PREFACE

There is no question that India and other parts of the still-under construction world must build green. The building sector is a major contributor to climate change and local environmental destruction – because of construction materials used; energy expended for lighting, heating and cooling; water consumption; and waste discharge. This is the threat. The opportunity is that most of India is still un-built – over 60 per cent of the building stock is still to be constructed. So, unlike the rest of the already developed world, the problem is not to retrofit the already built to make it green. The opportunity is to build new, which is efficient and sustainable.

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This is an issue that has been troubling us at Centre for Science and Environment. Over the past years, we have found increasing activity around the idea of green buildings – everybody, it seems, has turned a new leaf. Across the country, large and small constructions are advertised as greenest of green. To prove that they are indeed environmentally friendly, the business of certification has also grown. There are agencies that now simulate the performance and based on certain parameters, rate and award stars to individual buildings. This is not all. Many state governments are stepping ahead to make these same standards of green-ness mandatory. Some are even providing incentives, like exemptions on property tax or higher Floor Area Ratio (FAR) to those buildings that qualify as environmentally friendly. So, in many ways, you could argue that this sector has now sorted out the environmental problems and is on track.

I agree that all this is important and needs to be done. But the question still remains: do we know what green means?

When we began asking this question, what surprised us was the hostility with which it was received. Nobody, it seemed, wanted the new God to be questioned. Nobody wanted to be asked something as simple as what was the post-commissioning performance of a green building. We realised that the interests – of architects, builders, auditors and certifiers – in this new industry were already entrenched. It was a cozy club and nobody was keen

to give us entry, let alone membership.

But this was not good enough. The fact is that buildings are key to a cleaner and greener future. The building sector uses, already, some 40 per cent of the country's electricity generation. This will only grow. So, every effort made to reduce energy intensity of buildings will go a long way. We wanted to know what was happening and what more could be done to reduce the material use footprint and emissions of every construction in the country. We dug in our heels.

What we found is not a convenient truth.

First, the general approach is to first build wrong and then 'fit' in the green feature almost as an afterthought.

Take the glitzy, glass-enveloped buildings popping up across the country. It does not matter if you are in the mild but wet and windy climate of Bengaluru or in the extreme hot and dry climate of Gurgaon: glass is the in-thing. I have always wondered how buildings using glass extensively could work in such varied climatic zones, where one needs ventilation.

Here the story becomes interesting. The Energy Conservation Building Code (ECBC) has specified prescriptive parameters for constructing an energy-efficient building envelope – the exterior façade of a building. The façade, based on the insulation abilities of the material used for roof and wall construction, will reduce heat loss. It will also reduce energy use if it allows daylight in. It is, therefore, important for any green building to have the right material for its exterior.

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But this is not all that ECBC specifies. It goes on to set a wall-window ratio and fixes the area of the building envelope that can be covered with glass at 60 per cent. This implies that a building can be green and energy-efficient if it is covered by glass. The code then goes on to define the insulation and energy-efficiency specifications of glass that should be used. In this way, double-glazed or triple-glazed glass, which is solar reflective, is preferred as it provides superior thermal performance. In other words, glass built on certain superior and high specifications can reduce the heat gain of a building. ECBC, thus, endorses extensive use of glass and promotes high-performance and expensive glass, which is manufactured by a few high-end companies.

Then, we started reading that glass was green. Buildings liberally using glass were being certified green. How come? Small wonder glass manufacturers are making hay in this sunshine. Saint-Gobain Glass incidentally (or not) is also the founding member of the Indian Green Building Council, promoted by industry association CII which does green rating of buildings. Green rating is built for their business to thrive.

This would still have been acceptable had this prescription worked. But first, builders cut corners in the use of expensive reflective material. Glass traps heat, therefore, buildings require more air-conditioning. Energy requirement goes up. Secondly, even when double- or triple-glazed glass is used there is evidence that in India's extremely hot climate it does not work so well. A recent study by IIT-Delhi in Jodhpur, Delhi and Chennai found that energy use increased with increase in glazed area, irrespective of the glass type used in the building. The conclusion was that the glass curtain wall made of expensive reflective glass did nothing to cut energy costs as compared to ordinary glass.

We also forget that natural light in India is a glare, unlike in parts of the Western world where glass is used to reduce energy use for lighting. So, even if theoretically the use of glass optimises daylight, it remains a function of how much is used, where and how. For instance, the use of glass – of whatever glazing – in the south and west facades of a building will be bad in terms of thermal transfer. Then, even if you use glazed or tinted glass, where 50 per cent of solar heat gets reflected off the surface, 65 per cent of the visible light is transmitted into the building. Heat transfer may be reduced but the harsh light filters through. Buildings then need blinds to cut glare, again adding to the use of artificial light and increasing energy cost.

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What would work better is building protection against direct glare. Go back to the old fashioned methods of providing shades on windows. And do not build tight and sealed buildings, which do not optimise use of natural ventilation and breeze to reduce air-conditioning needs in certain periods of the year. In fact, glass necessitates air-conditioning, and so buildings become energy-guzzlers. The irony is that these buildings still qualify for a green tag when the air-conditioning system used in glass-cased constructions is more efficient. Build badly and then sugarcoat it, is the principle. Clearly, we need more appropriate and inventive architecture.

Secondly, we find that codes are being pushed through government and municipal schemes without any evidence that green-certified buildings are actually working. Noida awards a five per cent extra floor area for green-certified buildings; the MoEF provides fast-track clearance to such buildings. But data on the performance of the green buildings after they have been commissioned, was till very recently, not even disclosed. So, even though rating agencies say that green-certified buildings save between 30 per cent and 50 per cent of the energy and reduce water consumption by 20-30 per cent, they do not have corroborating data to verify the claim.

Thirdly, all these so-called green technologies end up hiking the costs to

the extent that buildings become unaffordable to most. This is not what we need. We need building standards that are appropriate and cost-effective. We need to make sure that green architecture is not a barrier to inclusive growth in our countries.

It is for this reason that we need to bring old knowledge to the table. It is not as if traditional building sense was inappropriate or unsustainable. In fact, traditional architecture is based on the principle of 'localising' buildings so that they can optimise natural elements and be efficient in resource use. This 'science and art' of engineers for nature needs to be infused with the new material knowledge of modern architecture.

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It is also a fact that many architects, engineers and builders are innovating with this old-new science. They are engineering buildings for our future. This is the knowledge we need to gather so that we can build the practice of affordable and sustainable buildings. It is also clear that this knowledge will evolve. So much is already happening in different parts of the world, including ours, to experiment with materials, energy and water. The task is to keep learning from each other so that every next building takes the knowledge to new heights.

This will be our effort. We hope you will join us in making this work.

– Sunita Narain