Himachal Pradesh State Cooperative Bank

Shimla, Himachal Pradesh, India

Solar Passive and Active Designs for energy efficiency

Nasruddin Nazerali, 2006

Concept of Building

- **Innovative combination of solar passive and active systems for a predominantly day-use building to cut down heating needs during winters** (*Representative Designs of Energy Efficient Buildings in India*, Ministry of Non-conventional Energy Resources and Tata Energy Research Institute, 2001)

- Institutional Framework: **State Council for Science, Technology and the Environment**, HP http://himachal.nic.in/hpscste/solar.htm 10/24/06

  "HP first state in the country to introduce solar passive building technology for the design & construction of Govt. & Semi Govt. buildings on large scale. The Council has formulated a **Solar House Action Plan** in May 1994, which is being supported by **Ministry of Non-Conventional Energy Sources**, Govt. of India."

  "The Council is coordinating the **Solar Passive Building Program** in Himachal Pradesh in collaboration with **HP Public Works Department**, **HP Housing and Urban development authority** (HIMUDA) Board & other organizations"

Design Process and Implementation

- Client/Owner: HP Cooperative Bank
- Architect: Ashok B. Lall
- Local Architect: C.L. Gupta
- Energy Consultant: S.S. Chandel, Principal Scientific Officer and Coordinator, Solar House Action Plan, HP CSTE
- Start-completion: 1995-1998
- Total building cost: Rs 22 million ~ USD 500,000. Solar passive component 5.6% increase in cost.

> "A **Technical Project Management Cell** [TPMC] has been set up in the Council to provide technical inputs to the state housing agencies for the implementation of policy decision & solar house action plan for HP
>
> Financial Incentives: Under the **Solar Passive Building Program**, the **Ministry of Non-Conventional Energy Sources** (MNES), Government of India, provides incentive of Rs. 50,000 for the preparation of the **Detailed Project Report** (DPR) for a solar passive building. The additional cost for solar passive buildings is met by the MNES, limited to 10% of the cost of the building or Rs 10 lakh (USD 20,000) per building. These incentives are available only in Govt./ semi Govt. sector."

Major Design Features

1. Sunspaces on the southern side
2. Solar wall on the southern side
3. Solar air heating system: solar heat collector on roof-top with duct system for supply to various rooms
4. Double glazed windows
5. Air-lock lobby at the main entrance

Economic Considerations

- Built-up area of 1650 m² (35% heated by solar air heating system)
- Total area of solar air heating panels 38 m²
- External walls 23-cm thick masonry with 5-cm thick glass wool insulation. Windows double-glazed. Total area 155 m². Roofing corrugated galvanized iron sheeting.
- Electrical back-up 3 × 15 kW (3 stages)
- Blower 4000 cfm (cubic ft of air/min)
- Ducting

  - ***Cost of entire system***: Rs 1.1 million ~USD 25,000
  - ***Total building cost:*** Rs 22 million ~ USD 500,000
    - "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"

Economic Considerations

- Council operates consultancy service for small fees to private owners
- Incremental costs 5–10% recovered in energy bill savings in 5–7 years

Conclusion

- The institutional setting in India is different from that of the U.S.
  - More government involvement
  - More focused approach

Sources

- *Representative Designs of Energy Efficient Buildings in India* Ministry of Non-conventional Energy Resources and Tata Energy Research Institute, 2001
- Solar Passive Building Technology in Himachal Pradesh http://himachal.nic.in/hpscste/solar.htm 10/24/06
- Arizona Solar Center, Solar Architecture, Passive Solar Heating & Cooling Manual http://www.azsolarcenter.com/design/pas-2.html 10/24/06