Development Alternatives (DA) in association with Tata Energy Research institute (TEAI), and guided by SKAT and Sorane - Swiss Consulting Organisations. Lessons from technologly transfer in China (where more than 50,000 kilns are operating) and in Nepal, Pakistan and Bangladesh were helpful in guiding the course of the project.

Two pilot VSBK's have been established - one at Datia in Madhya Pradesh (in 1996) and the second one at Kankia in Orissa through Gram Vikas - a partner organisation (in 1997), with the objectives of validating the potential of VSBK technology under Indian conditions and evaluating its performance in comparison with conventional practices. The pilot operations indicate better energy efficiency, lower emissions than other technologies and better quality in ternms of colour, ring and strength compared to clamps. Brick makers and development agencies including officials of All India Brick and Tile Manufacturers Federation have shown keen interst in the project and are helping guide its further progress. Establishment of more units under the programme have been planned - the next one in association with Comtrust in Kerala.

VSBK - Facts

Shaft Size	1mx1m	1mx1.5	1mx1.75	1mx2m
Production	2000	3000	3500	4000
Per day @ 11 batches/day				
Specific Energy Consumption : 0.75 to 0.95 MJ/kg bricks (10-13 tonnes coal equivalent per 1000,000 bricks)				
Compressive strength of bricks : 70 to 115 kg / cm ²				
Cost of construction of a 2 shaft kiln : about Rs. 1.5 to 2.5 lakhs				
Construction time : About 6 weeks				





A Green Technology for red brick production

Institute

Darbari Seth Block

India Habitat Centre

Fax: 91-11-4621770

Contact address:



Development Alternatives B-32 TARA Crescent Qutab Institutional Area New Delhi - 110 016, India Fax : 91-11-6866031 E-mail : TARA@sdalt.ernet.in

Gram Vikas Mohuda Post Berhampour - 760 002 Kerala, India Fax: 91-680-209 754

SKAT

SKAT Vadianstrasse 42 CH 9000 St. Gallen Switzerland Fax: 41-71-2285455 E-mail: info@skat.ch

> Swiss Agency for Development & Coorperation Swiss Embassy Chandragupta Marg New Delhi - 110 021, India Fax: 91-11-68736331 E-mail: delhi@sdc.net

Vertical Shaft Brick Kiln Technology



First VSBK in India at Datia, Madhya Pradesh Established by Development Alternatives

- Energy efficient
- Environment friendly
- Economically viable

Decentralised system for burnt brick production

Contrust 7/1136 South Mananchira Road Calicut-673 001 Orissa, India Fax: 91-495-722 266 E-mail: comtrust/

calicut@damail.dartnet.com

E-mail: mailbox@teri.res.in

Tata Energy Research

Lodhi Road, New Delhi - 110 003

Ectable Ea

SORANE Sa

Route du Chatelard 52 CH 1018 Lausanne Switzerland Fax: (021) 646 86 76 E-mail:sorane@worlcom.ch

VSBK - for cleaner brick production

Conventional burnt clay bricks will continue to be the main walling material required in meeting the huge demand for housing, in the foreseeable future notwithstajding substantial efforts to develop alternatives. Current technologies for brick production such as clamps, downdraught kilns and Bull's trench kilns consume large quantities of fuel such as coal, firewood and other biomass. The devastating effect of the pollution caused by huge amount of emissions from the brick industry has attracted the attention of regulatory agencies who have issued deadelines after which the polluting kilns are to "clean up or close down".

Vertical Shaft Brick Kiln technology developed in China is an energy efficient, environment friendly and economically viable means to produce quality bricks.

VSBK Construction - basic features

The VSBK consists of one or more shafts located inside a rectangular brick structure. The Shafts are 1 metre wide with nominal lengths of 1 m, 1.5m, 1.75m or 2.0m. The inside surface is a brick wall, sometimes lined with refractory bricks. The gap between the shaft wall and outer kiln wall is filled with insulating materials clay and rice husk, etc. (see diagram)

The shaft is loaded from the top with a number of batches of bricks for firing. Each batch contains four layers of bricks set in a predetermined pattern. The stack of bricks rest on square support bars (which can be removed or inserted) resting on a pair of horizontal beams across the arches in the unloading tunnel.



Unloading arrangement at the bottom

VSBK - How it works

During operation, one batch of dried green bricks is loaded at the top at a time. A weighed quantity of powdered coal (< 6mm) is spread on each layer uniformly to fill the gaps. The brick unloading is done from the bottom using a trolley, which runs on rails along the length of the unloading tunnel. Lifting and lowering of the trolley is done using single screw unloading mechanism. For unloading, the trolley is lifted so that



SCHEMATIC DIGRAM OF VSBK

the whole stack of bricks in the shaft rests on it. The stack is then lowered till the layer with openings appears, through which the support bars are then reinserted. On further lowering, the load of the stack is taken by the support bars except for the batch being unloaded which comes down along with the trolley which Finally rests on a pair of rails. The trolley is later pulled out along the rails and the bvricks subsequently unloaded and sorted out for despatch. The next batch is loaded at



Arranging green bricks at the top

the top using green bricks lifted upto the loading platform. The frequency of unloading - loading varies from 90 to 150 minutes.

The skill in operation is to keep the firing zone in the middle of the shaft. The draught of air moving up from the bottom cools the fired bricks in the cooling zone and itself gets heated. Maximum temperatures of upto 1000°C are attained in the central firing zone. The hot gases moving upwards dry and heat up the green bricks in the preheating zone. This recovery of sensible heat accounts for the ghigh energy efficiency of the VSBK technology.

Main Advantages of VSBK technologly

- High energy efficiency
- Less polluting emissions
- Better quality bricks compared to clamps
- Occupies less space low land requirement
- Can work throughout the year subject to availability of green bricks and market
- Minimal maintenance requirements
- Flexibility in volume of production
- Highly suitable where part of fuel is traditionally mixed with clay
- Construction and Operation easy to learn

VSBK Technology - Indian experience

An Action Research Programme was started in 1995 financed by Swiss Agency for Cooperation and Development (SDC) and coordinated/implemented by