

SMALL AND MEDIUM SCALE INDUSTRIES (SMIs) IN ASIA: ENERGY, ENVIRONMENT AND CLIMATE INTERRELATIONS

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Barriers on the Promotion of Energy Efficient and Environmentally Sound Technologies (E3ST) in The Philippine Ceramic and Metal casting Industries

The development of Small and Medium Scale Industries (SMIs) has been recognized as important for the growth of the Philippine economy as a whole. In compliance with President's directive, the Department of Trade and Industry (DTI) convened meetings of all the key players in SMI development, including the pertinent government departments and agencies, and formulated the National SMI Development Agenda.

The SMI sector is the backbone of the Philippine economy. It comprises about 99.6% of all registered firms nationwide, employing 69.9% of the labour force, and contributing 32% to the national economy. The SMIs help ensure a more equitable distribution of income, disperse economic activities to the countryside, and are a potent force in the war against poverty. The National SMI Development Agenda aims to increase the share of SMIs from 8.7% to 10% by graduating micro enterprises, strengthening SMI Centers nationwide, and increasing productivity in terms of gross value added from 32% to 40% (long-term).






One important aspect hindering the smooth attainment of productivity increase among SMIs is the high cost of energy. A large percentage of the SMIs is still in the dark on how to reduce the amount of energy consumed. Lack of awareness on energy efficient and environmentally sound technologies is still common among the SMIs.

A survey was made to rank barriers on the promotion of energy efficient and environmentally sound technologies in the ceramic and metal casting industries. About 40-50% respondents were from the industry, 30-40% from technical personnel and 10-20% from the policy makers.

Barriers were classified into 4 groups, namely, 1) financial and economic barriers, 2) technical and information barriers, 3) policy and market barriers, and 4) managerial and organizational barriers. The barriers were further broken down into sub-groups and ranked. Tables 1 and 2 show the ranking of specific barriers in the ceramics and metal casting industries. Both the ceramic and metal casting industries ranked the financial and economic barriers as top priority.

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SMI newsletter is published quarterly as an activity of the project SMIs in Asia: Energy, Environment and Climate Interrelations under the Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) - Phase III and is funded by the Swedish International Development Co-operation Agency (Sida). The newsletter is designed to disseminate information from this study and from other sources on Energy Efficient and Environmentally Sound Technologies of selected Small and Medium Scale Industries in Asian countries to policy makers, industrial associations and other related organisations, equipment suppliers, factories, academics and international organisations.

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High Initial Capital Cost and Limited Access to Funding

On funding the installation of E3ST, although the sources of credit and finance are available, only very few have availed of this funding scheme. The guarantee programs of local financing institutions like the Development Bank of the Philippines can address this need; however SMIs cannot pass the screening criteria. SMIs have no reliable financial records, hence assessing their credit risk is difficult. SMIs have also difficulties with securities and collateral requirements. Lack of collateral has always been a major obstacle in obtaining loans from banks. The tedious preparation of loan documents, processing and reporting requirements are also obstacles to avail the funds from the lending programs.

Table 1 Top 10 Barriers in the Promotion of E3STs in the Ceramic Industry

RANK	BARRIERS	WEIGHT
1	High initial capital cost	0.080
2	Difficulty in accessing financing	0.071
3	Higher priorities on production	0.066
4	Management is concerned about cost increase	0.059
5	Increased cost of production	0.059
6	Poor financial gain/return	0.055
7	Authorities not strict in enforcing and assisting the implementation of E3STs	0.055
8	Difficulty and lack of knowledge/best information to access external technical support	0.051
9	Limited in plant technical expertise/capability	0.050
10	Managements invest only on short term projects	0.048

Table 2 Top 10 Barriers in the Promotion of E3STs in the Metal casting Industry

RANK	BARRIERS	WEIGHT
1	High initial capital cost	0.1104
2	Difficulty in accessing financing	0.0670
3	Increased cost of production	0.0578
4	Poor financial gain/return	0.0574
5	Higher priorities on production	0.0561
6	Difficulty and lack of knowledge/best information to access external technical support	0.0527
7	Managements invest only on short term projects	0.0507
8	Less benefits from the government	0.0493
9	Authorities not strict in enforcing and assisting the implementation of E3STs	0.0487
10	Management is concerned about cost increase	0.0483

Reluctance to Invest in E3ST

In the Philippine context, entrepreneurs or industrial decision makers do not easily invest in the development or application of E3ST because of high investment cost and the lack of confidence that a certain market is available. This leads to a “chicken and egg” situation such that if a technology were cheaper the market would accept it. But since there is no or very limited market, E3ST market remains relatively unexploited commercially. Therefore, E3STs are expensive and hard to get.

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Investment in E3ST, like any investment project, is expected to be made only if worth is more than they "cost" at present. For instance, the two principal determinants on investing in energy efficient equipments are the price of oil and the productivity of the equipment. Energy saving is usually calculated on the assumption that oil prices will rise in the future. If oil prices rise more slowly than the over-all rate of inflation, the saving will be small or insignificant. Another issue in investing in energy efficiency equipment is the rapidly developing technology in this area that would suggest that money spent on this equipment now might have a greater productivity if invested in a better equipment later.

Lack of E3ST Awareness

A lack of technical understanding of energy and environmental issues is common to SMIs. This leads to distortion of facts, and energy and environmental issues have been used for political means. These include the use of the initiatives as political tools by pressure groups, who claim that E3ST initiatives are trade barriers due to limited knowledge and understanding on the part of industry. Where environmental issues are recognized, the best solution may not be chosen. There are a large number of offers and attractive marketing of end-of-pipe technologies, which relegate the E3ST options into the background. These short-term solutions promise easy quick turnkey projects in order to satisfy the international market, which is perceived to have put environmental requirements in place as a form of trade barrier.

Inadequate Training/Information Scheme

Although there are good training programs, lack of awareness on E3ST is still a common situation among SMIs. This is because the issue on E3ST is communicated on a technical level, which users cannot appreciate. Greenhouse gas emissions like CO₂ emissions endangering society cannot be well understood unless it is translated into financial terms e.g. reduced fuel costs as a result of efficient fuel combustion. A reorientation of the existing training programs should be done to add the layman's perspective on the use of E3ST.

The presence of a strong information mechanism such as the web may not actually enhance the knowledge of SMIs on E3ST. Even if the SMIs have the internet facility, it is a general observation that the available websites contain only general information on environmental technologies and do not deal with the process itself.

For more information, please contact: Industrial Technology Development Institute, Fuel and Energy Division, The Philippines (See address on page 8)

In Combustion Equipments

- ❖ Check for negative pressure, which can reduce combustion efficiency
- ❖ Check flues and chimneys for blockages or improper draft conditions
- ❖ Clean combustion surfaces
- ❖ Check fuel-air ratios
- ❖ Replace atmospheric burners with power burners
- ❖ Install pressure controls on furnaces
- ❖ Install automatic air-gas combustion controls
- ❖ Do not overfire equipment
- ❖ Repair furnace linings frequently
- ❖ Reduce production-equipment 'preheat times' to minimum required
- ❖ Reduce production-equipment temperatures to holding temperatures whenever production is halted for relatively long periods
- ❖ Shut off drying and curing ovens when not in use. Do not start them until just prior to shift
- ❖ Seal all cracks in furnaces, ovens, etc.
- ❖ Preheat combustion air with waste heat

(Adapted from the website <http://www.arcticair.biz/energysavings.htm>)

Digital Thermometers to improve Product Quality in Tile Industry

ISB, Sri Lanka with the assistance of Tile Manufacturers Association, introduced digital thermometers to tile industry to monitor and control the temperature levels in tile kilns. Since the introduction of these thermometers in September 2003, more than 75 factories have already installed them. According to the normal practice, temperature at the top of the kiln should not exceed 900°C as it leads to the production of black tiles, whereas temperature at the bottom of the kiln should not be less than 600°C as it tends to under-burn tiles in the down draft kilns. Therefore, introducing thermometers reduces the rejection rate of tiles and also reduces a significant amount of firewood consumption while at the same time ensuring the quality of tiles.

Before Installation of Digital Thermometers

Normally, skilled people are employed to maintain the kiln heat by controlling the firewood feeding-rate to kilns. But it may highly depend on the moisture content of firewood, weather condition, etc. Under such varying conditions, it was rather difficult to control the firewood feeding, and hence it led to over or under-burning of tiles. Normally, the cost of firewood for burning one batch of tiles (around 16000) was around Rs. 35,000 (US \$ 356).

After Installation of Digital Thermometers

After introducing digital thermometers, even unskilled people can control the firewood feeding in any varying climatic condition. The cost of firewood for the same batch size of tiles has come down to Rs. 28,000 (US \$ 285) which works out to a saving of Rs. 7,000 (US \$ 71) per batch for an investment on a thermometer of about Rs. 7,500 (US \$ 76) only.



Mr. S.A. Weerakkody, the tile miller explaining the operation and benefit of digital thermometer

For further details contact: Industrial Services Bureau of North Western Province, Sri Lanka (See address on page 8)

We welcome Industries, Energy Efficient and Environmentally Sound Technology (E3ST) suppliers, consultants, NGOs, and R&D Institutions to share information on E3ST in Brick, Ceramic, Desiccated coconut, Foundry, Tea and Textile Sectors. For further details, contact the SMI in Asia Project (address is given in page 8)

The Bombay Textile Research Association (BTRA) - ENERGY SAVER for weaving Sector

Introduction

Electricity is an important source of energy for Composite Mills in Textile Industry of India. The cost of electric power is increasing day by day. The average electric power requirement for a composite mill is around 23 kWh/loom shift. This works out to a power cost of Rs. 276 (US \$ 6.25) per day/loom. Further, out of the total power consumed, 22 to 25% is utilized by weaving alone. Hence, for economy in weaving there is an urgent need to cut down the power consumption and in turn the power cost. It is observed that at every warp/weft break/mechanical stop, loom oiling and cleaning work, the loom is stopped but the electric motor continues to run idle.

Considering that the average efficiency of the automatic shuttle loom is 75%, it can be stated that the loom is stopped for the remaining 25% of the time for attending the faults, which leads to wastage of power. BTRA has developed an 'Energy Saver', which enables saving in power for shuttle looms. This technical note brings out the salient features of this development.

Mill Trials

Trials were carried out in one of BTRA's member mills on a Ruti-B loom. Table 3 gives comparative data for a loom with and without installation of the BTRA Energy Saver.

Table 3 Comparative data for a loom with and without installation of BTRA energy saver

	BTRA Energy Saver	
	Before installation	After installation
Average efficiency during the trial period (%)	76.3	77.2
Units consumed (kWh) during trial period (per loom/shift/day)	6.50	6.00

Salient Features of the energy saver are:

- Handy, portable and compact
- Safe to handle
- Easy to fix over loom
- Maintenance free

Table 4 Techno- economic benefits

	BTRA Unit	
	Before installation	After installation
Saving of electric units/ loom shift	Nil	0.50 kWh
Electric unit saving/loom/day	—	1.50 kWh
Electric unit saving/loom/month	—	45 kWh
Electric unit saving/loom/year	—	16425 kWh
Saving in terms of Rs. per loom/month (Assuming Rs. 4.15 as electric unit cost)	45 x 4.15 = Rs. 186.75 (US \$ 4.23)	
Cost of the BTRA Energy Saver	Rs. 1500 (US \$ 34)	
Pay Back Period	8 Months	

1 US \$ = Rs. 44.14

For more details, please contact: The Director, Bombay Textile Research Association, L.B.S. Marg, Ghatkopar (West), Mumbai – 400 086. btra@vsnl.com

SMI Newsletter is available as a PDF file at: <http://www.serd.ait.ac.th/smi2/smi/roadmap/newsletters.html>

Cleaner Production opportunities for Garment Manufacturing Sector

PSG College of Technology has recently carried out a study at Tirupur, India, to implement cleaner production technologies in the garment manufacturing sector. Tirupur in Coimbatore district of Tamilnadu State, is known for the production of garments for the global market. It is one of the oldest centres of textile processing, particularly for the knitted cotton hosiery. The rapid pace of technological development in textile industry and the practice of age-old methods of bleaching and dyeing have affected the ecological balance in Tirupur.

The identified and evaluated Cleaner Production (CP) technologies, which will lead to substantial magnitude of energy saving and pollution reduction in Tirupur garments industry, are given below:

- ❖ Soft Flow Dyeing
- ❖ Use of Indirect Heating in Open Winches
- ❖ Control of Excess Air in Boilers

Soft Flow Dyeing

In winch dyeing, fabric is circulated in a tub/chamber containing dye-solution. But in soft flow dyeing, both fabric and dye-solution circulate. A nozzle sprays the dye-solution over the circulating fabric, and it is a highly economical machine for processing delicate and surface sensitive fabrics that require dyeing temperatures beyond boiling point. Benefits of this technology are:

- ❖ Process, which requires lesser speeds, can also be programmed, thereby reducing power consumption
- ❖ Soft flow dyeing uses water quantity which is 1/3 or 1/2 of winch dyeing
- ❖ It requires less dyes, salts and chemicals; hence, pollution is less
- ❖ Amount of water to be heated is considerably reduced, and the steam consumption is less by about 20 – 30% per kg of fabric

Use of Indirect Heating in Open Winches

Generally, the steam pressure used in winches is high in relation to the temperature required for the processes. The actual temperature required in the winches varies from 60° - 90°C. For this, a steam pressure of 1 to 1.2 kg/cm² is just sufficient. Any excess pressure will lead to escape of live steam in the winches. It has been estimated that approximately 10% of the steam is normally utilised in the winches, and the remaining 90% escapes as live steam. Benefits of this technology are:

- ❖ Reduction in steam consumption
- ❖ Improved process control

Control of Excess Air in Boilers

The excess air level should be reduced to around 50% for efficient performance of boiler in most of the boilers in Tirupur cluster. The CO₂ level in flue gas should be monitored and kept around 14% by proper control of Forced Draft (FD) & Induced Draft (ID) fans. Even by reducing the excess air to 100%, it is possible to save considerable quantity of fuel. Benefits of this technology are:

- ❖ Reduction in fuel consumption
- ❖ Reduction in GHG emission

The economic analysis of identified cleaner production technologies is given in Table 5.

Table 5 Economic analysis of CP technologies

Technology	Investment	Annual Saving	Payback period
Soft Flow Dyeing	Rs. 1150 million	Rs. 457.438 million	2.51 years
Use of Indirect Heating in Open Winches	Rs. 315 million	Rs. 104.208 million	3.02 years
Control of Excess Air in boilers	Rs. 11 million	Rs. 65.636 million	3 months

1 US \$ = Rs. 44.12 (As on 29.3.2004)

For more information, please contact: PSG College of Technology, India (See address on page 8)

Water & Wastewater Asia 2004: 5 - 7 October 2004, Bangkok, Thailand. This event is aimed at closing the huge gap that exists between South East Asian countries with regard to quality and quantity of water and wastewater services. Experts from this regional organisation, which include members from Indonesia, Malaysia, Philippines, Thailand and Vietnam, will contribute greatly to conference sessions as speakers and participants. Water & Wastewater Asia 2004 will host a number of key companies in the water and wastewater industry who are doing business in the region. This is the key place to research the many products and services that are available. *For further details visit:* <http://wwa04.events.pennnet.com>

Pollutec China 2004: 3 - 5 November 2004, Shanghai, China. A series of Conferences and Forums will be held alongside the exhibition, such as the "Water Forum", the "Waste Management" conference and the "Green City Planning" conference. Prominent speakers from France, UK, Japan, Singapore and China are invited. This event is supported by China's key government authorities, which include China Association of Environmental Protection Industry (CAEPI), China National Tendering Center of Machinery and Electrical Equipment and Shanghai Society of Environmental Sciences (SSES). *For further details visit:* <http://www.pollutec-china.com>

Seventh International Conference on Greenhouse Gas Control Technologies (GHGT-7): 5 - 7 September 2004, Vancouver, Canada. The conference is being organised by the University of Regina and Natural Resources, Canada, in co-operation with the IEA Greenhouse Gas R&D Programme. The aim of this conference is to provide a forum for the discussion of the latest advances in the field of greenhouse gas control technologies. The main themes of this conference are Capture and transmission of CO₂, Storage of CO₂, Comparison of greenhouse gas reduction options, Reducing greenhouse gas emissions from Industry and Zero emission technologies and decarbonised energy carriers from carbon based fuels. *For further details visit:* <http://www.ghgt7.ca>

Environment 2005: 30 January - 2 February 2005, Abu Dhabi, United Arab Emirates. This trade fair event covers Products, services and technology related to Air, Water, Land, Energy, Waste, Environmental Research, Science and Technology with special emphasis on Air, Water, Land and Energy. A conference is also being organized alongside this event. Environment 2005 is organized by Environmental Research and Wildlife Development Agency (ERWDA) and General Exhibitions Corporation (GEC). *For further details visit:* <http://www.imag.de>

Websites

[http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/LHOD5MJTKU/\\$File/2003-final-inventory_ch3-ip.pdf](http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/LHOD5MJTKU/$File/2003-final-inventory_ch3-ip.pdf) This website under the US Emissions Inventory 2003 for Industrial processes focuses on the GHG emission from the Industrial Processes and covers different sectors namely, Iron and Steel, Titanium Dioxide Aluminium and Ferroalloy Production; Cement, Ammonia, Lime and Soda Ash Manufacture; Urea Application; Lime Stone and Dolomite Use; and Carbon Dioxide Consumption. In addition to the uncertainties in the emission coefficients, sources of uncertainty specific to an individual source category are discussed. The results of the findings are tabulated from 1990 to 2001 for the various sectors.

<http://www.inforse.dk> This is the website of INFORSE, a global network of independent non-governmental organisations working for sustainable energy solutions to reduce poverty and protect the environment. INFORSE is a worldwide network consisting of 140 Non-Governmental Organisations working in about 60 countries to promote sustainable energy and social development. The Network was established in Rio de Janeiro in 1992 to secure follow-up in the political decisions at the United Nations Conference on Environment and Development (UNCED).

<http://data.cseindia.org> This is the website of Centre for Science and Environment (CSE) which is an independent, public interest organisation that aims to increase public awareness on science, technology, environment and development. The Centre was started in 1980. This website hosts a comprehensive resource of over 45,000 volumes and 25,000 documents on science and environment with special emphasis on South Asia.

<http://www.etei.org/handbook/eteihandbook.pdf> This is the website of the Emissions Trading Education Initiative (ETEI), a joint project of the Environmental Defence Fund and the Emissions Marketing Association, which hosts an emissions Trading Handbook. The Handbook is designed to be the resource of first reference on emissions trading. The Handbook walks through the emissions trading process step by step and is designed to provide a practical guide to environmental-based trading programs.

<http://www.janmanch.org> This is the website of Centre for Research into Environment and Development Online (CREDO). This website provides an extensive and regularly updated and contemporarised research database and information warehouse to researchers, NGOs and journalists working at developmental issues.

News items, articles, information on training courses, websites related to energy and environmental issues in the small and medium scale industrial sector and other correspondence can be sent to:

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Publications

The Greenhouse Gas Protocol: A corporate accounting and reporting standard

by Janet Ranganathan (WRI), David Moorcroft (WBCSD), Jasper Koch (WBCSD), Pankaj Bhatia (WRI), Joint publication of the World Business Council on Sustainable Development and the World Resources Institute, 2001, ISBN: 2-940240-18-3

This corporate accounting and reporting standard draws on the expertise and contributions of numerous individuals and organizations from around the world. The standard, guidance, and tools will help companies and other organizations: develop a credible GHG inventory underpinned by GHG accounting and reporting principles account and report information from global operations in a way that presents a clear picture of GHG impacts, and facilitates understanding as well as comparison with similar reports provide internal management with valuable information on which to build an effective strategy to manage and reduce GHG emissions provide GHG information that complements other climate initiatives and reporting standards, including financial standards.

Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs)

by Saleemul Huq, Atiq Rahman, Mama Konate, Youba Sokona and Hannah Reid, published by The International Institute for Environment and Development (IIED) 2003, ISBN: 1-84369-417-4, 38pp

The Least Developed Countries (LDCs) are a group of 49 of the world's poorest countries. They have contributed least to the emission of greenhouse gases but they are most vulnerable to the effects of climate change and have the least capacity to adapt to these changes. Adaptation to climate change has become an important policy priority in the international negotiations on climate change in recent years. However, it has yet to become a major policy issue within the developing countries, especially the LDCs. These reports focus on two LDCs, namely Bangladesh in Asia and Mali in Africa, where experience shows that although much has been achieved in terms of describing and analysing vulnerability to climate change and identifying potential adaptation options, there remains much more to be done in terms of mainstreaming adaptation to climate change within the national policy making processes in those countries.

Newsletters

GHG Protocol This is a bimonthly newsletter published by the Greenhouse Gas Protocol Initiative (GHG Protocol) which is a broad international coalition of businesses, non-governmental organizations (NGOs), government and inter-governmental organizations. It operates under the umbrella of the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI). *For further details visit:* <http://www.ghgprotocol.org/newsletters.htm>

The Challenge This is a half-yearly newsletter published by the Australian Greenhouse Office (AGO) which was established in 1998 as a separate agency

within the environment portfolio to provide a whole of government approach to greenhouse matters. *For further details visit:* <http://www.greenhouse.gov.au/challenge/newsletter/index.html>

CDM Monitor This is a monthly newsletter providing news, views and analysis of the emerging market for certified emissions reductions (CERs). The publication is intended for project developers, designated operating entities, analysts, consultants, government representatives and other interested parties. *For further details visit:* <http://www.pointcarbon.com/category.php?categoryID=195>