



Construction of Zero Carbon Building (ZCB)

- Challenges towards decarbonization of building sector -

18 November 2024
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Taisei Corporation

1. Taisei Group | Overview

Taisei Group Philosophy - To Create a Vibrant Environment for All Members of Society



Founded
1873



Number of employees
16,285



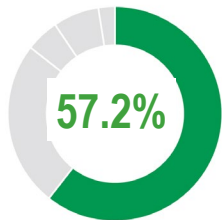
NET sales
11.6 billion \$



Overseas network
14 offices

Group Domestic Building Construction Business

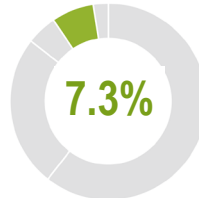
Net sales composition Sales **\$6,639 million**



Construction of offices, commercial facilities, factories, schools, hospitals, etc.

Group Real Estate Development Business

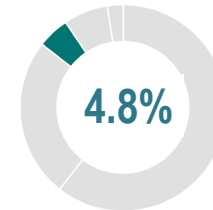
Net sales composition Sales **\$853 million**



Redevelopment, public-private partnership/private finance initiative (PPP/PFI), property management, and in-house development, condominium sales projects

Group Overseas Construction Business

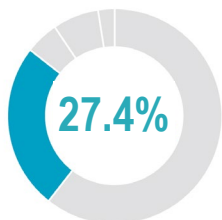
Net sales composition Sales **\$560 million**



Civil engineering and construction work in Taiwan, Vietnam, Singapore, the Philippines and other overseas countries

Group Domestic Civil Engineering Business

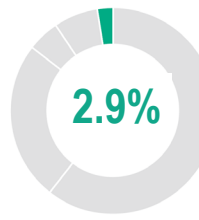
Net sales composition Sales **\$3,186 million**



Construction of tunnels, bridges, dams, railways, expressways, etc.

Group Engineering Business

Net sales composition Sales **\$332 million**



Development facilities in the pharmaceutical and logistics fields and Engineering of production facilities



1. Taisei Group | Environmental Goals and Targets



Decarbonized Society



Carbon Neutrality

	2030	2050
Scope 1+2	▲46%	Zero emission
Scope 3	▲25%	

base year FY2022

Specifically focused targets toward Year 2030

- Scope 1 | To promote of TSA and to ensure energy conservation
- Scope 2 | To possess our own power supply for consumption within the Group (220 GWh)
- Scope 3 upstream | To develop our technology for low carbon / decarbonized construction materials
- Scope 3 downstream | To develop ZEB technology
- To promote procurement and technology development that realize T-ZCB

Recycling-Oriented Society



Circular Economy

- To achieve and enhance Circular Economy by
 - Green procurement
 - Reduction of final disposal

Nature Co-existing Society

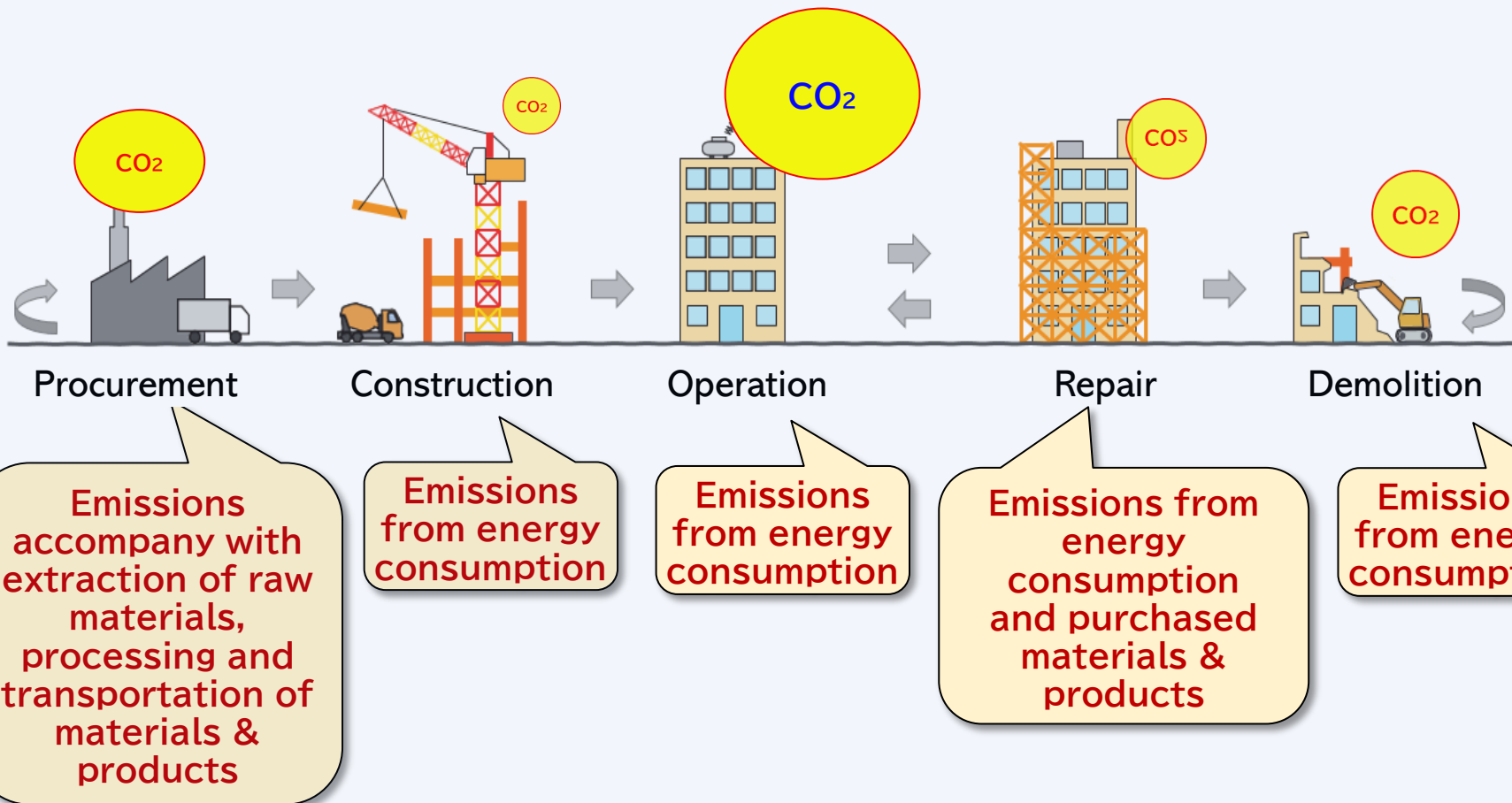


Nature Positive

- To achieve and enhance Nature Positive by
 - Minimizing negative impacts of our business
 - Maximizing positive impacts of our activities

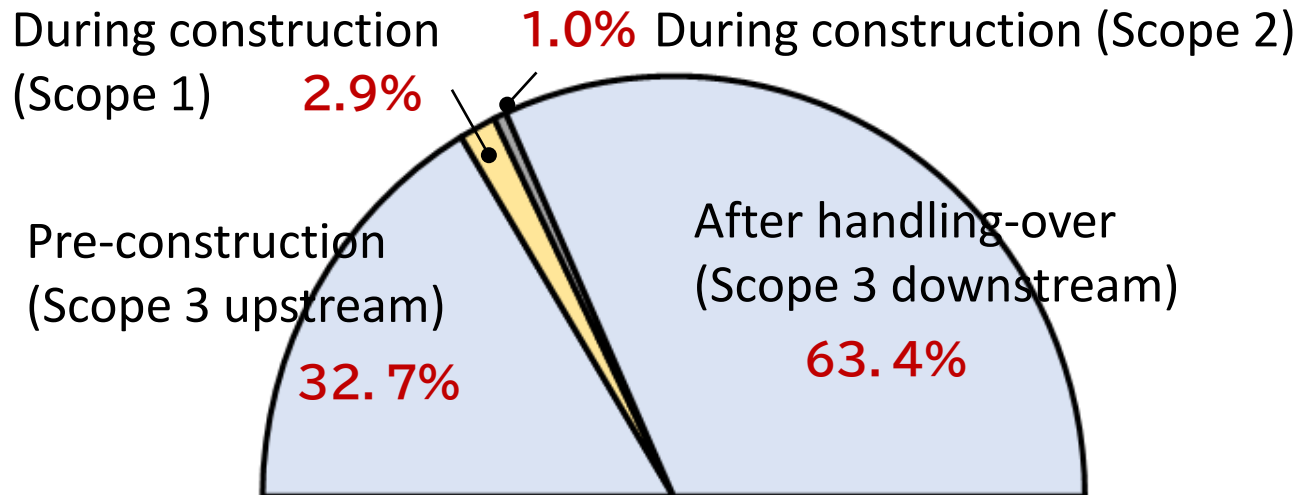
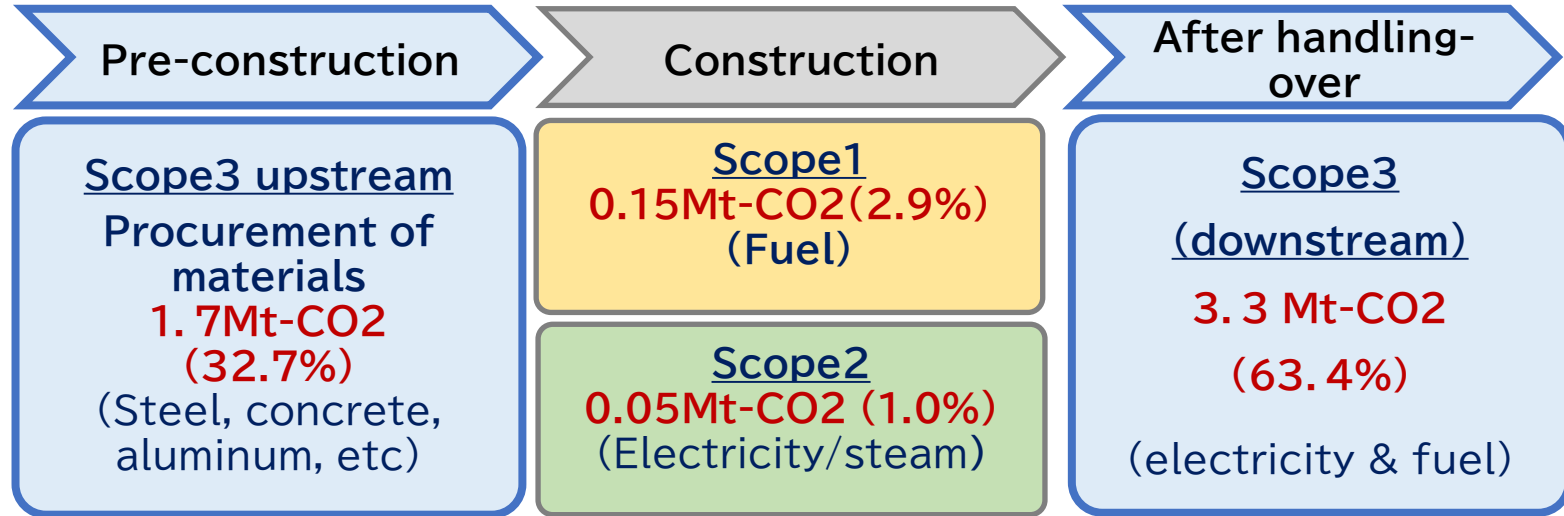
2. Taisei's efforts towards Decarbonization of Building

Building Lifecycle and accompanying CO2 emission



2. Taisei's efforts towards Decarbonization of Building

Taisei's Supply chain CO2 emissions (FY2023)



2. Taisei's efforts towards Decarbonization of Building

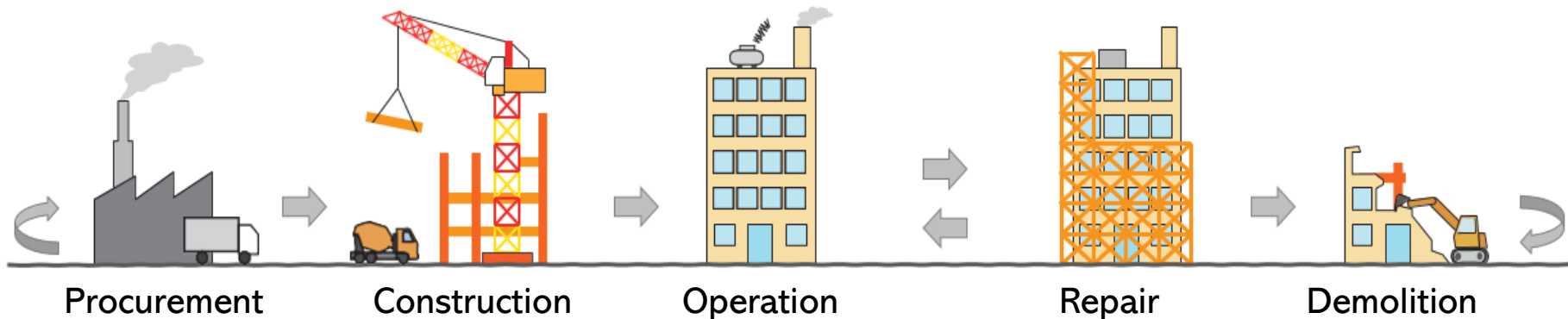
Reducing whole life carbon of buildings in 3 steps

1 Reduction of CO2 related to procurement

Zero-Carbon Design

2 Reduction of CO2 during construction

Zero-Carbon Construction



Application of wood and low/zero/negative carbon construction materials

Utilization of electric construction equipment and alternative fuels

Installation of RE system, high insulation, and energy saving equipment & system

Utilization of electric construction equipment and alternative fuels

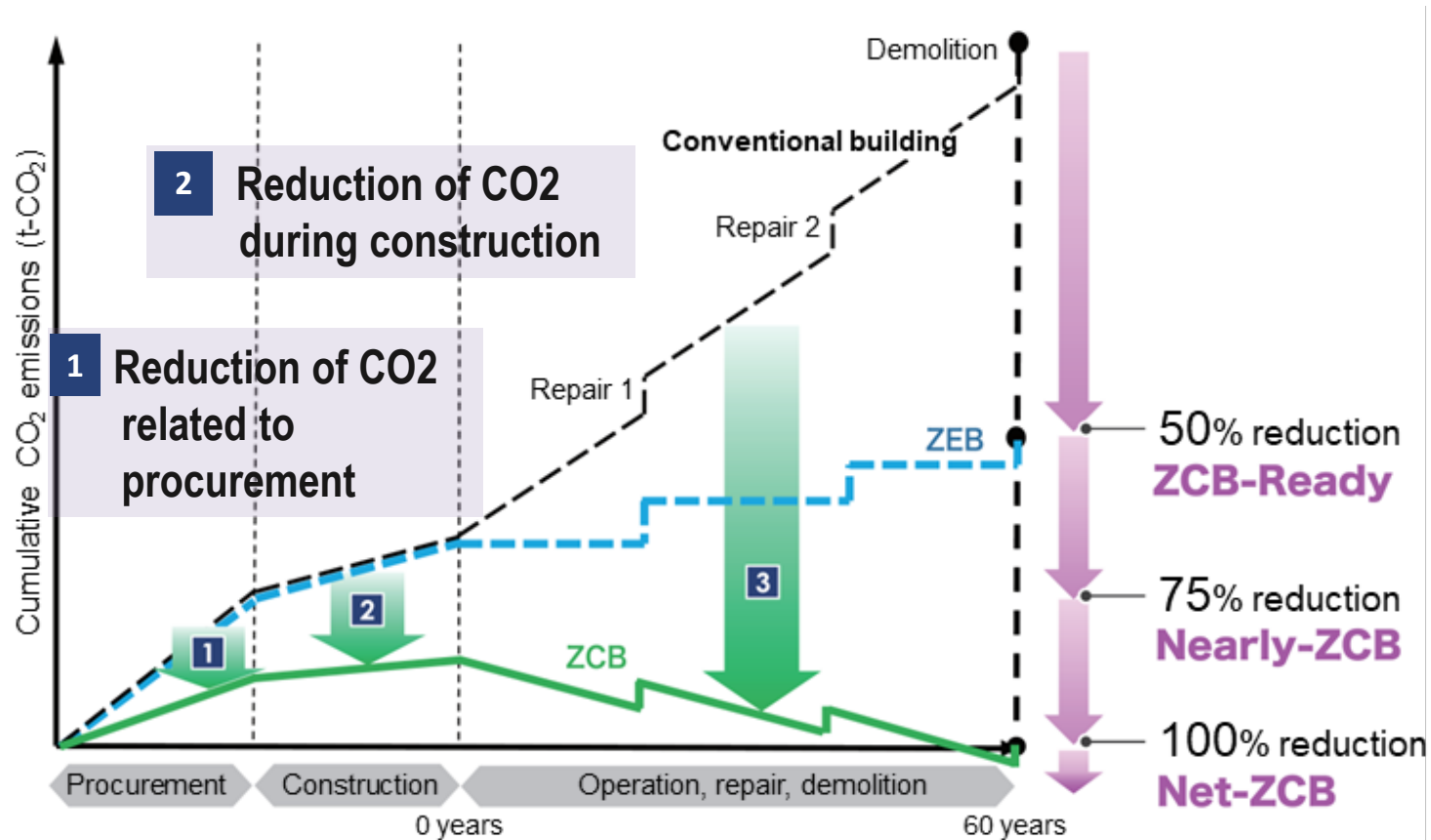
3 Reduction of Operational CO2

Zero-Carbon Operation

2. Taisei's efforts towards Decarbonization of Building

➤ T-ZCB chart

3 Reduction of Operational CO2



T-ZCB chart visualizes whole life carbon of a building, and the degree of CO₂ emission reduction is evaluated

2. Taisei's efforts towards Decarbonization of Building

1 Reduction of CO2 related to procurement

Zero-Carbon Design

■ Reduction of high-CO2 materials

- Reduction of steel
- Reduction in the number of piles

■ Utilization of low carbon & long-life materials

- Long-life exterior and interior
- Low carbon materials (electric furnace steel, green steel/aluminum/concrete, etc)

■ Utilization of zero/negative CO2 materials

- T-eConcrete® /Carbon-Recycle
- Utilization of local wood



Image: Eliminating pillars to create a large space

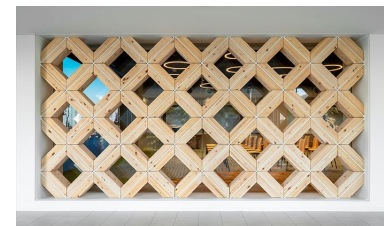


Image: long-life exterior (Floor)

PremiAL[®]R100
Recycled Low-Carbon Aluminum



Concrete tiles made from
T-eConcrete®/Carbon-Recycle



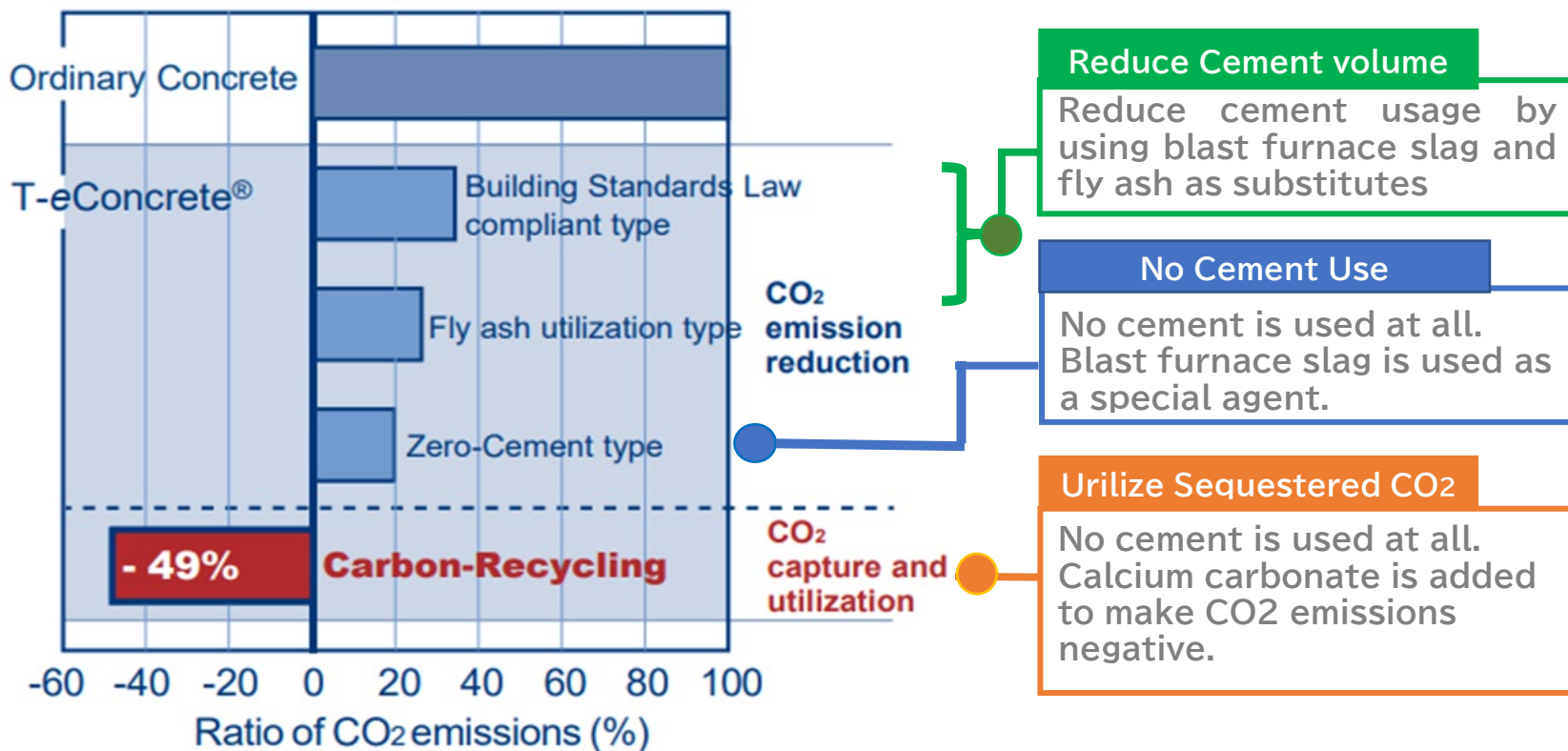
T-WOOD® BRACE: Timber based
seismic construction

2. Taisei's efforts towards Decarbonization of Building

1 Reduction of CO₂ related to procurement

Zero-Carbon Design

T-eConcrete[®] variations and their CO₂ emissions



2. Taisei's efforts towards Decarbonization of Building

1 Reduction of CO2 related to procurement **Zero-Carbon Design**

Examples of utilization of T-eConcrete®

Zero-Cement type



Cast-in-place concrete
(within red frame)



Shield Tunnel Segment



Box culvert

Carbon Recycle type



Bench



Foot protection block
(demonstration)



Gate

2. Taisei's efforts towards Decarbonization of Building

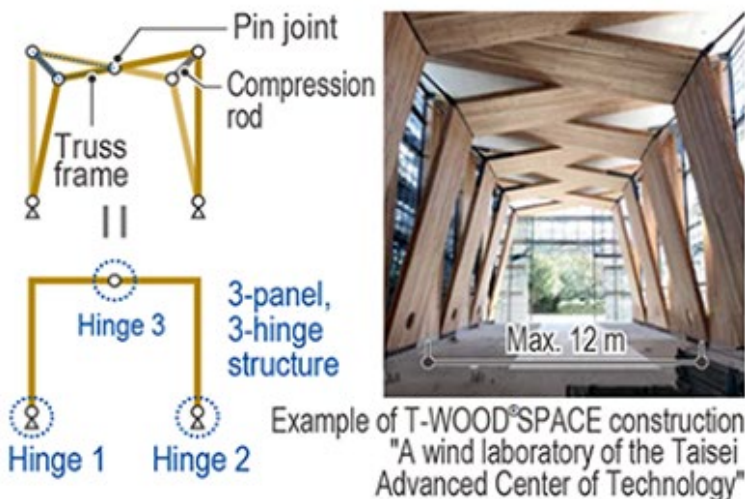
1 Reduction of CO2 related to procurement

Zero-Carbon Design

Technologies for expanded use of wood and wood products

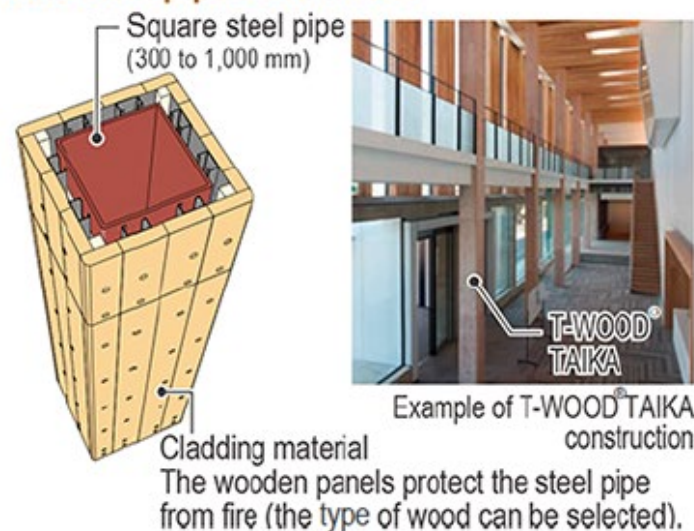
T-WOOD® SPACE

Large space achieved with a CLT structure



T-WOOD® TAIKA

Hybrid quasi-fireproof column comprising with steel pipes and timber



2. Taisei's efforts towards Decarbonization of Building

1 Reduction of CO2 related to procurement

Zero-Carbon Design

Examples of Wood-based buildings



Japan National Stadium(Tokyo)



New Kyotamba Town Office (Kyoto)



Furabira Town Multi-Purpose Facility
(Hokkaido)

2. Taisei's efforts towards Decarbonization of Building

2 Reduction of CO2 during construction

Zero-Carbon Construction

■ Reduction of Fuel CO2

- hybrid/electric heavy machinery
- Alternative fuels
- Waste collection by patrol



■ Reduction of electricity CO2

- Energy-saving enhancement at temporary offices



■ Utilization of renewable energy

- Utilization of RE certification
- Development of RE



In 2024, Taisei demonstrated technological verification to reduce CO2 emissions in civil engineering projects to virtually zero

2. Taisei's efforts towards Decarbonization of Building

3 Reduction of Operational Carbon Zero-Carbon Operation

Technologies to reduce CO2 emissions and enhance CO2 removal

■ Energy Saving

- Natural ventilation and natural lighting
- Highly efficient equipment/high performance exterior



■ Non-fossil energy use

- Solar power system
- Geothermal energy
- Hydrogen
- Other RE



■ Greening

- Exterior greening (landscape design)
- Rooftop and wall greening system

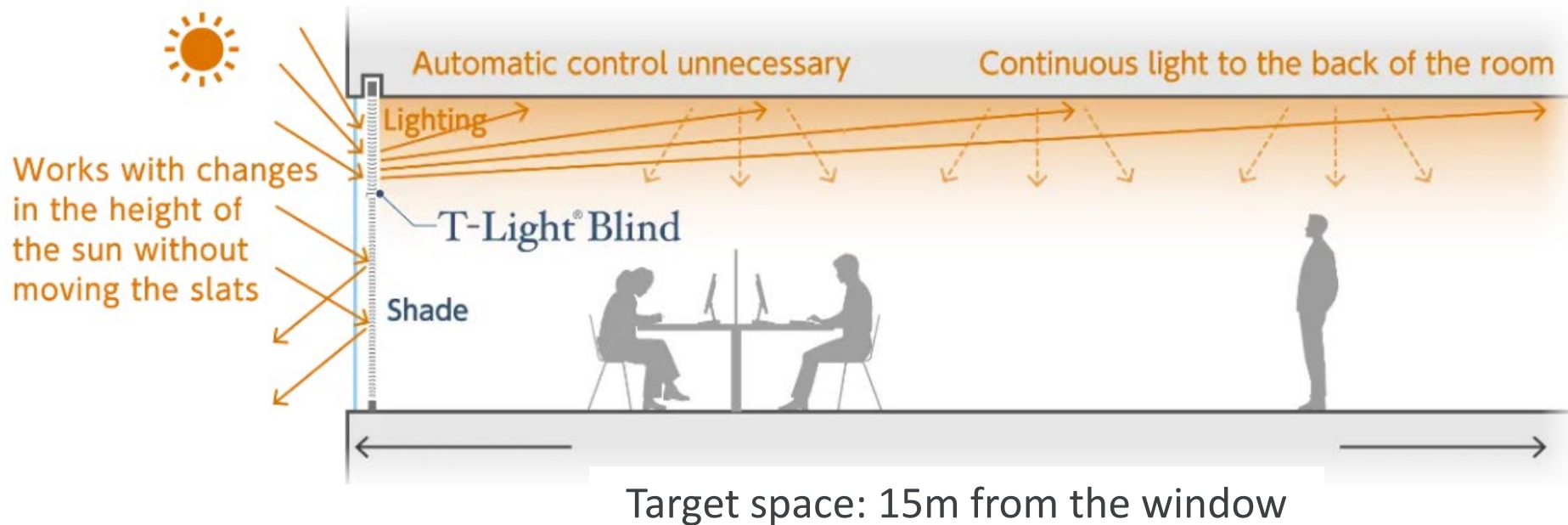


2. Taisei's efforts towards Decarbonization of Building

3 Reduction of Operational Carbon Zero-Carbon Operation

◆T-Light® Blind◆

Natural lighting blinds



2. Taisei's efforts towards Decarbonization of Building

3 Reduction of Operational Carbon Zero-Carbon Operation

◆T-Zone Saver®◆

Next-generation energy-saving automatic environmental control system

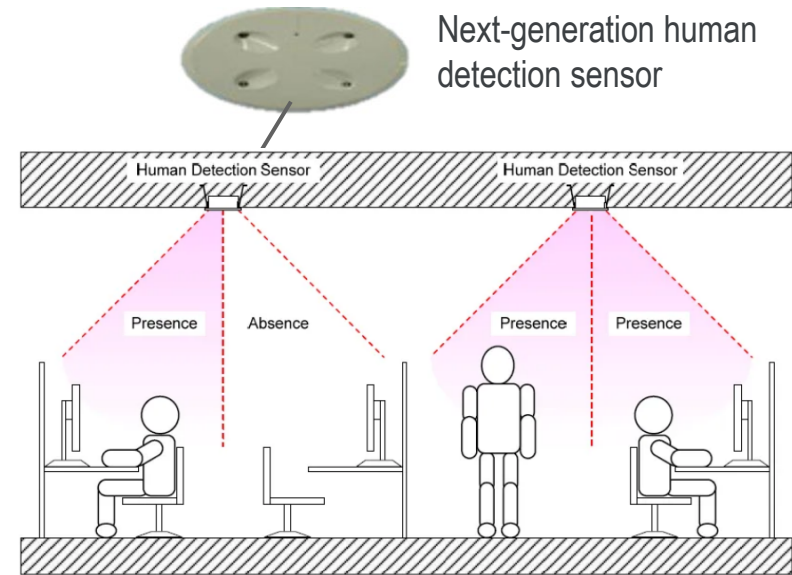


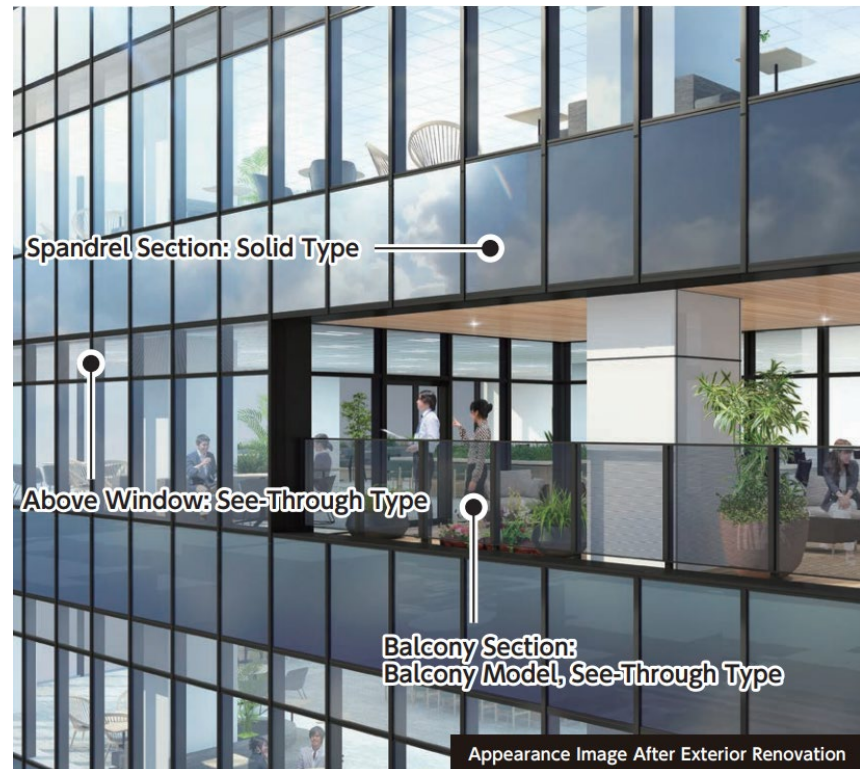
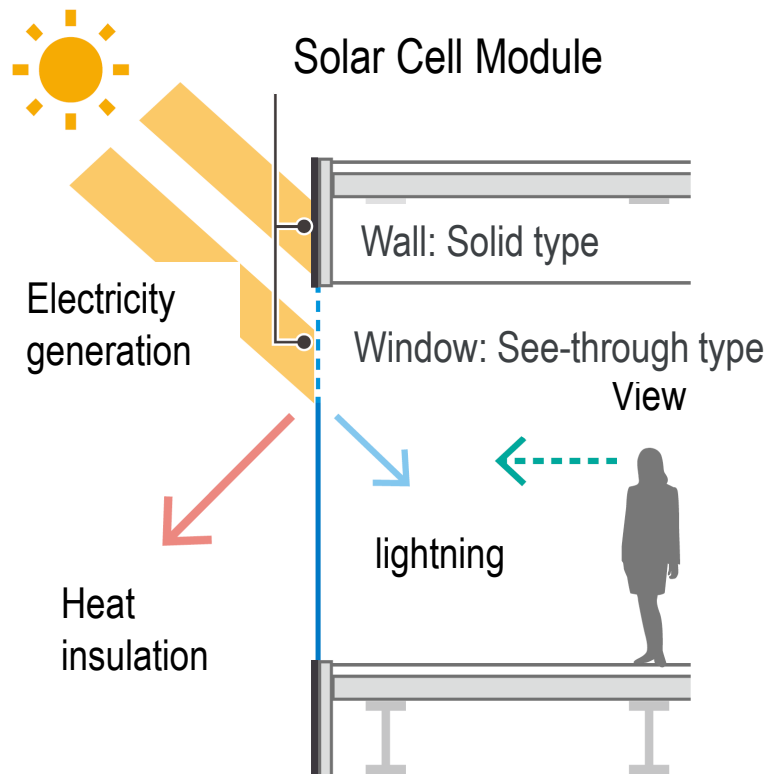
Fig. 1 Image of the operation of the human detection sensor

2. Taisei's efforts towards Decarbonization of Building

3 Reduction of Operational Carbon Zero-Carbon Operation

◆T-Green® Multi Solar◆

An exterior combined with solar power system



2. Taisei's efforts towards Decarbonization of Building



Zero Carbon Buildings under construction

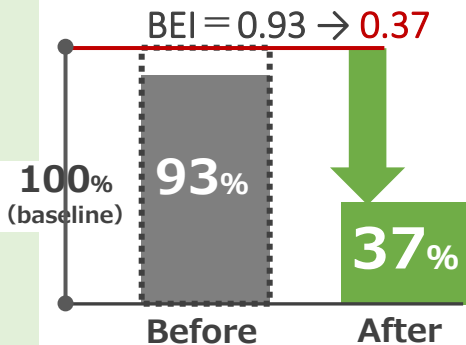
(Taisei Group Next-Generation Technology Research Institute)

Scheduled to be completed in autumn 2025

2. Taisei's efforts towards Decarbonization of Building

Examples of retrofitted existing buildings - "Green Renewal"

Kansai Branch Office



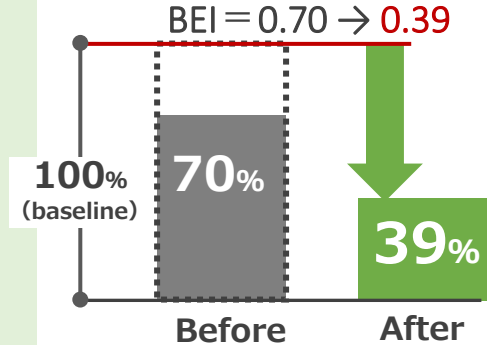
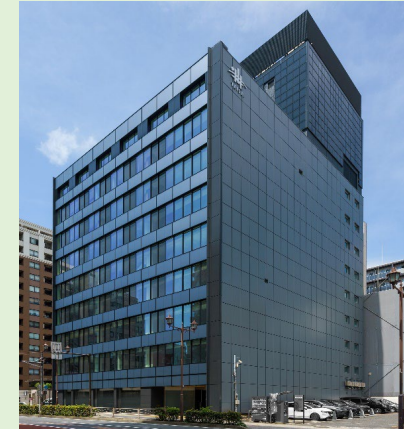
■ CO2 : ▲365t-CO2/yr
(▲52.7%)

■ Utility cost: ▲¥17.6M/yr
(▲44.3%)

■ CO2: ▲150t-CO2/yr
(▲39.0%)

■ Utility Cost: ▲¥7M/yr
(▲38.4%)

Yokohama Branch Office



3. Challenges in realizing the “Zero Carbon Buildings)”

1. Difficulties in “Zero Carbon Design”

- Increased construction material cost
- Availability of low-carbon building materials and products

2. Difficulties in “Zero Carbon Construction”

- Procurement of low-carbon/alternative fuels
- Limited availability of low-carbon (electric/hybrid) construction machinery

3. Difficulties in “Zero Carbon Operation”

- Increased facility cost



Barriers for building owners/developers

- No unified evaluating method for WLC
- Little incentives in reducing upfront carbon

Need financial and institutional support!!



TAISEI

For a Lively World

