

bmtpc



Strengthening Technological Base of Building Materials Industry

bmtpc

Building Materials & Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation, Government of India

Building Materials & Technology Promotion Council

Established in 1990 as an interministerial body, strives to promote innovative, cost-effective building materials and products through evaluation, validation of proven technologies, demonstration & large scale dissemination of information. The Council maintains a continuing interaction with R&D, standardisation institutions, industry, concerned associations/federations, industrial promotional agencies, financial institutions, construction organisations of public and private sectors and NGOs.

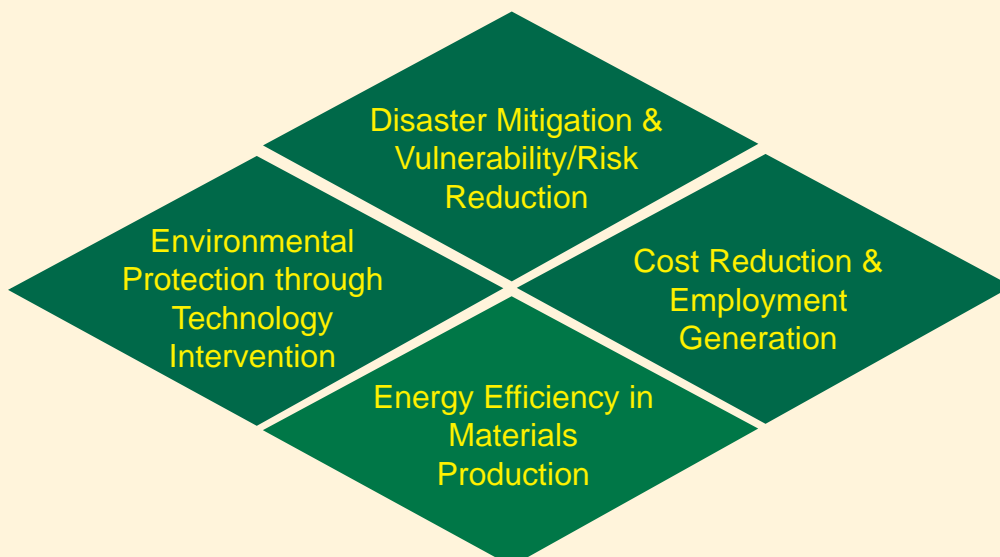
Mission Statement

Develop and operationalise a comprehensive and integrated approach for technology development, transfer and investment promotion to encourage application of environment-friendly & energy-efficient innovative materials, manufacturing technologies and disaster resistant construction practices for housing and building in urban and rural areas.

Objectives

1. To promote development, production, standardisation and large-scale application of cost-effective innovative building materials and construction technologies in housing and building sector.
2. To promote manufacturing of new waste-based building materials and components through technical support, facilitating fiscal concessions and encouraging entrepreneurs to set up production units in different urban and rural regions.
3. To develop and promote methodologies and technologies for natural disaster mitigation, vulnerability & risk reduction and retrofitting/ reconstruction of buildings and disaster resistant design and planning practices in human settlements.
4. To provide support services to professionals, construction agencies and entrepreneurs in selection, evaluation, upscaling, design engineering, skill-upgradation, and marketing for technology transfer, from lab to land, in the area of building materials and construction.

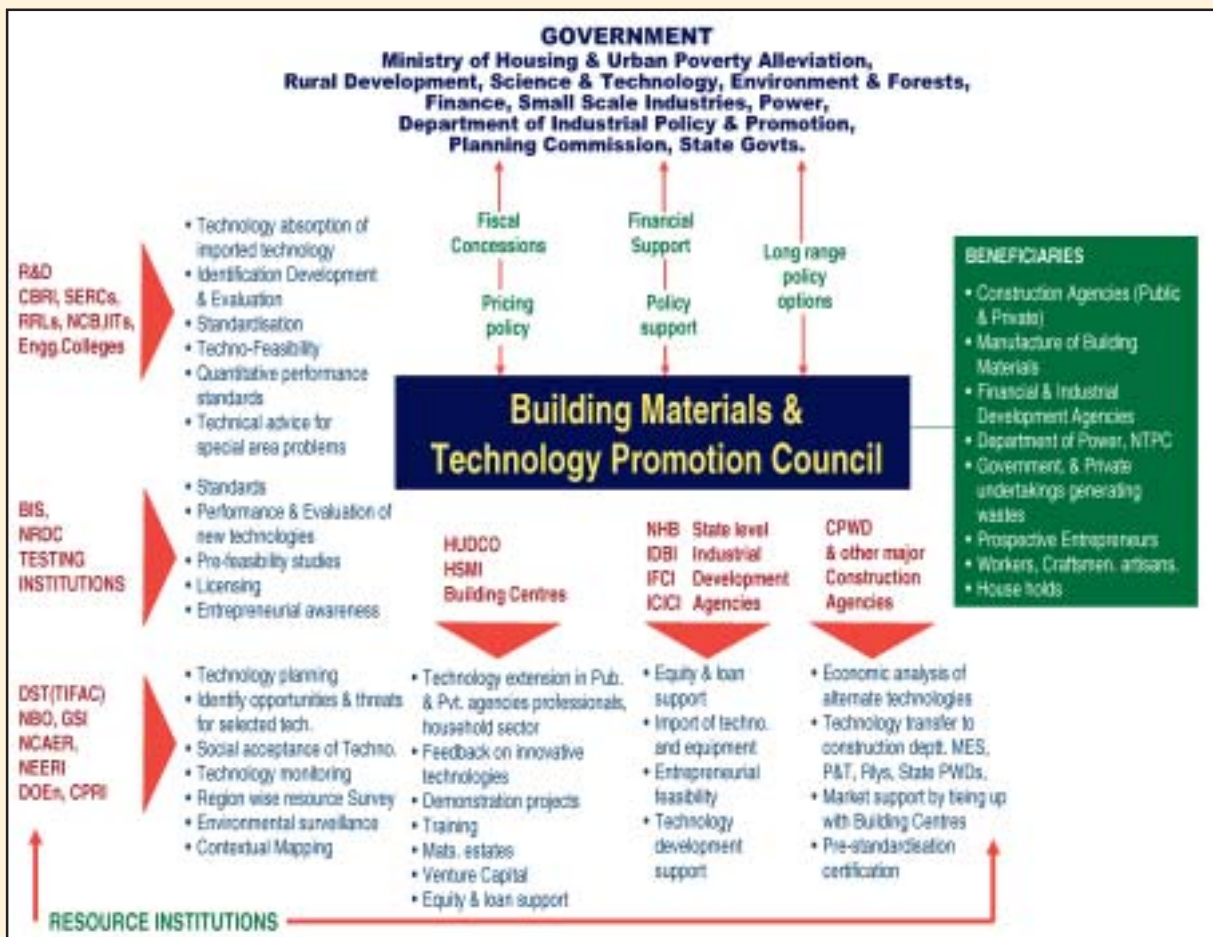
Focus Areas of Work



Support Services Offered

The Council with its extensive networking with various R&D Institutions, Ministries/Government Departments, Universities, Financial Institutions, Public Agencies, Business Federations/Organizations and various International organizations such as UNIDO, UNCHS, ADB, World Bank etc., strives to provide multifaceted support services to the various stakeholders in the construction industry.

- **Support for identification and development of technologies** and building materials based on agricultural and industrial wastes and promotion of proven technologies for rural and urban housing construction.
- **Advise entrepreneurs in technology selection**, prototype development, commercial production and marketing and extend appropriate support for training and development/upgradation of process/technologies and procuring equipment, etc.
- **Assist in arranging technology transfer** from other countries and selection and evaluation of foreign technologies.
- **Undertake Techno-Economic Feasibility Studies** and formulation of detailed Project Reports on innovative energy-efficient building materials/products and construction systems.
- **Assist in capacity building and skill development** through training of village artisans, craftsmen and help in production of simple building components using local materials, skills and manpower and to coordinate with national, state and local level institutions of periodic training and orientation courses for professionals like engineers, architects, town planners, contractors and construction managers for creating confidence in use of new materials and technologies.
- **Evaluation, validation, certification and standardization** of new building materials and construction technologies through Performance Appraisal Certification Scheme.
- **As a clearing house of technology transfer from lab to land**, through production and application and as repository of information on all types of building materials including conventional and newly developed, under development in India and abroad.
- **Persuade Central and State Government agencies**, housing development and construction agencies and organizations in private and community sectors for application of proven cost effective and energy-efficient building materials and construction technologies.
- **Rendering of design services on adoption and application of innovative building materials** and construction technologies in the housing projects and slum development programmes of Government, Public and Private agencies/bodies.
- **Undertake Rapid Damage Assessment Studies** of the disaster affected areas and to develop and promote disaster resistant construction technologies.
- **Advise on vulnerability and risk assessment** and on formulation of relief, reconstruction and rehabilitation programmes for disaster mitigation and assist in capacity building for disaster preparedness.
- **Recommend to Government for fiscal and other concessions** to be provided for promoting and scaling up new technologies and building materials.



Performance Appraisal Certification Scheme (PACS)

The Government of India, Ministry of Housing & Urban Poverty Alleviation has authorized BMTPC through Gazette Notification No. I-16011/5/99 H-II in the Gazette of India No. 49 dated 4th December 1999 to operate Performance Appraisal Certification Scheme (PACS). PACS is a third party operated voluntary scheme for providing Performance Appraisal Certificate (PAC) to a manufacturer/supplier/installer of a product which includes building materials, products, components, elements, and systems etc. after due process of assessment. The process includes:

- Establishing criteria of performance, if not available already.
- Verifying that the product conforms to the requirements for satisfactory performance, durability and safety;
- Operation of a Quality Assurance Scheme by the manufacturer/supplier/installer;
- Issue of PAC providing, amongst other things, necessary data to designers and users. The operation of PAC includes a mechanism for obtaining pro-active user feedback and user complaint redressal.

WHO CAN APPLY:

- Manufacturers / suppliers / installers of products
- Manufacturers/suppliers of machinery
- Construction agencies/installers - providing the system/product used is covered by "PACS"
- Installer of proprietary system
- Importers/Exporters of products / systems

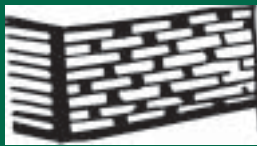
Choosing Cost Effective and Environment Friendly Materials

By and large, conventional building technologies like burnt bricks, steel and cement are high in cost, utilise large amount of non-renewable natural resources like energy, minerals, top-soil, forest cover etc. These increase dependence on external materials and manpower, harm the local economy and are generally polluting in nature.

The materials and technologies chosen for construction must, in addition to functional efficiency, fulfil some or more of the following criterion, for the cause of sustainability and a better quality environment:

- not endanger bio-reserves and be non-polluting;
- be self-sustaining and promote self-reliance.
- recycle polluting waste into usable materials
- utilise locally available materials
- utilise local skills, manpower and management systems
- benefit local economy by being income generating
- utilise renewable energy sources
- be accessible to the people
- be low in monetary cost

Walling



Flyash sand lime bricks/tiles, red mud bricks/tiles, compressed earth blocks, precast stone faced blocks, clay flyash bricks, solid/hollow concrete blocks, Fal-G bricks/blocks

Roofing



MCR tiles, red mud/bamboo mat corrugated sheets, ferrocement channels, funicular shells, adobe vaults, local stone, RCC planks & joists, filler slabs.

Flooring



Red mud tiles, precast concrete blocks, pavers, chequered/terrazo tiles.

False Ceiling



Aluminium rolled and extruded sections, gypsum fibre boards, MDF boards, bagasse boards, woodwool boards, bamboo mat boards, jute/coir composite boards.

Partitions



Plastic/PVC, MDF boards, gypsum fibre boards, rice husk boards, bagasse boards, bamboo mat boards, jute/coir composite boards.

Panelling



Particle boards, MDF boards, aluminium, wood and plastic composites, bagasse boards, bamboo mat boards, jute/coir composite boards.

Door Frames



Rolled steel, pressed steel, extruded aluminium, extruded PVC, Precast RCC, Ferrocement, rubber wood, poplar wood, jute composite.

Shutters



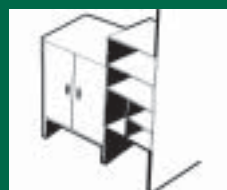
Red mud jute polymer/flyash polymer composites, ferrocement, steel, aluminium, MDF boards, cement fibre boards, rubber/poplar wood, densified fibre plates, jute/coir polymer composites, GRP.

Rafter/Purlin
















Ferrocement, steel, precast RCC, laminated wood, plastic components, bamboo.















Cabinets



RCC, ferrocement, MDF, various particle boards, bagasse boards, bamboo mat boards, jute/coir composite boards..

Building Materials from Recycled Waste

ITEM	SOURCE		Qty in MT/Yr.	Application in Building Material
Flyash	Thermal power stations		110	Portland pozzolana cement, bricks, lime pozzolona mixture, lightweight aggregate, cellular concrete, door shutters, blocks, tiles, kerb stone, controlled low strength flowable slurry, as partial replacement of fine aggregate in concrete
Blast furnace slag	Steel plants		11	Production of Portland blast furnace slag cement, super sulfate cement, as an aggregate in concrete, as substitute for sand, light weight concrete, Road Construction.
Cinder	Thermal power stations/ railways		1	Manufacturing of lime cinder mortar, production of concrete building blocks, production of bricks from black cotton soil.
Coal mine & washery waste	Coal mines		50	Manufacture of bricks, tiles, lightweight aggregates, fuel substitute in burning of bricks.
Copper tailings	Copper mines		3.84	For manufacture of stabilized and high strength ^o bricks, cellular concrete and masonry cement, Pressed burnt clay bricks, blended cement, calcium silicate bricks.
Gypsum mine	Gypsum mines		1.50	Gypsum building plaster, ready made plaster with lime.
Iron tailing	Iron ore mines		10.50	For making stabilized and burnt clay building bricks, high strength bricks, masonry cement, mortar, concrete
Kiln dust	Cement plants		2.00	In the cement industry, as a hydraulic binder.
Limestone waste	Limestone quarry		17.80	For production of masonry cement and activated lime pozzolona mixture.
Lime Sludge	Sugar, fertilizer, calcium carbide paper, acetylene		4	For the manufacture of portland cement , masonry cement, sand lime bricks, building lime pozzolona mixture.
Paper Waste	Paper, city garbage			For manufacture of pitch fibre pipes, asphaltic corrugated Roofing sheets, Egg/apple/fruit pack trays, pulp moulded packaging materials
Phospho-gypsum	Hydrofluoric/ phosphoric acid, amm. phosphate		4	For making gypsum plaster, fibrous gypsum boards and blocks, cement clinker, as a solid retarder and for making super sulfate cement.
Red mud	Aluminium extraction plant		3.50	For production of building bricks and tiles, lightweight structural blocks, roofing sheets and as an additive to concrete, Paint, Wood substitute, glass ceramic.

ITEM	SOURCE		Qty in MT/Yr.	Application in Building Material
Zinc tailings	Zinc mines		2.80	For making cellular concrete, sand lime bricks, precast blocks, concrete flooring tiles, calcium silicate bricks, as filler in mortar, plaster and precast concrete products, cement concrete tiles.
Bagasse	Sugar industries		90	For manufacture of insulation boards, wall panels, printing paper, corrugating medium and other non-permanent paper.
Waste glass	Glass plant			In the manufacture of mosaic and glazed tiles and lightweight aggregate, brick making, Glass silicate tiles, blunt sand.
Waterworks silts.	Waterworks Settings tanks.		10	For manufacture of structural clay product, lightweight bloated clay aggregate, high strength bricks.
Rice husk	Rice mills		20	As fuel, for manufacturing building materials and products for production of rice husk binder, fibrous building panels, bricks, acid proof cement
Banana leaves/stalk	Banana plants		0.20	In the manufacture of building boards, fire resistance fibre board.
Coconut husk	Coir fibre industry		1.60	In the manufacture of building boards, roofing sheets, insulation boards, building panels, as a lightweight aggregate, coir fibre reinforced composite, cement board, geo-textile, rubberised coir
Groundnut shell	Groundnut oil mills		11.00	In the manufacture of buildings panels, building blocks, for making chip boards, roofing sheets, particle boards.
Jute fibre	Jute Industry		14.40	For making chip boards, roofing sheets, door shutters.
Rice/wheat straw	Agricultural farm		12.00	Manufacture of roofing units and walls panel / boards.
Saw mill waste	Sawmills/ wood		2.00	Manufacture of cement bonded wood chips, blocks, boards, particle boards, insulation boards, briquettes
Sisal fibres	Sisal plantation		.023 (Asia)	For plastering of walls and for making roofing sheets, composite board with rice husk, cement roofing sheet, roofing tiles, manufacturing of paper & pulp
Cotton stalk	Cotton plantation		1.10	Fibre boards, panel, door shutters, roofing sheets, autoclaved cement composite, paper, plastering of walls
Marble dust	Marble Industry		6	Walling and flooring tiles, bricks and blocks

Glimpses of Some of the Innovative Materials

Historically composite building materials for housing and building needs were based on timber, bamboo, jute and a large variety of vegetable fibres such as reinforced mud-blocks for walls, panels for partitioning and roofing. In the modern context a vast variety of industrially produced composites have come into existence.

Search for stronger and stiffer fibres and feasibility to utilise widespread inorganic wastes and by-products have provided directions to the production and use of vegetable fibres, such as coir, banana, sunhemp, jute, sisal etc., as quite inexpensive and effective reinforcing fibres, and hydraulic binders as alternative to cements made of industrial wastes like flyash, waste limes, by-product gypsum and mine tailings. Technologies have been developed to manufacture building components and products which are environment friendly and energy efficient.

GRP / Composites Building Products

The Council in collaboration with RV-TIFAC Composites Design Centre, Bangalore, has successfully developed a number of GRP/composite building products - doors, door frames, window shutters and frames, wall/partition panels, staircase railings, roofing sheets, kitchen cabinets and other household furniture items etc.

GRP and composite materials, with their superior properties and lower costs, are the obvious choice for making building products in volumes. A number of units are manufacturing GRP products in India.



Bamboo Mat Corrugated Roofing Sheet

Recognising the urgent need for an appropriate and cost effective roofing technology for North-Eastern and other bamboo growing regions, and disaster prone areas, a technology for manufacture of laminated bamboo mat corrugated roofing sheets has been developed in collaboration with Indian Plywood Industries Research and Training Institute, Bangalore. The Bamboo Mat Corrugated Roofing Sheet are commercially available in the market.

This is an alternative for existing roofing sheets like corrugated A.C. sheets, G.I. sheets, Aluminium sheets, FRP, Red Mud and Asphaltic sheets.

These sheets are highly water and weather resistant and resistant to decay, termites and insects also.



Red Mud - a Resource for Building Componentes

During aluminium production, bauxite ore is digested with caustic soda, when most of the aluminium passes into solution as aluminate. The muddy red residue consists of alumina, iron oxide, titanium oxide and small quantities of silica, calcium oxide and alkali. India generates over 4 million tonnes of this by-product annually which is not otherwise put to any use.

Red mud is being used for making high quality exposable bricks, tiles, corrugated roofing sheets, and as binder for several useful products including composite doors, panels etc. These are commercially available.



Coir based Wood Substitutes

The natural fibres such as bamboo, coir, jute, etc., are used as biomaterial and possessing attractive engineering properties, they would be ideal choice for development of biodegradable and eco-friendly composites to substitute the natural wood.

The building industry can in many cases gainfully utilise coir for a variety of applications as wood substitute. The coir is being used in manufacturing of door shutters, paneling materials, ceiling, partitioning.

The products made from coir can be strong, lightweight and can also find easy aesthetic acceptance for use as exposed surfaces in residential and office interior construction.



Flyash based Building Components

72% of power generated in India is from thermal power stations. Ash content of 40-50% in coal generates nearly 110 million tonnes of flyash every year. Besides air and water pollution, the disposal of this flyash results in extensive land wastage.

Research & development indicates that bricks, portland pozzolana cement, sintered aggregates, tiles, light weight aggregates and solid/hollow blocks can be produced using flyash as raw material. The properties of the materials made from flyash have been found to be quite comparable with conventional materials for use in construction works. Besides these uses, flyash can be utilised for backfilling of mines, lining irrigation canals, agriculture, filling in road construction etc.



Open Prefab Systems for Small Building Components

Partial Prefabrication

Open prefab systems have attracted the attention of housing experts as an important option for arresting the rapidly rising escalation in the costs of material and labour. Building Centres in different regions of India have been instrumental in propagating several prefab systems at the grass-root level.

Partial prefabrication can be usefully employed for practically every part of a building - foundations, walling systems, doors and windows, roofing systems, lintels and staircase elements. Costs of a roof being one of the major components of the construction outlay in any building project, one of the thrust areas has been the prefabrication of roofing elements.



Machines Developed/Promoted for Production of Prefab Building Components

- | | | |
|---|--|--|
| 1. Alternate Station Hydraulic Brick Press (Model : AS-4/2) | Machine (Balram) (Model : MB-1) | Machine (Model : CJ-1) |
| 2. Bi-Directional Vibro Press (Model : AS-189) | 12. Compressed Earth Block Machine (Mardini) (Model : MB-2) | 21. RCC Joist Casting Machine (Egg laying Type) (Model : CJ-2) |
| 3. Bi-Directional Vibro Press (Model : AS-1818) | 13. Compressed Earth Block Machine (Hydraform) (Model : M-5) | 22. Ferrocement C-Beam Machine (Model : FB-1) |
| 4. Bi-Directional Vibro Press (Model : AS-1824) | 14. Ferrocement Wall Panel Machine (Model : WP-1) | 23. Micro Concrete Roofing Tile Machine (Model : MCR-1) |
| 5. Solid/Hollow Concrete Block Machine (Egg laying Type) (Model : CB-1) | 15. TNG Rural Housing Kit (Model : AS-1) | 24. Precast L-Panel Machine (Model : LP-1) |
| 6. Solid/Hollow Concrete Block Machine (Standing Type) (Model : CB-2) | 16. Ferrocement Roofing Channel Machine (Model : FCR-1) | 25. Terrazo/Chequered Tile Machine (Model : ASH-40) |
| 7. Concrete Block Machine (Sakar) (Model : CB-3) | 17. Precast RCC Plank Casting Machine (Model : CP-1) | 26. Precast concrete Door/Window Frame Machine (Model : CC-1) |
| 8. Stationary Block Machine (Model : ASH-168) | 18. RCC Plank Casting Machine (Rotating Type) (Model : CP-2) | 27. Combination Machine (Model : LP-2) |
| 9. Solid/Hollow Concrete Block Machine (Handheld Type) (Model : SVC-1) | 19. Precast RCC Plank Casting Machine (Egg Laying Type) (Model : CP-3) | 28. Multipurpose Stone Processing Machine (Model : SP-1) |
| 10. C-Brick Machine (Model : SL-1) | 20. Precast RCC Joist Casting | 29. Stone/Coal Disintegrator (Model : AS-1714) |
| 11. Compressed Earth Block | | 30. Bar and Pipe Cutting Machine (Model : AS-12) |

Field Level Applications of Innovative Building Materials and Construction Technologies

BMTPC in its endeavour to promote the use of innovative and environment-friendly building materials and construction technologies, embarked upon the field level application of innovative building materials and technologies by way of implementation of the housing projects under the VAMBAY Scheme, etc. and establishing Demonstration-cum-Production Centres for manufacture of cost-effective Building Components.



Promoting Indian Building Materials and Technologies in Other Developing Countries

The Council has made several efforts to popularise Indian technologies, technical know-how and expertise in other countries mainly in East African and Latin American regions. The Council has organised several Exhibitions, Workshops, Training Programmes, Seminars and Conferences supported by UNIDO and other international agencies in Uganda, Turkey, Kenya, Tanzania, Venezuela, Trinidad & Tobago and India. A large number of entrepreneurs from these countries have sought help in procuring technology from India for their housing programmes.

Current Project

The Ministry of Housing & Urban Poverty Alleviation, Government of India and United Nations Industrial Development Organization (UNIDO) is striving to promote technology transfer and investment in the area of building materials for low cost housing based on local resources. The Memorandum of Understanding (MoU) for furthering the objectives of the cooperation programme was signed on 12th January 2004 in Vienna, Austria. Further, a Project titled “**Inter-Regional Programme on Capacity Building for Transfer of Energy-Efficient and Eco-Friendly Technologies and Promotion of Local Investments in the Area of Materials based on Local Resources for Low Cost Housing in Africa, Asia and Latin America**” under a Trust Fund Agreement is being implemented. The Government of India and its organisations Building Materials and Technology Promotion Council (BMTPC) and Housing & Urban Development Corporation (HUDCO) is providing substantial support to UNIDO in the implementation of this project. The major objectives of the project are:

1. To bridge the technology divide between the acute needs in shelters, particularly for low-income strata of the developing countries, and the existing technology base for production of materials based on local resources for low cost housing in selected African, Asian and Latin American countries.
2. To build up national institutional, technical and managerial/entrepreneurial capacity to speed up the delivery of new technologies and innovations.
3. To foster North-South and South-South cooperation and partnerships amongst research, industrial and business communities.

The project will strengthen technological cooperation in:

- Building up the capacities at institutional and enterprise levels for productive employment and technology transfer and adoption.
- Protecting environment by utilisation of renewable resources.
- Promoting energy saving technologies.
- Encouraging competitive enterprises to gain access to profitable markets, especially in the alternative materials sector.



Disaster Mitigation and Management Activities

Recognising that large areas of the country are under constant threat of natural disasters like earthquakes, cyclones, floods and landslides, BMTPC has been taking several initiatives to provide technical and policy support for improving the level of preparedness against the fury and forces unleashed by frequent occurrences of natural hazards. Now BMTPC is on the forefront of national effort of disaster mitigation and preparedness.

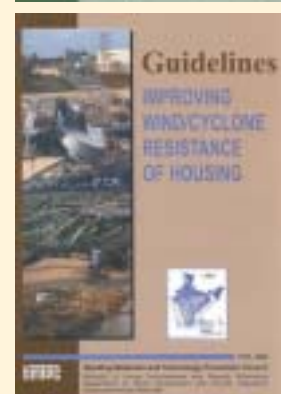
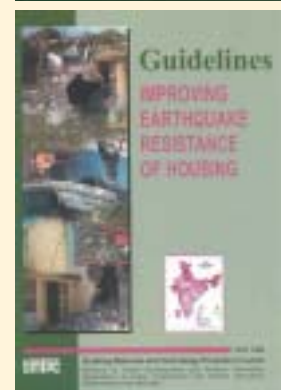
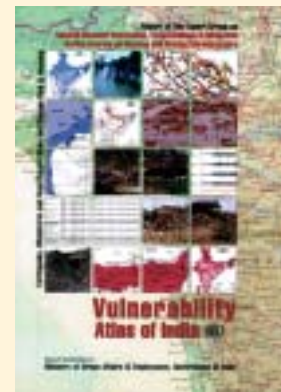
One of the significant contribution has been preparation of the Vulnerability Atlas of India which includes hazard maps w.r.t. earthquake, flood and cyclone and district-wise risk tables. Alongwith the Vulnerable Atlas, recommendations were brought to strengthen techno-legal regime through necessary modification in Land Use Zoning, Building Bye-Laws, Development Control Rules and Town & Country Planning Acts. Apart from publishing Landslide Hazard Zonation Atlas of India Guidelines, Technical Manuals and Do's and Dont's for Improving Earthquake and Cyclone/Wind Resistant Housing has also been brought out.

BMTPC undertook Rapid Damage Assessment Studies of nature and extent of damage to buildings after the earthquakes of Uttarkashi (1991), Latur (1993), Jabalpur (1997), Chamoli (1999), Kutchch (2001), cyclones of Tamil Nadu, Kerala, Andhra Pradesh in 1994 and cyclone in East & West Godavari districts (1996), Gujarat (1998) and floods in Punjab, Haryana (1996). State Governments are being assisted in amending their Building Bye-laws and Development Control Regulations for safety against Natural Hazard by organising Technical Workshops under a programme of Ministry of Home Affairs.

Under Capacity Building Programme in Partnership with Gujarat State Disaster Management Authority, 445 public buildings like schools, health centres, community centres were retrofitted and 478 new model houses were constructed spanning over 5 districts of Kachchh, Rajkot, Jamnagar, Surendernagar and Patan. Training were also provided to 5500 masons and 50 field engineers in construction of building using disaster resistant technologies and retrofiting of damaged buildings.

Apart from the above, BMTPC is playing important role for the following:

- Awareness generation for disaster resistance construction.
- Assessment of vulnerability of different types of buildings
- Retrofitting and strengthening of existing buildings and construction of demonstration buildings.
- Guidelines for retrofitting and construction of buildings
- Emphasizing the need to amend and regular reviewing of the building byelaws.
- Capacity enhancement of Urban Local Bodies to enforce compliance of techno-legal regime.
- Capacity building through training of artisans, masons, supervisors.



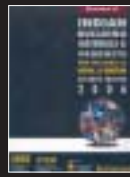
Video Films of BMTPC

1. MAKAN HO TO AISA *15 min.*
2. ABHIVARDHAN *30 min.*
3. A BETTER WAY TO BUILD *25 min.*
4. AASHRAY *28 min.*
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20. BUILD A SAFER TOMORROW ON CD ROM *12 min.*
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22. TECHNOLOGIES FOR POVERTY ALLEVIATION *7 Min.*
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23. BMTPC - PROTECTING HOMES AND LIVES *15 Min.*

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DIRECTORY OF INDIAN BUILDING MATERIALS & PRODUCTS (with information on Nepal & Bhutan) 2006
550 pages, Rs. 1000 + 200 postage



VULNERABILITY ATLAS OF INDIA (1997) - Earthquake, Windstorm and Flood Hazard Maps and Damage Risk to Housing. 712 pages, Rs. 3000 + 200 postage - State and Union Territories - wise
VULNERABILITY ATLASES - Rs.800 + 75 postage for each



BUILDING MATERIALS IN INDIA - 50 YEARS - 560 pages, Rs.1500 + 200 postage



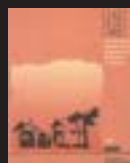
LANDSLIDE HAZARD ZONATION ATLAS OF INDIA - Landslide Hazard Maps and Cases Studies, 125 pages - Rs.2500 + 200 postage



HOUSING AND KEY BUILDING MATERIALS IN INDIA - A LONG TERM PERSPECTIVE - 98 pages, Rs. 700 + 75 postage



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INSTRUCTION MANUAL FOR APPROPRIATE BUILDING SYSTEMS 64 pages, Rs. 150 + 75 postage



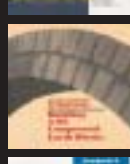
GUIDELINES FOR DAMAGE ASSESSMENT AND POST EARTHQUAKE ACTION - JABALPUR (Three Parts) - Rs. 250 + 75 postage for each part



PRECAST BUILDING COMPONENTS - 28 pages, Rs. 150 + 30 postage and packing



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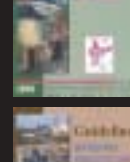
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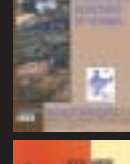
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ARCHITECTURE OF SAARC NATIONS. 196 pages, Rs. 250 + 75 postage

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