

# JOURNAL BRIEF: What are the Energy and Resource Requirements of Equitable and Inclusive Urban Development?

Sustainable Healthy Cities Journal Brief - 2018, No. 8 - Resource Requirements of Inclusive Urban Development

This brief is adapted from the following peer-reviewed journal article: Singh Nagpure, A., Reiner, M., & Ramaswami, A. (2018). "Resource requirements of inclusive urban development in India: insights from ten cities." *Environmental Research Letters*, 13(2).

#### **Study Intent and Research Question**

Understanding the resource requirements of developing more inclusive cities is the focus of this paper. Specifically, the study asks: What are thresholds for basic minimum infrastructure service consumption in Indian cities when looking at electricity consumption, clean cooking fuel use, access to piped sewerage systems, and adequate floor space per person? How many people in 10 Indian cities are consuming at levels below these minimum service thresholds? What quantity of resources (energy, materials, etc.) would be needed to ensure that minimum basic service thresholds are met for all residents? This study quantifies the resource requirements of inclusive development and provides a sense of scale-relative to current community wide resource flows-of the amount of additional resources needed to meet key inclusive development goals in 10 Indian cities.

### **Key Background Information**

In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, establishing 17 sustainable development goals (SDGs) (UN 2015).

SDG 11 addresses cities and communities, with the goal of making cities inclusive, safe, resilient, and sustainable. Particularly, target 11.1 focuses on 'access to adequate, safe and affordable housing and basic services for all.'

By the year 2050, more than 66% of the world's people will be living in cities, and much of the growth in urban population will happen in Asia and Africa. About 60% of those future cities have yet to be built (UNEP 2013). In many cities in Asia and Africa, there is a high proportion of slum populations that are underserved, representing as much as 28%-62% of the population (UN Habitat 2010).

While a few studies have indicated that providing basic services to underserved urban populations will increase

community-wide resource burdens, data and bottom-up methodologies have been lacking to quantify the anticipated increase in resource use for the underserved when compared to overall use by homes and businesses.

Beyond the presence/absence of basic services, access also includes consideration of minimum levels of basic service provision/consumption. The level of consumption needed to meet basic needs has been defined differently across infrastructure sectors and by various national and international organizations.

### **Key Findings**

Across the 10 Indian cities studied:

- 1%-6% of households do not have electricity
- 14%-71% use electricity below 25 kWh capita-month
- 4%-16% lack structurally sound housing
- 50%-75% live in floor area less than 8.75 m2/capita
- 0%-65% lack clean LPG cooking fuel
- 6%-60% lack connection to a sewerage system

To provide basic electricity (25 kWh capita-month) to all will require an addition of only 1%–10% in current community-wide electricity use.

To provide basic clean LPG fuel (1.2 kg capita-month) to all requires an increase of 5%–40% in current community-wide LPG use.

Providing permanent shelter (implemented over a ten year period) to populations living in non-permanent housing in Delhi and Chandigarh would require a 6%–14% increase over current annual community-wide cement use.

To provide permanent housing to all people living in structurally unsound housing and those living in overcrowded housing (<5 m cap-2) would require 32%-115% of current community-wide cement flows.

High income households are consuming many times the energy that poorer households consume, and both commercial and industrial energy users seperately consume greater than all residential users.

### **Policy and Practice Implications**

These findings show that inclusive development may be achieved without substantially exceeding current community wide resource flows, which means that sustainable development and inclusive development are not necessarily incompatible.

Resource efficiency strategies applied across all sectors commercial, residential, and industrial—as well as the promotion of sustainable consumption behaviors among the wealthiest/highest consumers could further help offset the resource requirements of inclusive development. The manner in which access to basic infrastructure services is increased is important. To provide adequate and structurally sound housing for all, compact multi-story construction within the city core offers benefits of reducing material use (36 percent less than single story construction) for all households (not only slums), in addition to reducing motorized travel demand and associated air pollution while improving access to employment (UN Environment 2018; Ramaswami 2017).

Distributed and renewable energy infrastructure, such as solar-powered microgrids, can be particularly useful in slums and pockets of deprivation in urban and rural areas (Kammen & Sunter 2016).



## **Further Reading and References**

-Kammen, D.M. & Sunter D. A. (2016). City-integrated renewable energy for urban sustainability. *Science* 352, 922-928.

-Ramaswami, A. (2017). Towards Zero Pollution Cities. Our Planet, UN Environment.

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### About the Sustainable Healthy Cities Network

The Sustainable Healthy Cities Network is a U.S. National Science Foundation supported sustainability research network focused on the scientific advancement of integrated urban infrastructure solutions for environmentally sustainable, healthy, and livable cities. We are a network of scientists, industry leaders, and policy partners, committed to building better cities through innovations in infrastructure design, technology and policy. Our network connects across nine research universities, major metropolitan cities in the U.S. and India, as well as infrastructure firms, and policy groups to bridge research and education with concrete action in cities.

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