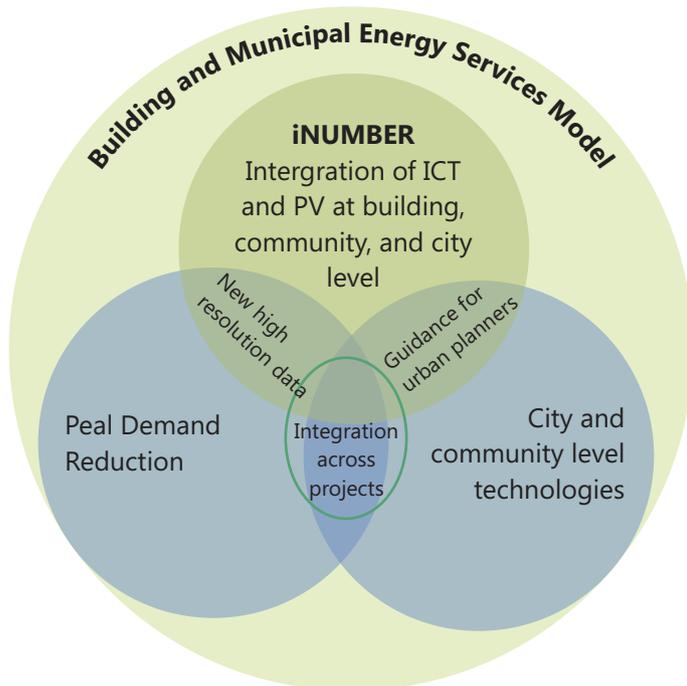


# iNtelligent Urban Model for Built environment Energy Research (iNUMBER)

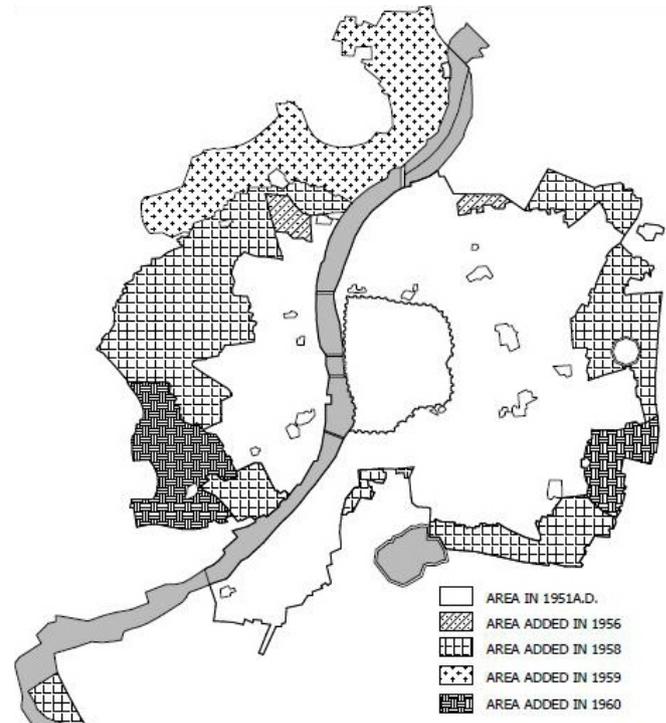
## Overview

Sustainable urbanization requires the provision of secured energy for health and comfort. Key to planning sustainable energy services is an understanding of how energy demand changes over time, space and tools to help plan for its reduction. The project iNUMBER is a research programme for four years (2017-2021) which work towards:

- Developing building stock and municipal service energy model to help plan a secure energy supply for urban populations to be thermally comfortable and healthy (via the provision of clean water and sanitation). The model will estimate total and disaggregated energy demand. It will assess the impacts of different mechanisms to reduce energy demand and the capacity to provide locally generated clean energy.



- Linking new and existing data sets. The challenge is acquiring the data to input and test the validity of models. iNUMBER will develop state of the art data collection and analytic methods to overcome this challenge in a range of scenarios with different data availability.
- Developing tools to help support the urban energy management process. iNUMBER supports Indian municipalities and local partners to develop a data-driven intelligent urban model for built environment energy research and municipal planning. It supports India's deep decarbonization pathway by mapping current and future energy demand reduction opportunities in the built environment. It will diagnose



urban energy problems, test solutions, verify progress, and improve policy decisions utilizing state of the art monitoring, data science and analytics. iNUMBER primarily focuses around meeting the India/UK Newton research topic 'Integration of information, communication and renewable energy technologies at building, community, and city level interventions'.

### Benefits and Outcomes

The project will:

- Undertake innovative research into urban data collection such as big data analytics and innovative modelling.
- Promote the economic development and welfare of developing countries, as required by Newton funding, by helping India to transition to a smart sustainable energy system which is critical to economic development.
- Engage users of different types. The initial project partners include Urban Local Bodies(ULB), energy software developers, energy meter hardware suppliers, residential construction companies, architectural firms, and user experience experts. Beyond these immediate partners, we will coordinate and collaborate with other research groups in the field, engage with policymakers, and benefit the public.
- Leverage Newton and DST funding with support from host universities and partners who will provide data, test sites, equipment, and provide sector expertise.
- Demonstrate usable solutions like online energy information systems; benchmarking backed up by large data sets; low-tech smarter retrofits for electricity meters and sub-meters; reduction strategies for energy use tailored to cities of different shapes and sizes.
- Build on the strength of India in Information Technology and the strength of the UK in energy epidemiology to build a best with the best collaboration. The team will include leading academics from interdisciplinary fields such as engineering, data science, information technology, energy analysis, architecture, building

science, urban science, urban planning, energy management from leading institutions in India and UK.

It will apply three intersecting levels of analysis, ranging from large data sets in municipalities to deeper dives into domestic buildings:

- 1) Top down data analytics to understand and benchmark data sets on buildings and municipal services.
- 2) Middle-out learning and engagement to focus on the role of urban organisations and institutions.
- 3) Improving data quality from the bottom-up focused on energy use at the building level using both surveys and quantitative measurement through innovative ICT technologies and applications.

The project will provide economic and social benefits to municipalities and urban planners; the building industry; utility companies, energy software companies, modellers and energy analysts; researchers and students; policymakers; and the public at large. The impact will be facilitated by active participation of key stakeholders in the case study of cities, high level policy meetings, workshops, CPD, iNUMBER open access tools, and the iNUMBER web site.

### R&D Partners



### Funding Agencies

