Sustainable Buildings in India: Energy Efficiency, Resource Efficiency, Green Cooling and Green Design

The expanding urban population of India beckons for a requisite growth in urban infrastructure for housing, and for commercial growth. The NITI Aayog estimates that per capita residential space in India will increase from 1.8 m^2 in 2012 to 35 m^2 in 2047, and per capita commercial building space from 0.7 m^2 to 5.9 m^2 over the same duration (NITI Aayog 2015). It has been estimated that over 800 million m2 of commercial building space, namely hotels, hospitals, offices, retail, educational buildings and places of worship, will be added to Indian cities in the next 20 years (Kumar, Singh, Kachhawa, & Pandey, 2017). Further, as a predominantly rural population rapidly becomes urbanized, provision of adequate housing and workspace becomes an important public investment. The construction sector contributed to 8.2 percent of the national GDP and 11.52 percent of total employment in 2014 (Ministry of Housing and Urban Poverty Alleviation, 2016). As economic activity in urban hotspots grows, people spend an increasing amount of time inside buildings. In developed countries, people can spend as much as 87% of their lifetime indoors (Klepeis, et al., 2001), demonstrating the importance of buildings in economic growth. For India therefore, buildings will form one of the crucial areas buttressing development. The Indian construction market, in fact, is pegged to become the world's third largest by 2030, overtaking countries like China and Qatar (Global Construction Perspectives and Oxford Economics, 2015).

Statistics of construction in residential and commercial buildings reflect this importance. In the housing segment India already had a shortage of 18.78 million houses in 2012 (Technical Group on Urban Housing Shortage, 2012) and needs to build a further 170 million houses between 2015 and 2030 to accommodate its urbanizing population (Global Construction Perspectives and Oxford Economics, 2015). In the commercial building sector, 2017 saw a leasing volume of 3.9 million square meters of floor space, with major absorption occurring in urban centres of Bengaluru, Delhi-NCR, Mumbai, Hyderabad, Pune, Chennai and Kolkata (Arora, Lari, Abraham, & Ravindran, 2018).

It is not difficult to see then, how the buildings sector in India will assume an ever greater importance in the national energy consumption landscape. In 2013 buildings contributed 41% to the total energy consumption of India (Central Statistics Office, 2017). If no interventions are made for energy efficiency this share will still climb rapidly.

As the global impetus on India to conserve and mitigate its energy consumption has increased, India has seen energy efficiency policies being implemented at some of the largest scales in the world. The UJALA Yojana has seen the price of energy efficient LED bulbs decreasing rapidly due to demand aggregation. The Bureau of Energy Efficiency (BEE) launched the Standards & Labelling scheme for appliances in 2006, which has affected an estimated energy saving of 111.68 billion units of electricity till March of 2018. The Energy Conservation Building Code (ECBC) launched in 2007, and revised in 2017, targets energy efficiency in the commercial

buildings sector through MEPS and passive design, and has been made mandatory by 11 major states and union territories (UTs) of the country.

However, a lot remains to be done. The experience of the past decade has brought out a number of glaring challenges in the implementation of energy efficiency policies and schemes pertaining to buildings, ranging from inadequate technical capacity in institutions, to an apparent lack of public and private financial resources. Although amongst the developing nations India is seen as a nation with positive intent toward the global challenges of climate change, the developments in creation of sustainable infrastructure have not been able to keep up with the urgencies and priorities of development.

This thematic track “Sustainable Buildings in India: Energy Efficiency, Resource Efficiency, Green Cooling and Green Design” will focus on the issue of achieving sustainability in building construction and operation through design interventions and operational energy shifts. The session will be a platform for stakeholder engagement to deliberate on the various options and opportunities.