GBPN
Global Buildings Performance Network

Building Policies for a Better World

Executive Summaries

MITIGATION POTENTIAL FROM INDIA'S BUILDINGS

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ACKNOWLEDGEMENTS

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FOREWORD

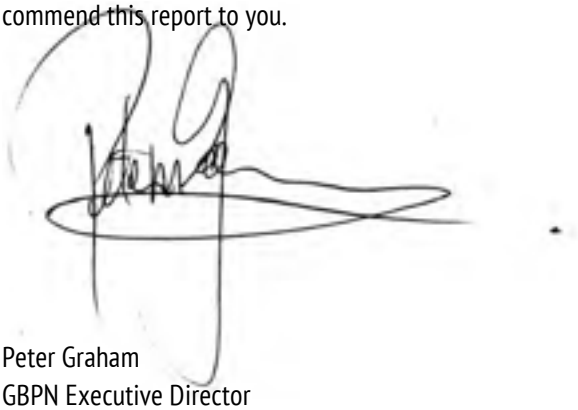
India doubled its floor area of buildings between 2001-2005 and is experiencing the fastest rate of growth in new building in the world. By 2050 India will have added about 35 billion m^2 of new building floor area. Most of this growth will occur in urban residential buildings, a typology for which no energy performance regulations currently apply. At the same time electricity demand is expected to increase six-fold by 2030 to reach 30% of households that currently don't have electricity.

Without urgent development and implementation of policy packages that ensure the construction of energy efficient new buildings, and particularly new residential buildings, the energy required to provide thermal comfort and hot water to residential buildings could increase by a factor 8 by 2050. This translates to a potential growth in energy related GHG emissions of 1.2Gt of CO_2. However, it is technically possible to achieve deep energy savings and CO_2 mitigation.

As this report details, there are a range of actions being taken by the government and practitioners to address these issues – but the rate of urbanization, lack of performance data, and India's cultural and economic complexity presents a unique set of challenges to rapid implementation of the kinds of policy interventions necessary to achieve deep reductions in building energy consumption and associated CO_2 emissions. However, by following state-of-the art policy strategies and incorporating traditional and contemporary technology and ideas growth in energy consumption could be reduced to about a factor 2 increase by 2050.

The environmental benefits of more energy efficient Indian buildings and cities are important, but perhaps more significant are the potential social and economic benefits of reducing the energy dependence of homes and businesses. Reducing energy demand of buildings increases the choices people have in how energy services can be provided. This in turn improves the resilience and prosperity of communities. These qualities are the foundations for sustainable development in India.

GBPN is developing a range of programs to address the priority issues identified in this report and we look forward to working with partners in India and internationally to build the foundations of a sustainable energy path for Indian buildings. I therefore commend this report to you.



Peter Graham
GBPN Executive Director

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A large part of the research for this report comes from two major studies contracted by the GBPN. The GBPN commissioned the Lawrence Berkeley National Laboratory (LBNL), United States, to identify and analyse the best performing building energy policies implemented today and the Central European University (CEU) Center for Climate Change and Energy Policy, Hungary, to determine the best-possible CO_2 mitigation scenarios globally and in each of our target regions.

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Finally, GBPN would like to thank Rod Janssen whose detailed and insightful guidance added significant value to the report.

EXECUTIVE SUMMARY

India's Mitigation Potential

By 2050, it is projected that India will see an unprecedented escalation of floor area of around 400% (Urge-Vorsatz et al., 2012). Buildings are responsible for around 35% of India's total energy consumption, and this is increasing by 8% year-on-year (Rawal, Vaidya, Ghatti & Ward, 2012). It is imperative for the Indian building sector to manage its projected growth in a sustainable fashion. The growth of India's urban areas, both projected and existing, must be supported by clean energy solutions in order to manage the dramatic impact of energy consumption.

The future of India's building energy usage is unclear and will depend on the political will of the government and building sector stakeholders. Today's current trends show that, without a transformational change, energy consumption of buildings will increase to levels that are unsustainable and threatening to India's energy security. However, improving the energy performance of existing and new buildings can have a major role in managing energy and CO_2 emissions.

A scenario analysis commissioned by Global Buildings Performance Network (GBPN) and produced by the Center for Climate Change and Sustainable Energy Policy (3CSEP) of the Central European University (CEU) estimated that India's growth could easily see an increase in building energy consumption and CO_2 emissions of around 700% by 2050 if left unchecked. However, by following an ambitious path, this could be reduced to an increase of Gt of CO_2 of 200% (Urge-Vorsatz et al., 2012). Nevertheless, considering the growth of population, floor area, comfort levels and migration to cities, keeping CO_2 emissions under a 200% increase compared to 2005 levels will be a huge task.

Ambitious efforts are required to introduce state-of-the-art policies and technology to India so that the potential energy savings will not be missed. A large-scale market uptake of best practice, state-of-the-art policies and supporting packages are essential if India wants to secure its future energy needs.

Policy Framework in India

This report explores India's current political status regarding building performance. Following current practice will not reduce energy demand or associated CO_2 emissions from buildings. However, it has found that India has recently begun to show interest in improving the energy performance of its buildings. However, India needs a strong policy framework to put its ideas into action. This is, in part, complicated because of the division of responsibilities under its constitution. There are some areas that are controlled by the central government, with others being the responsibility of the individual states.

In 2001, the Government of India passed an Energy Conservation Act (ECA); The Bureau of Energy Efficiency (BEE) was then established in 2002 to advance policy with an emphasis on self-regulation and market ideals. The principal objective of the BEE is to moderate energy intensity of the Indian economy by delivering governance in buildings. In 2007, India approved its first building code that related to improved energy performance.

Energy Conservation Building Code (ECBC)

In 2007, the BEE released a nationwide commercial building energy-efficiency code, the Energy Conservation Building Code (ECBC) and revised it in 2008 to cover an extended number of buildings. In 2004 it was estimated that full compliance would realise energy savings of 1.7 billion kWh each year (Liu, Meyer & Hogan, 2010), the savings are now argued to be much greater than originally estimated (Kumar, 2013). To achieve this the ECBC must be adopted by the states; however, the code remains voluntary until it is adopted into the by-laws of the individual states.

The ECBC sets minimum energy standards for new commercial buildings or building complexes with connected loads that are greater than 100 kilowatts (kW) or 120 kilovolts-ampere (kVA) (Bureau of Energy Efficiency, 2011). In principle the ECBC applies to residential complexes with the same connected load. However, in practice the code is concerned largely with

commercial buildings. This ECBC applies to large-scale commercial retrofits where the final air-conditioned space of the building is greater than 1,000 m^2.

The ECBC has yet to be adopted by most of India's states and therefore the majority of India's new commercial buildings are not built under the requirements of the ECBC. However, the BEE have outlined particular areas where the code could become mandatory, so far, two states (Rajasthan& Odhisha) have already mandated the ECBC, six others (Gujarat, Karnataka, Punjab, Kerela, Uttar Pradesh & Uttarakhand) have initiated the process and seven additional states (MP, Haryana, Chhattisgarh, Andhra Pradesh, Tamil Nadu, West Bengal & Maharashtra) have been identified as focus states by the BEE for the year 2012-13 (Chandiwala 2013).

Labelling and Certification

There are several voluntary building labelling and rating schemes used in India and their market uptake is slow. Most labelled buildings belong to governments or large corporations and most of these rating schemes are not designed primarily to rate the energy performance of buildings and do not provide consumption targets for new buildings (CSE, 2012).

LEED - India and GRIHA, are the most popular in the marketplace and address many issues such as materials, water consumption, and environmental and human health, rarely including building energy use. The BEE's Star Rating System evaluates existing buildings based on operational energy use and is the only energy-use-specific building label used in India.

Considering rating and labelling systems in India are voluntary, the call for buildings to be compliant with a rating system requires motivation due to the perceived conception that green buildings require large investment. The Indian government, through incentives or subsidies, is now backing rating and labelling schemes. However, this calls for the performance data of the rated buildings to be accountable, transparent and reliable. It is very important for buildings in India to be monitored; this demonstrates that the rated buildings are of high performance.

Incentive Programmes

India has promulgated a variety of national incentives and financing schemes for energy-efficiency measures in industry yet only one national-level incentive scheme exists for buildings: the Ministry of New and Renewable Energy (MNRE) incentive programme for GRIHA-rated buildings. This programme provides incentives to several stakeholders involved in GRIHA projects.

Government financial incentives and public financing options are rare and still in early development. The financial industry seems to be far from a widespread uptake of efficiency financing. This is due to apprehensions about a lack of demand. There is very little is documented evidence regarding the outcomes of present building energy-efficiency incentives on actual building energy use (CSE, 2012).

What conclusions can be drawn?

Currently there is a building construction boom occurring in India that is predicted to continue into the long-term future. This research shows that following today's practices will not reduce energy demand or associated CO_2 emissions from buildings in India. Existing policies therefore need to be made much more ambitious.

With state-of-the-art technology and policy measures implemented, it will be possible to reduce the absolute final thermal energy use in the Indian building sector dramatically by 2050. The savings potential is more than 5 times greater than the energy used by buildings in India today. If no action is taken it is predicted that India may face a growth in thermal energy demand in buildings of around 700 % (20.6 EJ).

Although India has gradually started to introduce energy efficiency solutions in their building sector and the national government has designed an energy efficiency building code together with several tools and strategies to assist with local adoption, these efforts must be improved in order to realise the potential energy savings India holds. India's building sector

must be supported by strong policies and packages that include multiple facets of development and up scaling of energy efficiency in both new and existing buildings.

Successful implementation of optimum energy codes is essential to provide India with comfort levels, energy security and CO_2 savings. Financial incentives should back up codes and labelling systems as part of an energy-efficiency policy package.

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About GBPN The Global Buildings Performance Network (GBPN) is a globally organised and regionally focused network whose mission is to advance best practice policies that can significantly reduce energy consumption and associated CO_2 emissions from buildings.