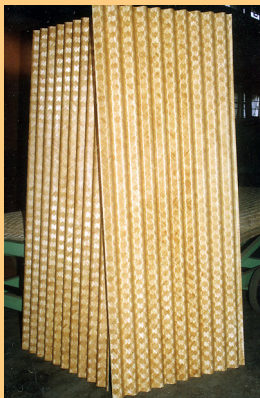
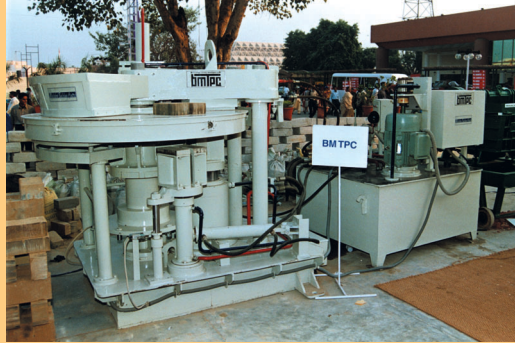
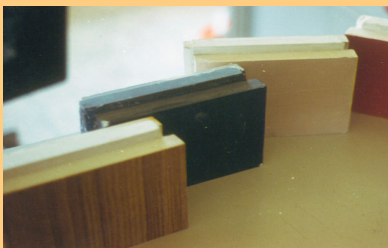




Commercialisation of Innovative Building Material Technologies



Enabling a process of re-thinking for reducing construction costs by promoting environment friendly materials and techniques



Building Materials and Technology Promotion Council

Ministry of Urban Development and Poverty Alleviation, Government of India

G-Wing, Nirman Bhawan, New Delhi - 110 011

Recent initiatives to promote innovative building material technologies

The Government of India has taken several initiatives to facilitate development, wide spread application and production of innovative building materials.

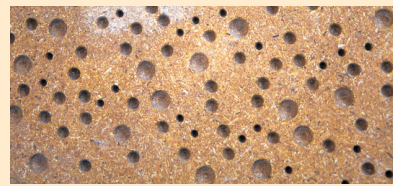
Technology transfer at national level

Building Materials & Technology Promotion Council (BMTPC) was set up in 1990 under the aegis of the erstwhile Ministry of Urban Development, to bring together scientific research, technological advancements and enterprise. The Council undertakes functions such as scaling of technologies from pilot to commercial stage, entrepreneurial development, facilitating venture/risk capital support to new industrial units, absorption and indigenisation of imported technologies, preparation of location specific feasibility reports, ensuring market support through building materials estates and adoption by public and private agencies.

Technology transfer at grass-root level

A centrally sponsored Scheme for establishing a **National Network of Building Centres** was launched in 1988-89. The Scheme is being implemented through HUDCO and so far over 653 locations have been identified and more than 490 centres have already become fully operational in several States. The Building Centres are *promoting cost-effective building materials, components and construction techniques through dissemination of related information, demonstration of such technologies in construction schemes, training of artisans and workers to gain proficiency in practice of new techniques and making available low-cost components to meet local needs*. Materials and components produced at the Building Centres have been exempted from levy of **Excise Duty**.

BMTPC is documenting all new building materials and construction technologies being propagated by the Centres. The Bureau of Indian Standards (BIS) is preparing standards and codes of practice in concert with concerned R & D institutions, BMTPC, HUDCO, CPWD, etc.



Other facilitating measures

The Government is encouraging thermal power plants to make flyash available free of cost and for allotment of land for producing flyash based materials on easy terms near thermal power stations.

While technologies for making clay bonded and sand-lime flyash bricks have been developed at the CSIR laboratories, the BIS has developed Indian standards on such bricks and for other applications of flyash in construction works. The CPWD has also inducted Flyash bricks in their schedule of specifications. HUDCO and NHB are promoting new building materials production units based on agricultural and industrial wastes by participating in the equity of new units and HUDCO is also extending term-loan support to entrepreneurs.

BMTPC facilitates establishment of new building materials production units by providing technology backup services, and coordinating with concerned departments/agencies for necessary policy supports, credit facilities and venture capital supports.

Fiscal Incentives

To effect economy in cost of housing construction alternate building materials and new construction techniques need to be increasingly adopted. Fiscal incentives for promoting new building materials technologies is an important facilitating feature of Government's policy support for housing and building sector. In order to facilitate growth of innovative building materials industry and faster utilisation of new construction techniques, the Ministry of Urban Development & Poverty Alleviation like previous years, had this year also, submitted proposals based on

the recommendations of BMTPC for fiscal incentives in terms of excise and custom duty concessions. The Government of India has been considering such proposals and has been giving exemptions/concessions on different items recommended by the Ministry. The BMTPC has been constantly interacting with the housing and construction sector, building materials manufacturers and various other concerned organisations in order to identify such new building materials which are proven and require further policy support for promoting large scale

commercial production in different regions of the country. The Ministry had kindly considered the proposals submitted by BMTPC and had strongly recommended the same to the Deptt. of Revenue, Ministry of Finance for considering the recommended concessions in excise and custom duties. It is a matter of great satisfaction that our recommendations have been duly considered and Government has given fiscal concessions/exemptions. Various concessions and fiscal incentives have been given during the last ELEVEN UNION BUDGETS.

Building materials from industrial waste

Phosphogypsum

About twelve fertiliser plants in the country produce nearly 4 to 5 million tonnes of Phosphogypsum as a by-product. While some quantities are utilised for production of ammonium sulphate and few other uses, there are accumulated stocks of more than 10 million metric tonnes of Phosphogypsum at various plant sites. Major producers are Coromandel Fertilisers (Andhra Pradesh), Fertilisers & Chemicals, Travancore (Kerala), Gujarat State Fertiliser Co. (Gujarat), Hindustan Lever Ltd. (West Bengal), Southern Petrochemical Industries Corporation (Tamil Nadu) & Paradeep Phosphates Ltd. (Orissa). Disposal of Phosphogypsum is not only a serious techno-economic problem but creates environmental pollution and requires large land area for dumping.

Gypsum as a building material has been in use since ancient times. First known use of Gypsum dates back to 3700 BC in Egypt for the construction of Pyramids. In modern times with advancement in technology for calcining of gypsum and various innovative production processes a range of gypsum based products and construction applications have been developed. These technologies have shown potential for commercialisation and wide spread adoption in building materials production and variety of civil works.

Product Range

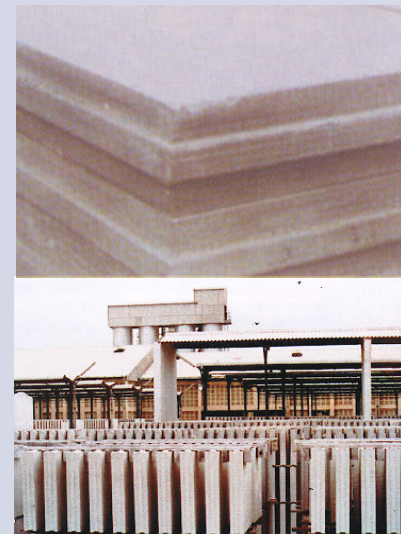
Partition Panels; Ceiling Tiles/Boards; Fibre Reinforced or Wood Chip Boards; Walling Blocks/Bricks with/without Flyash; Gypsum Marble/Slotted Tiles; Plaster Boards; Processed Gypsum can be used for special plasters and as ingredient in Fal-G cement and precast building elements.

Technology

Phosphogypsum contains several impurities which need to be reduced or made innocuous for its effective utilisation in manufacturing of building materials components. Several national laboratories, Central Building Research Institute (CBRI), Central Glass & Ceramic Research Institute (CGCRI), Regional Research Laboratories (RRL) at Bhopal and Thiruvananthapuram, National Council for Cement and Building Materials (NCB) Ballabgarh, Bhanu International in Andhra Pradesh have carried out extensive investigations in India and offer appropriate technologies. One of the popular sources of technology for converting Phosphogypsum to useful building materials is from Salzagitter Industriebau gmbH of Germany. A plant with this technology in collaboration with M/s. SALZGITTER AG is already in operation at Vishakhapatnam in Andhra Pradesh.

Applications Benefits

- Utilisation of industrial waste requiring large land areas & resulting in environmental pollution.
- Conservation of non-renewable natural mineral wealth.
- Manufacture of building materials at low specific energy consumption.
- Manufacture of materials possible for effective saving in consumption of cement and steel.
- Production of pre-fabricated components leading to standardisation and speed in construction.
- Production of building elements as substitute for timber.



Red Mud

Waste generated from the aluminium industry is commonly known as Red Mud. It is a Bauxite residue – a clay like silt-sized by-product consisting of undissolved mineralogical components and of new products formed during the production process of aluminium. The mud is usually disposed as slurry (water content 50%) into nearby ponds making it a source of land pollution as nearby fields acquire alkalinity to a harmful extent. Besides, quantities generated are huge and large tracts of land are required which make the waste disposal very costly particularly with increasing plant capabilities.

At present, five big aluminium plants namely NALCO, BALCO, MALCO, HINDALCO and INDAL are the major source of Red Mud as a waste by-product with nearly 3.5 million tonnes being produced annually.

Utilisation Potential

While Red Mud can be used for recovery of sponge iron, high purity aluminium and number of valuable constituents like vanadium, alkalis and titanium, its present use is generally in Cement industry both as a component of cement-raw mix as well as additive with specific advantages.

Product Range

Aggregates - Both dense and light weight by using Red Mud and Flyash combinations; Lightweight structural blocks and other building units using foaming techniques; Building bricks and flooring & walling tiles; Polymer composites for door panels, partitions etc.; As cellular concrete additive/filler; Red Mud light roofing sheets are already under production with imported technologies.

Application Benefits

- Utilisation of industrial waste accumulating in huge quantities, causing soil pollution.
- Conservation of agricultural soil (rich top soil) being used for brick making.
- Saving in energy intensive and scarce material like cement.

Flyash

As a result of considerable development (both in India and other countries), many projects and much experience in recent years, the following suitable options for utilisation of FLYASH are available.

As Raw Material

- Aerated light-weight cellular blocks and slabs
- Clay bonded Flyash Bricks/Blocks
- Sand Lime Flyash Bricks (Calcium Silicate Bricks)
- Precast Flyash concrete building elements/ components
- Precast Blocks for footpaths
- Flyash Ceramics
- Cellular light weight concrete blocks

As Admixture & Filler

- Cement Concrete using ordinary portland cement
- Ready mixed concrete for large scale concrete applications
- Flyash-Soil mixes for soil stabilization in road construction
- Lime-Flyash bound macadam in upper layers of road pavements
- Lime-Flyash stabilization of silty/black-cotton/red soils in sub-base course of road pavements.
- Bituminous Concrete in surfacing of roads
- As Fill-in highway embankments
- Stabilised Mud Flyash Bricks

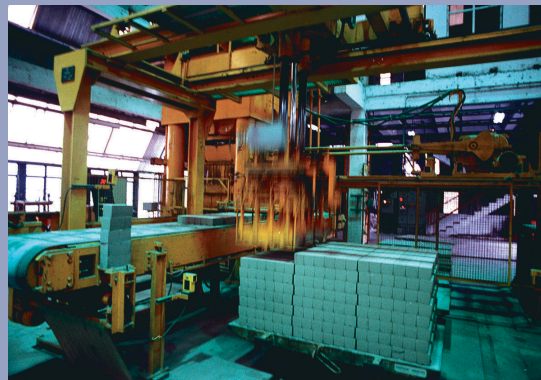
As Aggregate

- Sintered Flyash light weight aggregate
- Light weight aggregate concrete for blocks, walls, partitions

As Pozzolana

- Portland pozzolana cement
- Lime-pozzolana binders as masonry cement

The scope of flyash utilisation has been enlarged with the development of several process technologies now available in India or from abroad to manufacture above mentioned building materials and products. There are small scale, medium and large scale manufacturing processes available from CBRI, CFRI, NCB, CSMRS, NTPC, CRRI, ACC, Bhanu International, AEC Cements and Constructions Ltd. etc.



POSITION OF EXCISE DUTY STRUCTURE ON WASTE BASED BUILDING MATERIALS

S. No	Heading No.	Item	Status in 1997-98	Status in 1998-99	Status in 1999-2000	Status in 2000-2001	Status in 2002-2003
1	39	Products of jute and phenolic resin manufactured by pultrusion process, containing at least 40% by weight of jute.	-	NIL	NIL	NIL	NIL
	44.06 44.07	100% wood free plain or prelaminate particle or fibre boards made from sugarcane bagasse or other agro wastes	-	NIL	NIL	NIL	NIL
2	68.07	Low cost building materials and components produced at various Building Centres Nirman/ Nirmithi Kendra	NIL 5/97	NIL 5/98	NIL 5/99	NIL	NIL
3	68.07	Goods in which more than 25% by weight of Red mud or Press mud or blast furnace slag or all is used	8% 5/97	NIL	NIL 5/99	NIL	NIL
4	68.07	i. Cement bonded Particle Boards	8% 4/97	NIL	NIL	NIL	NIL
		ii. Jute Particle Board	8% 4/97	NIL	NIL	NIL	NIL
		iii. Rice Husk Board	8% 4/97	NIL	NIL	NIL	NIL
		iv. Glass Fibre Reinforced Gypsum Board (GRG)	8% 4/97	NIL	NIL	NIL	NIL
		v. Sisal Fibre Board	8% 4/97	NIL	NIL	NIL	NIL
		vi. Bagasse Board	8% 4/97	NIL	NIL	NIL	NIL
5	68.07	Goods in which not less than 25% by weight flyash or phosphogypsum or both is used	8% 4/97	NIL	NIL 5/99	NIL	NIL
6	68.07	i. Mosaic Tiles	NIL 4/97	NIL 5/98	NIL	NIL	NIL
		ii. Goods Manufactured at the site of construction of building for use at such site	NIL 4/97	NIL 5/98	NIL	NIL	NIL
		iii. Light weight (solid or hollow) concrete building block	NIL 4/97	NIL 5/98	NIL	NIL	NIL
		iv. Block, slab, lintels, concrete beams and stairs constituting intermediates & components of prefabricated building materials	8% 5/97	NIL	NIL	NIL	NIL
7	69	i. Clay bricks other than fire-clay bricks	NIL 5/97	NIL	NIL	NIL	NIL
		ii. Sand Lime bricks	NIL 5/97	NIL 5/98	NIL 5/99	NIL	NIL
		iii. Roofing tiles	-	NIL 5/98	NIL	NIL	NIL
		iv. Burnt clay tiles	-	NIL	-	-	NIL
8	94.06	Prefabricated buildings	8% 5/97	8%	NIL	NIL	NIL
9	38.24	Ready Mixed Concrete	13%	NIL 6/98	NIL	NIL	NIL

* Under Notification No.6/2002-CE dt.1.3.2002.

Performance Appraisal Certification Scheme (PACS)

- The Ministry of Urban Development & Poverty Alleviation, Government of India, under the Gazette notification No I-16011/5/99-H-II in the Gazette of India No. 49 dated 4th December, 1999, has authorised the Building Materials and Technology Promotion Council to issue **Performance Appraisal Certificates (PAC)** giving independent opinion of the fitness for intended use of new building materials, components, products, elements, construction systems and assemblies, not yet covered by the Indian Standards.
- **PACS** is not mandatory but a Voluntary Scheme for manufacturers and suppliers of materials, components, systems, interested in exploring wider market potential.
- **BMTPC BOARD OF AGREEMENT** has been constituted for managing the scheme and providing authoritative technical appraisal certificates. The Board is a representative body of decision makers, professionals and experts of Central, State, R&D and standardisation and major construction organisations, CIDC, BAI, CPCB, etc.
- **Process of Certification includes:**
 - Establishing criteria for performance of the product
 - Verifying through lab and field test, conformity to requirements for satisfactory performance, durability and safety
 - Operation of a Quality Assurance Scheme by the manufacturer/supplier/installer
 - Providing, necessary data to architects, designers, engineers, users and builders
 - The operation of PAC includes a mechanism for obtaining proactive user feedback
 - Issuance of certificates will be against payment of fees by applicants

For more information, please write to:

EXECUTIVE DIRECTOR, Building Materials and Technology Promotion Council

G-Wing, Nirman Bhawan, New Delhi - 110 011 Tel: 91-11-3019367; Fax: 91-11-3010145

E-Mail: bmtpc@del2.vsnl.net.in Website: <http://www.bmtpc.org>

AS PER BUDGET AND CONTINUED FURTHER**A. FLYASH BASED BUILDING MATERIALS INDUSTRY**

1. Brick Press with **Accessories like moulds, pellets, stackers, clamping devices or the like for flyash-sand-lime brick** capacity 3000-5000 bricks/hr up & down Stroke Pressure 300-400 kgs/sqm.
2. Flyash block making machine capacity 1000-2000 blocks/hr with vibrators, mixers and accessories like moulds, pallets, stacker's, clamping devices or like.
3. Mixer with bottom valve and outlet pipes for cellular concrete
4. Moulding equipment cross cutting plant and longitudinal cutting plant for cellular concrete
5. Moving grate sintering strand for light weight flyash cellular concrete
6. Centering bridge for moulds

B. FOR PHOSPHOGYPSUM BASED BUILDING MATERIALS INDUSTRY

7. Purification plant including diaphragm, pump, vacuum filter, gas scrubber, for phosphogypsum
8. Flash Calciner
9. Centrifuge for calcination equipment
10. Partition Panel plant
11. Mould for phosphogypsum
12. Drier-cum-calciner

C. FOR CLAY FLYASH BRICKS MAKING INDUSTRY

13. Edge Runner Mil (for crushing and kneading of Clay and Flyash Mixture output 15 to 40 tons per hour depending on the perforation of the grinding plates)
14. Pan Mixer (output 25 tons per hour)
15. Double Shaft Mixer (for mixing of the material consisting of Clay and Flyash)
16. Vacuum Worm Press Extrusion machine (capacity of the press up to 36 tons of material per hour)
17. Mouth piece (for the above Vacuum Worm Press with dimensions corresponding to the required type of bricks or blocks which will be produced)
18. Automatic Equipment (for cutting and handling of Bricks between the pressing shop and dryers)

D. FOR PREFABRICATED PARTS INDUSTRY

19. Plant & Machinery required for making hollow-core roofing/flooring units
 20. Large size plants for manufacturing of hollow and solid concrete blocks for walling
 21. Mechanised hydraulically operated Tunnel Form of Wall forms, Slabforms, Column forms
 22. Large-size Vibrating-beds with integrated curing and wire-tensioning arrangements
 23. Vibrating-distributors for speedy production of prefab building parts
 24. Hydraulic presses for manufacturing pavement blocks
 25. Hydraulic heavy duty press for making Hollow & Solid Concrete Blocks
 26. Foam Generating Equipment, spiral pumps and Foaming compound for light weight cellular concrete
 27. Densified wood fibres plates for door shutters.
- Notification No: 21/2002-Customs dt. 1.3.2002; Item No.219, Condition No.33, List No.14*

Conditions:

1. An officer not below the rank of a Deputy Secretary to the Govt. of India in the Ministry of Urban Employment & Poverty Alleviation certifies in each case that the said goods are for use in the Industry specified as above and recommend grant for exemption; and
2. The Importer furnishes to the Deputy Commissioner of Customs or the Assistant Commissioner of Customs, as the case may be, an undertaking to the effect that he shall use the goods for the purpose specified and in the event of his failure to do so, he shall be liable to pay an amount equal to the difference between the duty leviable on the said imported goods but for the exemption under the notification and that already paid at the time of importation.

Rate of custom duty to be paid on import of the above is 5%.

SERVICES OFFERED

BMTPC with its multi-disciplinary team promotes and facilitates technology and financial supports for establishment of industrial units for production of proven innovative building materials and components. Necessary support for development of new and environment friendly standardized materials/components based on agro-industrial wastes and energy conserving processes, is available for interested entrepreneurs and professionals. The Council also offers services in the area of building materials and construction technologies for the following:

- evaluation, validation of innovative technologies, and advice on cost effective options for choice of materials and technologies;
- documentation and dissemination of cost-effective materials, construction techniques;
- design and engineering consultancy for preparing technology profiles, location specific feasibility reports, and demand assessment reports for various building materials;
- design and technology options for housing and building schemes

based on use of innovative building materials and construction techniques;

- performance appraisal based on functional analysis of new building materials, products, components and construction systems; and
- selection and evaluation of foreign technologies.
- disaster resistant construction technologies.

BMTPC, in its interaction with various professionals, eminent architects, engineers, builders, technologists and decision makers in the fields of housing, building, road construction have noted a keen interest in them to adopt and promote innovative cost-effective materials, techniques and systems in their design and construction practice.

In order to ensure consistent and large scale availability of such cost-effective building materials and components, alternate and economical substitutes for costly conventional materials like cement, steel and timber, the Government is providing the required thrust by facilitating policy support in a number of ways. Some of these have been mentioned in other sections of this brochure.