



IGTIC

# Decarbonization of buildings and construction

# MODULE 6

Module 6 – Material for group work





IGTIC

## GOALS OF SECTORAL GROUP WORK

- Identify the main sources of greenhouse gas emissions in your sector.
- Familiarise yourself with the target indicators and quantitative indicators of decarbonisation in the sector.
- Identify which climate risks companies in the sector consider most significant.
- Evaluate the activities and technological solutions that are most common and appropriate in the short and long term to decarbonise the sector.



# Main sources of greenhouse gas emissions in buildings

Greenhouse gas emissions from buildings can come from a variety of sources caused by energy use and building operations, as well as construction.

Energy consumption and building operation:

- Heating: The use of natural gas, fuel oil, or other sources for heating buildings can lead to emissions of CO<sub>2</sub> and other greenhouse gases (Scope 1).
- Cooling: The use of refrigerants such as freons in air conditioning systems and refrigeration units can contribute to emissions of greenhouse gases (Scope 1).
- Electricity and district heating: If electricity or heat is generated from fossil sources such as coal or natural gas, CO<sub>2</sub> emissions occur during the production of electricity and heat (Scope 2).

Construction and materials:

- Production of building materials: The production of cement and steel requires large amounts of energy and can cause CO<sub>2</sub> emissions (Scope 3).
- Insulation: The use of materials with a high fluorocarbon content in insulation and insulation systems can lead to greenhouse gas emissions (Scope 3).

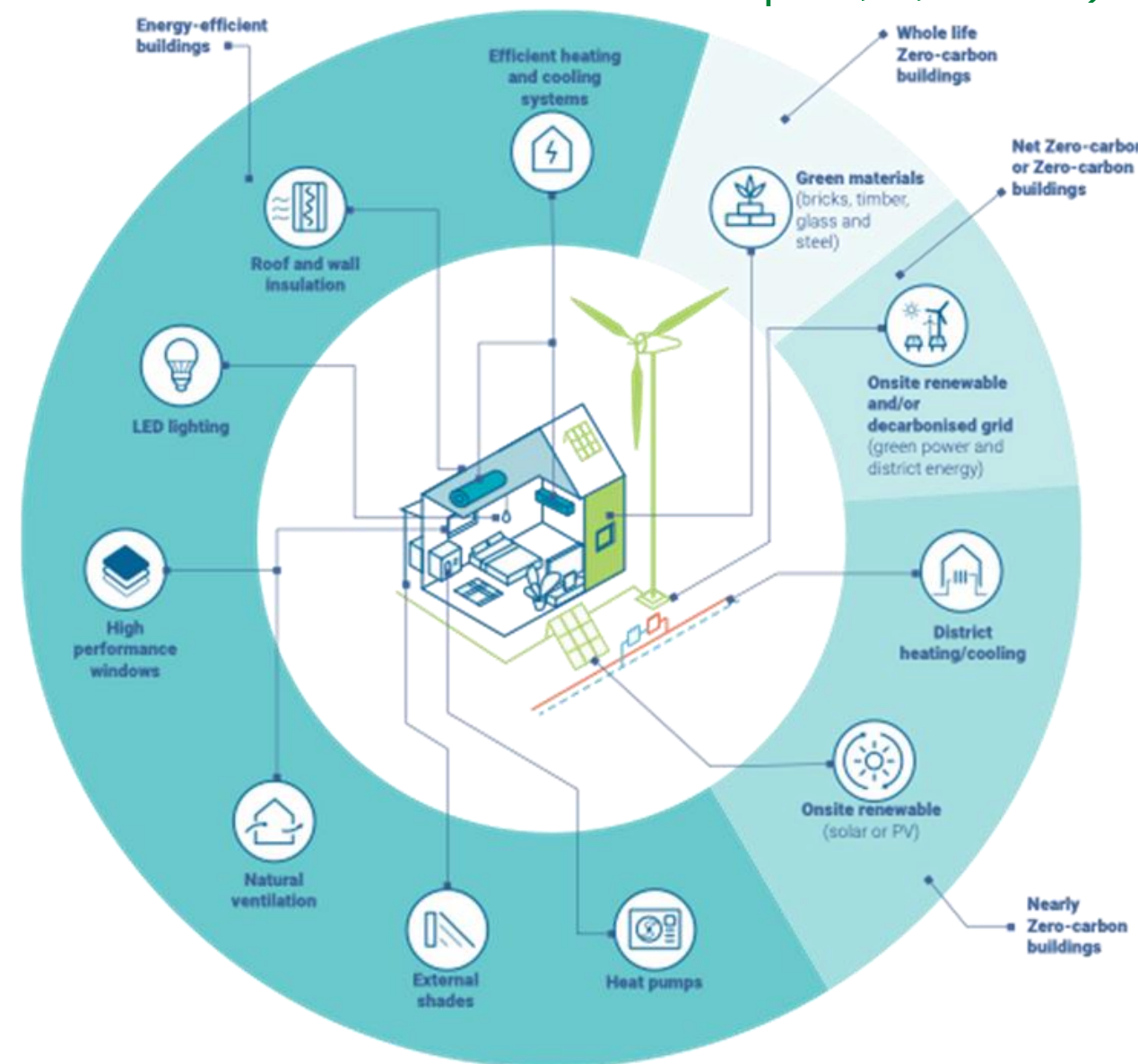


# UNEP: Degrees of decarbonization of buildings



Buildings with high energy efficiency in their design and engineering systems: lighting, insulation, windows and facades, heating, and ventilation systems  
(Low emissions under Scope 1 and 2)

Buildings with net-zero carbon emissions over their entire lifecycle: a building with net-zero carbon emissions with the additional requirement that emissions associated with materials used in construction are also net-zero (zero emissions under Scope 1, 2, and 3).



Buildings with net-zero emissions: a building that is energy-efficient and uses zero-emission energy sources to fully satisfy its energy needs (zero emissions under Scope 1 and 2).

Nearly zero carbon emissions: a building that is energy-efficient and may have access to a readily available zero-emission energy source (on-site or off-site), but does not fully offset the building's energy needs (minimal emissions under Scope 1 and 2).



# What processes lead to greenhouse gas emissions under Scope 1 and 2 at your enterprise (in your buildings)?

Use of fossil fuels: \_\_\_\_\_

Electricity consumption: \_\_\_\_\_

Heat consumption: \_\_\_\_\_

Cooling systems: \_\_\_\_\_

Others: \_\_\_\_\_



## Corporate goals for emission reduction in the industry

Company	Goal
<b>Skanska (global)</b>	Goal: Achieve carbon neutrality by 2045. Indicator: Reduction of greenhouse gas emissions for each construction project, based on the building's life cycle.
<b>Lendlease (global)</b>	Goal: Reduce greenhouse gas emissions by 50% by 2025. Indicator: Reduction of CO2 emissions per square meter of new construction projects.
<b>Turner Construction Company (UK)</b>	Goal: Increase the use of sustainable building materials by 50% by 2030. Indicator: An increase in the proportion of recycled, recyclable and environmentally friendly materials on each project.
<b>Shimizu (Japan)</b>	Goal: Reduce CO2 emissions from buildings by 80% compared to the 1990 level by 2050. Indicator: Reduce CO2 emissions per square meter of new construction projects.

# Has your company set decarbonization-related goals?

Scope 1 and 2: \_\_\_\_\_

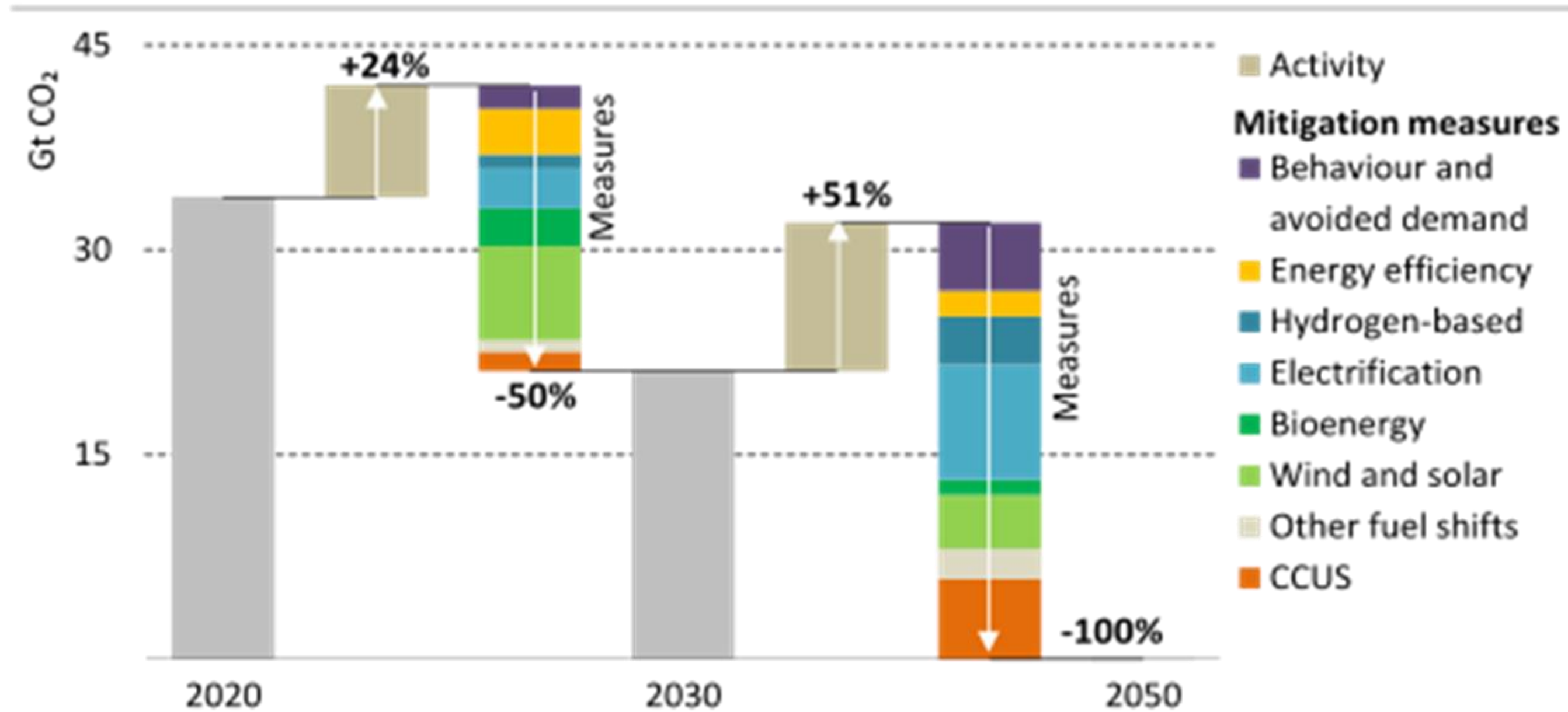
Scope 3: \_\_\_\_\_

Other goals:

- Energy efficiency improvement \_\_\_\_\_
- Use of renewable energy sources \_\_\_\_\_
- Others: \_\_\_\_\_

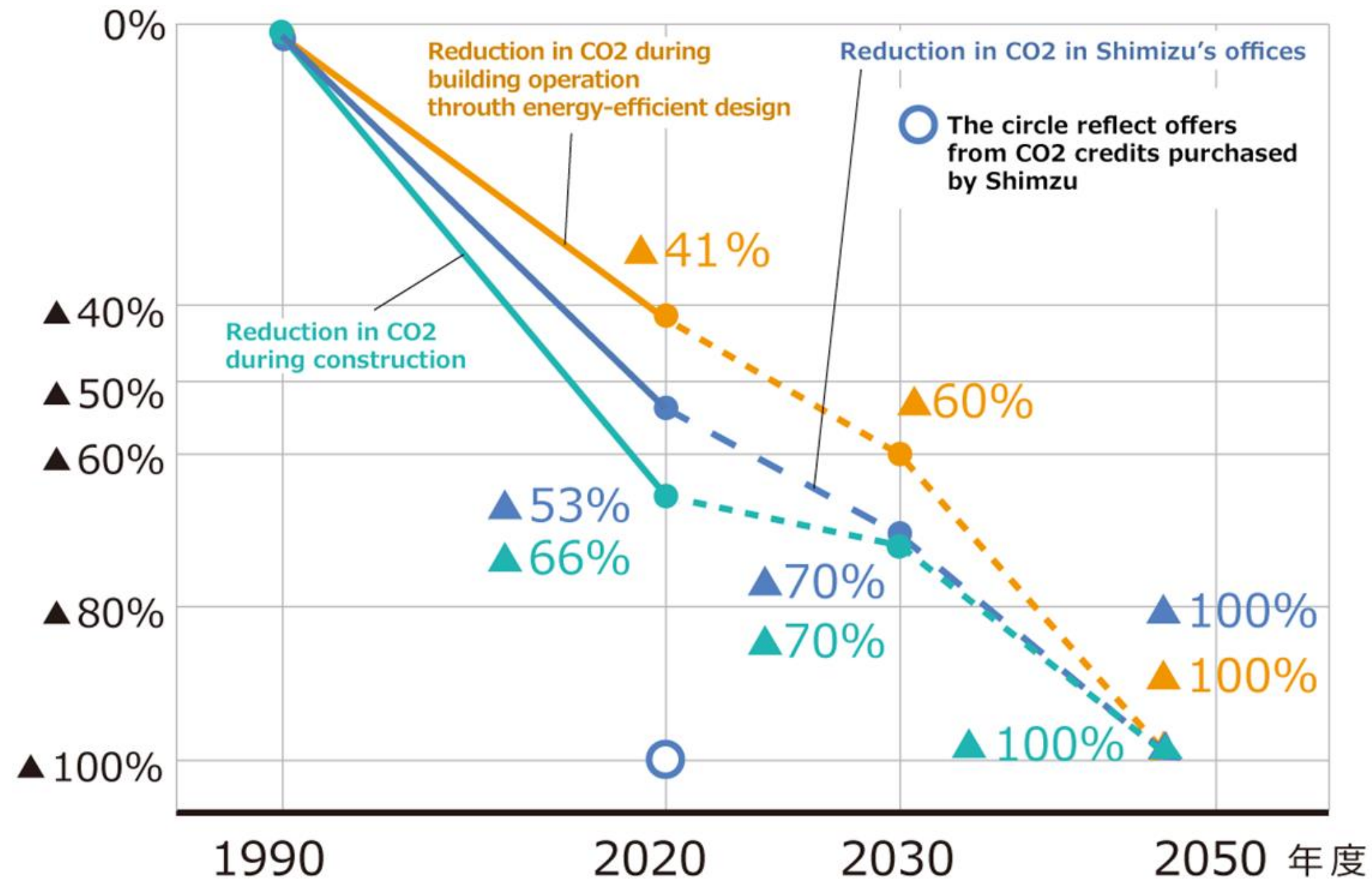


# IEA: Roadmap for decarbonizing buildings





# SHIMIZU: Decarbonization Strategy



- Reduction in CO2 during building operation through energy-efficient design
- Reduction in CO2 during construction
- Reduction in CO2 in Shimizu's offices



Project on complex modernisation of the “Tselinnaya” hotel building in Kostanay

Modernisation of the heating system, insulation of walls, roofing and replacement of windows

Greenhouse gas reduction: 2.8 thousand tonnes of CO<sub>2</sub> eq. per life cycle

Investments: 200 million tenge  
Energy saving: up to 50%

# Examples of net-zero buildings

KfW Westarkade, Frankfurt, Germany: This office building in Germany has achieved Passive House certification. It features thorough insulation, triple-pane windows, a heat recovery ventilation system, and other technologies aimed at reducing energy consumption.

Bahrain World Trade Centre, Manama, Bahrain: This is an outstanding example of an office building integrating passive energy sources. It has wind turbines installed between the towers to generate electricity and other technologies that reduce dependence on traditional energy sources.



# Examples of net-zero buildings



Karlín Group Headquarters, Prague, Czech Republic: This office complex in Prague is the first building in the Czech Republic certified to Passive House standards. It is equipped with excellent insulation, an efficient ventilation system, and heat pumps to ensure comfortable conditions with minimal energy consumption.

# COMPARISON OF ACTIONS

Summary of the action	Energy efficiency and retrofitting existing buildings	Construction of new highly efficient buildings (passive buildings)	Application of green technologies and materials in construction	Electrification and transition to renewable energy sources (RES)
Emission reduction potential in %	-50 -100%	-100%	-30%	-100%
Technological readiness (from 1 to 3)	3	3	1	2
Investments	Average	Low	Average	Average



# EVALUATE THE TECHNICAL AND ECONOMIC FEASIBILITY OF IMPLEMENTING DECARBONIZATION ACTIONS AT YOUR ORGANIZATION

Actions	Technologically possible	Economically justified
Energy efficiency and retrofitting existing buildings		
Construction of new highly efficient buildings (passive buildings)		
Application of green technologies and materials in construction		
Electrification and transition to renewable energy sources (RES)		



# What actions have already been implemented at your company?

Utilization of renewable energy sources: \_\_\_\_\_

Energy efficiency improvement: \_\_\_\_\_

Use of low-carbon materials: \_\_\_\_\_

Other actions: \_\_\_\_\_



# Assessment of climate risks

## **\*\*RISKS ASSOCIATED WITH THE GLOBAL TRANSITION TO LOW CARBON DEVELOPMENT\*\***

- Credit Risk Associated with ESG (Environmental, Social, and Governance): Risk of facing higher interest rates and difficulties in accessing financing due to strict ESG compliance requirements.
- Regulatory Risk: Risk of potential changes in national climate-related legislation, including greenhouse gas taxation, carbon footprint reduction targets, and potential litigation for non-compliance with regulatory requirements.
- Market risk: Risk exposure to carbon taxation in importing countries of production.
- Customer Risk: Risk of losing customers due to failure to meet their decarbonization targets as a supplier

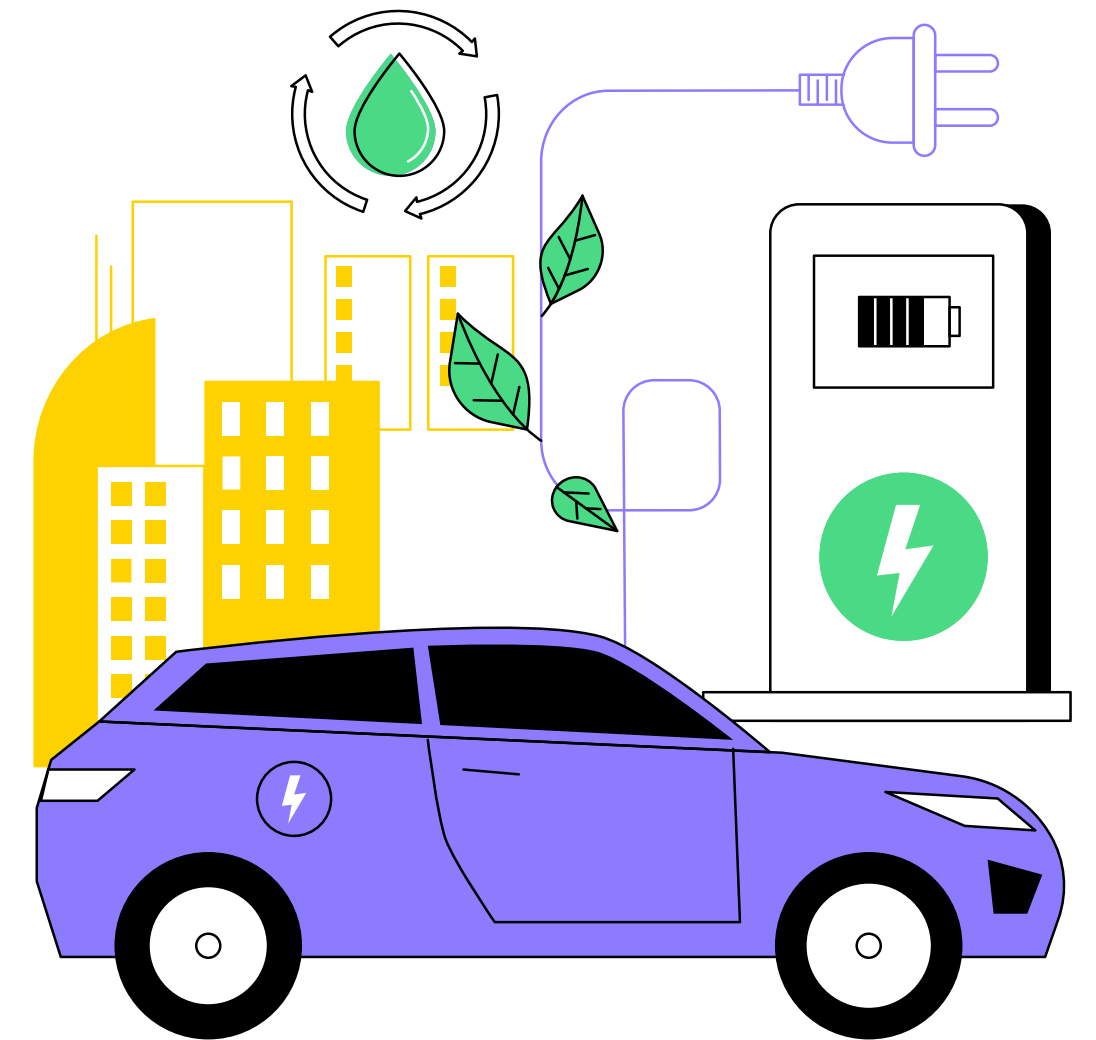




# \*\*ASSESSMENT OF CLIMATE RISKS\*\*

Risks related to the negative impact of climate change on operations:

- Operational risk due to changes in the amount of precipitation
- Operational risk due to extreme temperatures
- Operational risk due to extreme weather conditions
- Operational risk due to water scarcity



# ASSESS THE IMPACT THAT THE RISK MAY HAVE ON YOUR ENTERPRISE AND THE PROBABILITY THAT THE RISK WILL MATERIALISE

Risk	Impact	Probability
Credit risk: Access to capital		
Regulatory risk: Stricter legislation		
Market risk: Taxation of imports		
Customer risk: Loss of markets		
Operational Risk: Changes in precipitation levels		
Operational Risk: Extreme temperatures		
Operational Risk: Extreme weather conditions		
Operational risk: Water scarcity		

**Rate from 1 (low) to 5 (high)**

# Results of group work

- What are the main sources of GHG emissions in your industry?
- What goals do your companies set for themselves?
- Which decarbonization measures do you consider most realistic?
- Which measures have already been implemented?
- What are the main climate risks for your company?

