

Editorial

The building sector accounts for almost 40% of global greenhouse gas emissions. India, a country that is planning the construction of megacities to accommodate its booming economy, is meeting this challenge with the development of building regulations. Until today, there has been no building code for residential buildings in India. The **Indo-Swiss Building Energy Efficiency Project (BEEP)** helped to change this. The Indian and Swiss members of the BEEP team have provided the Indian government with expertise to develop a first Indian code for energy-efficient residential buildings.

Building codes have enormous potential for sustainable development, in particular because developing and emerging countries will continue to experience rapid urbanisation in the next few years. In India, the total building floor area is expected to double by 2035. A key BEEP objective is to help reduce the enormous demand for the energy used to cool buildings, which has increased five-fold in the last seven years.

But achieving the goal of the Paris climate agreement to limit global temperature rise to below 2 degrees Celsius above pre-industrial levels will require efforts beyond India. The SDC has therefore joined the Global Alliance on Buildings and Construction and the Energy Efficiency in Emerging Economies programme. This will provide opportunities to share the experience gained through the BEEP with emerging countries with climatic conditions similar to India's. BEEP is an important example of how local experience can contribute to national and international efforts to achieve global goals.

Tatjana von Steiger, Deputy Head of Global Cooperation Department, SDC

BETTER BUILDINGS EQUAL LESS POLLUTION: THE SDC SUPPORTS INDIA IN ITS EFFORTS TO COMBAT CLIMATE CHANGE



Architectural projects supported or awarded by the BEEP project are flourishing all over India, such as the latest hospital (top) to open in Pune, a city located 150km east of Mumbai. © BEEP

The SDC has become a major actor in energy-efficient construction in India over the past ten years. It has been working alongside the authorities and hundreds of architects, industrialists and property developers to help construct several innovative buildings and create new markets. The SDC-funded project is also developing the country's first regulatory framework for the construction of residential buildings.

Lofty declarations aside, what practical action can we take to limit global warming and, ideally, reach the Paris Agreement goal of a maximum two degrees temperature increase by 2100? By reassessing how we construct

buildings, argues the SDC. Although the idea itself isn't new – think Minergie, developed in Switzerland – it becomes all the more relevant if it can help the ever-growing construction industry in the Global South.

Built-up areas to double by 2035

The buildings sector is one of the largest energy-consuming and, therefore, polluting sectors – responsible for 39% of global CO2 emissions alone. In addition to the energy required to produce the construction materials themselves, the amount of energy needed for equipment and use of the buildings must also be taken into account. Air conditioners are the main culprits there. Even if they are only used by a tiny minority in India (see article on page 3), they use a vast amount of energy. Considering that most local electricity in India is produced by coal-fired power stations, the resulting pollution is eight times higher than if an equivalent amount were produced in Switzerland. Adding to the challenge is the fact that built-up areas in India are set to double by 2035, less than 20 years from now. And many other emerging countries are showing the same construction frenzy.

The Indian government has enlisted the help of the SDC, which already has long-standing experience in India's energy sector. The SDC has now been fully committed to the issue of energy-efficient building in India since 2008. The declared objective is to contribute to the limitation of global warming, knowing that the effects of the latter harm in the first place the most deprived. Another argument put forward is that better energy efficiency inevitably leads to lower operating costs and higher comfort for those who cannot afford air conditioners.

Twenty-two building models

The SDC has launched the Building Energy Efficiency Project (BEEP) with various academic and technical partners from Switzerland and India. The approach focuses on 'learning by doing'. Technical workshops on rethinking how commercial, public and private buildings are designed have taken place in different Indian cities, with engineers, architects, façade specialists and property developers taking part. To date, 22 construction projects have been launched and more

than 1,500 building professionals have expanded their knowledge bases. "The whole challenge is in convincing developers that with just a few adjustments to the design of a building early on you can substantially improve comfort at no extra cost," says Ashok B. Lall, an Indian architect who has been involved in BEEP from the start.

And what are these adjustments? This basically involves the external envelope (walls) of buildings, the size of glass surfaces, and moveable items (blinds, shutters) that should go on the front of external walls to limit solar radiation and, consequently, the extreme heat that this can cause inside buildings in most of the country from March onwards. Pierre Jaboyedoff, one of BEEP's co-project heads, doesn't hesitate to call the surge in huge glass towers all over India an 'energy crime' with the mercury regularly soaring to 45 degrees Celsius in the height of summer. "Many Indian property developers are contributing to an Americanisation of the local culture by offering well-off clientele projects out of catalogues that are totally unsuited to this country..."

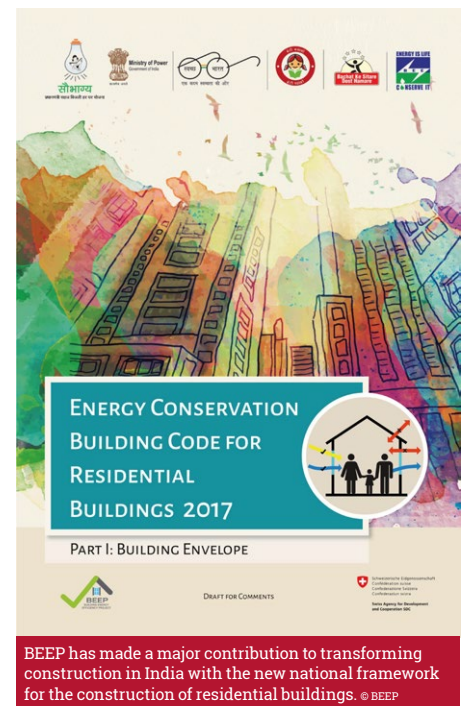
BEEP also opposes this trend for the sake of environmental conservation. The venture isn't just about sharing technical knowledge and experience among specialists – the Indian authorities are also closely involved, particularly the Ministry of Power and the Bureau of Energy Efficiency underneath it. At the local level, India's states and municipalities have also opened their doors to BEEP specialists.

Regulatory framework for residential buildings

In July 2017, BEEP was asked to develop the first national energy conservation building code for the construction of residential buildings based on a number of guidelines and manuals produced earlier by the BEEP project (an equivalent code for commercial buildings has existed since 2007). Five months later, BEEP submitted its document to the Bureau of Energy Efficiency for a

broad-based consultation. "We worked day and night to come up with this text, negotiate the points and then finalise it," remembers Jaboyedoff. "The end result is a great recognition of the work and ideas of our combined Swiss and Indian expertise."

The application of the new national code would entail a heat reduction of around 20%, which would result in 20 to 40% less energy needed to cool down the building interior. According to the specialists, the new code is very easy to use and can be applied to both simple and complex buildings. And it has huge potential in terms of energy savings for a country like India. "Hopefully, the code and standards we have listed will eventually become binding to obtain a building permit," Jaboyedoff continues. But the challenges are real and, as in Switzerland, there are multiple layers of state authority in India. For Lall, time is of the essence. "Without decisive political rulings, developers won't change their mail-order buildings any time soon..."



Alternatives to air conditioners

It is well known that air conditioners are major polluters, given the massive amount of electricity they consume. But there is another fact that does not receive much attention: half of the world's population cannot actually afford one. In India, less than 10% of the population gets to breathe in this luxurious air.

In this context, BEEP's 'thermal comfort' goal has a clear social dimension. The SDC-funded project is involved in designing energy-efficient affordable housing with cool interiors, even without air conditioners.

There are several ways to ensure that the people living in the buildings feel comfortable. Instead of reinforced concrete for the exteriors, cellular concrete is used. The lower parts of the windows are opaque, so as

to limit the sun's rays penetrating into the buildings. And, ideally, an external moveable shading system is installed to complete the whole package. But these have to be accepted in the first place... "Surprisingly, many people don't want any of these protective features because they're worried they might fall off," notes Pierre Jaboyedoff.

Five moveable wall prototypes

In order to change people's mindsets and establish new approaches at the national level, BEEP is looking to support the research and development of five moveable shading device prototypes and how to produce them locally. At the same time, over the course of one year the project team will test a low-power ventilation/cooling system installed in a new commuter town in Rajkot,

the fourth-largest city in the state of Gujarat. The Indian Ministry of Power will also sponsor an annual nationwide competition and award for the best building designs.

BEEP is using a range of outreach measures to make people aware that stifling indoor conditions are not inevitable. "Making sure consumers are better informed is another great way to put pressure on the market to turn around," hopes Ashok B. Lall. ■

Three questions for... Samhita Madanagobalane

An architect by profession, 38-year-old **SAMHITA MADANAGOBALANE** heads a consultancy firm that promotes energy saving in building projects.



What do you think about the upswing in energy-efficient buildings in India?

When you think that we just started in the 2000s, we can be quite proud of our progress so far. A lot of regulations have been put in place and we have access to innovative technologies. More

people – professionals and customers – are realising that designing a building well from the outset doesn't make it more expensive. But there is still a lot to be done in terms of implementing the well-intentioned decisions that are taken at the highest level.

What is your track record with energy-efficient building?

I worked on an eco-friendly kindergarten and primary school concept in Chennai. The school has now been built and can take in up to 900 pupils. I owe a great deal to the BEEP team, who gave us useful guidance on improving the school's energy performance when we contacted them. Because we included ventilation shafts in the design at the very beginning, for example, the school can save on air conditioning for four months during peak

summer temperatures, whereas the rest of the city usually has air conditioning from March to November.

People say that it is a challenge to make new building norms binding in a huge country like India...

That's true. I used to work in the state of Telangana, which was created a few years ago. There, the 2007 regulations for the construction of commercial buildings are strictly applied. But here in Tamil Nadu, they are still training people. Having said that, I think we are moving in the right direction. Decision makers are aware of the fact that the Indian construction industry can no longer rely on using more and more electricity produced from coal.

Replicating the Indian experience on a global scale

After ten years of successful experiments in India the SDC has decided to go global with its learnings. "When you look at what we've been able to establish in terms of initiatives and building codes in India, we think it's time for other countries to benefit as well," explains Mirjam Macchi, the project manager in Bern.

That's why Macchi and other specialists mandated by the SDC – both Swiss and Indian – are now playing an active role in the discussions in the Global Alliance for Buildings and Construction (GABC), and the Energy Efficiency in Emerging Economies Programme of the International Energy Agency (IEA), and other international platforms.

A showcase for technological innovation

Switzerland is also part of the GABC steering committee, where it can provide concrete examples of BEEP technological innovations

with the aim of generating interest among decision makers and developers in countries with climates similar to India's. Ajay Mathur, who heads the leading Indian think tank on sustainable development TERI, goes even further: "The growing interest in energy-efficient building that we see in India today gives us both a great deal of experience to share with others, as well as a good reason to want to learn about best practices elsewhere."

For the SDC, there is huge potential to influence building regulations in emerging countries too. BEEP's new national energy conservation building code for the construction of residential buildings in India could also inspire other countries. As Indian architect Ashok B. Lall points out, "At the same time, our authorities would benefit from talking to other governments so that they understand how important it is to pass laws that are binding."

In fact, the outcomes of these exchanges will

be extended to a very wide range of BEEP initiatives – from updating the curriculum for architects and engineers in training, to raising awareness on eco-friendly urban development among local authorities.

Local capacity building

As another successful SDC project in India – CapaCITIES – demonstrates, increasing capacities at the local political and administrative level to legislate on energy-efficient housing is key to making progress in this area. By 2021, BEEP is planning to invest in amending building permits and training expert examiners, particularly in the states of Rajasthan, Gujarat and Andhra Pradesh and in several partner cities. They have even been invited to help design all of the new administrative buildings currently planned for Andhra Pradesh's newly designated capital, Amaravati. All of these collaborative projects will be showcased in study tours and international conferences organised for representatives from other emerging countries.

The SDC also intends to make use of its presence in the GABC and IEA to advocate for the eco-friendly cement 'LC3' – which is better for the environment in almost every respect – a joint design by the Swiss Federal Institute of Technology Lausanne (EPFL) together with Indian and Cuban universities. "If we can convince the private sector of the benefits of using LC3, we can save 400 million tonnes of CO₂, which is eight times the amount of emissions Switzerland produces every year," calculates Macchi. ■



The building constructed for the Government of Rajasthan Forest Department in Jaipur can serve as a model. Its energy consumption is less than half that of the 'five-star' label developed by the Indian Bureau of Energy Efficiency. © BEEP

For further information

BEEP: www.beepindia.org
Global Alliance for Building and Construction: www.globalabc.org
International Energy Agency: www.iea.org/topics
CapaCITIES project: www.capacitiesindia.org
LC3 cement: www.lc3.ch

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