



# **Pathways for delivering zero-carbon ready buildings by 2030**

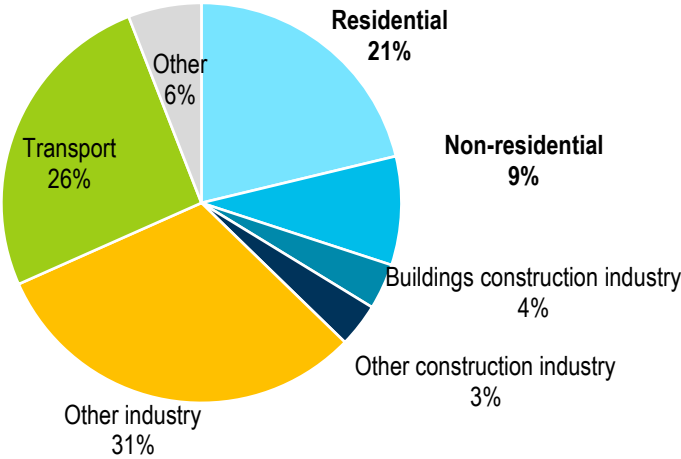
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The 8th IEA-Tsinghua Joint Workshop, 27 October 2022

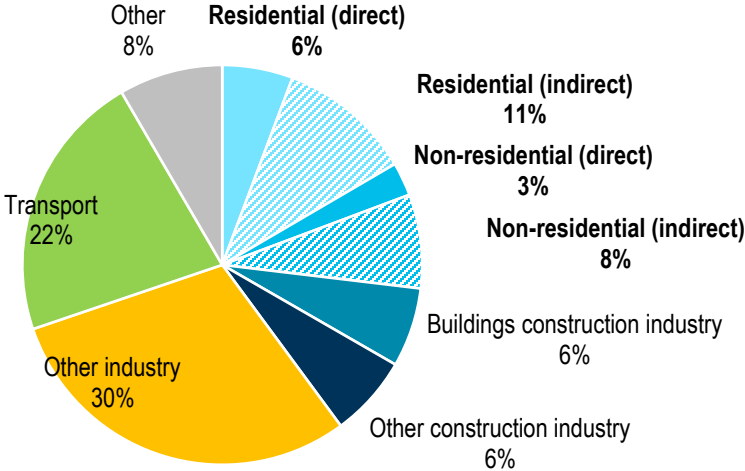
# Buildings sector CO<sub>2</sub> emissions rebounded to above 2019 levels



Global final energy consumptions, 2021  
~440 PJ



Global energy and process CO<sub>2</sub> emissions, 2021  
~36 Gt

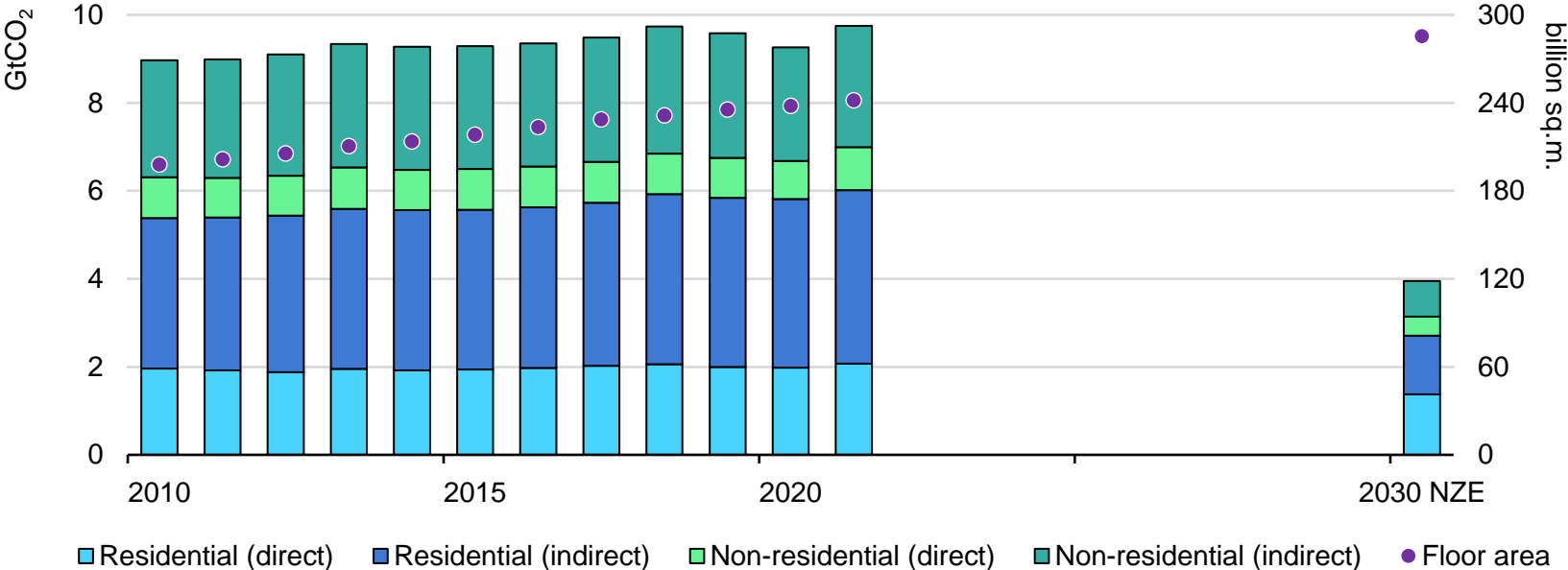


**In 2021, buildings sector operation is responsible of 27% of global CO<sub>2</sub> emissions and 30% of final energy consumptions**

# Buildings are not on track to achieve the Net Zero by 2050 target



CO<sub>2</sub> emissions of buildings operation and floor area increase, 2010-30 NZE



**The current decade is a critical period for governments to put in place policy frameworks and regulations to support the achievement of longer-term targets, and behavioural changes play an essential, complementary role**

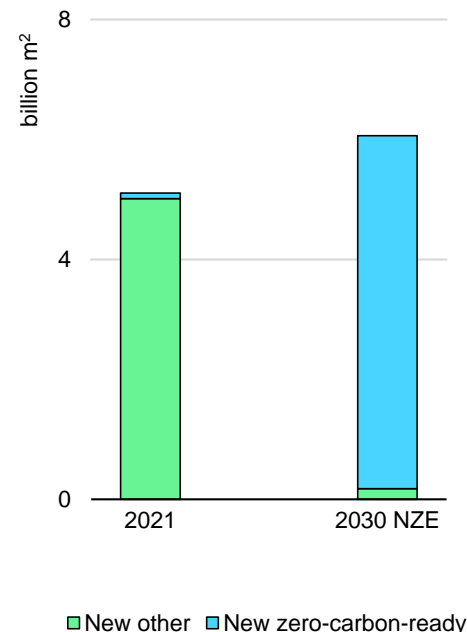
# All countries targeted for zero-carbon-ready codes by 2030

Zero-carbon ready buildings: “Highly *energy-efficient* and *resilient* buildings that either use *renewable energy directly*, or rely on a source of energy supply that can be *fully decarbonised*, such as electricity or district energy”

## Performance criteria of zero-carbon-ready buildings

- **Energy efficiency and resiliency:** buildings envelope; technologies progressively towards best available
- **Zero emissions fuels:** direct renewables or completely decarbonized energy supply
- **Flexibility:** integration and exploitation of storage, connectivity and automation
- **Embodied carbon:** targeting emissions from the manufacturing of building construction

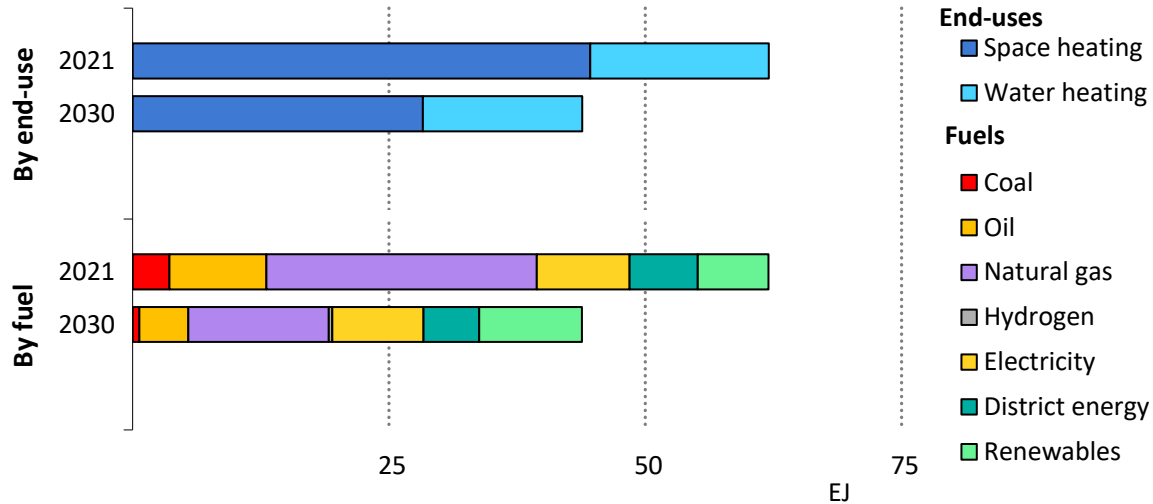
Added floor area by type, 2021-30 NZE



**In the NZE, 20% of the existing building floor area are to be renovated to this level by 2030, with annual energy efficiency renovation rates jumping from less than 1% today to 2.5% by 2030 globally.**

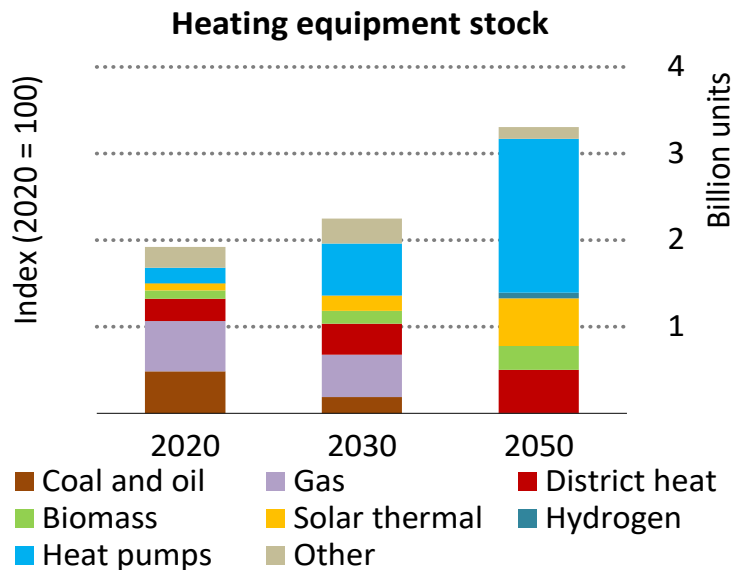
# Need of a rapid shift: heating is the most carbon-intensive end-use

Heating energy consumptions in buildings, 2021-30 NZE



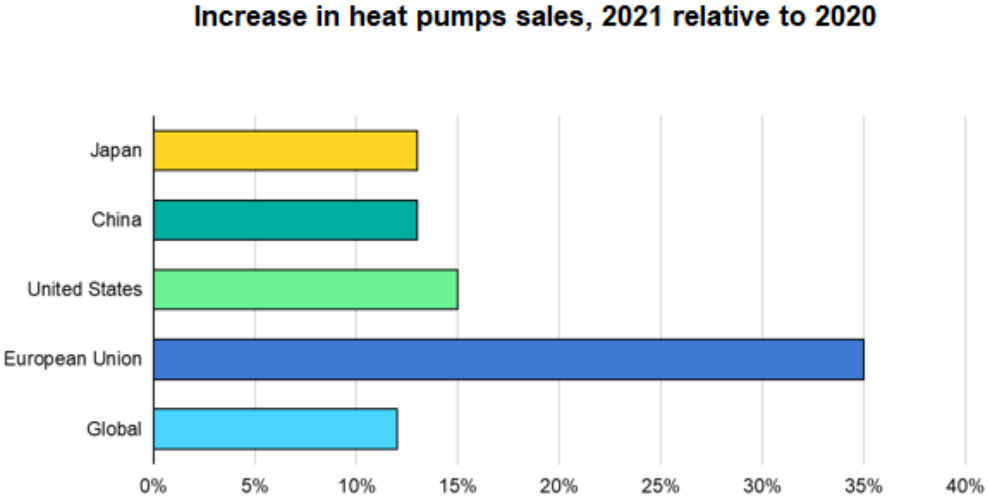
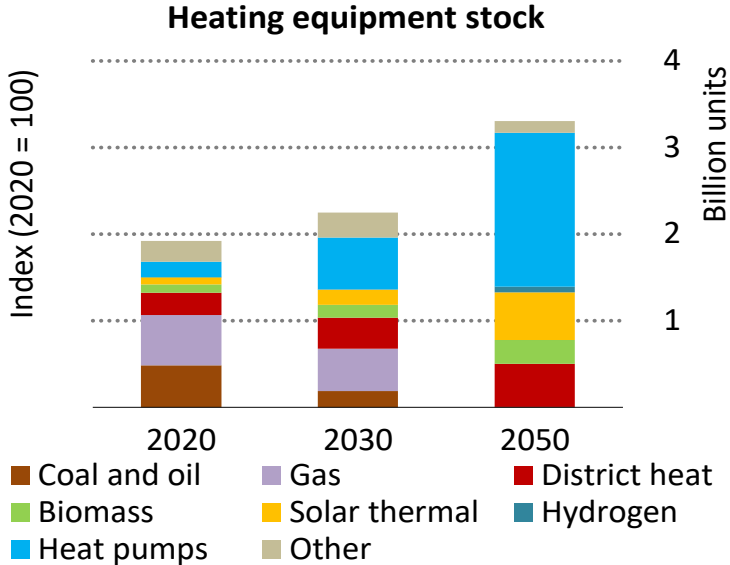
**The adoption of clean heating technologies requires a step change to align with the Net Zero Scenario, reaching 100% of sales before 2030. Technologies are available and mature today, and in many markets are cost-effective.**

# Heat pump potential needs to be unleashed



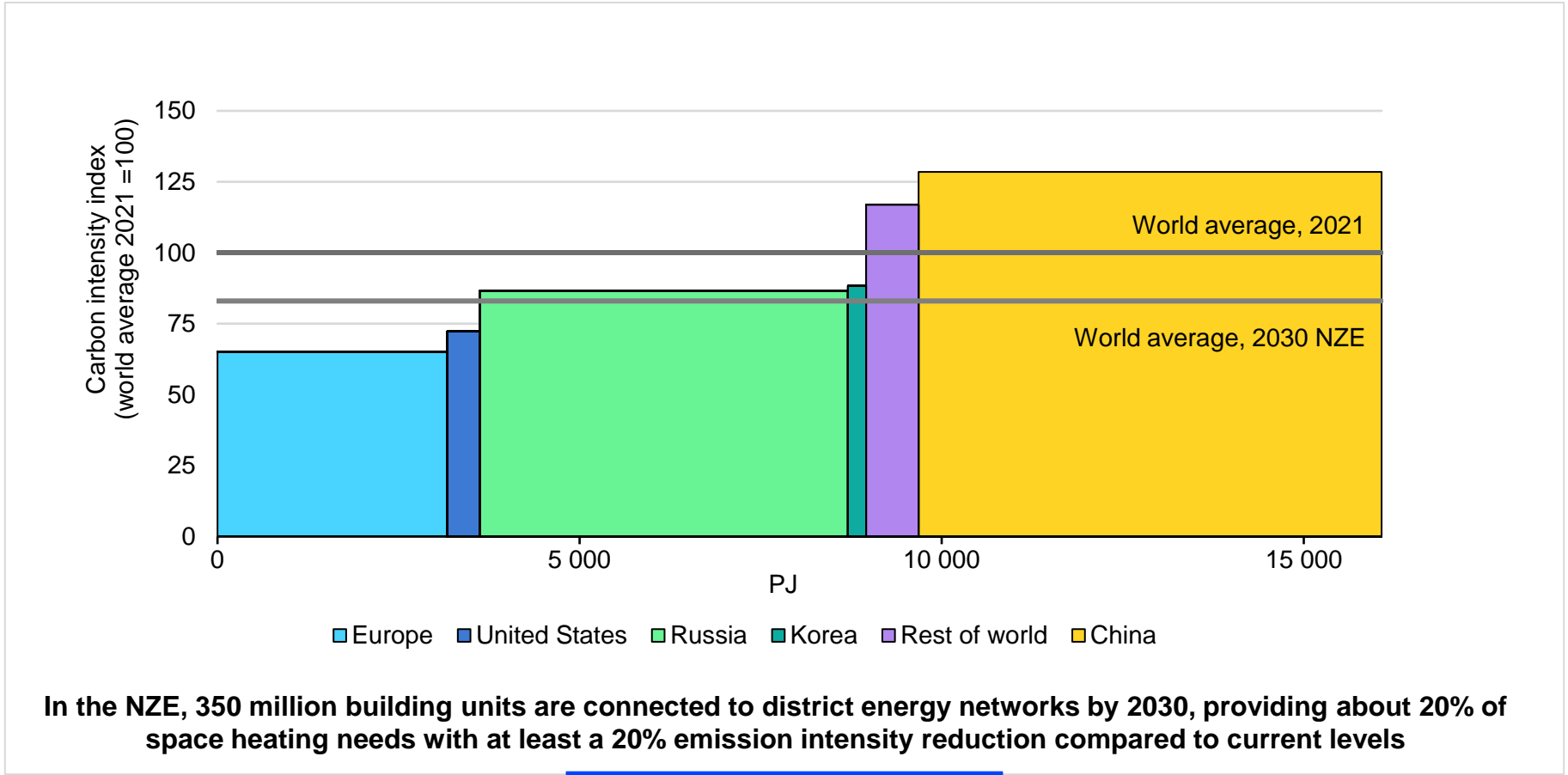
**Heat pump deployment needs to scale up quickly in order to meet the 2030 NZE scenario target: the heat pump stock should reach 600 millions and cover more than 20% of the total heating needs**

# Heat pump potential needs to be unleashed



**Heat pump sales increased by more than 13% globally, with record-high numbers in the EU (35% year-on-year growth) and positive signs in the US (15%), Japan (13%) and China (13%)**

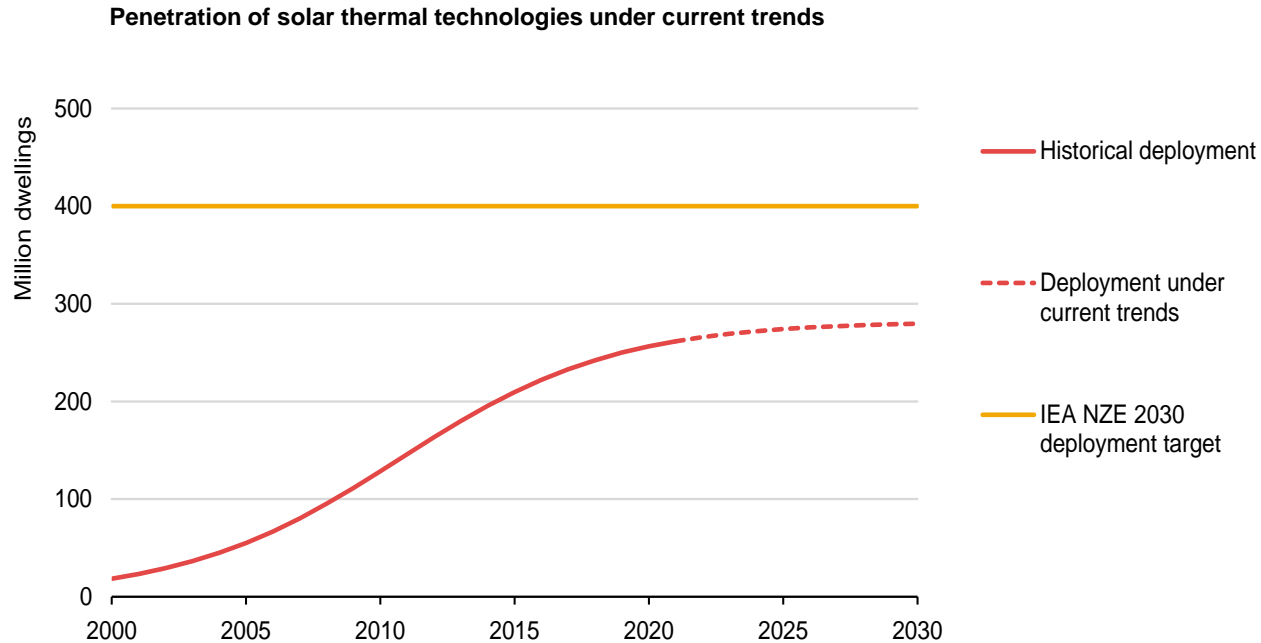
# There is room to reduce the emission intensity of district energy networks



**In the NZE, 350 million building units are connected to district energy networks by 2030, providing about 20% of space heating needs with at least a 20% emission intensity reduction compared to current levels**



# Standard and emerging solar thermal technologies should scale up



**290 million new solar thermal systems will need to be installed this decade in order to meet the NZE milestone by 2030. This would mean to at least match the total deployment from the previous two decades**

- **Financial instruments:** to reduce **upfront cost** and prioritise the deployment of all **clean** energy technologies and retrofits, especially targeting low income homes
- **Bans and regulations:** ban the deployment of **fossil fuel** technologies in new installations and promote higher **energy performance standards**
- **Codes and standards:** advance national building codes to promote **zero carbon ready metrics** and ensure their compliance
- **Public support to R&D:** to support the development of **innovative technologies** and ramp up their learning curves
- **Planning instruments:** develop and enhance **national energy planning instruments** and integrate them in planning procedures
- **Capacity building:** develop **training and upskilling packages** to build/upgrade zero-carbon-ready buildings and design/install clean energy technologies



[IEA \(2022\), Buildings, IEA, Paris](#)



[IEA \(2022\), Technology and Innovation Pathways for Zero-carbon-ready Buildings by 2030](#)

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