Building for a low-carbon future

Effective policies can lead to buildings and wider settlements that are climate resilient and use energy efficiently, so curbing the rise in greenhouse gas (GHG) emissions. There is potential for energy savings of 50–90% in existing and new buildings.

In 2010, buildings accounted for 32% of global final energy use.

In 2010, buildings accounted for 19% of energy-related GHG emissions.

CO_2 emissions in the building sector could double or triple by 2050.

BUILDING-AS-USUAL

Buildings' energy use in developed countries is generally wasteful and inefficient. Developing countries risk locking into the same pattern as their economies and populations grow richer.

Demand Pressures

Under business-as-usual projections, use of energy in buildings globally could double or even triple by 2050. Drivers include billions of people acquiring adequate housing and access to electricity. More wealth, more urban dwellers and a higher global population will also raise demand.

Impacts and Risks

Many buildings are vulnerable to impacts of climate change. These include increased precipitation, thawing permafrost, and extreme weather-related events such as wildfires, severe storms and floods. Without investment in improved resilience, this vulnerability is destined to increase.

Warming and Energy Demand

Higher temperatures will drive changes in climate-related energy demand. In low-income countries, rising wealth will be the main driver of increasing energy demand, principally for air conditioning and transport.

Energy in the Home

Traditional large appliances account for most household electricity consumption, yet their share is falling fast. Electronic entertainment and communications equipment now account for more than 20% of residential electricity use in most countries.

KEY ISSUES

- ENERGY INSECURITY
- EXTREME WEATHER
- DROUGHT
- GLOBAL WARMING
- HUMAN BEHAVIOUR

BUILDING FOR THE FUTURE

Widespread implementation of best practices and technologies could see energy use in buildings stabilise or even fall by 2050. Many mitigation options promise multiple co-benefits.

Energy-Efficient Technology

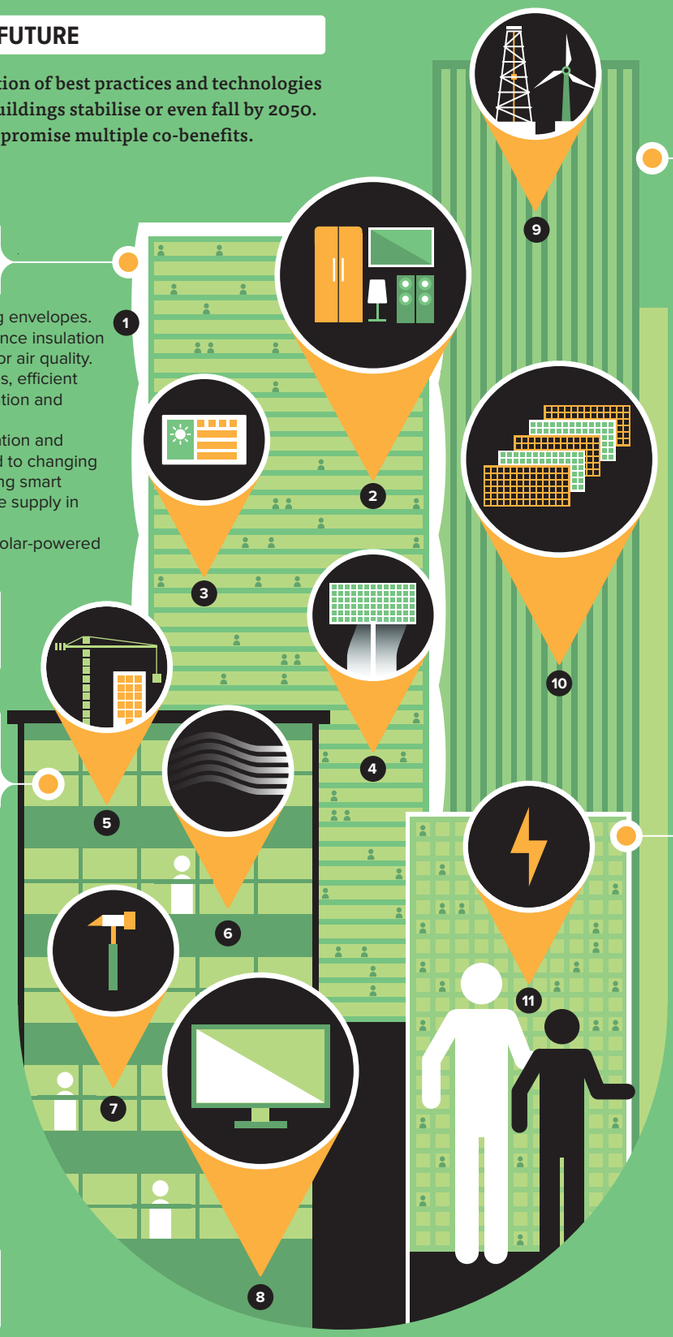
1 High-performance building envelopes. Typically, with high-performance insulation and windows, and high indoor air quality.
2 Energy-efficient appliances, efficient lighting, and Heating, Ventilation and Air-Conditioning (HVAC).
3 Improved building automation and control systems that respond to changing conditions. 'Daylighting'. Using smart meters and grids to modulate supply in real time.
4 Evaporative cooling and solar-powered desiccant dehumidification.

Average CO_2 reduction potential: 20–45% of baseline

System Infrastructure Efficiency

5 Know-how exists on retrofitting and how to build very low-and zero-energy buildings, often at little marginal investment cost or manageable payback times.
6 Passive building designs that minimise or eliminate the need for mechanical heating, cooling and ventilation.
7 Deep retrofits of existing buildings have brought 50–90% energy savings.
8 Integrated Design Processes prioritise energy performance-and-use factors through building design, construction and commissioning.

Average CO_2 reduction potential: 30–70% of baseline



Carbon Efficiency

9 At present, electricity is the main form of energy used for cooling and appliances, while fossil fuels are used for heating. Changing fuels and energy supply infrastructure to buildings will be needed to deliver large emissions cuts even if end-use demand falls.
10 More than 2 billion people currently lack access to modern energy carriers. The evolution of their energy provision will drive trends in buildings-related emissions.

Average CO_2 reduction potential: 20–45% of baseline

Service Demand Reduction

11 Energy use increases projected for buildings relate mainly to higher demand for energy services, driven by people moving out of poverty and changing patterns of consumption. Potential means to deliver demand reduction include carbon pricing, personal carbon trading, property taxation related to building CO_2 emissions, progressive appliance standards and building codes with absolute consumption limits.

Average CO_2 reduction potential: 20–40% of baseline