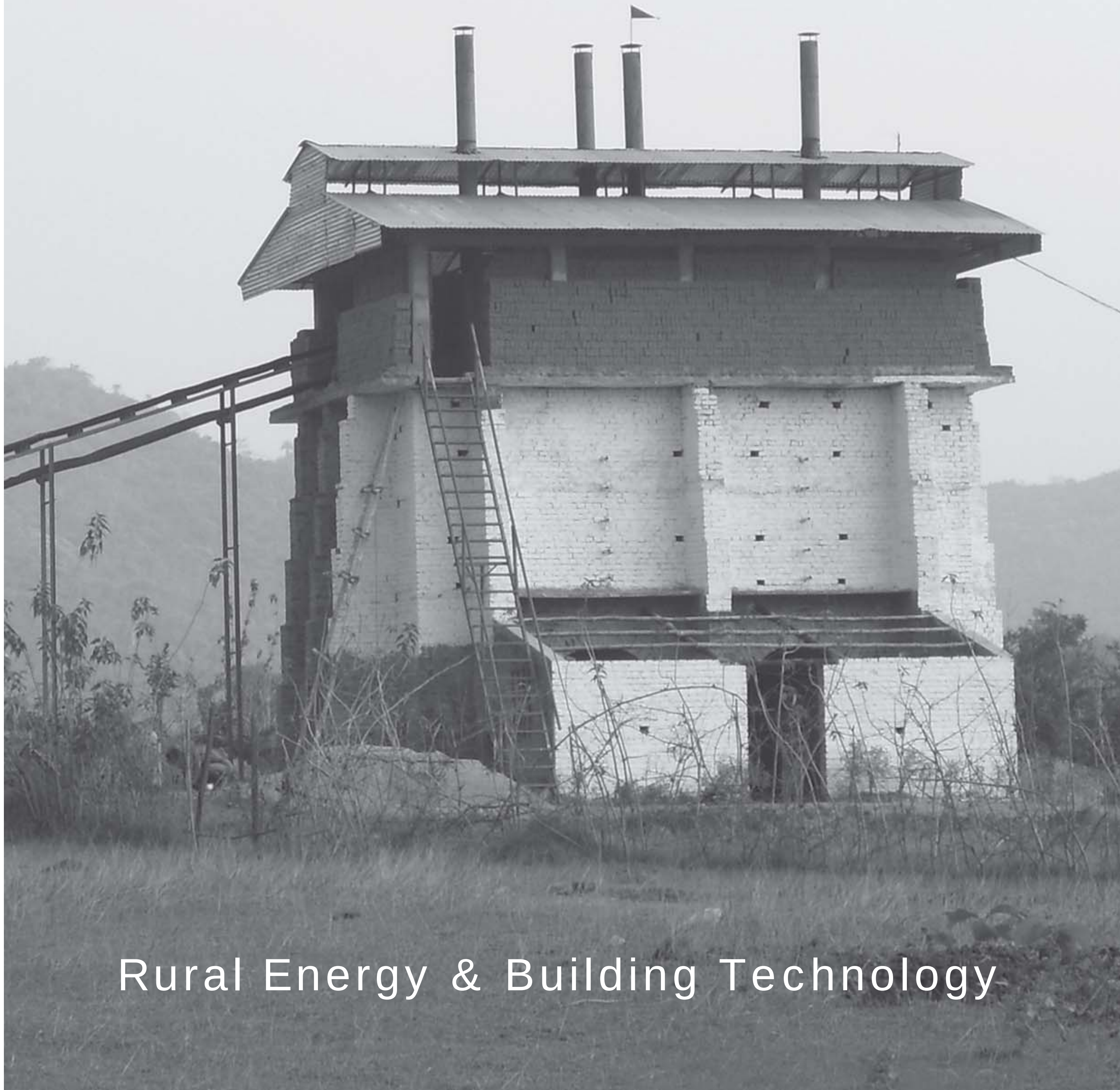
basin–South Asia

Regional Knowledge Platform

basin–*South Asia* Quarterly Newsletter / 2010 / No.17



Rural Energy & Building Technology

Editorial

Energy in Rural Habitat

This quarterly newsletter is a publication of the **basin**-*South Asia* Regional Knowledge Platform. **basin**-*South Asia* is the regional chapter of the International basin network.

This newsletter is published by **basin**-*South Asia* and is supported by Building and Social Housing Foundation, UK.
The views expressed in the newsletter are those of the authors and are not necessarily those of the publisher.

Secretariat and corresponding address for general issues:
Development Alternatives
B-32 TARA Crescent
Qutab Institutional Area
New Delhi 110016, India
Tel : +91-11- 2680 1521, 2680 4482
Email: basin@devalt.org
Website: www.basinsa.net

This issue has been compiled by **Development Alternatives** and Sponsored by:

bshf

Building and Social Housing Foundation

Editorial Assistance:
Indira Mansingh (Development Alternatives)
Rizwan Uz Zaman (basin-*South Asia* Secretariat)

Printed by: Communication Consultants
63A, Bapu Park, Kotla Mubarakpur
New Delhi-110003, India

Cover photo:
TARA Eco-Kiln at Nayagarh, Orissa, India by Soumen Maity

Domestic energy use has seen slow transition from traditional biomass energy to commercial fossil fuels. The penetration of modern energy sources is greater in urban households as compared to rural households. The 61st round of the National Sample Survey of India (2004-05) found that 75 per cent of the rural households depend upon firewood and chips for cooking. As per Census 2001 about 80 per cent of the inhabited villages have electricity and about 44 per cent rural households used electricity as a source of lighting.

Rajiv Gandhi Grameen Vidyutikaran Yojana **(RGGVY)** was launched in 2005 under the aegis of Ministry of Power to achieve 100 per cent village electrification by 2012 and Govt. of India is providing 90 per cent capital subsidy for infrastructure. RGGVY involves supply of energy for two production oriented activities like minor irrigation, rural industries etc. and electrification of villages. Distributed Decentralized Generation projects are taken up under RGGVY in remote villages where grid connectivity is either not feasible or not cost effective. Under RGGVY, 10 per cent villages and about 30 per cent households are electrified The Govt. of India also launched **Remote Village Electrification Programme (RVEP)** under the aegis of Ministry of New and Renewable Energy, which targets to electrify all the remote census villages and remote hamlets of electrified census villages through non-conventional energy sources such as solar energy, small hydro power, biomass, wind energy, hybrid systems, etc. A capital subsidy of 90 per cent of the system cost or Rs. 18,000/- per household, whichever is lower is provided. Under RVEP 5348 villages/1408 hamlets have been electrified.

While RGGVY and RVEP focus on the supply side to promote village electrification, **Light Emitting Diode (LED) Village Campaign (LVC)** has been launched to cater to the needs of demand side management in rural areas under 100 per cent sponsorship of Ministry of Power/ Bureau of Energy Efficiency which proposes to convert the existing incandescent bulbs (ILB) in the households and the street lights of one village with LEDs in each State. The scheme is to be implemented in a village comprising approximately 250 households and aims to replace 4 ILBs in each household. The objective is to showcase the new technology for lighting using LED so that a comparison can be demonstrated between LED and ILBs. This will also facilitate the State Governments/U.T. Administration in replicating these demonstration projects through various Departments / Agencies. 28 States have identified a village each for the LVC and implementing them will reduce the electricity consumed in the identified villages by a minimum of around 1000 units per annum.

Arijit Sen
Bureau of Energy Efficiency
asengupta@beenet.in

Focus

From Omissions to Emissions: Two Schools or Old Wine in New Bottle?

Laurie Baker method of practice was the very opposite of what was the God mantra of other architects of his generation. Thus while architects were the director-designers working from their offices and directing their operations from their drawing boards, he was more of a traditional craftsman – never a regular office, often sketched on waste paper and designed largely on site. This hands-on approach made it possible for him to pursue cost-effectiveness in design, otherwise impossible in the normal professional mode.

His designs were minimalist, but the thought process was indeed rich. Hands on innovation was useful in omitting the unnecessary as defined by the context, plaster on walls, technically 'dead' concrete to make way for concrete 'filler slab' (with sometimes recycled clay tiles), and brick jaalis replacing expensive windows. In parallel, solar passive design of buildings reflected in the sitting, design of spaces and detailing of fenestrations following the basic principles – keep out the rain, let in the breeze, modulate daylight, introduce jaalis, provide roof overhangs, wrap of internal spaces around intimate courtyards, all together giving unique visual identity to Baker design and build structures – An architectural expression of omissions!

At around the same time as Baker gained recognition, Barefoot College founded by Bunker Roy in 1972 was gaining ground on similar socio-technical innovations. Benefiting the poorest of the poor in Tilonia, Rajasthan, the barefoot movement catalyzed a sizable number of social engineers, architects, scientists, artists and crafts – persons; thus creating the 'green jobs' back then. The group contextualized technological know-how to a degree where the common sense solution became common place enough to influence the economics of the region.

Fig. 1– Guna tile vaults at CSV campus, Wardha

Fig. 2 – Guna tile manufacture

Similar moves were being made elsewhere too, that focused deeper into technological innovation and brought it face to face with the existence of the "invisible" hand of the markets. Inter-mediate Technology Development Group (ITDG), now Practical Action and Development Alternatives are two of the few institutions that lived to this purpose. These developments continued to generate dialogue, agreements and disagreements at a time even when internet was yet to be invented.

Three decades later, while the larger alternate technology dialogue is at a critical stage of development, it is almost being (further) jargonized beyond recognition and appropriated by blue-collared corporative certification systems. This need not be so since all of this pertains to 'development' that was, at the start of the dialogue, meant to be "for the people" if not always 'by' and 'with' the people.

Going back to the case of habitat development, globally, construction industry contributes to 40 per cent of the total GHG emissions. It is forecasted that growth in infrastructure in developing countries will surpass that in developed countries by 2020[1]. Residential construction is expected to be 40% of the total global construction output.

Rural India particularly faces vast housing and infrastructure shortages. Fulfilling these needs in a manner that addresses the varied vulnerabilities of 312 multi-hazard prone districts of India, is obviously good news. On the other hand according to preliminary estimates by Development Alternatives, rural India will need to consume approximately 1700 million metric tones of cement, 14 X 106 million fired bricks, 300 million tones of steel and approximately 200 million liters of potable quality water for basic housing alone. Additional infrastructure and public facilities required to ensure the rural communities and dignified basic living and working environment will probably treble this figure [2].

While the 'climate change' agenda puts technology in focus for driving change that may ultimately lie in the 'social' and 'behavioural' domains,, the challenge is not be purely technological and might rather be based on 'social goodwill' that it was earlier. Techno-social integration has traditionally been the mantra for success. Technology alone with little or no reference to the social dimension will struggle to provide sustainable solutions to rural and urban housing in the country. Three decades of field practice in alternate/CEEF technologies and their shortfalls give us enough ground for learning. Such learning must inform the current practices towards addressing housing shortage. Knowledge has to not only transferred from 'Lab to Land', there is enough evidence to suggest that there is an equally strong argument for knowledge to transfer from 'Land to Lab'. This is one of the vital components that will help to mainstream alternate techniques and technologies – and also answer the loud cry of the carbon emissions foghorn. A socio-technical road map begins to emerge as we bring together real-time social and technological field experience with technical wisdom.

Suneet Anand
Knowledge Works
suneetanand@gmail.com

Case Study

Dissemination of Energy Efficient Buildings in the Cold Desert of Western Indian Himalayas

Remote in the west Himalayan range in Leh and Kargil district (Jammu-Kashmir) and Lahaul & Spiti district (Himachal Pradesh), the valleys of those desert areas lay at more than 3,000 masl. Temperatures frequently fall below -20°C during the harsh and long winter. Villages are isolated for more than six months per year due to the snow and the shutting down of access passes. However, they benefit from an exceptional sunshine of around 300 days per year. Shortage of local fuel and high price of imported fossil fuels result in energy vulnerability. Since thermal efficiency of most of the buildings is poor, indoor temperature often falls below -10°C in winter. Living conditions are all the more difficult as combustion in traditional stoves produce lots of unhealthy smoke.

The project aims at improving the rural population livelihoods by integrating energy efficiency technology in 1,000 rural houses and community buildings in 100 villages, and setting-up a platform for scaling-up.

Low-cost Construction Techniques Based on Local Materials

Energy efficiency combines low-cost passive solar architecture and thermal insulation with local materials. Different technologies are proposed: Solar Wall (Thrombi Wall), Veranda and Direct gain.

The additional costs related to the energy efficiency and solar design is ranged from 5 to 15%. They are based on investment capacity of the rural population.

Gradual Implementation towards Dissemination

Three phases in the project enable to ensure replication:

- Demonstration: a few 'influent promoters' demonstrate the positive results and impacts of passive solar housing, which convinces other villagers

- Extension: wider number of promoters with lower capacity investment build energy efficient houses with technical and financial support from the project
- Exit strategy: replication of energy efficient buildings without financial support

Enabling Scaling-up

All required conditions are set up to ensure large and sustainable dissemination of energy efficient buildings after the project period:

- Awareness raising campaigns are performed to both at informing people about the Passive Solar House benefits and at generating demand
- 200 masons and carpenters are trained as service providers to supply the generated demand
- Sustainable networks are set up to mainstream energy efficiency:
  - Some 10 grassroots level networks at clusters level act as a pressure group for policy advocacy with the local authorities;
  - Three policy-level networks at the district and state levels promote energy efficiency practices/policy and support very poor villagers.

Impacts of Passive Solar Housing in Himalayas

Household & Social Impact

- Significant amount of time dedicated to collecting fuel wood and biomass is saved and invested in income generation activities or in education. Time is also saved in the use of heating equipment: the time spent in taking care of the stoves is at least divided by two. Considering that this activity is essentially carried out by women, time saving contributes to lessen their burden.
- Health & hygiene conditions are improved.
- Social relations are developed: family or village gatherings organised in their house increase.

Economic Impact

- In the areas where people have to buy fuel wood, annual average savings are estimated to 60.

- Income generation activities are increased (handicraft or occasional labour): the additional yearly income can go up to 55.

Environment & Energy Impacts:

- Fuel consumption of households decreases by 50 per cent to 60 per cent, which contributes to curb pressure on natural sources and reduce CO_2 emissions by 2t /year/ building.
- Indoor temperature remains continuously above 5°C (even when outside temperature is -20°C)

Implementation Team & Sponsors

A network of five Indian NGOs and one European NGO implements the project:

ECOSPHERE, Ladakh Ecological Development Group, Ladakh Environment and Health Organisation, Leh Nutrition Project, Students' Educational & Cultural Movement of Ladakh and *Group* for the Environment, Renewable Energy and Solidarity.

The project is funded by the European Commission with co-funding from private French foundations, companies & donors (ADEME, Fondation Ensemble, Gaz and Electricity of Grenoble, Lord Michelham of Hellingly Foundation).

Lydia Adelin-Mehta
GERES India
l.adelin-mehta@geres.eu

Case Study

Panchatantrika Fly Ash Brick-Making Enterprise, Khaparkheda, Nagpur

Khapadkhera fly ash brick unit

Keywords: carbon efficient green technology, poverty reduction programme, women empowerment, habitat based livelihood, self help groups, waste to wealth technologies, fly ash utilization.

Summary

This project shows how sustainable livelihoods can be created utilizing industrial waste. Fly ash from Khaparkheda power plant is used by a woman self help group to make bricks. The self help group supported by a local NGO, Vansampada, bought a hydraulic brick making machine from TARA and set up the brick making enterprise. The group comprising of 25 women from 3 villages today, produces around 8000 bricks per day. This has provided them with a sustained source of livelihood making them feel confident and empowered. Each brick is sold at Rs. 2 – 3 in the market. The overall capital investment was about Rs. 10 lakhs; Rs. 5 lakhs were contributed by the DRDA Nagpur and the rest was accessed as a loan from Dena Bank.

Facts

Context

Panchatantrika, the brick making enterprise has been set up in the Khaparkheda village. The unit lies in the close proximity to the Khaparkheda Thermal Power Plant, about 20 km from the Nagpur city. Started in 1989 Khaparkheda is the oldest Power Station in Maharashtra State Power Generation Co. Limited (Mahagenco) with an installed capacity of 4 X 210 MW.

Need

In the process of power generation, thermal power plants generate a lot of waste which are simply dumped at various sites further polluting the environment. However, there has been evidence that is properly managed waste can be converted into wealth. Recognizing the worth of industrial waste, NABARD and Development Alternatives jointly came up with the proposal that wherever there was a thermal power plant, a community based enterprise linked to the waste from the plant should be promoted. The idea was to ensure a market-based sustained livelihood based for the community making use of the already running power plant. Khaparkheda fly ash centre in Nagpur is one such example where industrial waste (fly ash) from the power plant is being utilized to make fly ash bricks.

Scale

The fly ash brick centre, known as *Panchtantrika*, is an SHG-based (five in number) brick-making enterprise employing 25 – 30 women, and producing about 7,000 – 8,000 bricks a day. Each brick is sold at Rs. 2 – 3 in the market. The initial overall capital investment was about Rs. 10 lakhs. After spending the money over all the expenses, the enterprise now makes a net profit of about Rs. 60,000 per month.

Objectives

The underlying objective of this initiative is to create an environmentally responsive community-based enterprise making use of the industrial waste from the already functioning thermal power plant in the vicinity. This would empower the women SHGs involved and ensure a sustained livelihood base for the entrepreneurs.

Significant Highlights

Technology

Conversion from waste to wealth through the use of alternate technologies has been a significant feature of the project. The machine is fairly simple to use. The TARA personnel support the enterprise for its maintenance. It is seen that the strength of a fly ash brick is almost the same as normal clay burnt brick; however, the cost is less by about 20 per cent.

Institutional

The initiative is a unique example of various stakeholders coming together for a common objective. One more machine is planned to be installed. Though only some of the SHG members are working in the enterprise, there are plans to share the profit with other members as well.

The entrepreneurs are being supported by various other agencies to ensure the proper functioning of the enterprise. These include local NGO Van Sampada for awareness and mobilization; NTPC for raw material supply; TARA and Development Alternatives for technology and marketing support; and the DRDA and the DENA Bank for the financial support.

Social

The project is a good demonstration of women's empowerment through livelihood creation. The women's collective coming together to set up an enterprise to produce building materials is in itself a breakthrough given the conventional presence of males in the building material production industry. Earlier, the women faced suppression from their male counterparts, but now the women were overwhelmed with the fact that now sometimes they can earn more than their husband, sometimes could save some amount for the family and overall they had gained lot of confidence in themselves. They are extremely happy with the fact that they don't have to ask money from their husbands for the trivial needs. The social impacts can be seen in terms of the increased capacities, self respect and self confidence of the women.

Energy, Resources & Environment

Conversion of waste (fly ash) to wealth (bricks) through the use of alternate technologies has been an innovative feature of the project. Using coal fly ash for building materials conserves energy by reducing the demand for typical materials such as lime, cement, clay, sand, limestone and gravel which take energy to mine and produce.

Challenges & Response

Strategies

The following strategies were adopted as part of the initiative:

- Livelihood generation for women by converting industrial waste (fly ash) from the nearby power plant to wealth (brick) through the use of alternate technologies.
- Mobilization and capacity development of women SHG to undertake the enterprise.
- Provision of required assistance to the SHG in accessing finance and technology, sourcing raw material and marketing of final product.

Process

Through the efforts of NABARD and Development Alternatives it was proposed to set-up community-based enterprises near the thermal power plants making use of the waste generated at the plant. One such site was selected near the khaparkheda power plant in Nagpur district. To start up the enterprise, members from five women SHGs were brought together, convinced and supported by a local NGO called Van Sampada. The overall capital requirement for the unit was Rs. 10 lakhs; 5 lakhs were provided as the subsidy by DRDA, Nagpur and 5 lakhs were availed as loan from the DENA Bank. The women SHG faced the challenge while availing the loan

Contd. on page 7

3D Panel Technology in Construction

SICP – Structurally Insulated Cement Panel

- **A Superior Solution** – Strength, Cost and shorter construction period
- **Proven Technology** – Over a time span of quarter century
- **Certified** – European and US Standards ICBO-ER-3509
- **Versatility** – To meet any architectural/ engineering requirements
- **Energy efficient** – Superior thermal & sound insulation qualities

An introduction

The 3D Panel technology is basically structured around panels and the panel consists of three dimensional welded wire frames resembling a space frame, integrated with a modified expanded polystyrene insulation core. Each panel consists of a steel structure and an insulator.

The three dimensional wire panel are made of, High tensile (700-750 Mpa), 12 gauge galvanized steel, with self extinguishing EPS (density 15-20 Kgs/Cum) kept in its core and shot created with 1:4 mortar on either sides. Cement Sand Mortar shot create done on site.

The result is a stronger, monolithic, **seismic resistant** wall that also **has thermal and acoustical insulation**

Features

- LIGHT WEIGHT BUILDING: Saves up to 40 per cent - 50 per cent on the foundation cost there by reduces the overall construction cost and also improves seismic resistance of the building
- REDUCED CONSTRUCTION TIME : Helps in putting the construction in to use quickly construction can be completed in 50% of the time when compared to conventional construction techniques
- REDUCED LABOUR REQUIREMENT: Dependability on lab hour can be reduced
- GREATER STRUCTURAL INTEGRITY: The monolith structure helps in ensuring greater structural integrity
- OFFERS DESIGN FLEXIBILITY: The panels can be cut to any shape, assembled and concreted
- SUPERIOR FIRE RESISTANCE: Ensures fire resistance of 1 hour with 1" concrete on either side
- EXCELLENT THERMAL INSULATION: Ensures Low running cost of HVAC equipments as well as downsized HVAC Capacities
- EXCELLENT FLEXTURAL RESISTANCE: Ensures good wind resistance
- TERMITE INSECT AND HURRICANE PROOF

Structural Properties of SICP

- SICP takes up to .6 tons of flexure. With appropriate structural elements each panel can take up to 3 tons/Sqm
- SICP takes up to 50 Tons of Axial loading
- SICP takes up to .566 tons of shears.
- SICP can withstand wind Velocity up to 300 Km / hour
- Endure earth quake at more than 7.5 Richter
- Sound insulation: sound impregnation RW 42 Dh (normally, it is RW 72 Dh)
- Long life span
- Reduced energy bills - 30-40 per cent and is compliant with ASHRAE STD 90.1/2004
- Steel and EPS in the panel have more than 20 per cent recycled material and are 100% recyclable
- EPS is manufactured without the use of CFCs or HCFCs

Since these are light they required shallow foundation rendering lees damage to the environment with respect to excavation activity for foundations

The above is based on international test data available on this type of products as well as our own tests being conducted in SERC

Reducing Global Warming Pollution Begins at Home. Make your home more energy efficient:

Insulate ceiling, walls and floors:

- 35 per cent of heat loss from a house is through non-insulated ceiling
- Non-insulated walls account for a further 15 to 25 per cent
- Non-insulated floors lose between 10 and 20 per cent of heat.

Fully insulating your home can halve heating and cooling greenhouse gas emissions and reduce costs and dramatically improve comfort all year

The significance of this technology in construction is the elimination of the normal brick & block stones, thereby protecting the environment.

The lightweight panel used for the structure, which comes in 8x4 sizes, is exceptionally strong. It contains a polystyrene layer in the center which reduces heat transfer to the building, thus providing a comfortable living. The panel acts as the insulator. This in turn reduces the cost of air-conditioning in warm areas as well as heating in cold areas.

Viability

This universal technology is superior and a best alternative to conventional building materials such as bricks or blocks. This technology offer more features & benefits along with favorable economic comparisons, to both builders and consumers, than conventional building technologies.

Panel Production

Environmental Friendly

A non CFC blowing agent is used in EPS panel cores and does not threaten the earth's ozone layer. In addition, the production of the EPS used in Insulated Load Bearing Structural Panel does not produce CFC's or HCFC's or formaldehyde and does not produce harmful off-gassing.

Efficient use of Petroleum

The expanded polystyrene insulation used by Insulated Load Bearing Structural Panel is made of petroleum-derived styrene; however, this light-weight foam product needs 98% air and requires only a small amount of petroleum to produce.

Reducing waste at the job site

The 3D Panel greatly minimizes the amount of onsite scrap produced at the jobsite thus reducing the amount of job waste in landfills. Due to these features the technology has been recommended by the **Environmental *Protection Agency's* (EPA) of *Energy Star Program & US Energy PATH Program***

Strong Wall

Concrete as sustainable resource

Concrete is a friend of the environment in all stages of its life span, from raw material production to demolition, making it a natural choice for sustainable home construction. Here are some of the reasons why, according to the Portland Cement Association and the Environmental Council of Concrete Organizations:

Relectivity

Concrete minimizes the effects that produce urban heat islands. Light-colored concrete pavements and roofs absorb less heat and reflect more solar radiation than dark-colored materials, such as asphalt, reducing air conditioning demands in the summer.

Resource Efficiency

The predominant raw material for the cement in concrete is limestone, the most abundant mineral on earth. Concrete can also be made with fly ash, slag cement, and silica fume, all waste byproducts from power plants, steel mills, and other manufacturing facilities.

Durability

Concrete builds durable, long-lasting structures that will not rust, rot, or burn. Life spans for concrete building products can be double or triple those of other common building materials.

Thermal Mass

Homes built with concrete walls, foundations, and floors are highly energy efficient because they take advantage of concretes inherent thermal mass or ability to absorb and retain heat. This means homeowners can significantly cut their heating and cooling bills and install smaller-capacity HVAC equipment.

Steel Structure

The wire frame consists of 14 gauge high tensile galvanized wire trusses, spaced at 2-inch centers. The Assembly is held together with 12 gauge horizontal wires on each face at 2” centers welded to the truss chords.

The reinforcement module (RIM) is manufactured with highly automated equipment. The welded wire fabric conforms to ASTM A185. The diagonal cross wires, as well as wire used in the fabrication of the welded wire fabric, conform to ASTM A82. Different configurations of RIM are manufactured depending on the end use.

Insulator

Type 1 expanded polystyrene foam core with a minimum density of 0.9 pounds per

Viability

	Brick	Hollow Panel	Block
Load Bearing	Medium	Low	High
Sound Barrier	Medium	Low	High
Energy Saving	No	No	Yes
Strength	Medium	Low	High
Hurricane Resist	Low	Low	High
Earthquake Tolerant	Low	Low	High
Flood Resist	Medium	Low	High
Land Slides	Low	Low	High
Fire Resist	Medium	Medium	High
Construction Time	High	Medium	Low
Labour Utilisation	High	High	Low

cubic foot; a flame spread index of 25 or less and a smoke developed rating of 450 or less when tested in accordance with ASTM E84; a potential heat of 6,000 BTU/ sq. ft. or less when tested in accordance with NfiPA259. Thickness of panels can vary.

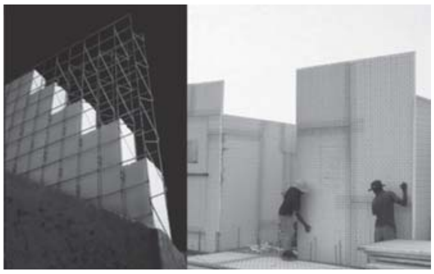
Need least amount of Raw Material

This System does not require any blocks or Bricks for walls, and requires only 20% - 30% percent of Cement and Sand (Only for plastering) compared to conventional construction methods. 8’ x 4’ Panels used for walls are manufactured with high tensile galvanized steel wire, weighing only 26.4lbs/panel. This will be a huge advantage in transfer raw material for construction. We believe that this would be the most appropriate and suitable method for construction.

Design Flexibility

Recessed, welded steel ties provide solid, secure attachments for any interior or exterior finish you desire.

Exterior walls built with Panels are structural entities themselves allowing designers to easily place cantilever windows, load-bearing floor systems and outer-wall



openings with total flexibility. Interior walls built with Panels help bear loads throughout your structure, allowing greater distances to be spanned without interim supports.

Learn more on Panel Applications.

Fire Resistance

Panels has the following fire-resistance ratings (ratings are valid for fire exposure from either side). Fire-rating is derived from the wire mesh gauge in combination with cement thickness (see chart below). The insulation core Type I polystyrene demonstrated a flame spread index of 25 or less and a smoke developed rating of 450 or less when tested in accordance with ASTM-E84. The modified polystyrene core will not burn and does not contain ozone-damaging chlorofluorocarbons (CFC’s) in the manufacturing process of products.

- 2.5" polystyrene core with 1.00" cement each side = 1.5 Hours
- 2.5" polystyrene core with 2.00" cement each side = 2.0.Hours
- 2.5" polystyrene core with 3.1/8" cement each side = 4.0 Hours

The fire rating increases with greater quantities of cement applied to each side. The polystyrene core will not burn.

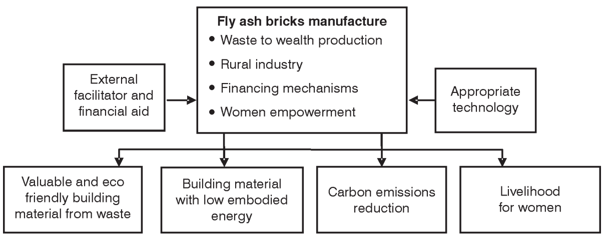
Naina Shah
Exnora International
nainashah@gmail.com

Contd. from page 5

from the Bank. The regular visits and written assurance from the SHGs removed this bottleneck. Moreover, the regular payment of installments has also strengthened the trust factor. The land for the unit was taken on rent from a private landowner. The technology, hydraulic brick making

Women SHGs telling about their learning from Khapadkhera fly ash brick unit

machine, was sourced from TARA, which also imparted training to the women entrepreneurs. The raw material is sourced from the power plant on a regular basis. The marketing of the bricks is done by the entrepreneurs themselves with initial and time-to-time support from the Van Sampada and TARA.



Impacts

The enterprise employing 25 women produces about 8,000 bricks a day in two shifts. Production cost of one brick is within Rs. 1.50 and the bricks are sold for about Rs. 2.00 – Rs. 3.00. About one lakh bricks are sold in one month. After deducting the salaries, running cost of the enterprise and the bank installment, the net profit of the enterprise comes out as about 60 – 70,000 a month, which is deposited in the bank.

The economic impacts of the enterprise can be seen in terms of monthly income of the entrepreneurs which is Rs. 3000. This has increased the overall household income of these women and has made them economically independent.

Working in the enterprise has also affected the internal household dynamics; it has earned respect for the women by their male counterparts. However, being an all women enterprise, it became easy for the members to convince their husbands. Moreover, on the receipt of the salary every month, everyone got happy. The husbands are now assisting their wives in household works while they are on work.

Lok Awaas Secretariat
basin@devalt.org.

basin South Asia Regional Knowledge Platform

Auroville Earth Institute aims to research, develop, promote and transfer earth-based technologies which are cost and energy effective.

Aga Khan Planning and Building Services, **Pakistan** works to improve the built environment through the provision of technical assistance and construction management services.

National Centre for People's Action in Disaster Preparedness, India striving to bring sustainable technologies to help people reduce their vulnerability against future disasters.

Coastal Area Disaster Mitigation Efforts, India is a network of twenty voluntary organizations working for disaster preparedness of Fishing Communities in India.

Exnora International, India works as a catalyst in bringing about local initiative and community participation in overall improvement in quality of life.

Grambangla Unnayan Committee, **Bangladesh** is a non-profit, non-governmental organization working for people affected by extreme poverty, exclusion and disease.

Maithri is supporting Panchayat Raj institutions for developing perspective plans on basic need fulfillment and natural resource management through capacity building processes.

Orissa Development Technocrats' Forum, India works to facilitate an effective rural housing delivery system through appropriate technologies and sustainable livelihoods.

Trust for Village Self Governance, India is a charitable trust focusing on local self governance in villages for creating sustainable employment through habitat development.

Practical Action, Bangladesh, Nepal & Sri Lanka work with poor communities to develop appropriate technologies in food production, energy, transport, shelter and disaster mitigation.

Swiss Agency for Development and Cooperation (SDC), **India** is Switzerland's international cooperation agency within the Swiss Foreign Ministry.

Secretariat

Development Alternatives is a not-for-profit sustainable development enterprise that designs and promotes programmes and products which, through the use of alternative technology, contribute to the enrichment of human life.

Gram Vikas, India is a rural development organization, working with poor and marginalized communities of Orissa since 1979 making sustainable improvements in the quality of life.

Unnati is a non-governmental organization working over the last 15 years for "civic leadership promotion and strengthening local self governance."

basin-*South Asia* Regional Knowledge Platform (basin-*SA*) is committed to *"developing knowledge systems and promoting collaborative action within South Asia to enable access by the poor to sustainable habitat and livelihoods."*