ARRPEEC III
SMI Newsletter

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

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Prioritizing the Energy Efficient and Environmentally Sound Technologies (E3STs)

Energy Efficient and Environmentally Sound Technologies (E3STs) aim at reducing pollution, energy use, water and material resources, and minimizing waste without reducing production capacity. The E3ST options include better housekeeping practices, alternative inputs, energy efficiency improvements and proper production planning. E3ST implementation is a strategic process oriented approach for energy saving, waste reduction and economic benefits. E3ST implementation requires changing attitudes, responsible environmental management and evaluating technology options.

The large number of small and medium scale industries (SMIs) in India are energy intensive and contribute significantly towards industrial pollution. It is due to the adoption of primitive technology, use of low-grade raw materials and fuels. Energy related pollution is closely linked to inefficient resource use, poor work practices and housekeeping measures. Promotion and implementation of E3ST technologies to reduce energy consumption and waste to increase economic benefits and to mitigate green house gas emission (GHG) and other pollutions in SMIs is an important task.

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Many decision making situations involve preferential selection among identified E3STs. In the best circumstances, there would be some intuitive measurement scale that could be used for comparison and for the best choice among the E3STs that has a high score in that scale. By ranking E3STs on the basis of numerical scores, an implied priority for those E3STs is created. When the selection criterion is "least cost", for example, the measurement scale is obvious and so choosing becomes easy. In most cases, however, there is not a single, simple scale for measuring all competing E3STs. More often, there are several criteria that must be weighed and often those criteria are related to one another in fairly complex ways. Also many factors influence the implementation of E3STs in SMI sectors. These factors have to be identified and E3STs are prioritized based on these factors (criteria).

E3STs need to be evaluated based on three sets of criteria

- Technological feasibility
- Financial viability,
- Environmental and other benefits

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The details of criteria for prioritizing the identified E3STs are given in Table 1.

Table 1 Details of Criteria for prioritizing the identified E3STs

S. No.	Criteria
1.0 Technological Criteria	
1.1	Materiality and reliability of the E3ST
1.2	Requirements for external technical supports to install E3ST
1.3	Needs for additional training to operate and maintain E3ST
1.4	Requirements for additional space, infrastructure and adaptation to integrate E3ST with the existing production system
1.5	Special needs for adaptation (electricity in place of heat).
2.0 Financial Criteria	
2.1	Initial capital cost
2.2	Payback period
2.3	Internal Rate of Return (IRR)
2.4	Net present value
3.0 Environmental and other Benefits	
3.1	Potential in productivity and quality improvement
3.2	Potential for energy saving, reduction in pollutants and GHG mitigation
3.3	Potential in reducing the use of key raw/auxiliary materials
3.4	Improvement of working environment and safety

Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP), used in this techno-economic analysis, is a powerful and flexible decision making process to help set priorities and to make the best decision when both qualitative and quantitative aspects of a decision need to be considered. By reducing complex decisions to a series of one-on-one comparisons, and then synthesizing the results, AHP not only helps decision makers arrive at the best decision, but also provides a clear rationale to know that it is the best. The weights were calculated by the AHP analysis software based on the feedback collected on the identified E3STs.

Results of the evaluation of identified E3STs

AHP analysis was carried out on the feedback collected from industry personnel and the results are as follows:

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Foundry Sector

The ranking of E3STs in Foundry sector based on feedback from stakeholders is given in Table 2.

Table 2 Ranking of E3STs in Foundry sector

Ranking	E3STs	Weight
1	Replacement of Main Frequency Induction Furnace with Medium Frequency Furnace	0.431
2	Duplexing of Cupola and Induction Furnace	0.315
3	Replacing conventional cupola with Cokeless cupola	0.169
4	Installation of automatic star delta converter	0.084

Textile Sector

The ranking of E3STs in Textile sector based on feedback from stakeholders is given in Table 3.

Table 3 Ranking of E3STs in Textile sector

Ranking	E3STs	Weight
1	Usage of energy efficient pneuma fans in spinning mills	0.231
2	Heat recovery from DG exhaust for process hot water generation	0.167
3	Installation of soft starter-cum-energy saver in place of fluid drive system in the simplex frames	0.163
4	Installation of FRP fan blades for humidification fans in weaving	0.158
5	Installation of photocells for speed frame	0.145
6	Implementation of energy efficient soft flow dyeing	0.136

Tea Sector

The ranking of E3STs in Tea sector based on feedback from stakeholders is given in Table 4.

Table 4 Ranking of E3STs in Tea sector

Ranking	E3STs	Weight
1	Usage of Fluidised Bed Dryers in place of Conventional Dryers	0.372
2	Replacement of Conventional Motors by Energy Efficient Motors	0.243
3	Installation of Direct Oil-fired Heater for Withering and Drying of Tea	0.206
4	Use of Energy Efficient Burners	0.179

The ranking indicates that the industry prefers to use technologies which will reduce consumption of electricity because their major concern is increased huge electricity bills.

For more information, please contact: PSG College of Technology, India (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)

Identification of Gaps to improve the National GHG Inventories – Indian Perspective

India's Initial National Communication (NATCOM) to the UNFCCC carried out an Initial National Communication (INC) exercise which identified constraints, gaps and related financial, technical and capacity needs to adequately fulfill the obligations under the UNFCCC. This includes improving the quality of national GHG inventories, regional and sectoral assessment of vulnerabilities and adaptation responses, and also the communication of information on a continuous basis. These are summarized in Table 5.

Table 5 Summary of Initial National Communication Exercise

Gaps and constraints	Description	Potential measures (Illustrative examples)
Data organization	Published data not available in IPCC friendly formats for inventory reporting	Design consistent reporting formats
	Inconsistency in top-down and bottom-up data sets for same activities	Data collection consistency required
	Mismatch in sectoral details across different published documents	Design consistent in reporting formats
Non-availability of relevant data	Time series data for some specific inventory sub-categories, e.g., municipal solid waste sites	Generate relevant data sets
	Data for informal sectors of economy	Conduct data surveys
	Data for refining inventory to higher tier levels	Data depths to be improved
Non- accessibility of data	Proprietary data for inventory reporting at Tier III level	Involve industry and monitoring institutions
	Data not in electronic formats	Identify critical datasets and digitize them
	Lack of institutional arrangements for data sharing	Establish protocols
	Time delays in data access	Generate awareness
Technical and institutional capacity needs	Training the activity data generating institutions in GHG inventory methodologies and data formats	Arrange extensive training programmes
	Institutionalize linkages of inventory estimation with broader perspectives of climate changeresearch	Initiate wider dissemination activities
Non-representative emission coefficients	Inadequate sample size for representative emission coefficient measurements in many sub-sectors	Conduct more measurements
Limited resources to sustain national communication efforts	Sustain and enhance research networks established under Initial National Communication	Global Environment Facility (GEF)/ International funding
	India-specific emission coefficients	Conduct adequate sample measurements for key source categories
	Vulnerability assessment and adaptation	Sectoral and sub-regional impact scenario generation, layered data generation and organization, modelling efforts, case studies for most vulnerable regions
	Data centre and website	Establishment of National centre

(Adapted from final report prepared by the India's Initial National Communication (NATCOM) to the UNFCCC http://www.natcomindia.org/natcomreport.htm)

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

Sustainable Guarantee Facility (SGF) for Energy Efficiency and Renewable Energy Projects in Sri Lanka

Sri Lankan Government is planning to establish a Sustainable Guarantee Facility (SGF) aimed at improving the access to finance for energy projects in Sri Lanka. South Asian Regional Initiative for Energy and NEXANT on behalf of United States Agency for International Development (USAID) is providing SGF for energy investments in Sri Lanka. The Energy Conservation Fund of Sri Lanka is to provide repayment guarantees to Participating Financial Institutions (PFI) for loans made, and is targeted to non-conventional renewable energy and energy efficiency projects. It is to overcome the major barrier faced by energy efficiency projects, namely the lack of collateral by providing a comprehensive repayment guarantee that will act as a collateral substitute. The Participating Financial Institutions (PFI) which will provide financial assistance to Energy Efficiency Projects will have the option of requesting repayment guarantees.

PFIs will agree to follow the guidelines provided by the SGF. The purpose of the Operations and Management Guidelines Manual is to provide guidance to SGF staff as well as participating bank staff on the policies and procedures for considering Loan Guarantees under the Sustainable Guarantee Facility. The SGF seeks to act as a catalyst to increase financing of such projects. In this regard the SGF welcomes applications through its network of participating banks for any type of energy efficiency projects. In accordance with the manual, the SGF as a general principle seeks to support projects under the following criteria: Projects which demonstrate the economic and productivity advantages of energy efficiency and non-conventional energy investments, technical viability of non-conventional renewable energy system, projects that have a high probability of replication in the future, using technology that is proven in terms of its feasibility and effectiveness, and projects that have a clear payback time frame and are financially capable of repaying the principal and interest amount of the project loan.

The total guarantee from the SGF for a particular project will not exceed 75% of the total loan offered. However, the maximum guarantee per project is limited to SLRs. 10 million (around US $ 100,000/=), and there is no minimum guarantee size. Grace periods will be three to six months from the time of release of the first installment (normally an advance payment) of the loan up to the release of the final installment. Loans provided by the PFI will be offered at market rates. However, it is expected that the PFI will reduce this rate at least by 2-3% taking into consideration the loan guarantees offered by the SGF. An annual premium for the guarantee is at the rate of 0.5 per cent (%) of the amount guaranteed or outstanding in the loan account at the end of each immediately preceding year.

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

Increased Production and Reduced Emissions Using Gas-Fired Scrap Preheater

Scrap is often used as the raw material for producing iron and steel in a foundry. The problem is that scrap is composed of many elements other than the iron itself (moisture, carbon-based gases, oils, etc.). When molten metal comes in contact with these elements, undesirable effects may be encountered such as toxic gas emissions, unpredicted ignitions and flashes. These hazards are potentially very dangerous and can injure workers, damage the surrounding equipment and cause significant deterioration of the indoor air quality. Scrap preheaters help avoid these situations in addition to energy saving.

The system is typically incorporated with the existing charging equipment as shown in Figure 1. In operation, the preheater's double-walled insulated steel bucket is top-loaded with scrap metal from a vibrating conveyor. A pneumatic arm then lowers the hood/burner assembly to the top of the bucket, and an exhaust vent to its bottom, completely sealing the material inside. Flame from the gas burner is drawn down through the scrap under negative pressure. Combustion gases and particulates are sucked away by the exhaust fan and funnelled to a high efficiency cyclone and afterburner, where they are consumed. The charge bucket, exhaust ductwork and combustion air stream are instrumented to monitor the progress of the preheat cycle. The preheater shuts off automatically when the exit gases reach a pre-set temperature, or a pre-set time, depending on customer preference.

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The centrepiece of the materials handling system is an automated turntable that supports up to four buckets. The turntable positions the buckets, one at a time, under the loading conveyor, then rotates them to the next station. The arrangement makes good use of available space and keeps production moving: while one bucket is loaded, another is preheated, a third is emptied into the furnace and a fourth is returned to the turntable. Operators use electric hoists and overhead monorails to move the buckets.

The scrap metal preheater is useful for:

- ❖ reducing the melting time when the scrap is processed through the furnaces;
- ❖ drying the scrap to avoid flashes;
- ❖ controlling fugitive emissions from the melting operation;
- ❖ reducing energy cost and manpower requirements.

The techno-economic evaluation of this gas-fired-preheater is given in Table 6.

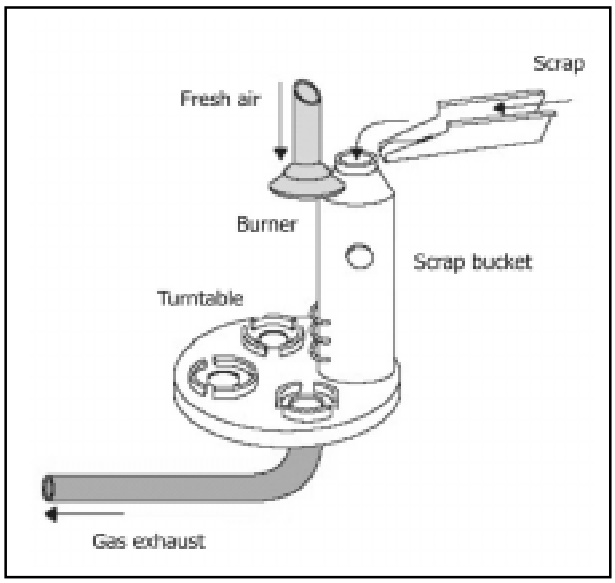

Figure 1 The Schematic Diagram of Scrap Preheater System

Table 6 Gas-Fired Scrap Preheater Economics

Type of Industry	Foundry	
Application of E3ST	Preheating of Scrap	
Name of the E3ST	Gas-Fired Scrap Preheater	
Name of supplier: R.J. Cyr Co. Inc. 330 Richmond Street, Suite 200 Chatham, Ontario N7M 1P7,Canada Tel.: +1-519-351-2418 or +1-877-426-1495 Fax: +1-519-351-8183 E-mail: rjcyr@mnsi.net Contact: Mr R. Cyr	Name of the User: Standard Induction Castings Ltd 3827 Peter St WINDSOR, Ontario, N9C 1K3 Tel.: +1-519-253-2446 Fax: +1-519-253-0212 Contact: Ms Maggie Robertson	
Category of E3ST technology	Process Improvement	
Introduction of new equipment	Energy saving/Emission reduction equipment	
Benefits		
Reduction in melting time	17%	
Energy Use		
Average energy consumption per load	216 kWh (before)	170 kWh (After)
Energy and Environmental Benefits		
Net energy saving	11%	
Reduction in fugitive emission	90%	
Cost Benefits		
Total investment of the new preheater	600,000 CAD	
Increase in productivity	17%	
Simple payback period (Approximately)	3 years	

The above Table was prepared using the information that appeared in CADDET energy efficiency technical brochure CA 99.531/2B.F06 published by CADDET (IEA/OECD), Swentiboldstraat 21, 6137 AE Sittard, PO Box 17, 6130 AA Sittard, The Netherlands. E-mail: caddet@caddet-ee.org, www: http://www.caddet-ee.org.

Capacity Building

Global Eco-Meet - PRITHVI 2005: 19 – 28 February 2005, Thiruvananthapuram (Trivandrum), India. This is a Global Meet on eco-friendly products, technologies and initiatives. An international convergence, which is to bring together diverse players like academicians, researchers, consumers, producers, marketers, communicators, and policymakers from across the world. With the biosphere challenged on all fronts, new options in lifestyles assume great significance. This meet aims at evolving new partnerships for a sustainable life. *For further details visit:* http://www.prithvionline.org

WETEX 2005: 1 – 3 February 2005, Dubai, UAE. The Water & Energy Technology and Environment Exhibition will provide an ideal platform for buyers and sellers to forgo new business alliances or reinforce current business relationships. The exhibition will feature companies pioneering new technologies and solutions for better management of water, energy & environment. The exhibitions will benefit extensively from the environmental experts attending the exhibition and the accompanying seminar, representing environmental agencies, government legislators and regulators, local government authorities and commercial organizations drawn from the water, energy and environment industries. *For further details visit:* http://www.wetex.ae

GIN2004 - 12th International Conference of The Greening of Industry Network: 7 - 10 November 2004, Hong Kong, China. This conference, organized by The Greening of Industry Network, is an international association of researchers, business leaders, activists, and policy makers dedicated to building a sustainable future. This event provides a platform for people from diverse backgrounds to share ideas and experiences and to strengthen relationships, visions and practices for sustainable development. Features of the Network conference include keynote speeches, plenary debates, breakout sessions, research paper workshops, and poster presentations. *For further details visit:* http://web.hku.hk/~gin2004/index.htm

SAVE ENERGY 2004 – 6th International Trade Fair for Energy-Saving & Building Technology: 1 – 4 December 2004, Moscow, Russia. The main topics of this trade fair are: Energy-saving and building technology, heating, cooling, water supply systems, gas and steam turbines, ventilators and pumps, energy-saving lamps, lighting technology etc.; Renewable energy sources, solar energy, wind energy, water power, geothermal energy, biomass, biogas; hydrogen technology, Energy recovery systems, Energy-related environmental technology. *For further details visit:* http://www.owp-tradefairs.com/e_se1.php3

Websites

http://www.natcomindia.org This is the website of India's National Communication (NATCOM) to the UNFCCC which was initiated and funded by the Global Environment Facility under its enabling activities programme through the United Nations Development Programme, New Delhi. This gives information on India's national circumstances in terms of climate, population profile, geography, basic natural resources available and socio-economic scenario. It also includes a description of climate change related research and systematic observations in the country, national development policies and priorities, and identification of constraints, gaps and related financial, technical and capacity needs to respond to the continuing need of improved National Communications in the future.

http://www.getf.org This is the website of the Global Environment & Technology Foundation (GETF), a not-for-profit corporation. This organization promotes the development and use of innovative technology to achieve sustainable development. For more than fifteen years, GETF has brought industry, government and communities together to address environmental challenges with innovative solutions. This organization also helps businesses, government, and environmental organizations to develop high-leverage technological, strategic, financial, and regulatory tools to foster the adoption of clean solutions.

http://www.climatebiz.com This website is a resource for Climate Management, which helps companies of all sizes and sectors understand and address climate change in a way that aligns environmental responsibility with business success. The mission of this resource is to provide hands-on tools, action steps, and other resources companies can use to understand the underlying issues, assess their climate footprint, and devise and implement a plan to significantly reduce their climate impacts throughout their operations and supply chains.

http://carbonfinance.org This is the website of the World Bank's carbon finance initiatives, which are part of the larger global effort to combat climate change, and go hand in hand with the Bank's mission to reduce poverty and improve living standards in the developing world. This website hosts information on new private and public investment into projects that reduce greenhouse gas emissions, thereby mitigating climate change and promoting sustainable development. An increasing number of governments and companies are entering the market, which is projected to grow significantly.

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 e7 Guide to Implementing Projects under the Clean Development Mechanism, 2003.
This guide was prepared by the e7, which consists of nine leading electricity companies and was formed to play an active role in global electricity issues and to promote sustainable development. The purpose of this Guide is to provide guidance to parties seeking to develop projects under the Clean Development Mechanism (CDM). The document is based on the project experience of the e7 and the guidelines and procedures set out by the United Nations Framework Convention on Climate Change (UNFCCC) and its related Protocols and Accords. The Guide provides an introduction to the e7, a historical overview of the CDM, the CDM project activity cycle and a discussion of the context and potential barriers for CDM projects. The discussion of the guidelines and procedures is supplemented with comments and recommendations based on e7 project experience in developing countries. *For further details visit:* http://www.e7.org/PDFs/CDM_Warehouse/CDM%20Guide%20%20Final.pdf

Guidelines for the Monitoring, Evaluation, Reporting, Verification, And Certification of Energy Efficiency Projects for Climate Change Mitigation, by Edward Vine and Jayant Sathaye, **1999.**
The intent of this report is to provide initial methodologies that will support the measurement of greenhouse gas removals from project-level activities. These methodologies will also assist project developers in preparing and implementing monitoring, evaluation, and verification plans that can lead to better estimates of energy saving as well as to improve the projects themselves, making them more attractive to investors, the private sector, and local communities. These guidelines can also be used by anyone involved in the design and development of joint implementation and Clean Development Mechanism projects, such as: facility energy managers, energy service companies, development banks, finance firms, consultants, government agency employees and contractors, utility executives, city and municipal managers, researchers, and nonprofit organizations. *For further details visit:* http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BUJYK/$File/energy_lbnl_41543.pdf

Newsletters

SUSTAINABLE MINNESOTA This is a biyearly newsletter published by Minnesotans for an Energy Efficient Economy (ME3), a nonprofit organization leading the transition to a clean, efficient, and fair energy system.
This newsletter updates on local, regional, and federal energy policy and technology developments. *For further details visit:* http://www.me3.org/newsletters/index.html

CLF News This is the e-newsletter of the Conservation Law Foundation (CLF). The newsletter which is published twice each month includes features, CLF case updates, and opportunities to get involved in CLF's efforts to help preserve, promote, and protect New England's environment.
This newsletter deals with the issues related to clean air and climate change, natural resources, communities and marine resources. *For further details visit:* http://www.clf.org/general/index.asp?id=351

CAC News This newsletter gives regular update on policy and scientific issues, scientific research, and other general information that is of interest to the coal and fossil fuel industry, policy makers, and environmental scientists and managers. Specific topics covered by the CAC News include: climate change, energy use, energy efficiency, environmental issues, energy and mining policy development, etc. *For further details visit:*http://www.coal.ca/cacnews/