluster like prominent industrial association members, academic institutes, government officials, and financial institutions.



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