

## **BRIEFING NOTE**

**Centre for Science and Environment (CSE), New Delhi  
Punjab Energy Development Agency (PEDA), Government of Punjab**

**Chandigarh, December 11, 2012**

# **Orientation Workshop on Agenda for Sustainable Buildings**

## **Stringent grassroots action needed in cities to curb resource guzzling in the building construction sector**

- **Punjab cities and Delhi that represent high growth areas in India, need second generation action to scale up greening of the building construction sector to curb energy and resource guzzling.**
- **Compared to other sectors electricity consumption shows highest growth rate in the residential and commercial building sector of Punjab. The energy and overall environment impact of the construction boom can be severe.**
- **Delhi and Punjab cities would need aggressive action plan for scalability of action. Nationally, even less than 3 per cent of the built up area are certified green today.**
- **Without resource efficiency measures frenetic building construction will severely affect liveability of cities. Nationally, residential and commercial building guzzles more than 40 per cent of energy in India. 70 per cent of building stock that will be there in 2030 is yet to be built in India.**

In the coming decade, the building-construction sector is going to boom: both residential and commercial buildings will increase several fold. This will have enormous impact on the quality of urban space, water and energy resources in cities, and waste generation. Unless guided with right principles for selecting locations, architectural design, appropriate choices of building material, operational management, and strong monitoring, the building sector can make cities unliveable. The cities of Punjab and Delhi are high growth areas in India's north and need strong technical and administrative preparedness to curb the environmental fallouts of the aggressive building construction that is underway.

This workshop, organized by the New Delhi-based research and advocacy body Centre for Science and Environment (CSE) in association with the Punjab Energy Development Agency (PEDA), focused on the energy challenge of this sector. A meeting of stakeholders, the workshop was addressed by Karan A Singh, principal secretary to the government of Punjab, Department of Science & Technology, Environment and Non-Conventional Energy; Bhawana Garg, special secretary, Department of Science, Technology and Environment, government of Punjab;

and Anumita Roychowdhury, executive director in charge of research and policy advocacy at CSE, New Delhi.

### **Real estate boom in Punjab is an opportunity for sustainability**

In Punjab, real estate is like a magnet for investment. According to the Associated Chambers of Commerce and Industry in India, Punjab attracted Rs 4.97 lakh crore worth of investment in 2011. The real estate sector accounted for close to half -- 49.7 per cent -- of total live investments. Projects include 26 ongoing mega housing projects by private developers covering 4,404.78 acres of land; seven more such projects covering about 978 acres are under process. The Punjab Urban Development Authority is also executing a number of residential projects of its own, while a number of malls, hotels, IT parks, medi-cities and educational institutions are underway. In Ludhiana alone, 11 new malls are under construction.

This growth is expected to get a further boost from the expanding townships in the region. The Punjab government has additionally sanctioned funds for integrated development of 147 cities. The state has notified master plans of 32 cities, 72 local planning areas and 147 towns. Punjab would be the only state with master planning for all its urban centres.

New development in the region will also occur in suburbs and new towns. More than half to 95 per cent of the new buildings will come up in resource-stressed suburbs and new townships. IDFC's *India Infrastructure Report 2009* states -- the size of private 'integrated' townships ranges from 100 to over 1000 acres and nationally more than 200 such townships covering more than 200,000 acres are under approval for planning and construction. Touted as *Walk to Work Green Towns*, the new towns are sprouting across the country without clear green benchmark, implementation strategy or strong regulatory safeguards. .

While individually buildings have substantial impact on the surrounding environment, cumulatively and together they make significant impact on the urban environment. In India buildings are responsible for 40 per cent of the energy use, 30 per cent of the raw material use, 20 per cent of water use, and 20 per cent of land use. At the same time it causes 40 per cent of the carbon emissions, 30 per cent of solid waste generation, and 20 per cent of the water effluents.

Despite being a major resource predator, the sector is poorly regulated. There are some green building regulations, especially those for energy efficiency. But these require aggressive and scaled up implementation.

Keeping all this in mind, the state offers an opportunity for integrating the principles of sustainability.

### ***First generation action initiated in both Delhi and Punjab cities***

Grassroot action on green buildings has begun to take roots in Punjab cities as well as in Delhi. Over the last few years, both the Punjab and Delhi governments have initiated action or have proposed action on green buildings.

### **First generation action in Punjab cities**

-- Issuing of state draft of the ECBC for public comment – code to be implemented by April 2013  
 -- PEDDA conducted investment grade audit of 24 Government/Public buildings identifying 15-20% energy saving potential in these buildings. Energy audit has also been carried out for two big institutions i.e. Punjabi University, Patiala and National Institute of Pharmaceutical Education and Research (NIPER), Mohali covering all areas such as building, water pumping, street lighting, sewerage pumping etc. having saving potential of 1.21 MU and 0.51 MU respectively.

- Annual Energy Saving Plan for Commercial Buildings in Punjab has been prepared through Energy Efficiency Services Limited (EESL). There are about 1344 commercial buildings having connected load of more than 100kW which includes government buildings, hospitals, educational institutes, malls, cinemas, hotels etc. The overall annual energy saving potentials in the commercial building sector has been estimated to be 25% (114MU) of the total consumption.
- Procurement of energy-efficient lights for offices, guest houses, colonies and thermal power stations.
- Since 2006, mandatory use of solar water heating systems, compact fluorescent lamps and BIS marked pumpsets in government and private buildings
- Since 2007, incandescent bulbs replaced with CFLs in all government buildings and offices

### **First generation action in Delhi**

- Cool roof programme initiated
- Implementation of ECBC in government buildings to bring down average energy use by 25-40 per cent
- One of the targets in Enhanced Energy Efficiency Mission is to retrofit 100 existing buildings with area above 10,000 sq ft to make them energy efficient.
- Delhi secretariat to be converted into a green building. About 15 more government buildings have been identified
- Solar water heater system mandatory in industries, hotels, hospitals, nursing homes, hotels, canteens and residential buildings having an area of 500 sq meter. Grant of subsidy worth Rs 6,000 for purchase of solar water heater etc
- Proposal for a solar city in the NDMC area

### **Issues for the second generation action**

**Cities must ensure effective resource savings:** Household need significant energy savings to derisk against growing energy crises. With more efficient lighting, ventilation, air conditioning, refrigeration and architectural design it is possible to save 30-70% of energy. The 2010 McKinsey estimates confirm that the national power demand can be reduced by as much as 25 percent in 2030 by improving energy efficiency of buildings and operations. The Bureau of Energy Efficiency has also stated that even existing buildings have the potential to save 30-50 percent of energy.

Both Punjab and Delhi are charting the roadmap for the implementation of the energy regulations especially energy code for building construction (ECBC). New and existing buildings can be made more energy-efficient using a combination of passive and active design measures and operations. Energy use can be cut by about two-thirds. Improving the performance of appliances and equipment in the building can get more savings. This must be scaled up more aggressively. This demands strong institutional framework and technical capacity building in urban local bodies. Suitable fiscal incentive and regulatory push is needed to encourage the market to move beyond the minimum requirements of ECBC and maximize energy savings. Also promote quick measures like cool roof.

**Appropriate and sustainable material:** Green building demands appropriate selection of building material that are locally appropriate, locally available and have low embedded energy. This needs to complement innovative architectural design. In 2012, Supreme Court order enforcing new environmental control guidelines issued by the Ministry of Environment and Forest (MoEF) related to mining and brick kilns has led to shortage of construction materials like sand, gravel and bricks in Punjab. The prices of materials have also increased by almost 30% thereby increasing the investment required for any construction activity. This may be looked at as an opportunity to use alternate building materials. A new policy expected in Punjab in December 2012 is expected to incorporate measures to promote the use of green materials for sustainable buildings.

**Ensure quick uptake of energy efficient appliances in households:** With rising income levels ownership of household appliances is growing very rapidly. A study by Pune-based think-tank Prayas Energy shows that given the income levels in India the major initial spurt will be in basic appliances like fans and televisions as more households will move up the income ladder. Though smaller in volume compared to fans and televisions, the air-conditioning market is already galloping at 25 per cent a year. Bureau of Energy Efficiency has already implemented energy rating of key appliances.

**Avoid rebound effect. Ensure behavioural change:** Even as efficiency of appliances improves increased multiple ownership of even efficient appliances like refrigerators, televisions can lead to more energy use. Similarly, retailers may increase lighting use. Global studies show that people are careless about usage after they install efficient lights. It is estimated that they may lose up to 12% of the expected energy savings by leaving them on longer. Similarly, those who buy an efficient furnace lose up to 30% because they raise the thermostat. Therefore, as a policy it is important to use a range of other energy indicators to influence and track energy usage like absolute figures on total usage, per person per year, per square meter per year. Household level targeted metering, auditing, incentives linked with energy billing may help to stimulate behavioural change.

**Improve poor people's home as well:** Not just resource efficiency in rich person's home. Green measures are needed to improve comfort and efficiency of poor peoples' home as well. Rajiv Awas Yojana (RAY) earmarks 20-25% of developed land in all housing projects (both public and private agencies) for EWS/LIG with cross-subsidization. Architectural and material innovations are needed to improve thermal comfort and efficiency of poor peoples' home as well.

**Need performance monitoring and reporting actual building performance:** Green building regulations may remain a non-starter if post construction monitoring is absent or weak. There are strong concerns about the actual performance of the buildings. Even in cases where green rating systems have been promoted with government back up and incentives there is no record of the actual performance of the buildings and the nature of resource efficiency measures applied. There is no information and data on buildings in the public domain. Cities in Maharashtra, NOIDA among others are allowing extra built up area, tax concessions etc to incentivise green rating of buildings. But these incentives are not linked with actual performance of the buildings. This has made evaluation of the performance of the rated buildings almost next to impossible. Any programme that is built with official backing must be transparent and accountable. Without proper performance monitoring green rated buildings can perform worse than the standard buildings as is evident in the US and other countries.

**Affordable and quality energy-efficient solutions must be adapted to local contexts:** Green building policies have created enormous market opportunity for innovation in energy efficient technology. Market is abuzz with green building products for lighting, insulation, glazing and glass. Wall insulation products or insulated roof tiles are competing intensely with claims of going beyond the requirements of ECBC. While technology is an opportunity, its inappropriate selection and application can make things go awry. Climatic conditions – temperate, warm and humid, composite and hot and dry, govern the choice of material and design.

But often the construction industry push for material and architecture from the west that are not appropriate Indian climate. For instance, craze for glass in composite hot climate, leads to unacceptable heat ingress and increased use of energy intensive air conditioning. But ECBC allows a maximum wall-to-window ratio (WWR) of 60 per cent. This does not differentiate between various climate zones or between conditioned and non-conditioned buildings.

Also for instance, increased demand of air conditioned building is adding to need of insulation. This is pushing for high performance insulation products and use of expensive, imported and environmentally

inappropriate materials. The insulation materials in the Indian market include mineral wool, rock wool, vermiculite, foams expanded polystyrene, extruded polystyrene among others. Like glass wool, rockwool can be harmful. Thermocol (polystyrene) is less stable, releases gases in an unavoidable process of degradation that affects all plastics. Buildings may reduce usage of high performance insulation and harmful products by following a system approach using many natural and passive cooling methods -- sun shades, ventilation, and innovative insulation methods to keep structures cool and comfortable.

### **Public policies at the city level must push for energy-efficient practices**

Cities in the region will have to work with a wide variety of policy tools. These include regulatory and institutional reforms, change in building permits requirements, metering policies, energy efficient rules for rental markets, transparent information on resource efficiency, energy bills based on individual uses and GHG emissions etc. Ensure measurable results from post-occupancy valuation of buildings to go as feedback to developers and users. Performance based monitoring and compliance. Initiate:

- Audit energy performance of buildings
- Star labeling systems for buildings
- Enforce increasingly strict building energy codes
- Subsidies for high performance buildings
- Sub-metering controls and charging according to use
- Requirement for zero net energy, etc
- Awareness for owners, project developers, tenants
- Capacity building for developers, architects, engineers and building trades to improve understanding of code requirements,
- Promote onsite renewable generation for new low-rise buildings.
- Introduce process incentives for developers for integrated design approaches achieving high energy efficiency

**Improve public acceptance of green buildings and build public support:** Demystify green building measures and build public support and acceptance of these programmes. Tell people what “works” and what “doesn’t work” in terms of energy-efficient and water-saving strategies for homes. Inform people about the rate of return on costs for energy-efficiency and water-conservation products and appliances. Build support for green buildings. Tell people what “works” and what “doesn’t work” in terms of energy-efficient and resource saving strategies for homes. Tell them about the rate of return on costs for energy-efficiency and appliances. People must know where to find information on options, prices and Suppliers. Deepen understanding -- how individual decisions to conserve water and energy add up to overall savings that benefit the community. Resource efficient city development can happen without compromising economic growth.