

Energy Technology Perspectives: Scenarios & Strategies to 2050

Fact Sheet Buildings and Appliances

How important is energy consumption in buildings and where is it concentrated?

Today, energy use in residential, commercial and public buildings accounts for 35% of total global final energy consumption. Energy use in buildings increased 39% between 1973 and 2003 in IEA countries. Space heating is still the main end-use in buildings in these countries, but appliances are driving growth, while electricity is the most important fuel in IEA countries.

How important is the buildings sector to the savings in the Accelerated Technology (ACT) Scenarios?

Accelerating progress to make energy use in buildings more efficient is indispensable. There is significant scope for adopting more efficient technologies in buildings. In non-IEA countries, the potential for improvement is even greater, as rapidly expanding economies offer enormous opportunities for investment in energy efficient technologies. **Buildings and appliances** account for about a **quarter** of the total CO₂ emission **reductions** below the Baseline Scenario in 2050 in the ACT scenarios.

Which end-uses contribute the most to the savings in energy?

Space heating accounts for 50% of the savings in energy in the ACT scenarios in the residential sector and 40% in the commercial sector, **appliances** account for 21% of the savings in the residential sector, **lighting and miscellaneous** electrical end-uses 32% in the commercial sector, **water heating** for 15% in the residential sector and 16% in the commercial, **air conditioning** for 13% in the commercial sector and 6% in the residential sector, and **lighting** for 3% in the residential sector.

What technologies are the most important?

- Lighting, appliances and air conditioning account for just over half of the total CO₂ emissions reduction in the building sector by 2050. The efficiency of lighting technologies has improved in recent years. Some estimates show that cost-effective efficiency gains of 30 to 60% remain.
- Space heating dominates energy use and the savings in energy. Measures that improve the building envelope and the heating system are therefore very important.
 - Building envelope: In many countries, new buildings could be made 70% more efficient than existing buildings. The best windows on the market insulate three times as well as their double-glazed predecessors. Super-insulation, which is also three times more effective, will soon be on the market.

- Heating systems: Natural gas and oil furnaces have achieved efficiencies of more than 95% with condensing technology. Further improvements are possible with new control systems. District heating has great potential in many countries, and advances are being made in boiler efficiency and controls. Heat pumps also show significant promise. Solar space heating has long been commercially available. Wood heating, common worldwide, can benefit from advanced combustion technologies.
- Energy efficient air conditioners now use 30 to 40% less energy than models sold ten years ago. Ventilation systems have improved and new systems can lead to energy reductions of 10 to 15%. There have been major energy efficiency improvements in refrigerators, freezers, washing machines, dryers and dishwashers. There is potential for further improvements.
- More energy efficient wood stoves need to be more widely deployed in developing countries.