Representative designs of energy-efficient buildings in India

Tata Energy Research Institute

Ministry of Non-conventional Energy Sources

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Printed by
Multiplexus (India)
94, B D Estate, Timarpur
Delhi – 110 054

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Preface

A penny saved is a penny earned, they said. So with joules of energy! With recent exponential increases in energy pricing, the formerly neglected or underestimated concept of energy conservation has swiftly assumed great significance and potential in cutting costs and promoting economic development, especially in a developing-country scenario.

Reckless and unrestrained urbanization, with its haphazard buildings, has bulldozed over the valuable natural resources of energy, water, and ground cover, thereby greatly hampering the critical process of eco-friendly habitat development.

However, it is not too late to retrace the steps. The resource crunch confronting the energy supply sector can still be alleviated by designing and developing future buildings on the sound concepts of energy efficiency and sustainability.

Energy efficiency in buildings can be achieved through a multipronged approach involving adoption of bioclimatic architectural principles responsive to the climate of the particular location; use of materials with low embodied energy; reduction of transportation energy; incorporation of efficient structural design; implementation of energy-efficient building systems; and effective utilization of renewable energy sources to power the building.

India is quite a challenge in this sense. N K Bansal and Gernot Minke (1988), in their book entitled *Climatic Zones and Rural Housing in India*, have classified Indian climate into six major zones: cold and sunny, cold and cloudy, warm and humid, hot and dry, composite, and moderate. Translation of bioclimatic architectural design in the Indian context, therefore, provides a plethora of experiences and success stories to learn from. Several buildings have come up, fully or partially adopting the above approach to design.

Detailed information on 41 such building projects, representing different climatic zones of India, is available in the book titled *Energy-efficient buildings in India*. These projects are selected on the basis of their integrated approach to energy-efficient design.

The book will prove to be of interest and of benefit to practising architects, building designers and scientists, engineers, urban planners, architecture students, municipal authorities, policy makers, and concerned citizens. We expect the book to serve not only as a handy reference document but also as a source of inspiration to correct our building concepts and practices. This booklet carries synopsis of 15 representative projects.

Introduction

Buildings, as they are designed and used today, contribute to serious environmental problems because of excessive consumption of energy and other natural resources. The close connection between energy use in buildings and environmental damage arises because energy-intensive solutions sought to construct a building and meet its demands for heating, cooling, ventilation, and lighting cause severe depletion of invaluable environmental resources.

However, buildings can be designed to meet the occupant's need for thermal and visual comfort at reduced levels of energy and resources consumption. Energy resource efficiency in new constructions can be effected by adopting an integrated approach to building design. The primary steps in this approach are listed below.

- Incorporate solar passive techniques in a building design to minimize load on conventional systems (heating, cooling, ventilation, and lighting)
- Design energy-efficient lighting and HVAC (heating, ventilation, and air-conditioning) systems
- Use renewable energy systems (solar photovoltaic systems / solar water heating systems) to meet a part of building load
- Use low energy materials and methods of construction and reduce transportation energy

Thus, in brief, an energy-efficient building balances all aspects of energy use in a building – lighting, space-conditioning, and ventilation – by providing an optimized mix of passive solar design strategies, energy-efficient equipment, and renewable sources of energy. Use of materials with low embodied energy also forms a major component in energy-efficient building designs.

A publication, titled *Energy-efficient buildings in India*, has been published to provide thorough insights into energy-efficiency aspects of 41 projects from various climatic zones of India. Drawn from this publication, this booklet carries synopsis of 15 representative projects. Each project highlights the energy-efficiency measures adopted by the architects.

Himurja office building, Shimla

Office building for Himachal Pradesh Energy Development Agency with active and passive solar retrofits

Project details

Location Shimla, Himachal Pradesh
Building type Office building
Climate Cold and cloudy
Architects Arvind Krishan and Kunal Jain
Owner/client Himachal Pradesh Energy Development Agency (Himurja)
Year of completion 1997
Built-up area 635 m^2
Cost The initial cost of the building was estimated at Rs 7 million (without incorporation of passive or active solar measures). Additional amount of Rs 1.3 million was incurred due to incorporation of passive and active solar measures. Thus there was an increase of 18.6% over initial cost by adoption of these measures. The high additional cost is attributed to the fact that solar systems were retrofitted onto an already constructed building.

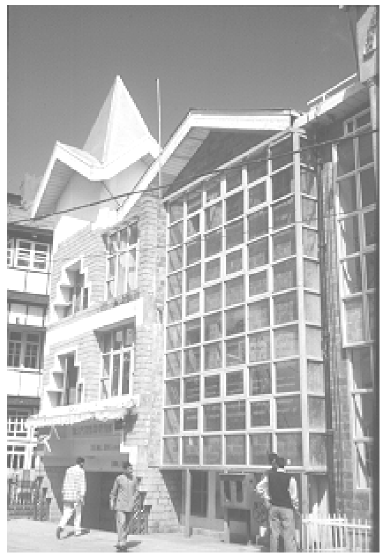
Design features

- Air heating panels designed as an integral part of the south wall provide effective heat gain. Distribution of heat gain in the building through a connective loop that utilizes the stairwell as a means of distributing heated air
- Double-glazed windows with proper sealing to minimize infiltration
- Insulated RCC diaphragm walls on the north to prevent heat loss
- Solar chimney
- Specially designed solarium on south for heat gain
- Careful integration of windows and light shelves ensures effective daylight distribution
- Solar water heating system and solar photovoltaic system

Himachal Pradesh State Co-operative Bank, Shimla

Innovative combination of solar passive and active systems for a predominantly day-use building to cut down heating needs during winters

Project details



Location Mall Road, Shimla, Himachal Pradesh
Building type Office building
Client/Owner Himachal Pradesh Co-operative Bank
Architect Ashok B Lall
Climate Cold and cloudy
Local Architect C L Gupta
Energy consultant S S Chandel, Principal Scientific Officer and Coordinator, Solar House Action Plan Himachal Pradesh, State Council for Science, Technology, and Environment.
Year of start/completion 1995–1998
Built-up area 1650 m² (about 35% is heated by solar air heating system)
Total area of solar air heating panels 38 m²
Cost of entire system Rs 1.1 million (includes AHU, electrical back-up, blower, ducting controls)
Electrical back-up 3 × 15 kW (in 3 stages)
Blower 4000 cfm (constant speed)
Brief specifications The external walls are 23-cm thick masonry construction with 5-cm thick glass wool insulation. The windows are double-glazed and the total area is about 155 m². The roofing is made of corrugated galvanized iron sheeting.
Total building cost Rs 22 million (including solar passive and active features). The initial cost of the bank building without incorporation of passive solar measures was Rs 12 666/m², which was increased by Rs 680/m² to Rs 13 346/m² thus resulting in 5.6% increase in cost due to incorporation of passive solar measures

Design features

- Sunspaces on the southern side
- Solar wall on the southern side
- Specially designed solar air heating system – solar heat collector on roof-top with duct system for supply to various rooms
- Double-glazed windows
- Air-lock lobby at the main entrance

LEDeG Trainees' Hostel, Leh

The trainees' hostel uses various types of direct and indirect heat gain systems. Each system has been monitored and the performance results help the designer in choosing the appropriate system for new buildings

Project details

Project description Hostel building for trainees in appropriate technology
Architect Sanjay Prakash
Climate Cold and sunny
Consultants In-house
Project period 1994–1996
Size 300 m^2 covered area in a small campus
Client/Owner LEDeG (Ladakh Ecological Development Group)
Builder/Contractor Owner-managed construction

Design features

- Traditional materials and methods of construction have been modified and adapted to achieve energy efficiency
- Predominantly south exposure with no overhangs for maximum winter gains.
- Entrance lobby designed as a solarium on the south side.
- Bedrooms provided with various types of Trombe walls (half Trombe, unvented Trombe, vented Trombe) or direct gain systems for passive heating.

Transport Corporation of India Ltd, Gurgaon

An office building in the composite climate of Gurgaon with a climate- responsive built-environment to take advantage of seasons and thereby facilitating reduction in energy consumption.

Project details

Site address No. 69, Sector 32, Institutional Sector, Gurgaon, Haryana
Architects A B Lall Architects
Climate Composite
Year of start/completion 1998/99
Client/owner Transport Corporation of India Ltd
Total built-up area 2750 m²
Cost:
Infrastructure (electrical, plumbing, HVAC, lift, fuel oil tank, pumps andtubewells) – Rs 24 million
Civil, false ceiling, strong rooms, steel pergola at entrance – Rs 30.7 million
Landscaping – Rs 0.35 million

Design features

- Inward-looking compact form, with controlled exposure
- Two types of windows designed: peep windows for possible cross-ventilation and view, the other being for daylighting
- The courts towards which the building has more transparency have structural framework to provide support for shading screens
- Landscaping acts as a climate modifier
- The window reveals of the peep window cut out summer sun and let in winter sun
- Adjustable Venetian blinds in double window sandwich to cut off insulation and allow daylight
- Polyurethane board insulation on wall and roof
- Fountain court with water columns as environment moderator
- Building systems designed so as to draw upon external environment to supplement the air-conditioning system
- Eco-friendly absorption technology adopted for air-conditioning
- Careful planning of air distribution system
- Air-conditioning standards set by acceptance level of office staff and not by international norms
- Energy-efficient lighting system and daylight integration with controls
- Optimization of structure and reduction of embodied energy by use of less energy-intensive materials

Redevelopment of property at Civil Lines, Delhi

Passive devices and innovative construction methods are a winning combination in these residential units

Project details

The project explores the possibility of responding more deliberately to climatic factors in a dense setting.

Building type Residential
Climate Composite
Location It is located in the Civil Lines area of Delhi where large open plots of land are being subdivided and redeveloped to provide more upper-middle income housing
Architect Ashok B Lall
Built-up area 1687 m^2
Year of completion 1999

Design features

- Orientation of the building to cut off solar insolation during summer and let in winter sun
- Design of sections to let in winter sun into the first-floor rooms on the north side of the house
- Terraces with skylights that admit winter sun
- Insulated walls using innovative construction sandwich
- Sunshading reduces heat gain
- Courtyard design
- Roof finished with China mosaic and is insulated using 30-mm thick polyurethane board insulation above the RCC slab
- The courtyard roof is the main climate-responsive device acting as a large evaporative cooler over the central space of the house. All rooms communicate with this space
- Conventional mosquito-proof evaporative cooler housed on the roof
- External windows are designed with double rebates
- The west house has a wind-driven evaporative cooler

Dilwara Bagh, Country House for Reena and Ravi Nath, Gurgaon

A country house in the vicinity of Delhi uses traditional Indian architectural principles and methods of construction to provide updated requirements of an international lifestyle

Project details

Project description Country house for a couple with two children
Architects Gernot Minke and Sanjay Prakash
Climate Composite
Consultants In-house
Project period 1992–1996
Size 206 m² covered area in a plot of about 16 000 m²
Client/owner Reena and Ravi Nath
Builder/contractor Architect-cum-owner managed construction

Design features to suit seasonal needs

Summer

- Reduction of heat gain by
  - air cavity in walls and roofs
  - earth berms
  - shading by overhangs and louvres
  - shading by vegetation (trees and creepers)
- Increase of heat loss by
  - cross-ventilation
  - cooling through evaporation by water surfaces and plants (except during monsoon)
  - cooling through earth tunnel system

Winter

- Increase of heat gain by
  - direct gain through windows
  - underground earth tunnel
- Reduction of heat loss by
  - air cavities
  - compact building form

All seasons

- Balancing of tempera-ture through thermal mass of walls and floors
- Balancing of indoor air humidity by earth walls (adobe)
- Increase of daylight by reflecting stone louvres in all windows
- Balancing of microclimate through water and vegetation

RETREAT: Resource Efficient TERI Retreat for Environmental Awareness and Training, Gurgaon

A powerful and effective combination of modern science and traditional knowledge

Project details

Project description 30-room training hostel with conference and ancilliary facilities
Climate Composite
Building type Institutional
Architects Sanjay Prakash and TERI
Year of start/completion 1997–2000
Client/owner Tata Energy Research Institute, New Delhi
Covered area 3000 m²
Cost of the project Civil works - Rs 23.6 million; Electrical works - Rs 2.5 million; Cost of various technologies - Rs 18.54 million

Design features

- Wall and roof insulation
- Building oriented to maximise winter gains; summer gains offset using shading
- East and west walls devoid of openings and are shaded
- Earth air tunnel for rooms – four tunnels of 70-m length and 70-cm diameter each laid at a depth of 4 m below the ground to supply conditioned air to the rooms
- Four fans of 2 hp each force the air in and solar chimneys force the air out of rooms
- Ammonia absorption chillers for the conference block
- Hybrid system with 50 kW biomass gasifier and 10.7 kWp solar photovoltaic with inverter and battery backup to power the building
- 2000 lpd building integrated solar water heating system
- Energy-efficient lighting provided by compact fluorescent lamp, high efficiency fluorescent tubes with electronic chokes.
- Daylighting and lighting controls to reduce consumption
- Waste water management by root zone system
- Building monitoring and management system

Solar Energy Centre, Gual Pahari, Gurgaon

Demonstration of passive and active solar systems and use of innovative fenestration design to achieve thermal and visual comfort in a institutional-cum-residential complex

Project details

Site 200 acres of land in Gurgaon
Climate Composite
Building types Institutional/residential
Architect Vinod Gupta
Building/project name Solar Energy Centre
Year of start/completion 1984–1990
Client/owner Solar Energy Centre, Government of India
Covered area 6943 m²
Cost of the project Rs 15.5 million (excluding cost of renewable energy technologies)

Design features

Technical and administrative block

- Courtyard planning with single-loaded corridors for ventilation and landscaped courtyard to modify microclimate
- Hollow concrete block walls to reduce heat gains
- Properly designed windows and shading devices
- Provision for rooftop evaporative cooling
- Insulation for air-conditioned blocks

Workshop building

- Building section developed for ventilation and daylighting
- Heat gain by the roof minimized by insulation and reflective roof finishes

Guest house

- Built on the south slope of an undulating site, and partially earth-bermed from three sides.
- Terrace garden is watered during the summer months. The evaporation of water modifies the microclimate and also absorbs a major part of the cooling load in summer.
- A special section of the roof provided with manually-driven ventilators to ensure cross-ventilation of each guest suite.
- External surfaces of the building finished with white reflective paint
- Windows protected by arched sunshades (overhangs and sidewalls) of predetermined dimensions to avoid direct sun during summers.
- Solar water heaters integrated with the architectural design have been provided for each bathroom.
- A sunny terrace provided near the kitchen to facilitate solar cooking.

Sangath – an Architect's Studio, Ahmedabad

Sangath – spatial, constructional and landscape response to combat hot and dry climate of Ahmedabad. Various passive solar architectural techniques have been adopted to negate the impact of harsh sun

Project details

Building/project name Sangath – an Architect's Studio
Location Ahmedabad
Building type Institutional
Architect Balkrishna Doshi
Climate Hot and dry
Year of start/completion 1979–1981
Client/owner Balakrishna Trust
Site area 2346 m^2
Covered area 585 m^2
Cost of the project Rs 600 000 (1981)

Design features

- Underground construction
- Thermal storage walls
- Vaulted roof form to create efficient surface/volume ratio. The vault induces convective air movement thereby cooling internal spaces
- Vaulted roof of sandwiched construction with an insulating layer of locally made clay fuses sandwiched between two concrete slabs
- Use of broken China mosaic glazed tiles from local factory as top finish for the vault to reflect heat
- Daylighting by north-glazing, skylights, and roof cutouts
- Microclimate modified by vegetation and water bodies
- Rainwater and roof tank overflow water harnessed for recycling and reuse

Torrent Research Centre, Ahmedabad

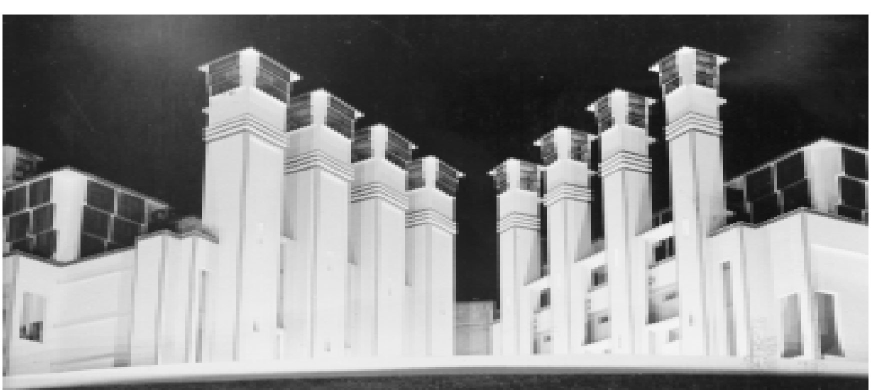
Torrent Research Centre demonstrates innovative technological solutions to cut down space-conditioning and artificial lighting loads without compromising on required levels of thermal and visual comfort

Project details

Building type Complex of research laboratories with ancilliaries
Architects Nimish Patel and Parul Zaveri, Abhikram, Ahmedabad
Energy consultants Brian Ford, Brian Ford and Associates, London, UK (for the typical laboratory block in all aspects); C L Gupta, Solar Agni International, Pondicherry (for the rest of the blocks, vetting Abhikram designs)
Project period 1994–1999
Climate Hot and dry
Client/Owner Torrent Pharmaceuticals Ltd
Size Built-up area of approximately 19 700 m^2

Design features

- Design maximizes the use of locally available natural materials and avoids the use of synthetic materials.
- RCC-framed structure with brick in-filled walls, with glossy enamel paint on cement/vermiculite plaster on the internal surface.
- Vermiculite, a natural mineral, is extensively used for the insulation in roof and cavity walls to achieve the required R-values, along with cement–brickbat-based waterproofing
- PDEC (passive downdraft evaporative cooling) system has been designed and adopted for space conditioning of the building.
- Daylight integration has been made for reducing energy usage.
- Innovative use of half-round ceramic pipes, on the outer face of the inlet and exhaust shafts of the PDEC system, to reduce the entry of larger dust particles by creating local turbulence.



Residence for Mahendra Patel, Ahmedabad

This house depends on solar energy to a great extent. Minimally relying on the grid for power, the architect has also integrated the house with an automation system for the purpose of saving energy

Project details

Building/project name Residence for Mahendra Patel
Site address 15, Kairvi Society, Bodakdev, Ahmedabad
Building type Residential
Climatic zone Hot and dry
Architect Pravin Patel
Year of start/completion 1996/97
Client/owner Mahendra Patel
Built-up area 550 m^2
Cost of the project Rs 21 million (This includes construction work, finishes, solar systems, electrical works, security systems, air-conditioning systems, and interior work)

Design features

- A connected load of 18 kW is used to fulfil the client's need without compromising on any comfort
- Air-conditioning load reduced from 36 to 26 tonnes by passive solar interventions
- Fly ash bricks are used for masonry work
- External walls and roof are insulated
- Windows are with double glass shutters
- Walls are finished with white paint, which reflects heat
- There are 1.2 metre projections all round the building that work as service ducts to carry all the utility services like electricity, water supply, fan coil units for air-conditioning, and also as a shading device
- Problem of air and light quality is eliminated by provision of north light and fresh air unit at the top of the entrance hall
- Solar photovoltaic and solar water heating systems are used
- Building automation system is used to minimize energy wastage

Residence for Mary Mathew, Bangalore

At a time when human relationship with the ground and sky is cut off by multi-storeyed high-rise energy guzzlers, the Mathew house makes a case for the urban house with a traditional garden court, determined by limitations of space, affordability, and climate

Project details

Building/project name Residence for Mary Mathew
Site address 2 Temple Trees Row, Viveknagar Post
Bangalore – 560 047
Building type Residence-cum-office
Climate Moderate
Architects Nisha Mathew and Soumitro Ghosh
Year of start/completion August 1995 to June 1996
Site area 237 m^2
Total floor area 236 m^2
Total cost Rs 1.1 million

Design features

- Natural lighting is extensively used in the north-east and north-west by hollowing out courtyards, which become permanent sources of light and ventilation.
- Roof insulation was provided by using a roof system of precast hollow terracotta curved panels with nominal G I reinforcement. A nominal layer of concrete of only 2-inch thick at the crown of panel was poured into place. The hollow terracotta layer works as heat-resisting layer.
- A thick 'wall' on the southern/south-western side, which comprised largely masonry surface within which were located the services such as toilets, pantry, kitchen work space, and servants' room. The depth of the south-west wall was used to shield the heat and provide pockets for openings located on this 'wall' to pull in south-west breeze.

Office building of the West Bengal Renewable Energy Development Agency, Kolkata

This office building showcases passive solar architectural principles for warm and humid climate. Well-lit and naturally ventilated round the year, this building also boasts of a 25-kW peak grid interactive solar photovoltaic system

Project details

Building type Commercial (Office building)
Location Kolkata
Climate Warm and humid
Architect Gherzi Eastern Ltd
Energy consultant TERI (Tata Energy Research Institute), New Delhi
Year of completion 2000
Client/owner West Bengal Renewable energy Development Agency
Plot area 10 895 m²
Built-up area 2026 m²
Total project cost Rs 16.3 million, excluding the cost of solar photovoltaic system and air-conditioning

Design features

- Space planning done so as to reduce air-conditioning loads.
- Ground surface facing southern and eastern sides of the building to be covered with grass.
- Use of vegetation and water bodies to be encouraged as a modifier of microclimate.
- Office spaces naturally lit by way of raised roofing with low e-glass and light shelves.
- Proper design of shading device to cut off direct gains and let in daylight.
- Removal of internal heat by incorporating ventilation device.
- Energy-efficient lighting with integration of daylighting.
- 25-kW_p grid-interactive solar photovoltaic system for meeting major part of the building load

Office-cum-laboratory for the West Bengal Pollution Control Board, Kolkata

An office building in a tight urban setting that uses innovative planning and detailing to achieve energy efficiency

Project details

Project description Partially conditioned office building on a busy traffic intersection in Kolkata.
Building/project name Office-cum-laboratory building for West Bengal Pollution Control Board
Climatic zone Warm and humid
Building type Office-cum-laboratory building
Architects Ghosh and Bose & Associates Pvt. Ltd
Energy consultant TERI (Tata Energy Research Institute), New Delhi
Year of start/completion 1996–1999
Client/owner West Bengal Pollution Control Board
Built-up area 4500 m^2

Design features

- Optimum orientation of planform
- Solar passive features include optimum window disposition and sizing to allow maximum daylighting, while minimizing adverse thermal effects
- Switching circuits for lights have been designed based on a computer-simulated lighting grid
- Energy-efficient lighting techniques have been adopted
- Shading devices are specifically designed for different wall orientations to control the glare and also reduce the thermal load on the building
- Techniques evolved to treat waste water

Vikas Apartments, Auroville

Resource efficiency and community participation are key to energy efficiency. It has been aptly demonstrated in this building, which has used climate-responsive building design and elements, appropriate building technologies, renewable energy technologies, and waste management techniques. Efficiency is being maintained at end-use by conscious use of various resources and systems

Project details

Project description 23 residential apartments housing 50 people, and common facilities
Building type Residential
Climate Warm and humid
Built in area 1420 m²
Architect Satprem Maini
Period of construction 1992–1999

Design features

- Buildings oriented longitudinally along the east–west axis with openings along the north–south for cross-ventilation and reducing summer gains. Pier walls oriented at 45 degrees to the predominant wind direction further aid cross ventilation
- Partly sunken buildings with adequately daylit basement floors (1.2 m deep) that are cool in summer (earth stabilizes internal temperature)
- Soil excavated for construction used in making earth-blocks
- Solar chimneys integrated with the building structures creating a natural draft that add to the ventilation
- Fenestration with overhangs adequately designed to get enough daylight and cut off direct gains
- Terrace gardens and creepers on the west façade reduce cooling loads
- Energy-saving compact fluorescent lamps of 9 W and 6 W used for lighting

Government of India
Ministry of Non-Conventional Energy Sources

Solar Building Programme

Objective

The objective of the Solar Buildings Programme is to promote energy efficient building designs by optimum use of available solar energy (and other forms of ambient energy) in building energy management.

Programme Components

Research & Development

R&D projects are sponsored to universities, research organizations and other institutions with the objective of developing suitable design techniques and concepts, software packages, materials, architectural instruments, thumb rules etc. for solar efficient buildings.

Training & Education

Workshops and seminars are being organized with the financial assistance from the Ministry throughout the country for creating awareness, generating public interest and providing inputs about the technology to engineers, academicians, scientists, planners, builders, students, consultants, housing financing organizations and potential house owners. Orientation courses are being organized for architects and builders to make them familiar with the new developments and to motivate them for adopting solar efficient building design concept.

Awareness Programme

This programme envisages creating awareness about the technology through publication of popular literature, books for architects and designers, general publicity through various media etc.

Demonstration Programme

To demonstrate the concept of solar buildings, the Ministry accepts proposals for solar building projects for construction from government and semi government organizations generally through State Nodal Agencies. To encourage these organizations for constructing their new buildings on the basis of solar design principles, the Ministry provides the following partial financial assistance:

(a) Preparation of Detailed Project Reports (DPRs)

50% of the cost of DPR of a building designed with the help of solar building design principles or 1.5% of the estimated cost of the building with a maximum of Rs.50,000 for each project.

(b) Construction of Solar Buildings

Limited to 10% of the cost of the building with a maximum of Rs. 10,00000 for each project.

About TERI

A dynamic and flexible organization with a global vision and a local focus, TERI was established in 1974. While in the initial period the focus was mainly on documentation and information dissemination activities, research activities in the fields of energy, environment, and sustainable development were initiated towards the end of 1982. The genesis of these activities lay in TERI's firm belief that efficient utilization of energy, sustainable use of natural resources, large-scale adoption of renewable energy technologies, and reduction of all forms of waste would move the process of development towards the goal of sustainability.

A unique developing-country institution, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to helping shape the development of the Indian oil and gas sector; from tackling global climate change issues across many continents to enhancing forest conservation efforts among local communities; from advancing solutions to growing urban transport and air pollution problems to promoting energy efficiency in the Indian industry, the emphasis has always been on finding innovative solutions to make the world a better place to live in. However, while TERI's vision is global, its roots are firmly entrenched in Indian soil. All activities in TERI move from formulating local- and national-level strategies to suggesting global solutions to critical energy and environment-related issues. It is with this purpose that TERI has established regional centres in Bangalore, Goa, and Guwahati, and a presence in Germany, Moscow, and Japan. It has also set up affiliate institutes: TERI–NA (Tata Energy and Resources Institute, North America), Washington DC, USA, and TERI–Europe, London, UK.

TERI celebrated its silver jubilee in February 2000. With a staff strength of around 500, drawn from multidisciplinary and highly specialized fields, and offices and regional centres equipped with state-of-the-art facilities, TERI has come a long way in these 25 years. As the Institute has grown in size and reach, so have its activities grown and diversified, and TERI is now the largest developing-country institution working to move human society towards a sustainable future. And, well on its way to becoming a cybercorp, it makes effective use of the latest developments in modern information technology in both its in-house and outreach activities.

Today, TERI is poised for future growth, driven by a global vision and outreach, with a philosophy that emphasizes and assigns primacy to enterprise in government, industry, and individual actions.