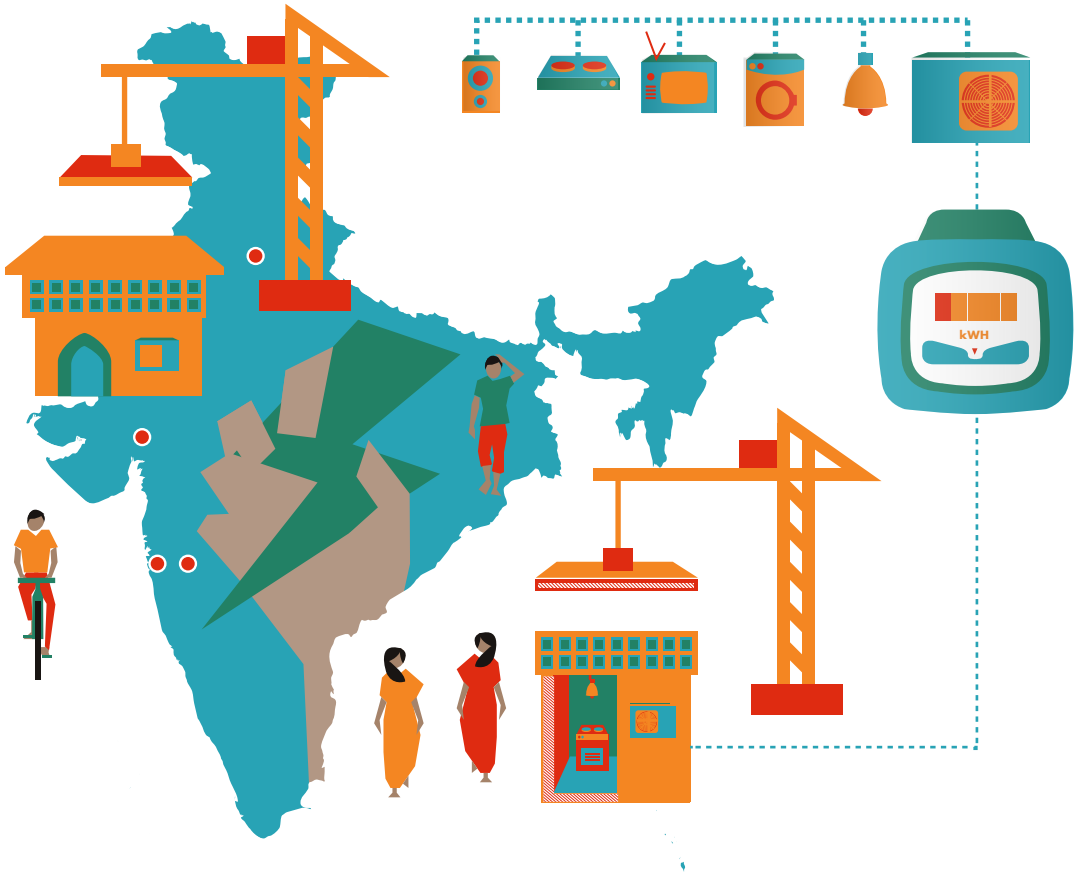
RESIDENTIAL BUILDINGS IN INDIA: ENERGY USE PROJECTIONS AND SAVINGS POTENTIALS



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Global Buildings Performance Network

INDIA, BUILDING A SUSTAINABLE ENERGY FUTURE FOR ALL HOMES

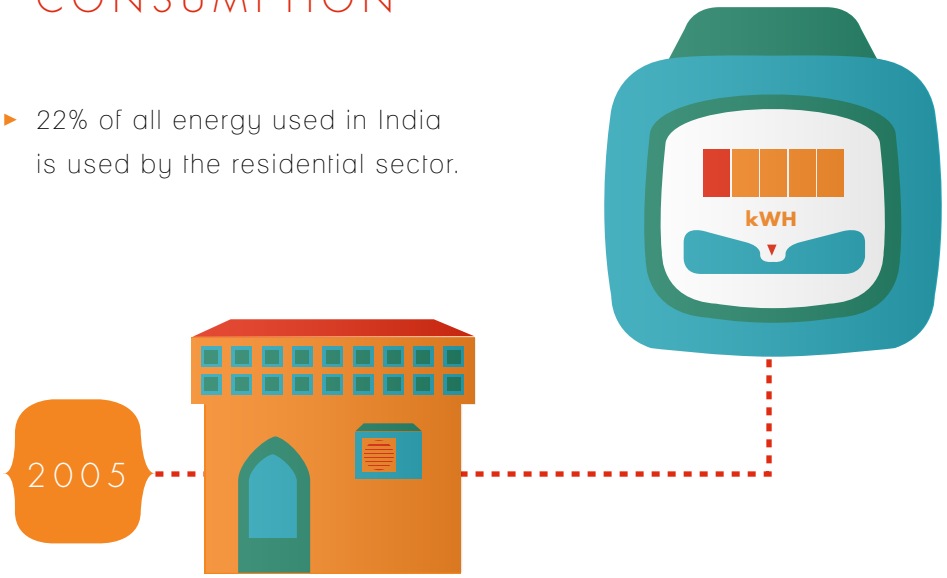
WHY FOCUS ON THE **RESIDENTIAL SECTOR?**

India is currently experiencing one of the fastest growth rates in new buildings globally, mainly in the residential sector. Energy demand from residential buildings is expected to rise sharply in the coming decades, due to the combined growth of: POPULATION, URBANISATION, GDP AND CONSUMER PURCHASING POWER. This will lead to a dramatic increase in the demand for improved domestic comfort. A very aggressive energy efficiency policy and market driven strategies focused on better building envelopes can play a key role in mitigating energy consumption from residential buildings.

UNPARALLELED GROWTH OF ENERGY CONSUMPTION IN RESIDENTIAL BUILDINGS

TOTAL ENERGY CONSUMPTION

- 22% of all energy used in India is used by the residential sector.



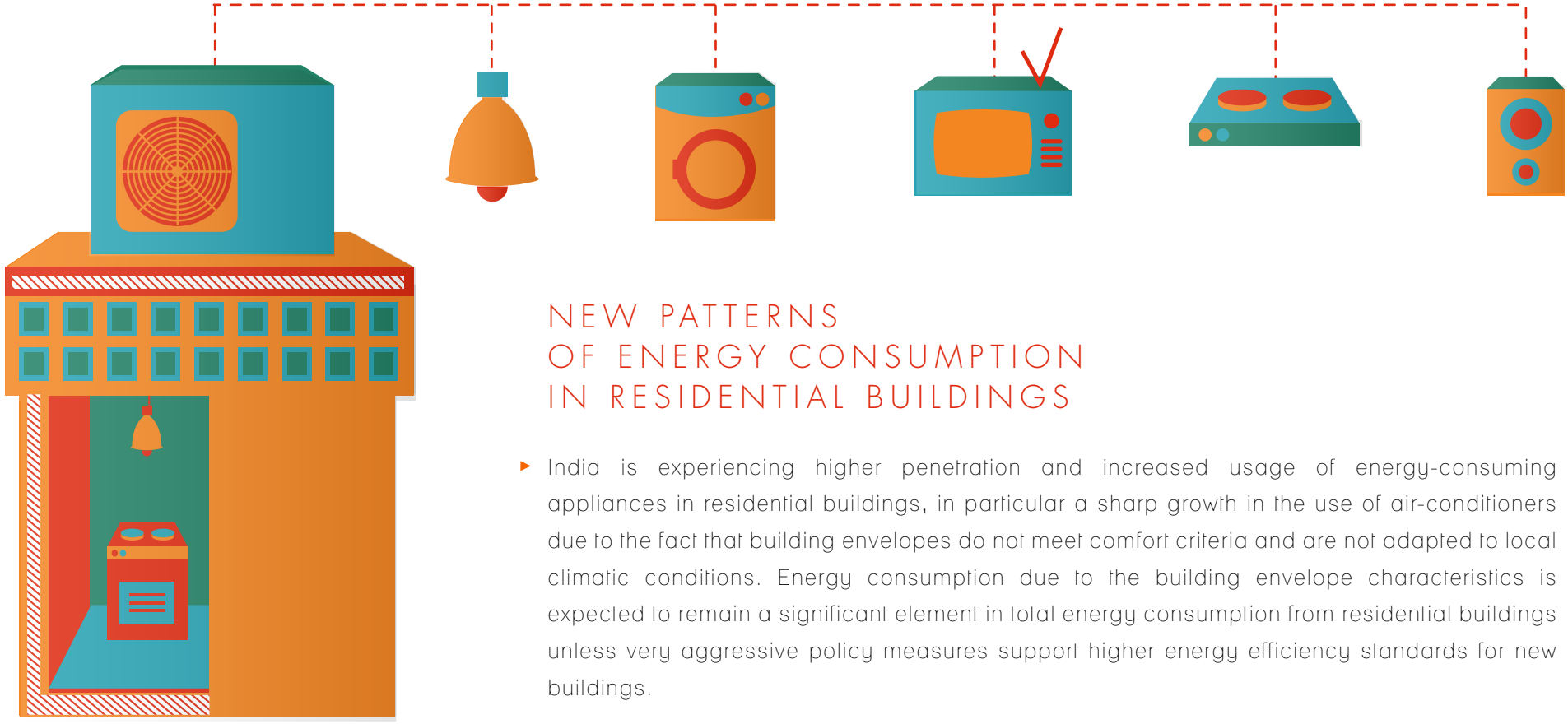
CONSTRUCTION & URBANISATION BOOM

- By 2030 India will have added more than 20 billion m^2 of new building floor area.
- 85-90 % of the new constructions expected by 2030 will be for residential purposes.
- Due to projected economic development, per capita final energy use in urban areas is likely to double by 2050 compared to 2005 levels.

x5

CONSTRUCTED FLOOR AREA

UNPARALLELED GROWTH OF ENERGY CONSUMPTION IN RESIDENTIAL BUILDINGS



NEW PATTERNS OF ENERGY CONSUMPTION IN RESIDENTIAL BUILDINGS

- India is experiencing higher penetration and increased usage of energy-consuming appliances in residential buildings, in particular a sharp growth in the use of air-conditioners due to the fact that building envelopes do not meet comfort criteria and are not adapted to local climatic conditions. Energy consumption due to the building envelope characteristics is expected to remain a significant element in total energy consumption from residential buildings unless very aggressive policy measures support higher energy efficiency standards for new buildings.

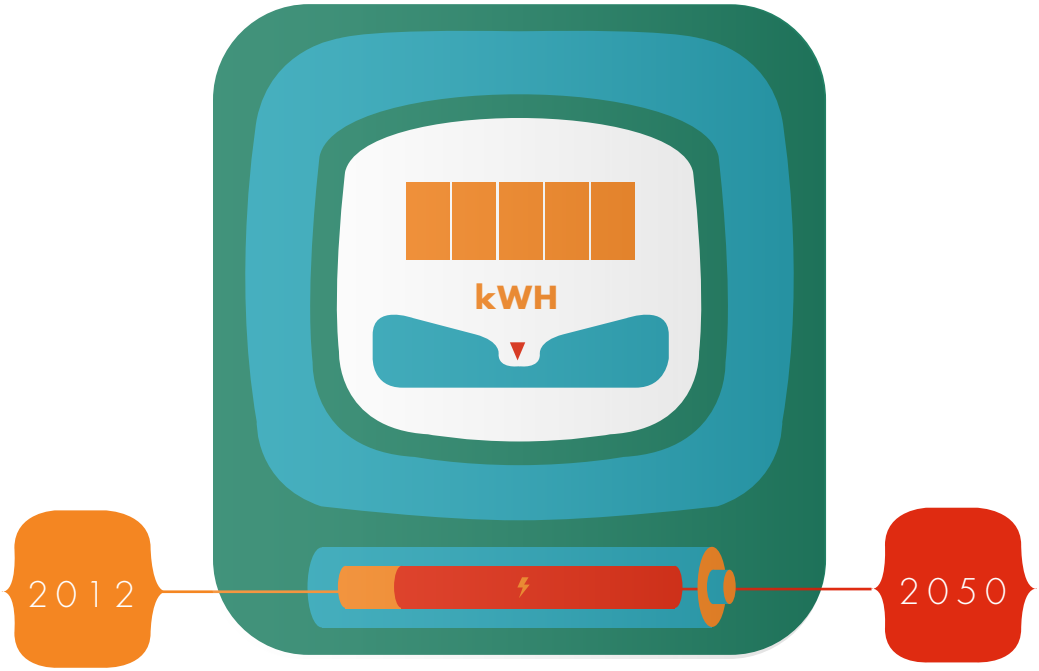
DRAMATIC MISSED OPPORTUNITIES FOR ENERGY SAVINGS

- Without any energy efficiency measures mainstreamed at the initial construction stage of the residential buildings, large savings potentials are locked-in during the building's life span (50-60 years). Unless aggressive policies are introduced Indian households could miss out on saving nearly 60% of the energy demand by 2050.

UNPARALLELED GROWTH OF ENERGY CONSUMPTION IN RESIDENTIAL BUILDINGS

ENERGY CONSUMPTION FROM RESIDENTIAL BUILDINGS

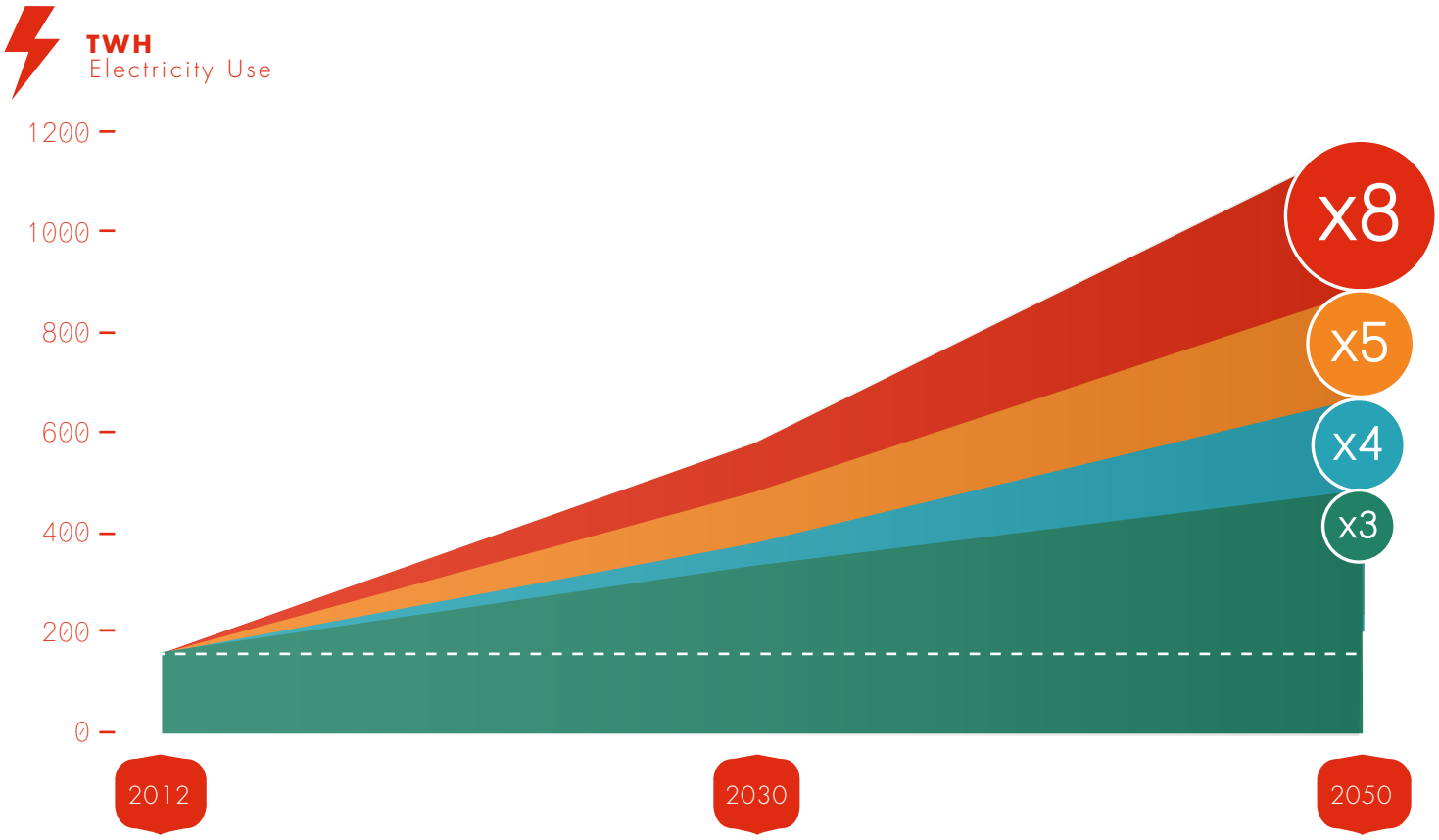
- The residential sector's overall energy use is projected to grow by 800% by 2050 compared to 2012 levels ; 8-fold.
- The building sector will emit 7 times more CO_2 by 2050 compared to 2005 levels.



ENERGY CONSUMPTION
FROM RESIDENTIAL BUILDINGS

FOUR POSSIBLE RESIDENTIAL ENERGY CONSUMPTION SCENARIOS

ENERGY USE PROJECTIONS BY 2050 PER POLICY SCENARIO



BUSINESS-AS-USUAL SCENARIO

- No new policy or market developments, and no air conditioning or appliance efficiency improvements since 2012 (reference year).

MODERATE SCENARIO

- Implementation of Energy Conservation Building Code (ECBC) standards, low penetration and moderate air conditioning and appliance efficiency improvements.

AGRESSIVE SCENARIO

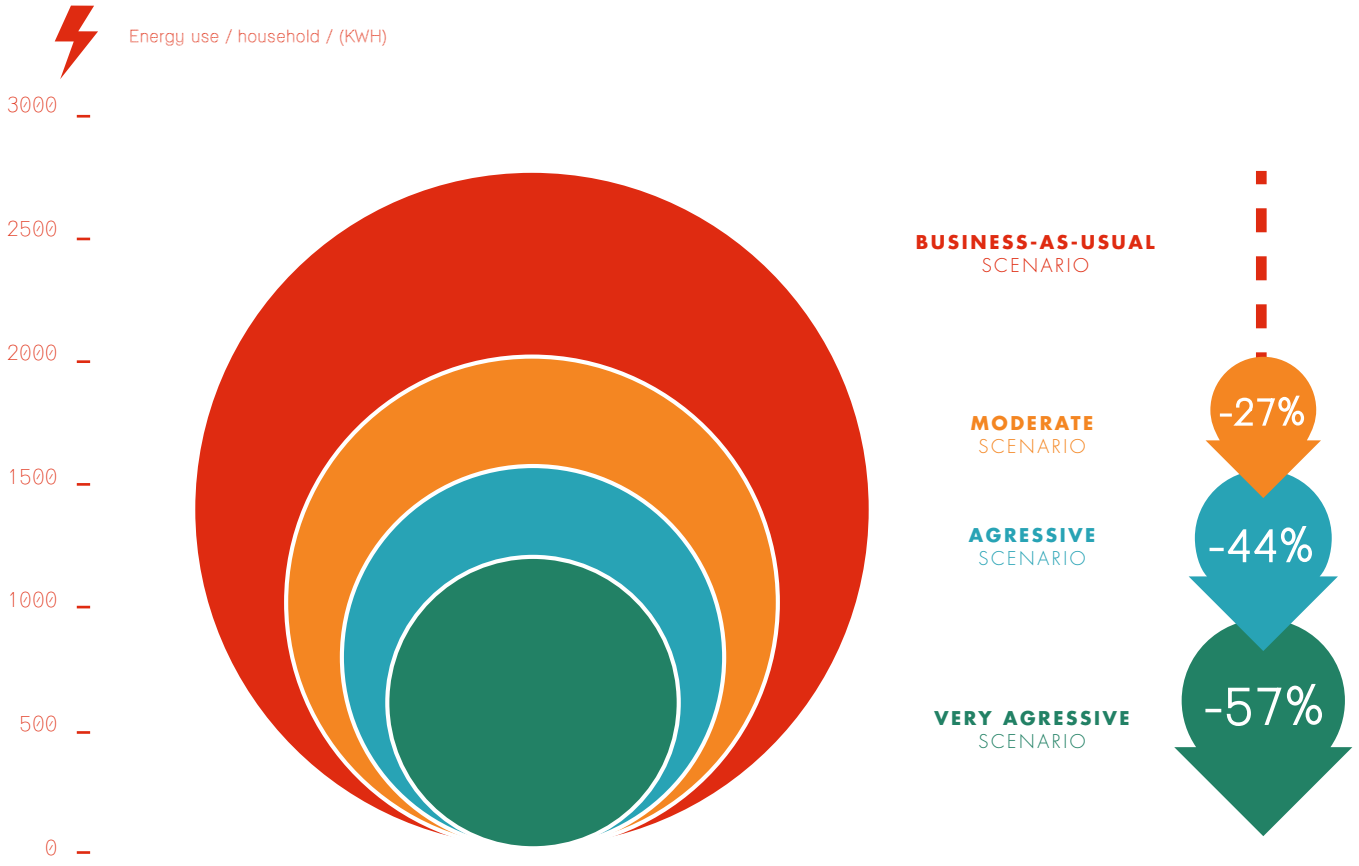
- Penetration of 50% by ECBC and 10% by ECBC+ envelopes in new buildings by 2050 as a result of aggressive policy efforts. High air conditioning and appliance efficiency improvements.

VERY AGRESSIVE SCENARIO

- Penetration of 30% ECBC+ envelops generally, and a 40% penetration of ECBC+ envelops in new buildings by 2050. Very high air conditioning and appliance efficiency improvements.

FOUR POSSIBLE RESIDENTIAL ENERGY CONSUMPTION SCENARIOS

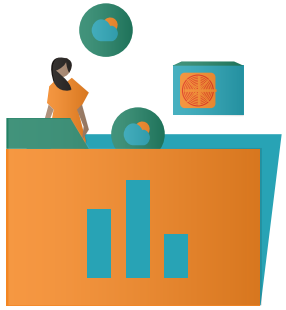
ENERGY USE PROJECTIONS PER HOUSEHOLD BY 2050



- If we want to avoid an eight-fold increase in energy consumption, unsustainable levels of energy consumption in households while ensuring that Indian residents have a secure supply of energy and desired comfort levels, there is no choice but to go deep and follow a very aggressive policy and market driven strategy.

ONLY ONE POSSIBLE SUSTAINABLE ENERGY PATHWAY

- It is vital to develop energy-efficiency strategies specifically focused on the residential sector in India to limit escalating electrical energy demand and achieve the saving potentials of the very aggressive policy and market driven strategy. Ensuring efficiency in this sector can produce a large number of additional benefits for protecting the planet while ensuring societal and economic wellbeing.

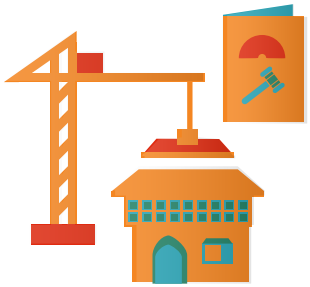


1.

The introduction of a residential baseline programme to get a better picture of residential energy consumption.

2.

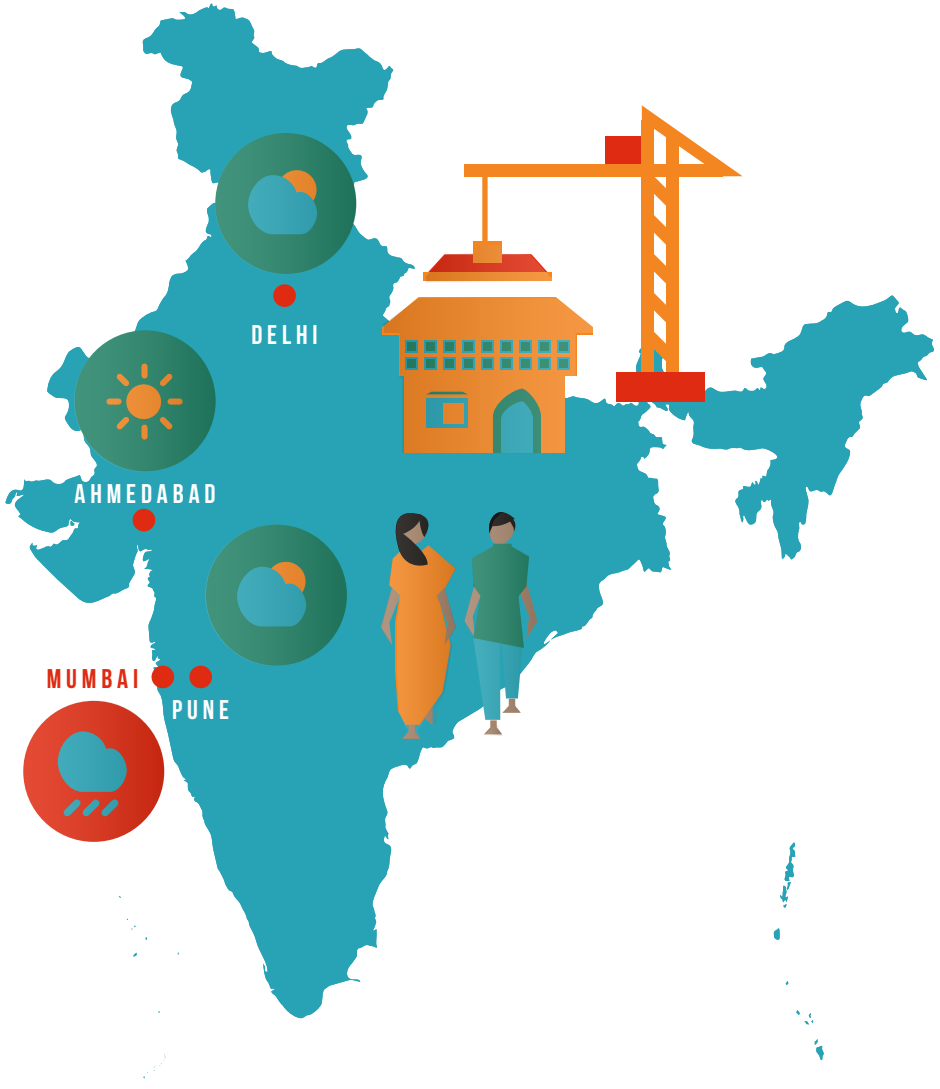
Develop roadmaps that can support the implementation of energy efficiency measures for buildings.



3.

A residential code focused on envelope efficiency and adapted to the different climat zones should be developed to realise the savings potentials of all building envelop components and to offer increased comfort.

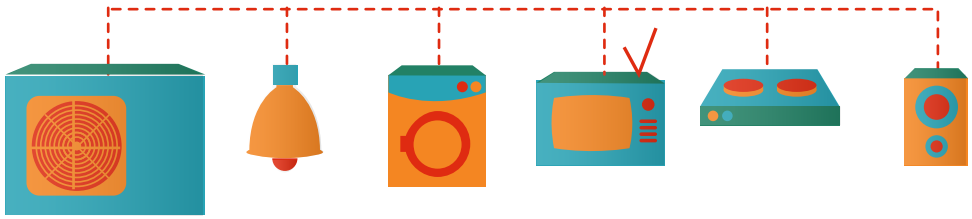
SURVEY OF 800 HOUSEHOLDS LOCATED IN 4 DIFFERENT CLIMATE ZONES



METHODOLOGY

- Mapping of current penetration rates of domestic equipment and electricity consumption patterns and analysis for different sizes of residential units with varying occupancy rates, appliances and climate zones.

- Overall scenario assessment of the residential sector determining long-term energy mitigation potentials. Building energy modelling has been deployed to quantify comfort benefits and the energy savings potentials of better-performing building envelopes.



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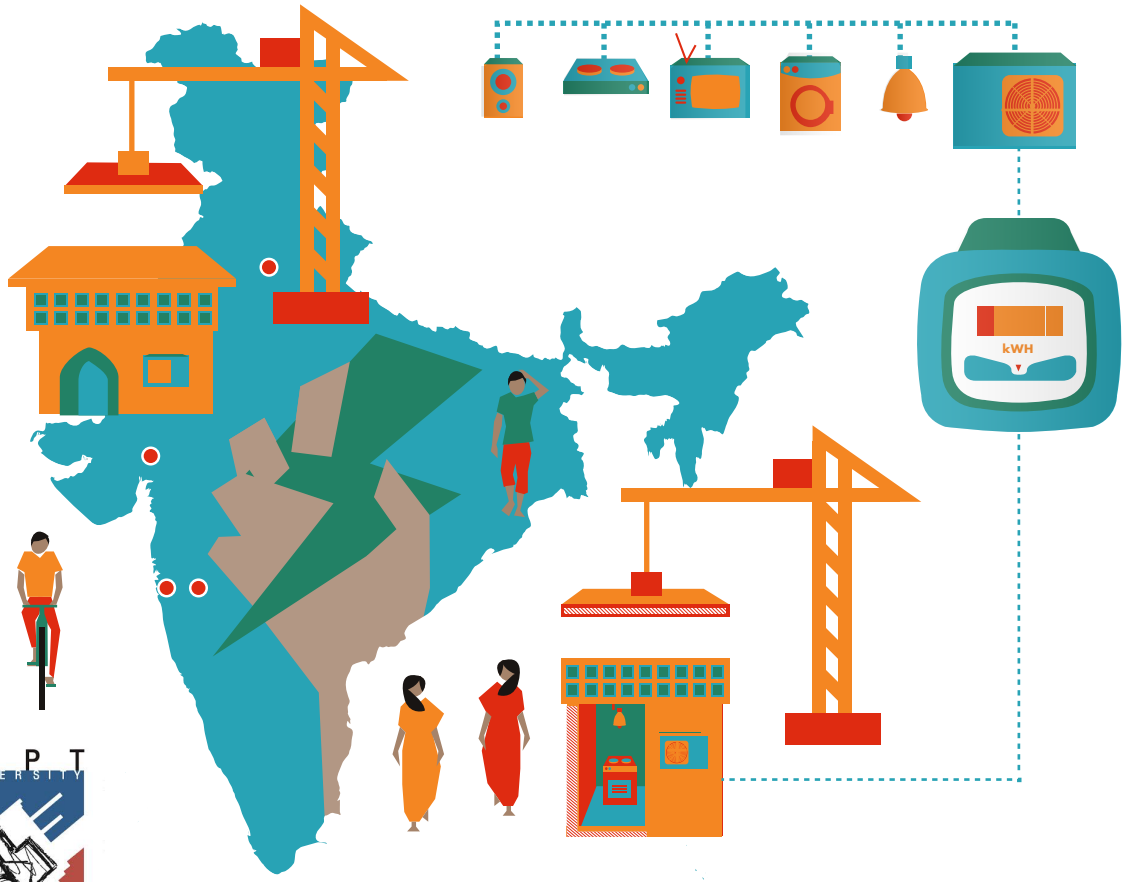

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