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## Net Zero by 2050 - A Roadmap for the Global Energy Sector

### New IEA publication

**With this report, IEA shows how the transition to a net zero energy system would be possible by 2050, while ensuring stable and affordable energy supplies, providing universal energy access and enabling robust economic growth. While the study addresses the energy sector, the chapter on buildings does offer some perspectives.**

### Buildings

The 244-page study focusses on the energy sector. For information, abstracts from the chapter on buildings are copied below (page 141-150). It should be kept in mind that the study applies globally, so interpretation may not always be easy.

#### Zero-carbon-ready buildings

The NZE pathway for the buildings sector requires a step change improvement in the energy efficiency and flexibility of the stock and a complete shift away from fossil fuels. To achieve this, more than 85% of buildings need to comply with zero-carbon-ready building energy codes by 2050. This means that mandatory zero-carbon-ready building energy codes for all new buildings need to be introduced in all regions by 2030, and that retrofits need to be carried out in most existing buildings by 2050 to enable them to meet zero-carbon-ready building energy codes.

#### Heating and cooling

Building envelope improvements in zero-carbon-ready retrofit and new buildings account for the majority of heating and cooling energy intensity reductions in the NZE, but heating and cooling technology also makes a significant contribution. Space heating is transformed in the NZE, with homes heated by natural gas falling from nearly 30% of the total today to less than 0,5% in 2050, while homes using electricity for heating rise from nearly 20% of the total today to 35% in 2030 and about 55% in 2050.

High efficiency electric heat pumps become the primary technology choice for space heating in the NZE, with worldwide heat pump installations per month rising from 1,5m today to around 5m by 2030 and 10m by 2050. Hybrid heat pumps are also used in some of the coldest climates but meet no more than 5% of heating demand in 2050.

There are no new coal and oil boilers sold globally from 2025 in the NZE. Sales of gas boilers fall by more than 40% from current levels by 2030 and by 90% by 2050. By 2025 in the NZE, any gas boilers that are sold are capable of burning 100% hydrogen and therefore are zero-carbon-ready. The share of low-carbon gases (hydrogen, biomethane, synthetic methane) in gas distributed to buildings rises from almost zero to 10% by 2030 to above 75% by 2050.

Buildings that meet the standards of zero-carbon-ready building energy codes drive down the need not only for space heating but also for space cooling – the fastest growing end-use in buildings since 2000. Space cooling represented only 5% of total buildings energy consumption worldwide in 2020, but demand for cooling is likely to grow strongly in the coming decades with rising incomes and a hotter climate. In the NZE, 60% of households have an air conditioner in 2050, up from 35% in 2020. High-

performance building envelopes, including bioclimatic designs and insulation, can reduce the demand for space cooling by 30-50%, while providing greater resilience during extreme heat events. In the NZE, electricity demand for space cooling grows annually by 1% to reach 2.500 TWh in 2050. Without 2.000 TWh of savings from residential building envelope improvements and higher efficiency equipment, space cooling demand would be almost twice as high.

Retrofit rates increase from less than 1% per year today to about 2,5% per year by 2030 in advanced economies: this means that around 10m dwellings are retrofitted every year. In emerging market and developing economies, building lifetimes are typically lower than in advanced economies, meaning that retrofit rates by 2030 in the NZE are lower, at around 2% per year. This requires the retrofiting of 20 million dwellings per year on average to 2030. To achieve savings at the lowest cost and to minimise disruption, retrofits need to be comprehensive and one-off.

### **Recommended actions**

Members may find the study useful or use the opportunity to browse the IEA website to get updated on some of the country reports.

### **Related documents and links**

All related documents and articles can be found in the respective sections in the right sidebar.

- GEN – 1247.01 – IEA report
- IEA website: <https://www.iea.org/>