

Delft University of Technology
Faculty of Architecture and the Built Environment

Course:
AR3AD100
Dutch Housing Graduation Studio
Chair of Architecture and Dwelling

Tutors:
Theo Kupers
Anne Kockelkorn
Pierijn van der Putt
Ferry Adema

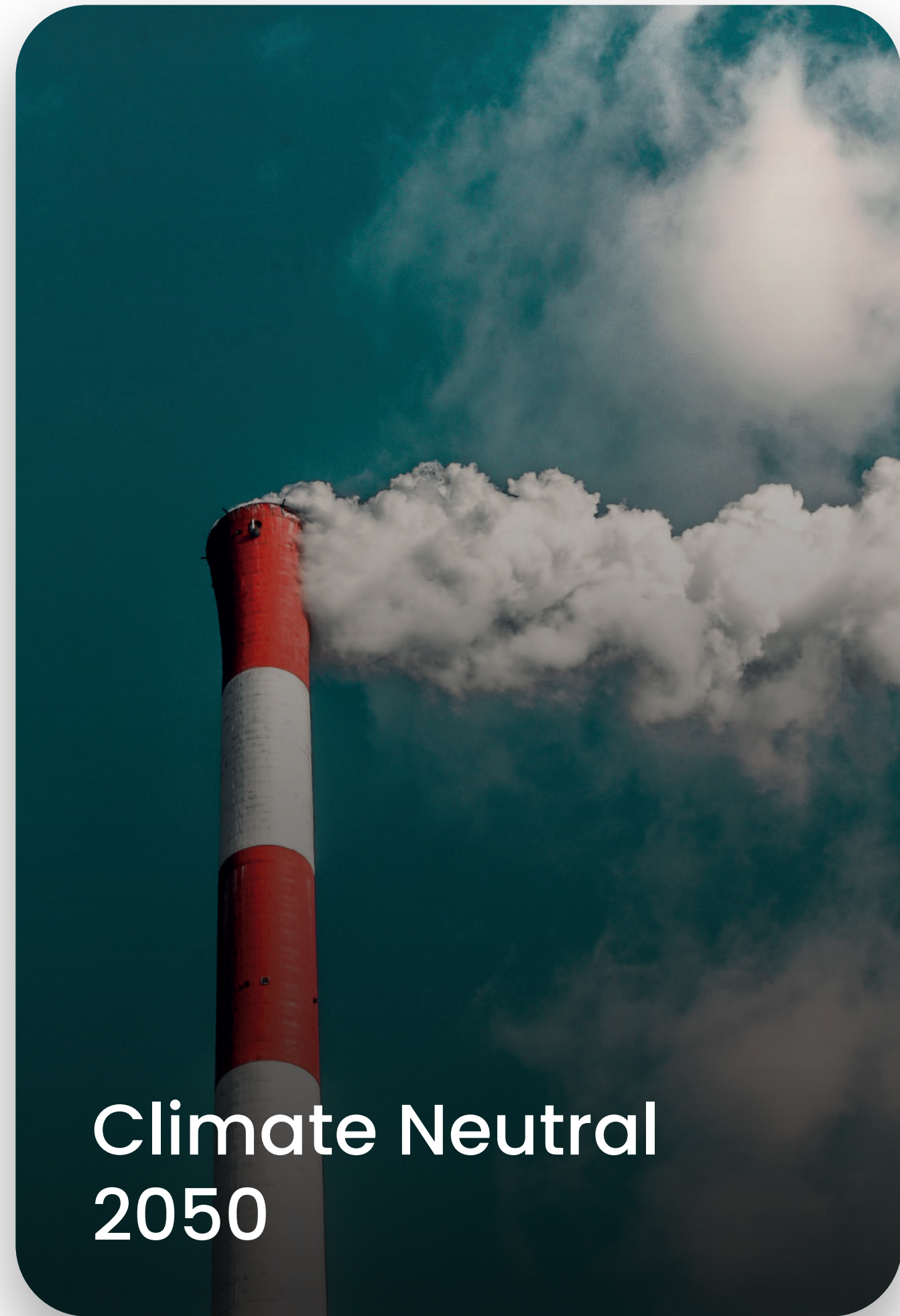
Delegate:
Paul Chan

A Recipe for Sustainable Living

An Architectural Recipe for Nudging Towards Pro-Environmental Behavior in Housing

Danny Westerink
January 10, 2022

Studio Assignment



Studio Assignment

How do we provide a way of living that ensures liveable, affordable and sustainable housing for a diverse population?

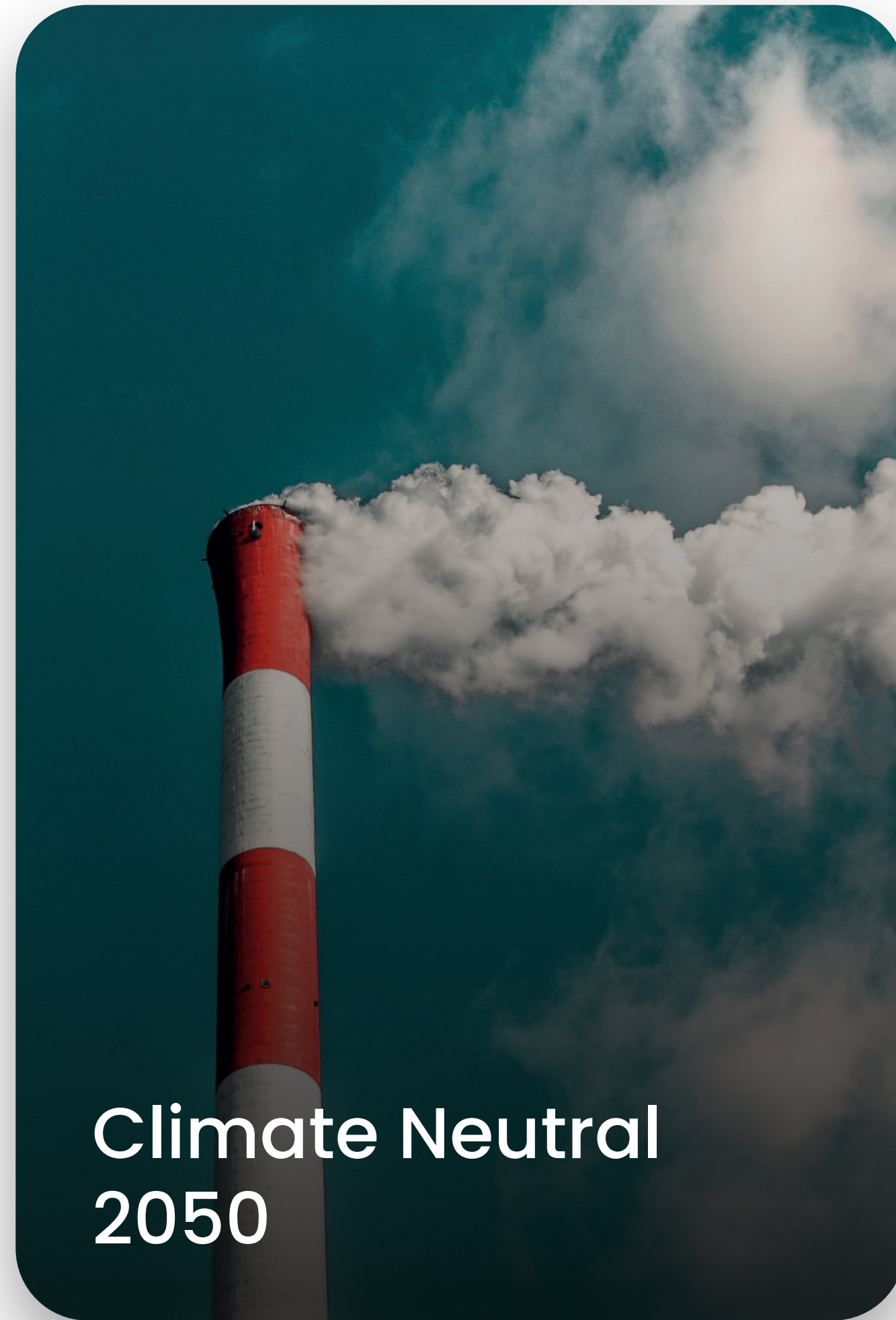
Studio Assignment



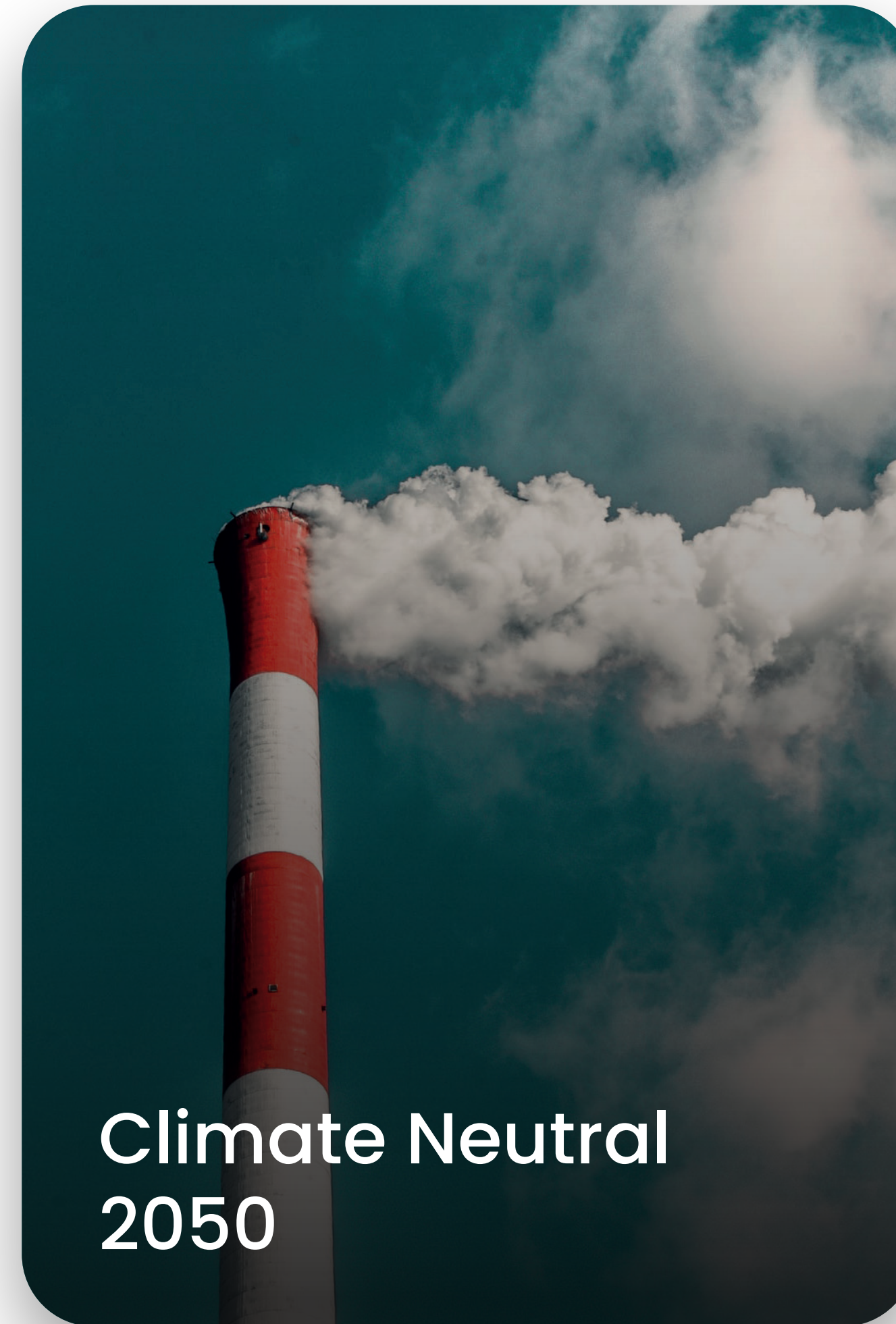
Studio Assignment



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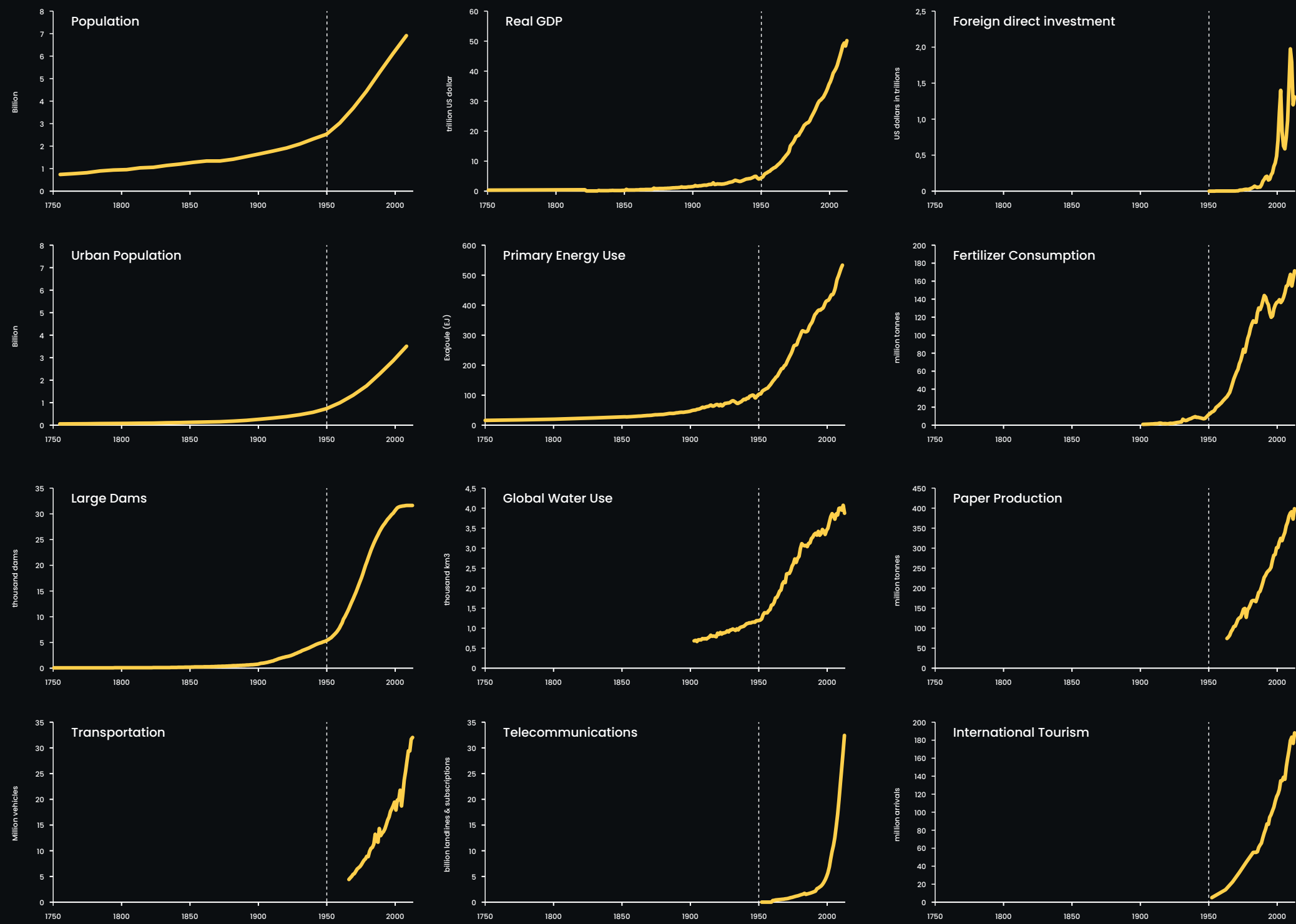


Studio Assignment



Problem Statement

Socio-Economic Trends

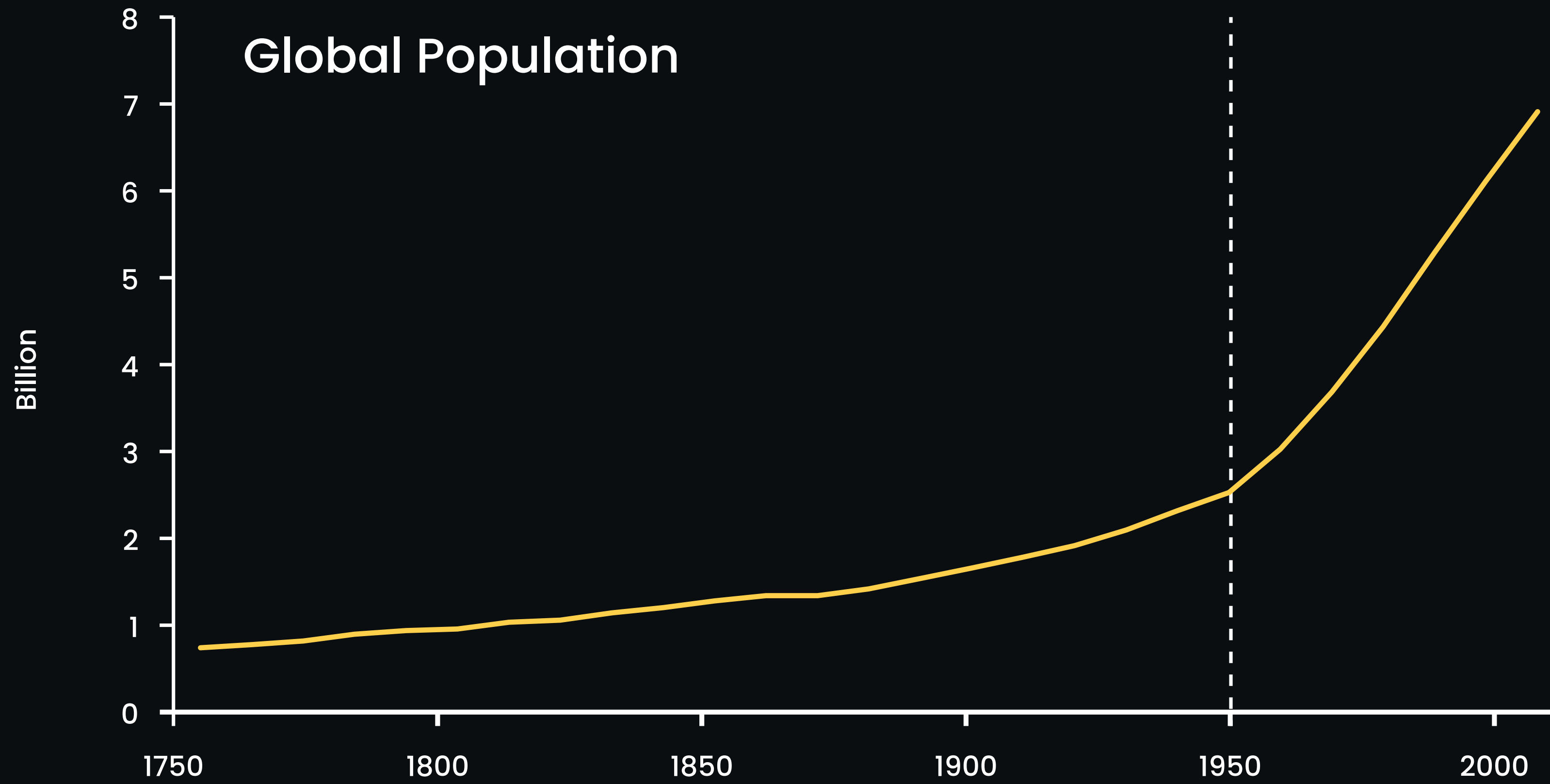


Ecological Trends



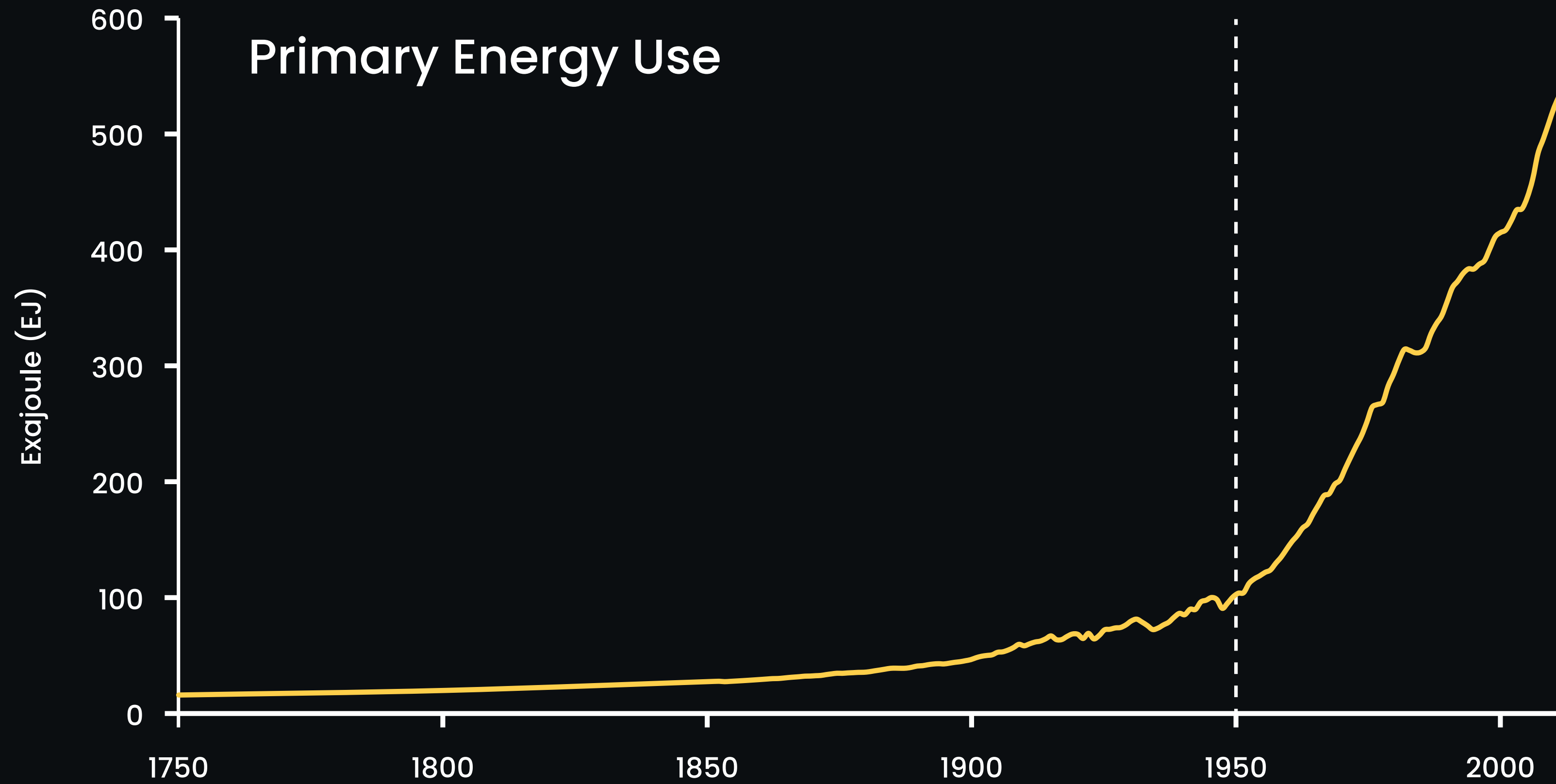
Adapted from Steffen et al, Global Change and the Earth System (2004).

Problem Statement



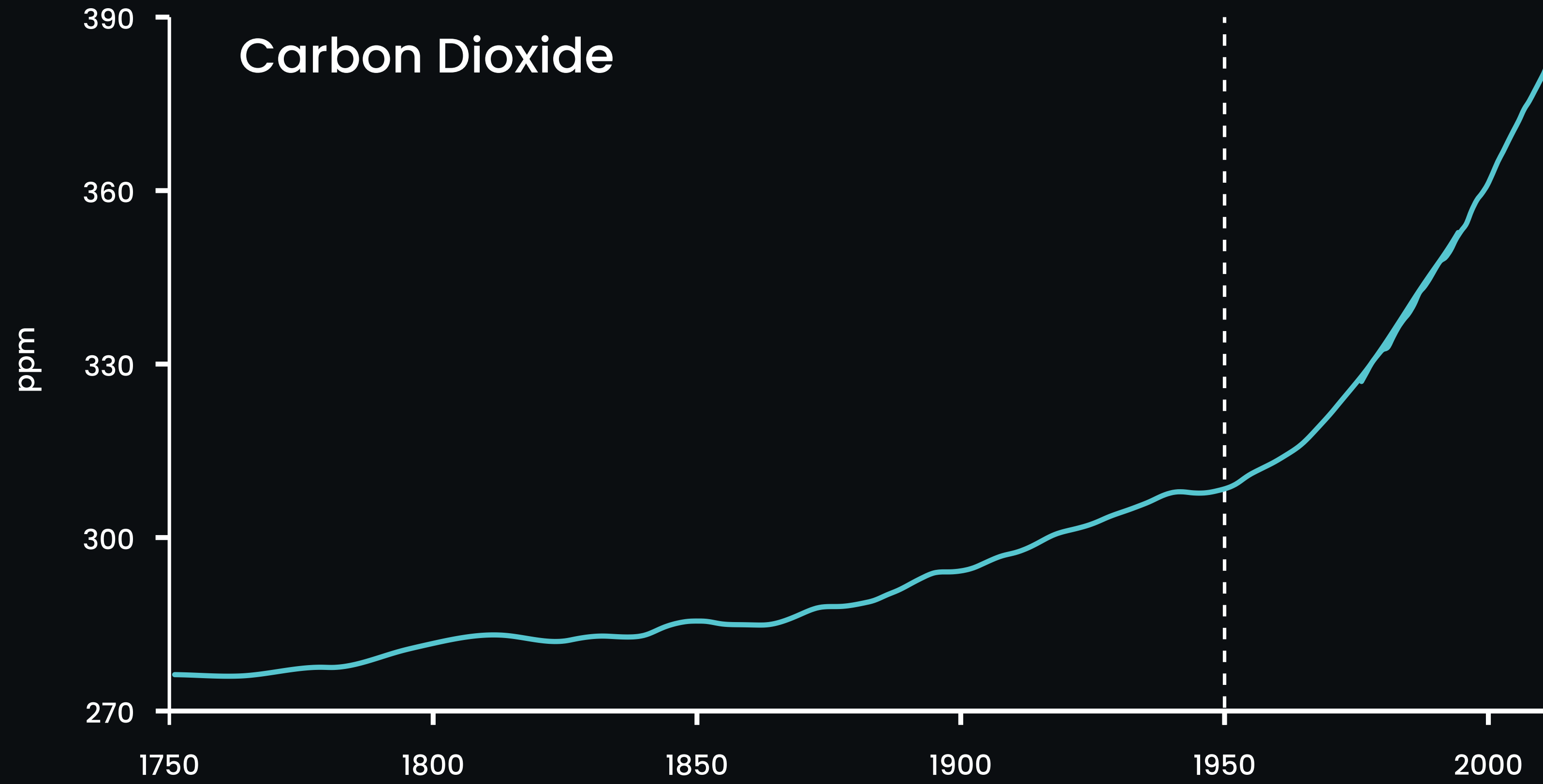
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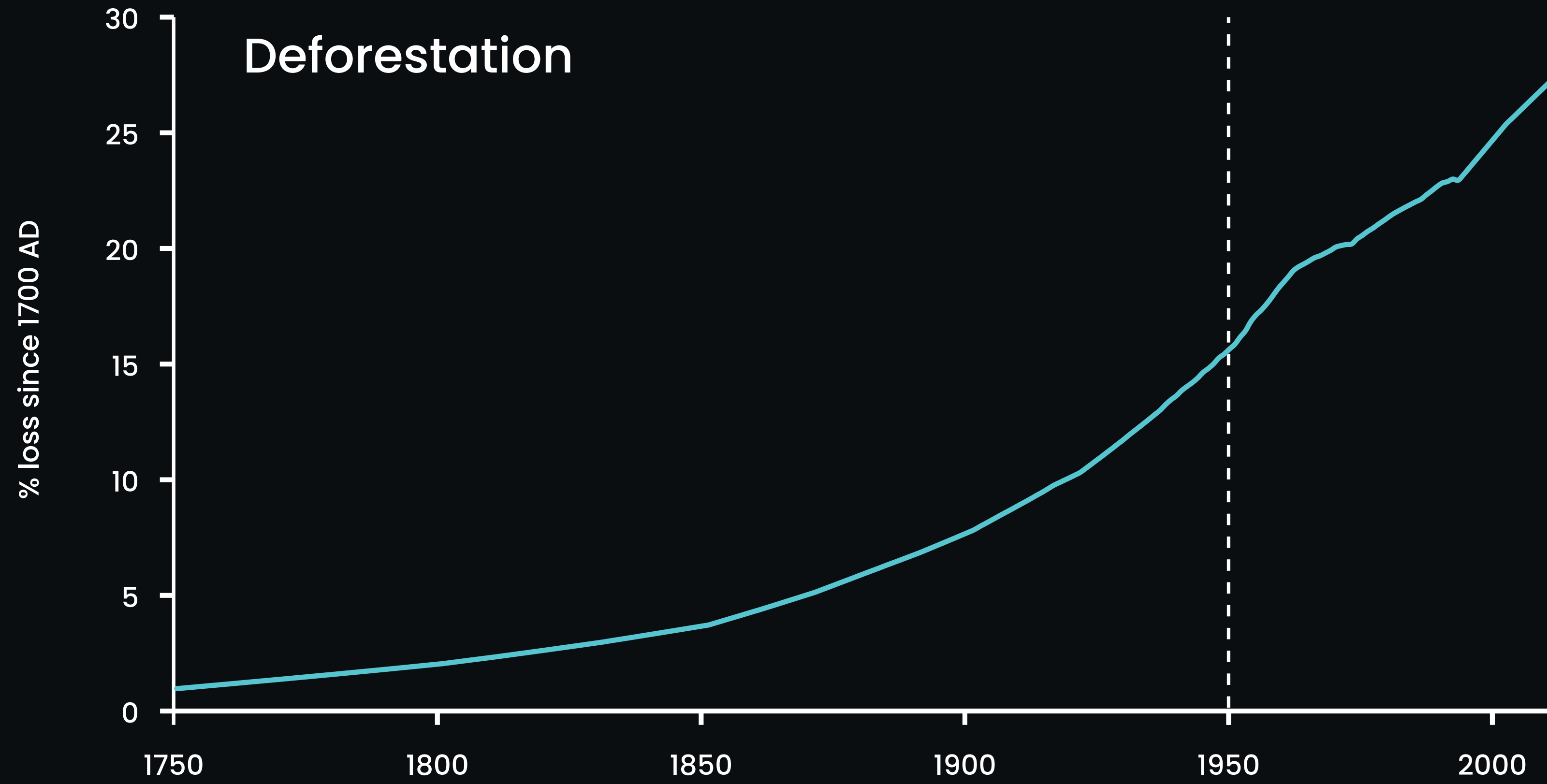
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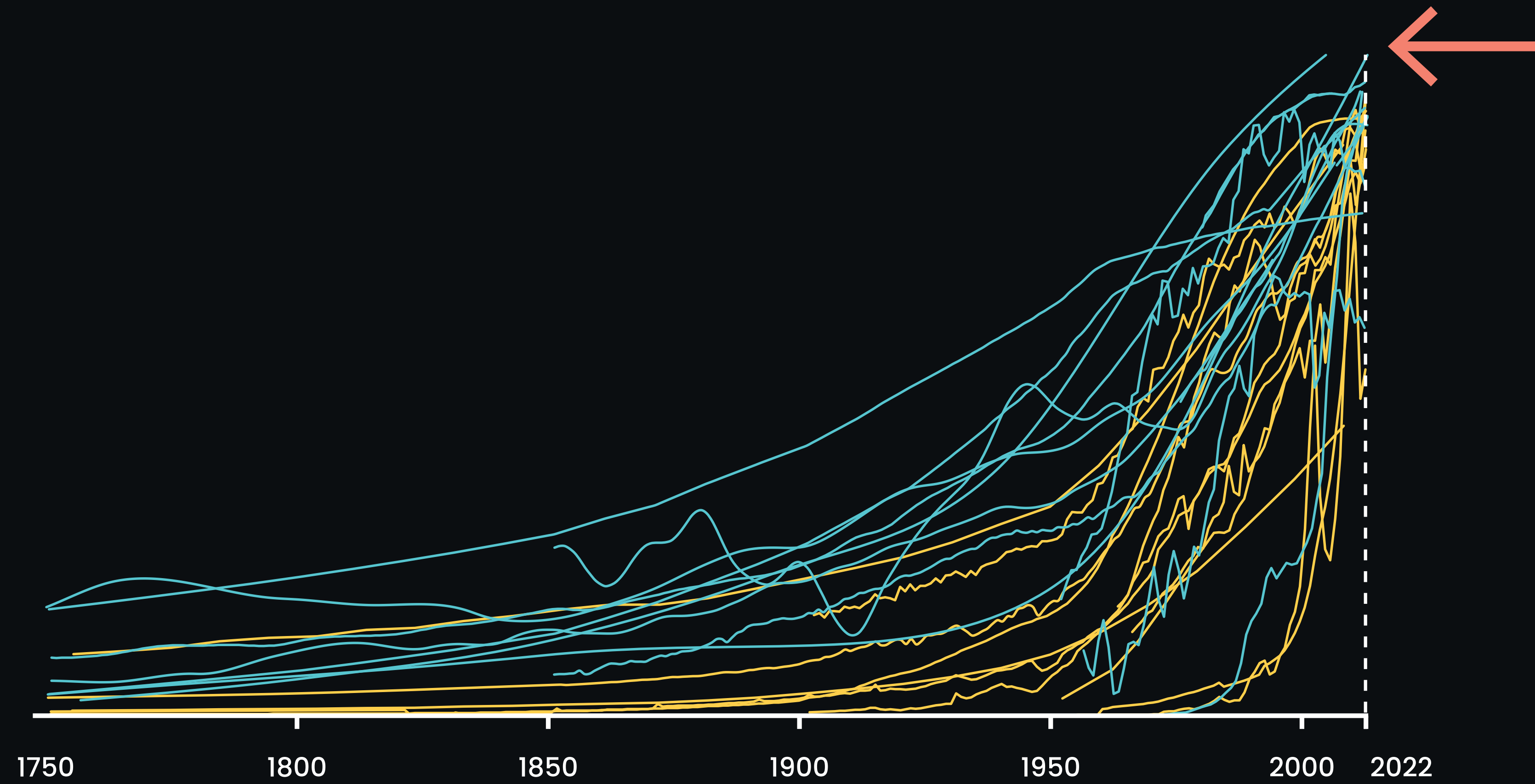
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Problem Statement



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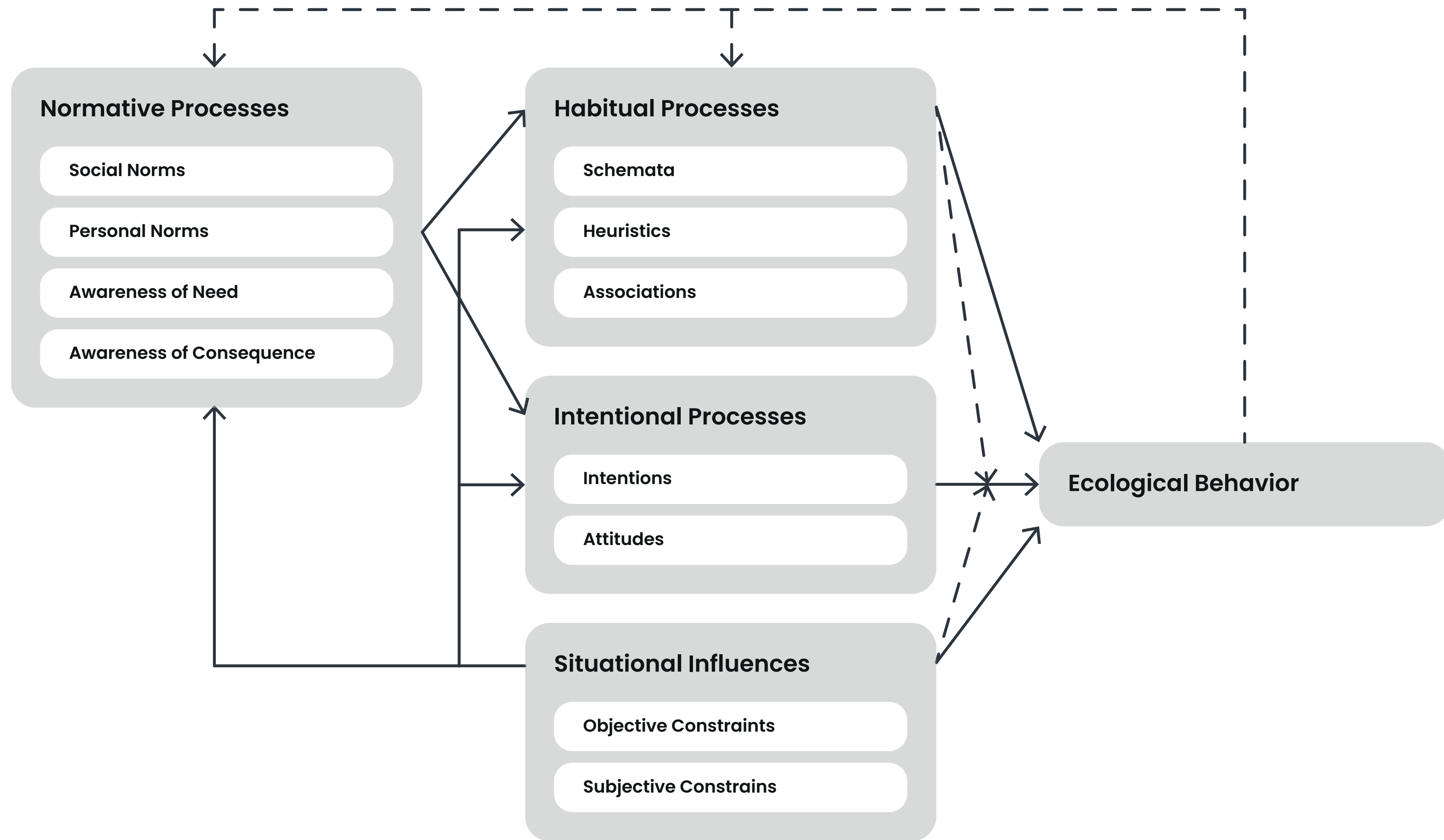
Problem Statement



Adapted from Steffen et al, Global Change and the Earth System (2004).

“...95% of the UN’s climate researchers agrees that human activity is the dominant cause of observed warming since the mid-20th century.”

Human Decision-Making Process



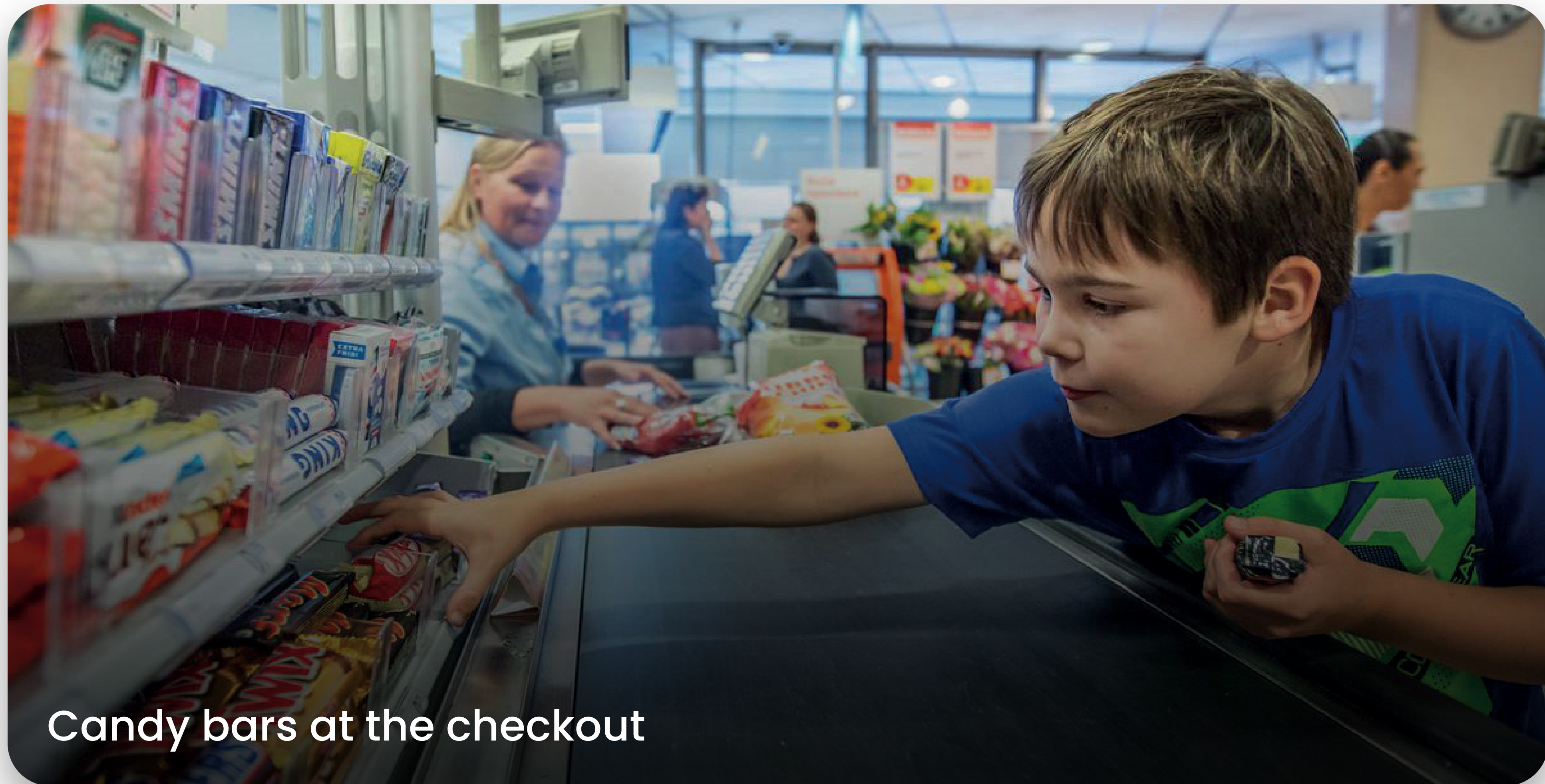
If architects are able to create a supportive environment for eliciting sustainable behavior, architects can improve people's lives and promote sustainable behavior that mitigates the current societal and environmental challenges humanity is facing today.

The concept of Nudging

Nudges

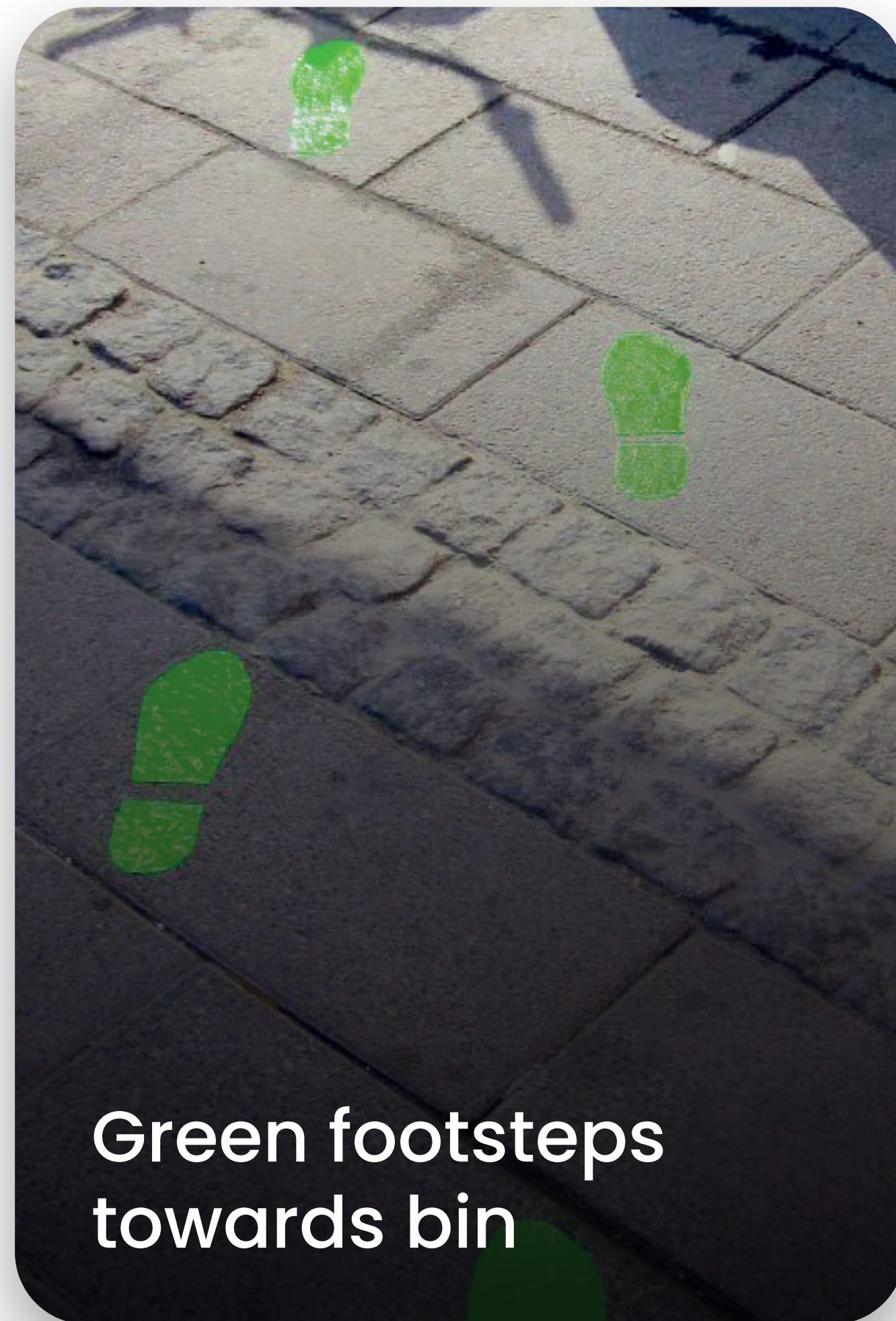
“...An umbrella term for a deliberate and predictable method of changing people’s behavior by modifying the cues in the physical and/or social context in which they act.”

Nudges

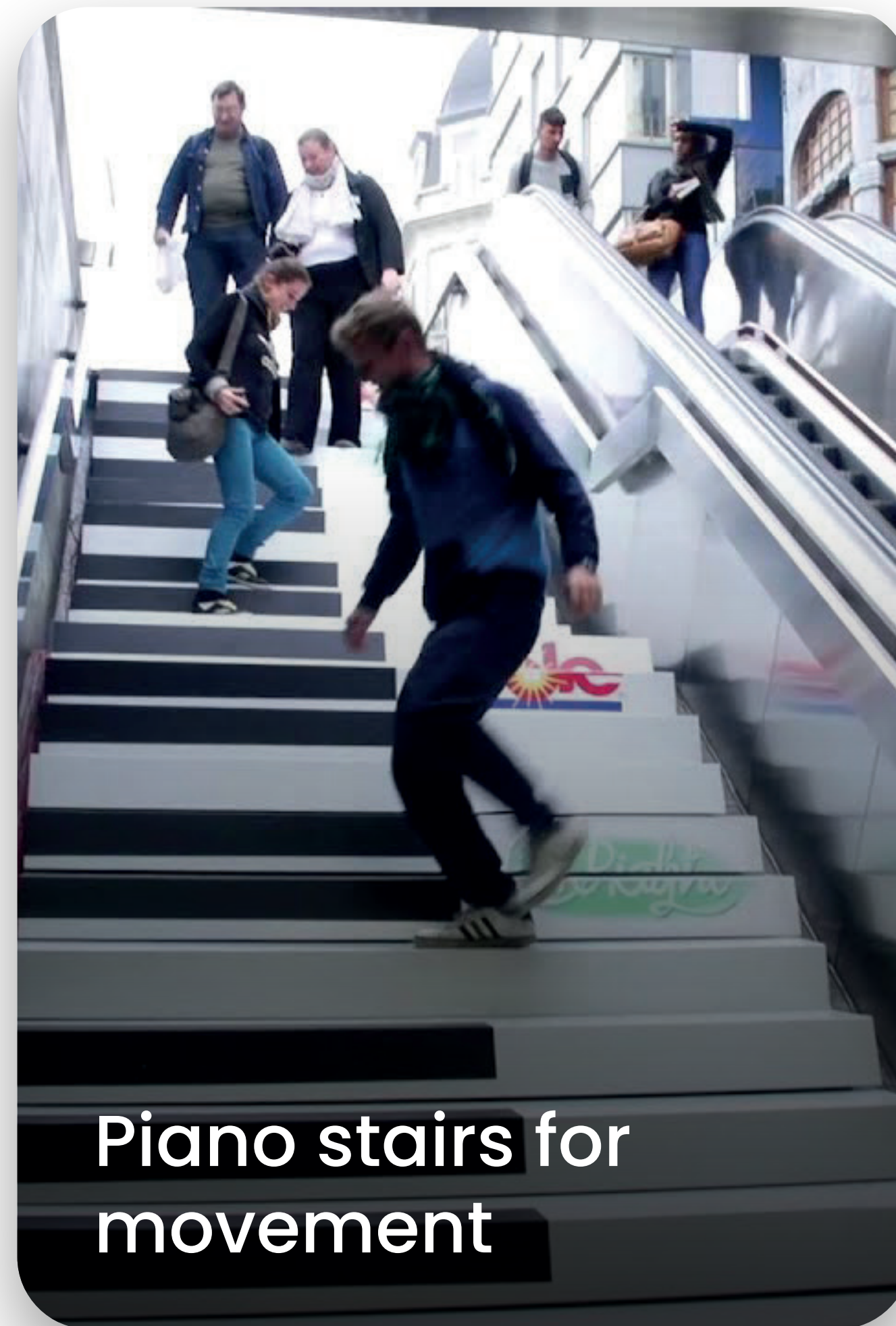


Candy bars at the checkout

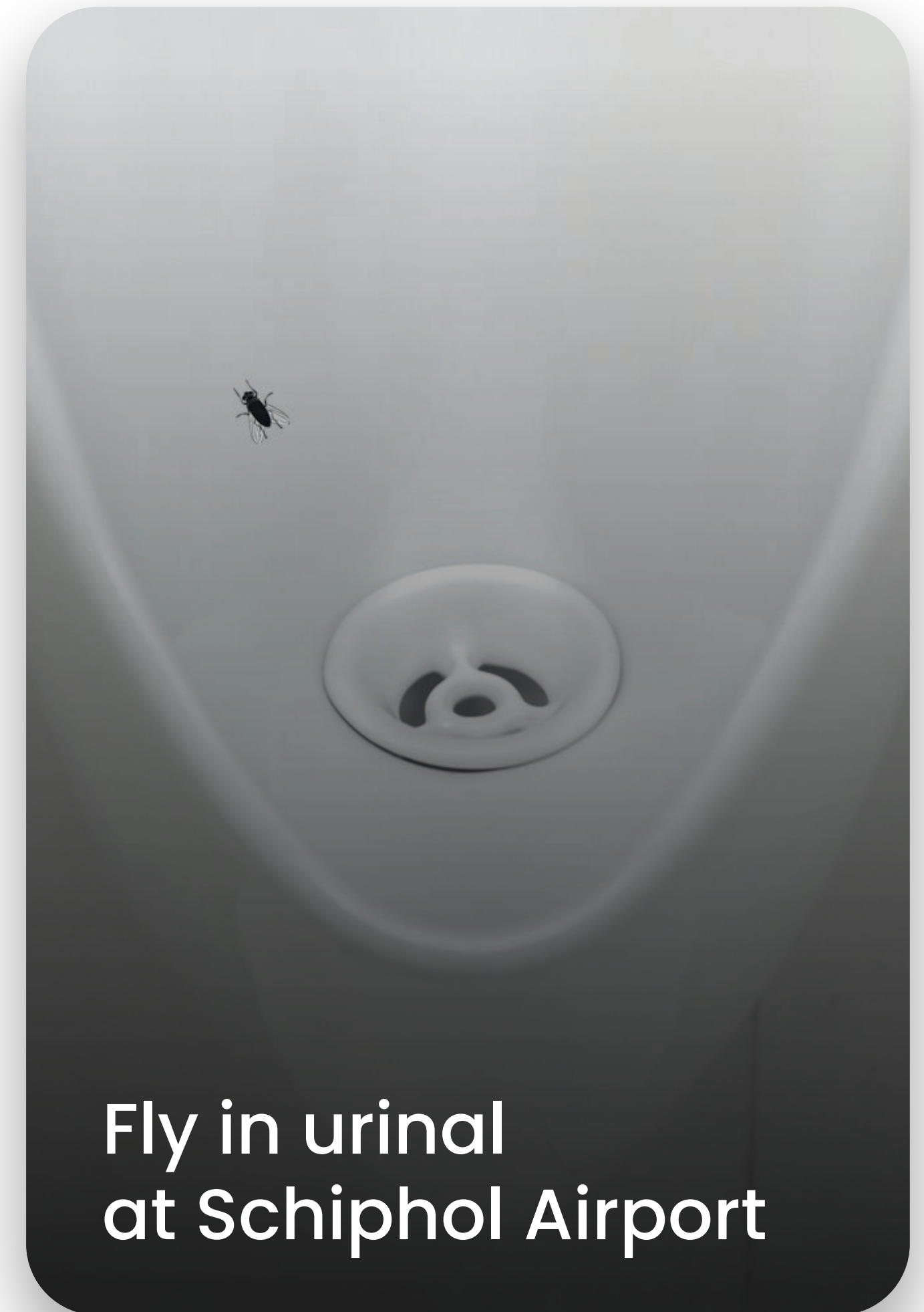
Nudges



Green footsteps towards bin



Piano stairs for movement



Fly in urinal at Schiphol Airport

Architectural Recipe

Prime (Prepare)

Communicating a Sustainable Ethos

- 1 Social Sustainability
- 2 Environmental Sustainability
- 3 Economic Sustainability

Attention Restoration

- 4 Visual Connection Nature
- 5 Physical Connection Nature
- 6 Psychological Connection Nature

Social Support

- 7 Horizontal Connection
- 8 Vertical Connection
- 9 Social Program
- 10 Spatial Configuration
- 11 Points of Interaction

Permit (Allow)

Behavioral Control

- 12 Operable Windows & Coverings
- 13 Adjustable Lighting
- 14 Modular Building Typologies
- 15 Flexible Floor Plan
- 16 Flexible Furniture Modules
- 17 Flexible Collective Spaces

Invite (Encourage)

Informational Nudges

- 18 Increase Knowledge
- 19 Social Norms
- 20 Feedback
- 21 Choice Default
- 22 Rewards
- 23 Behavioral Commitments
- 24 Prompting

Structural Nudges

- 25 Availability
- 26 Proximity
- 27 Priming
- 28 Sizing
- 29 Presentation
- 30 Functional Design

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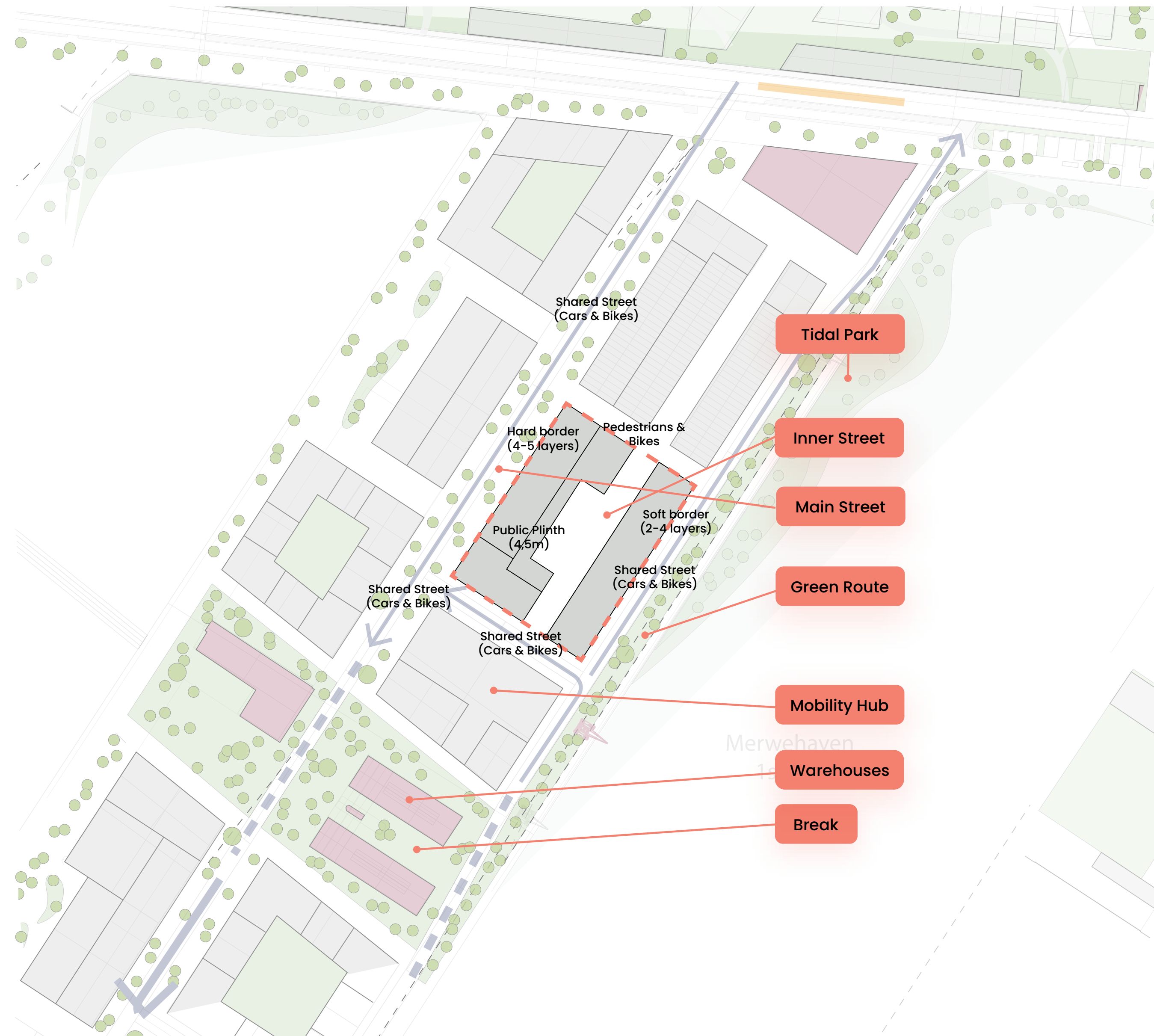
Merwehaven
3rd Gat

Merwehaven
2nd Gat

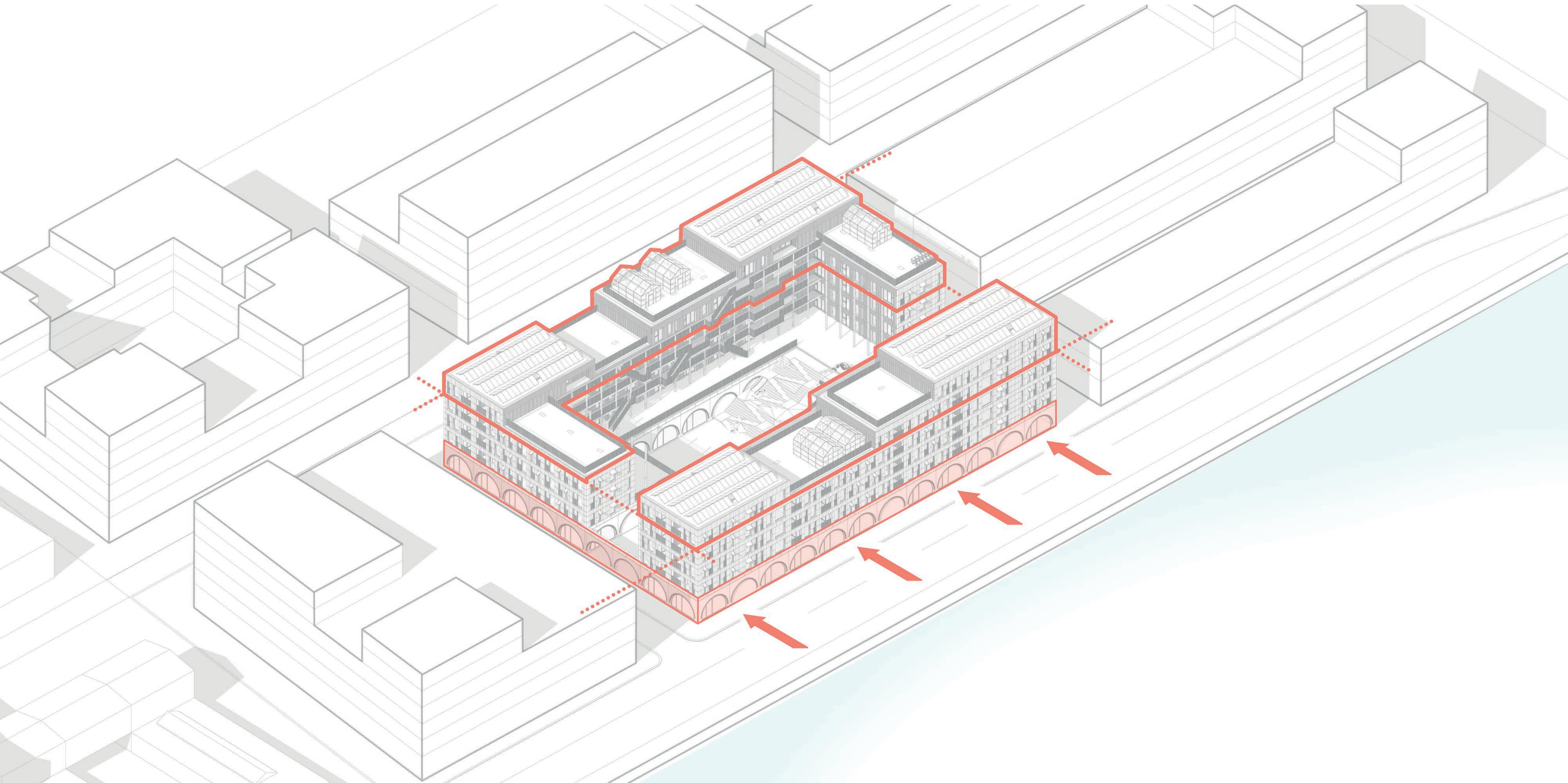
Merwehaven
1st Gat

Merwehaven

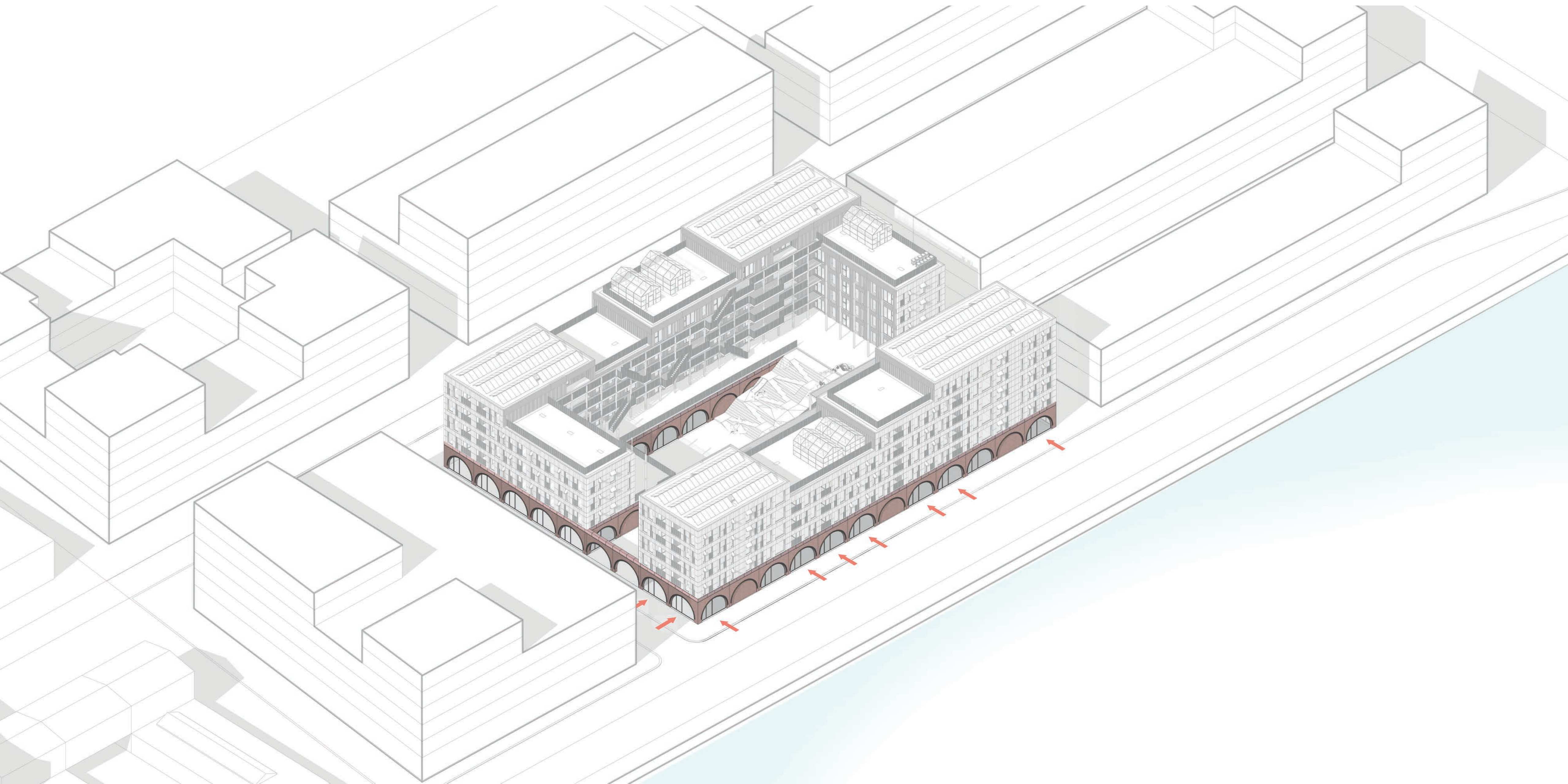
Urban Context



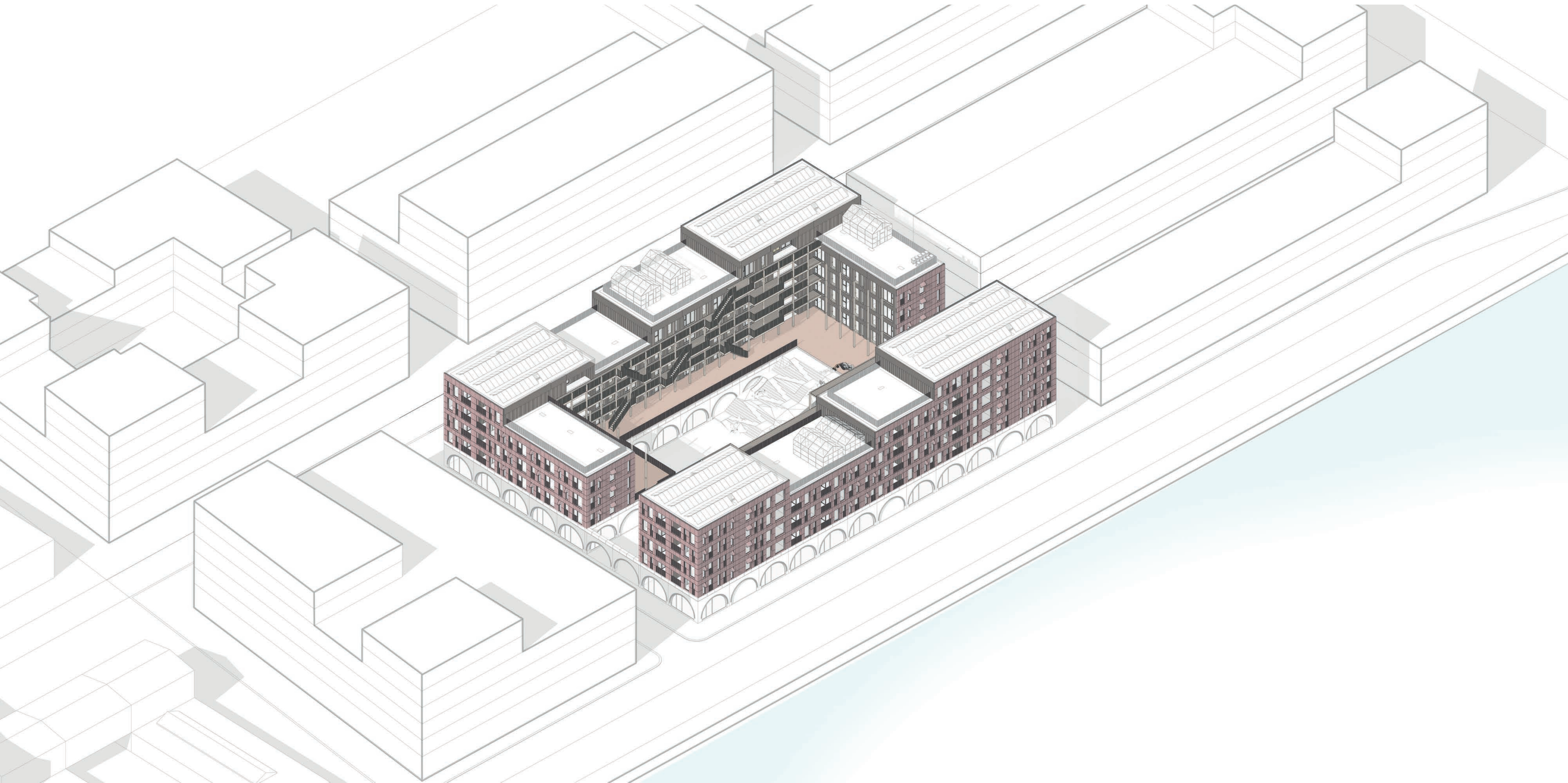
Concept



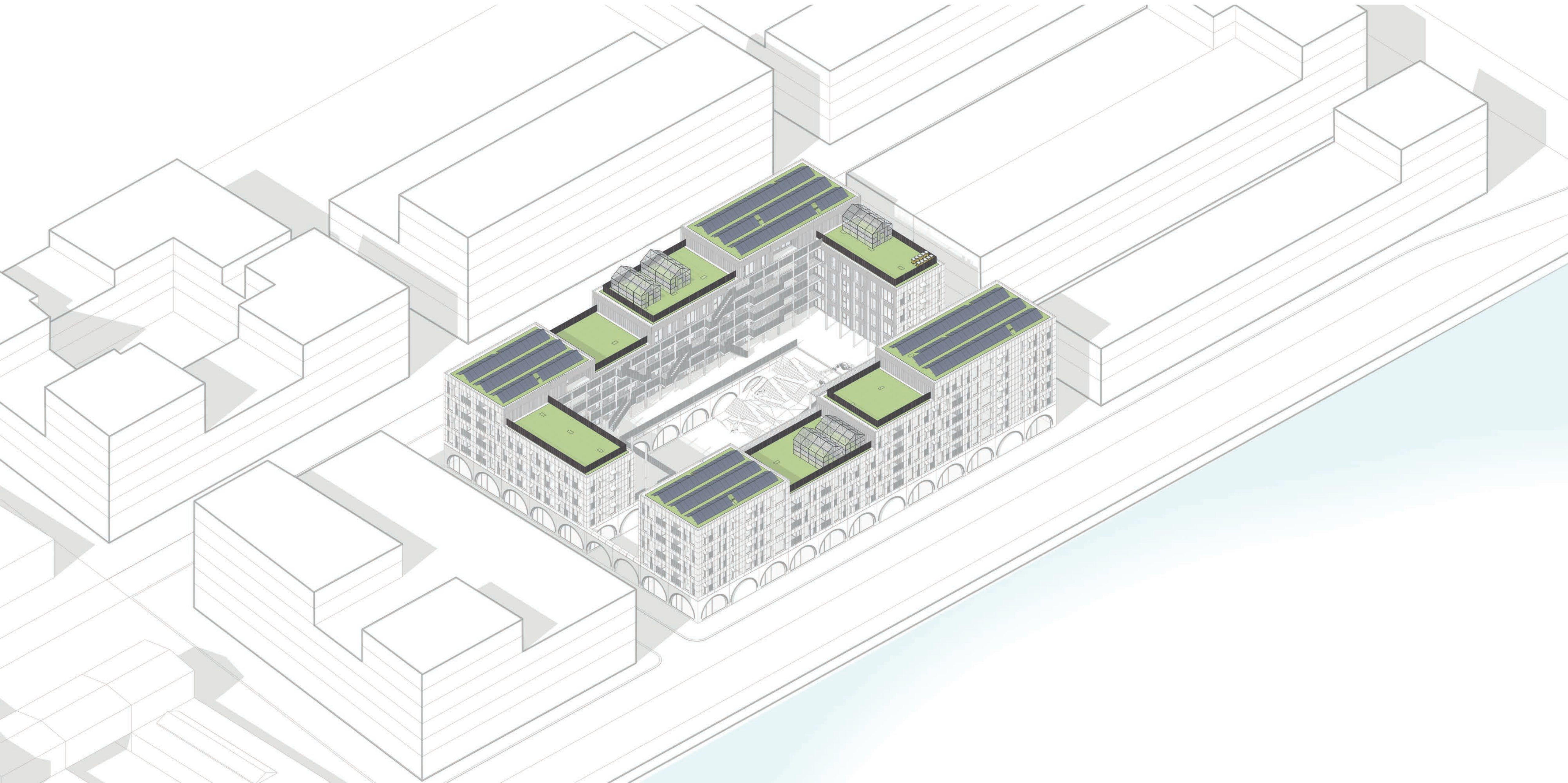
Concept



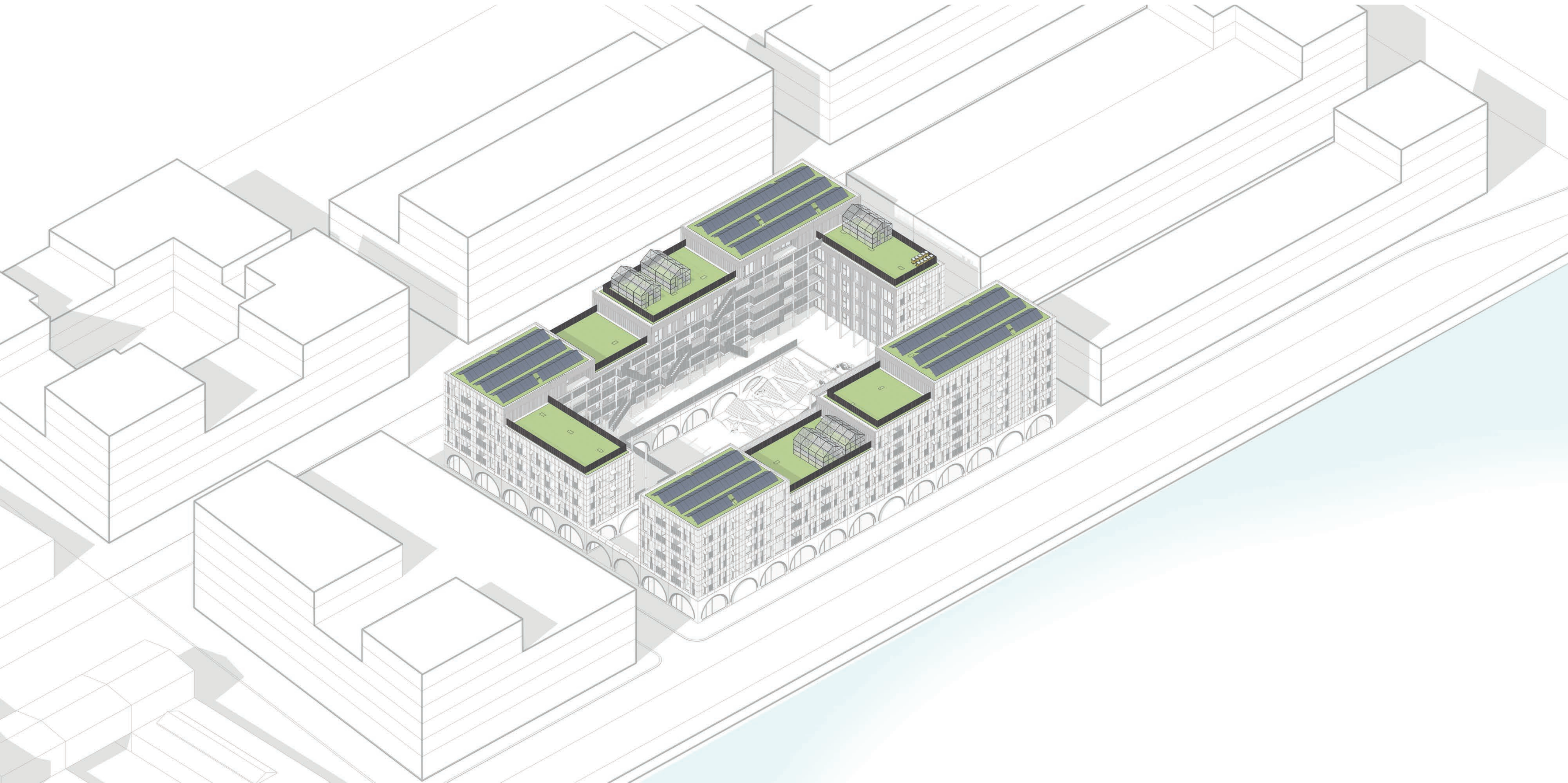
Concept



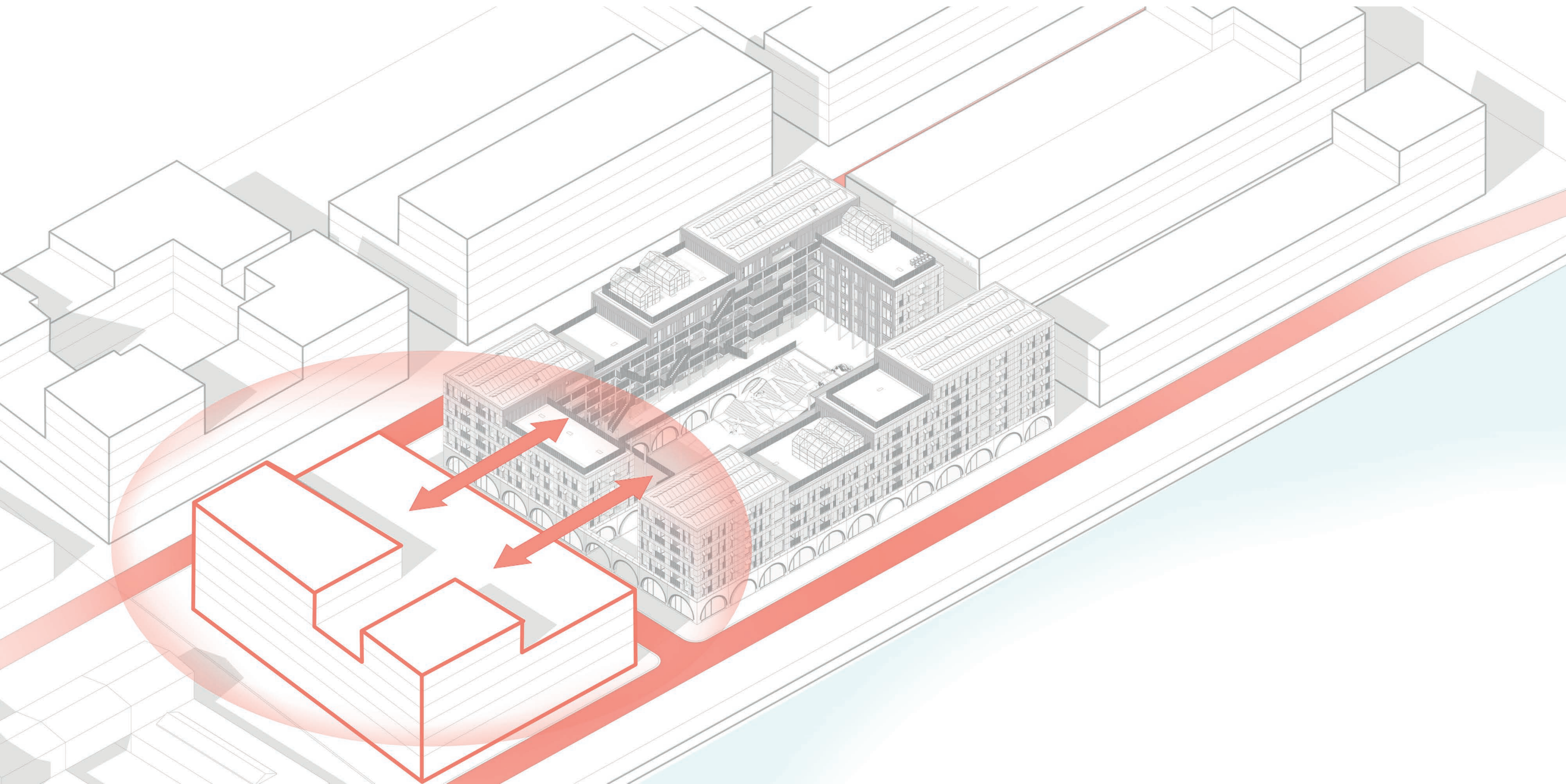
Concept



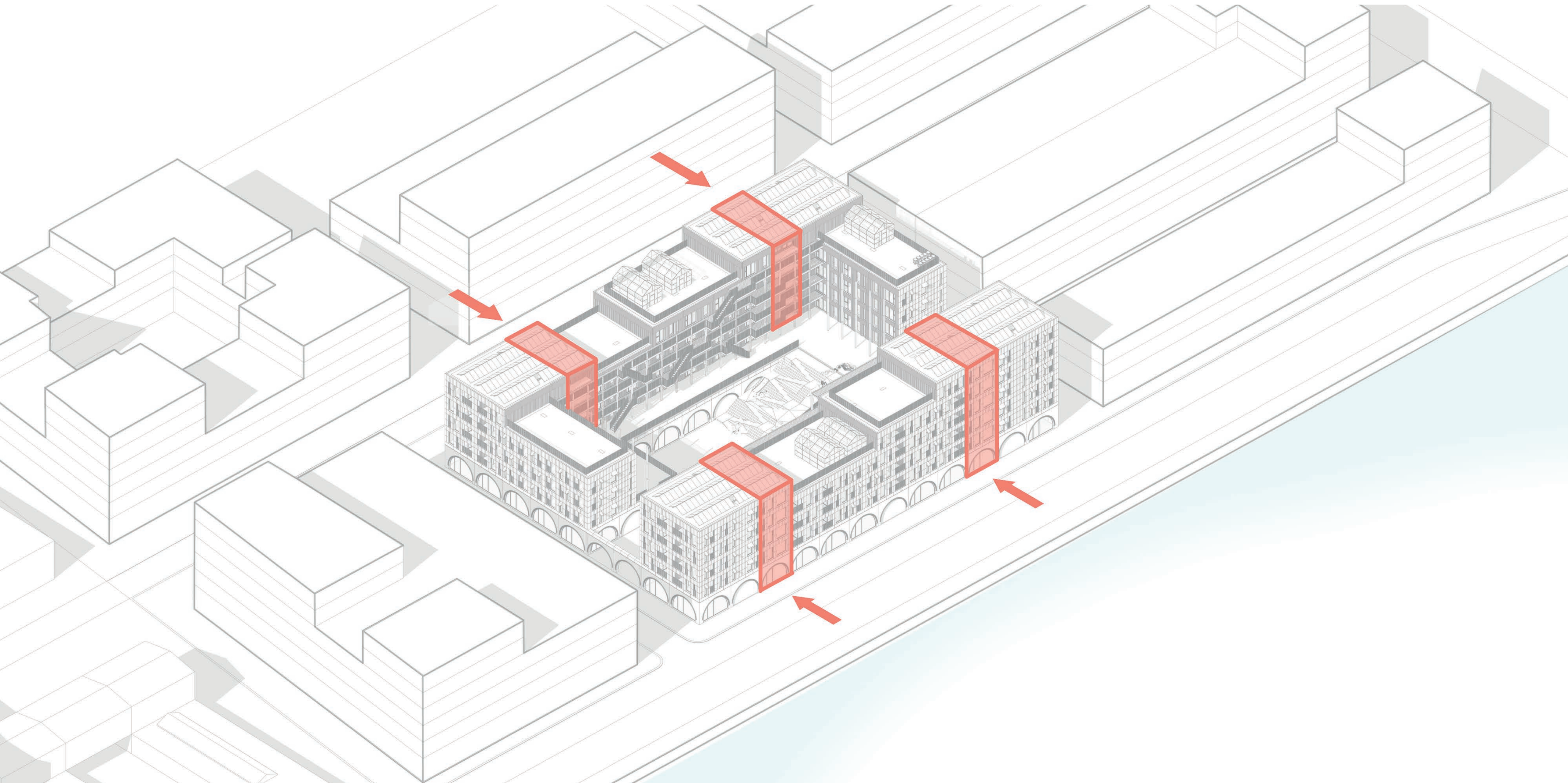
Concept



Concept



Concept



Dwelling Typologies & Residents

Residents



Single



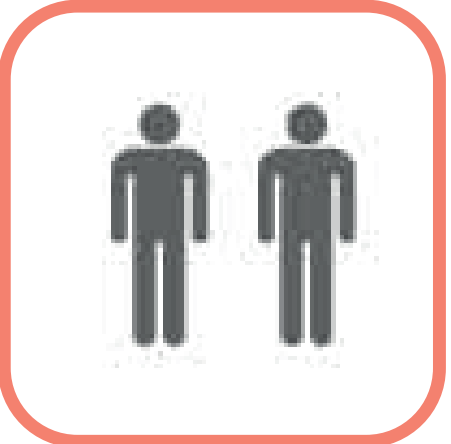
Work/Live



Single Parent



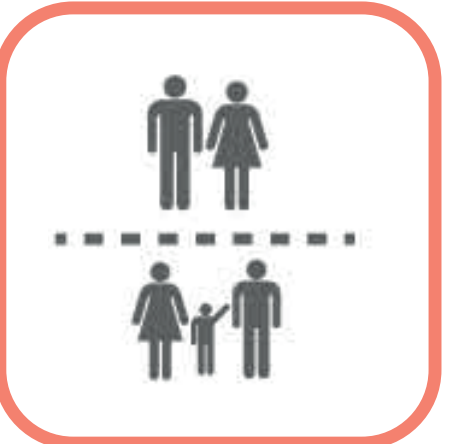
Divorced Living



Couple



Family



Multi-Generational

50% single-person households
10% single-parent households
20% two-person households
20% families

Dwelling Typologies



Dwelling Typologies



Dwelling Typologies



Dwelling Typologies



Dwelling Typologies



Dwelling Typologies



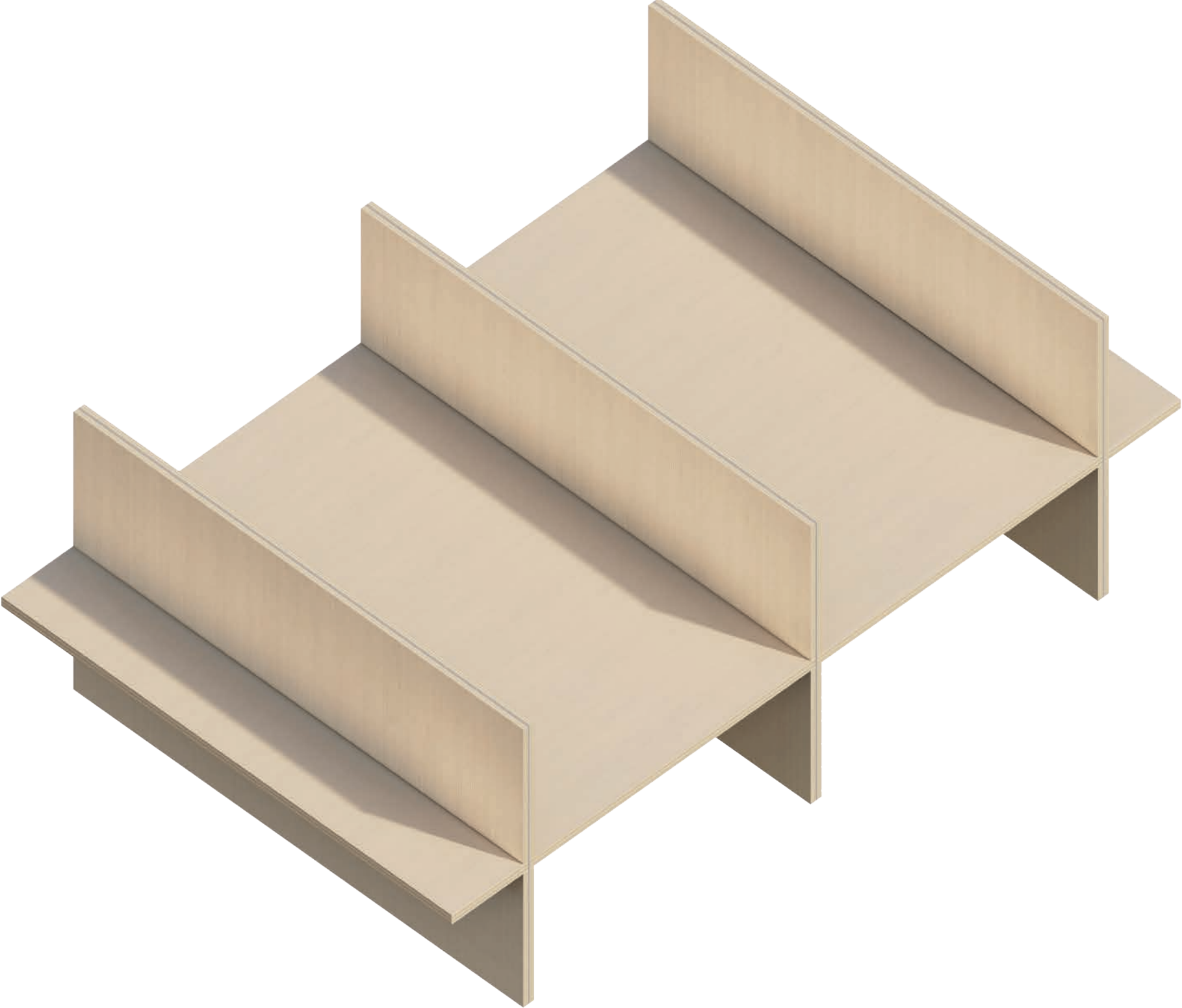
Dwelling Typologies



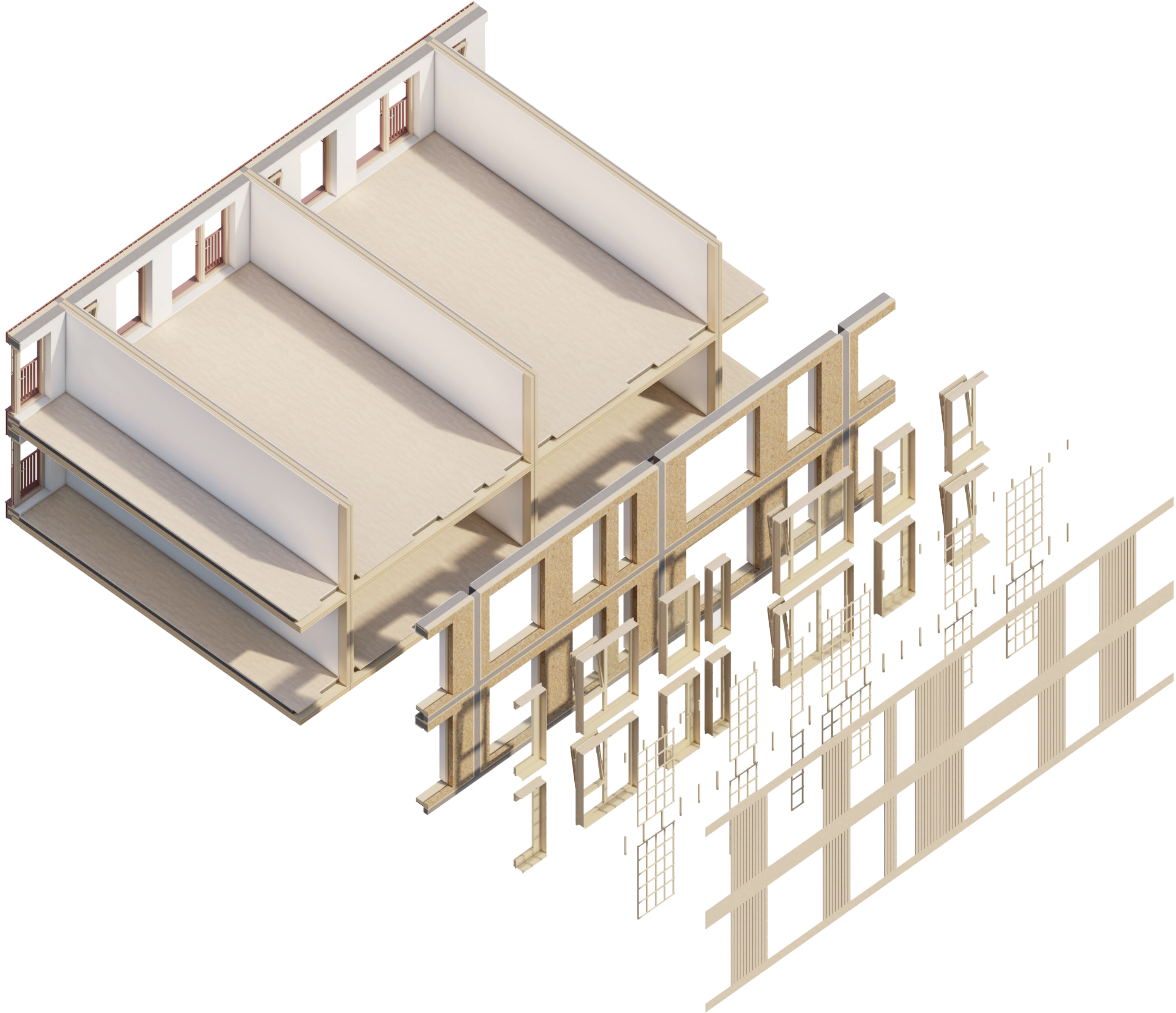
Dwelling Typologies



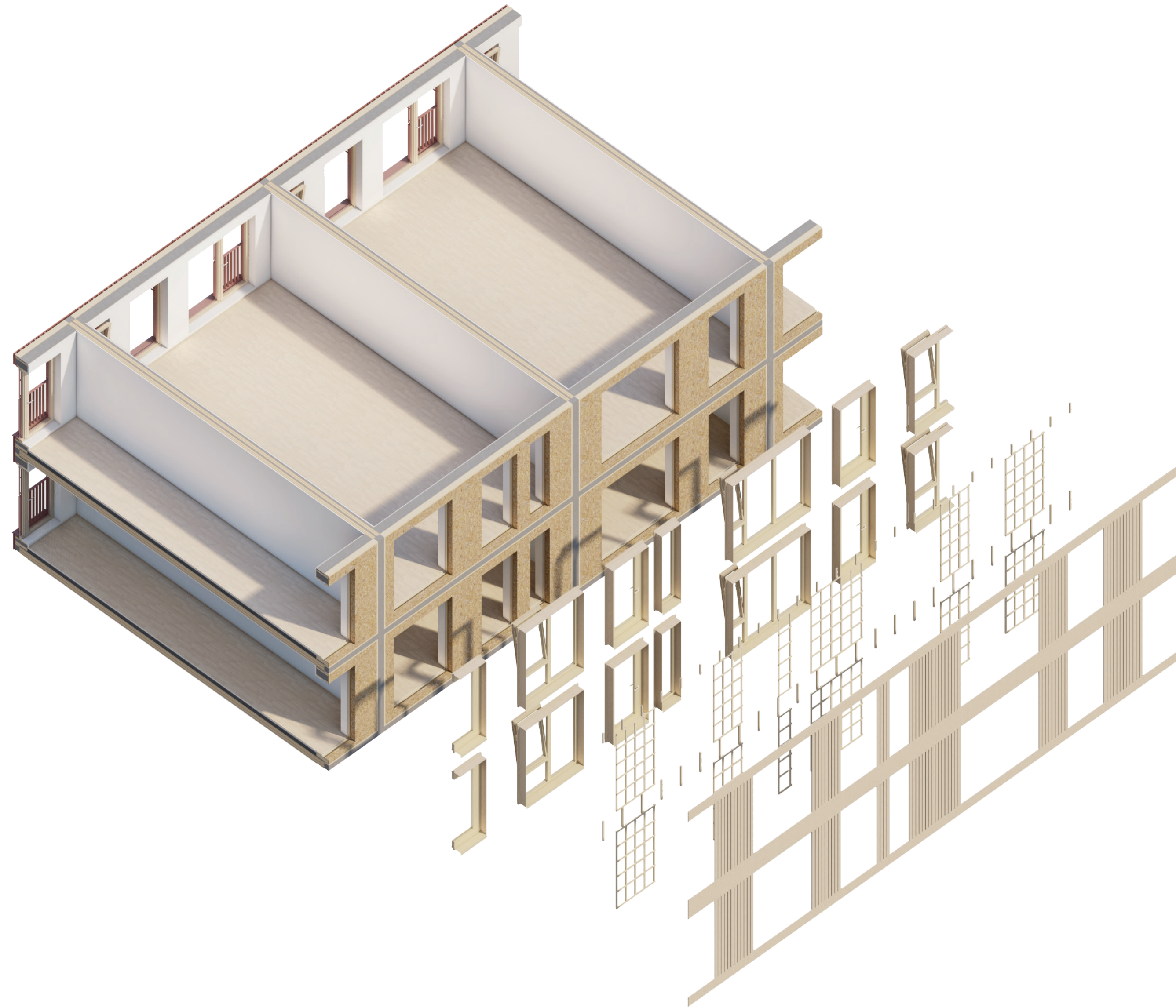
Structure



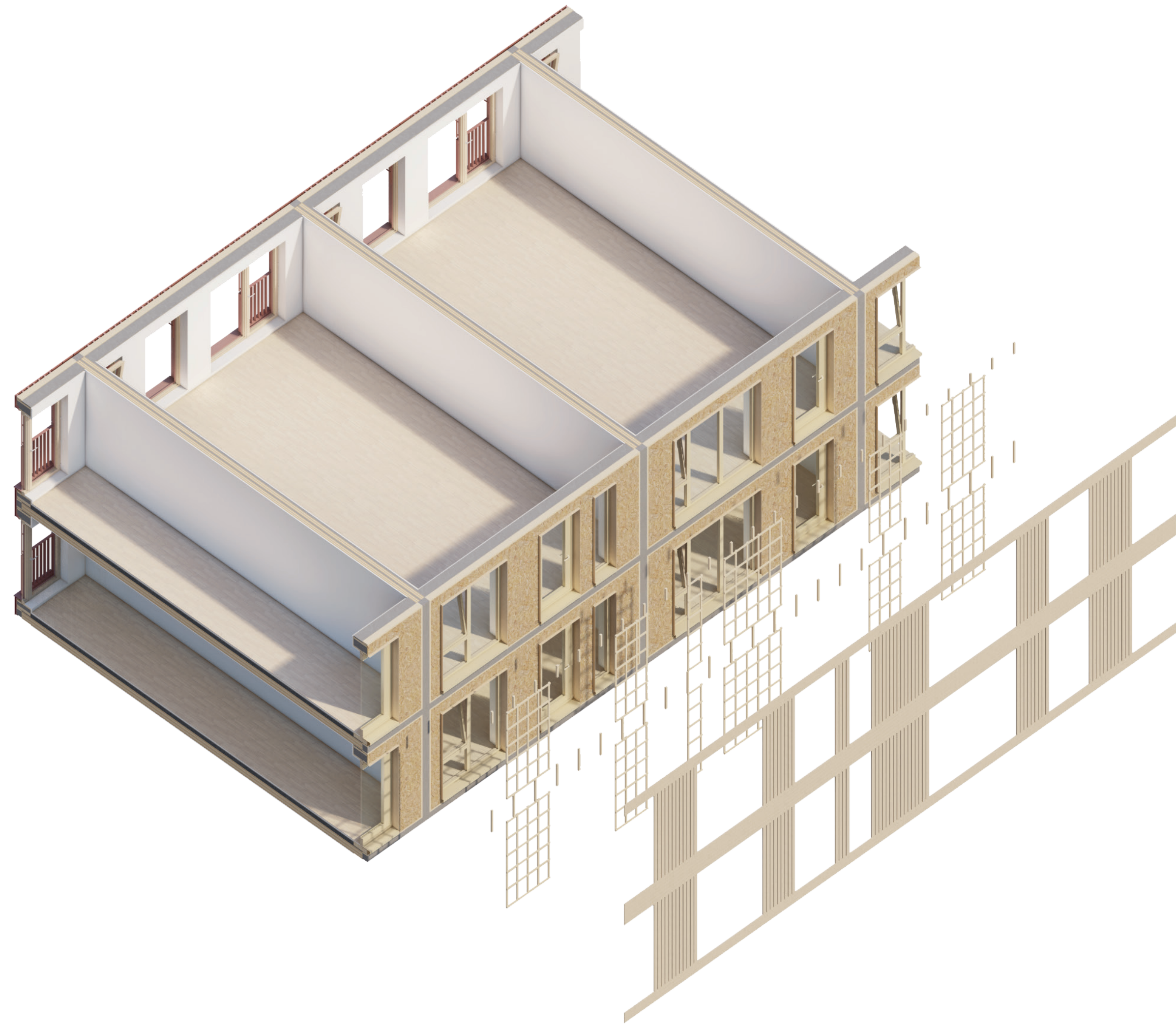
Skin



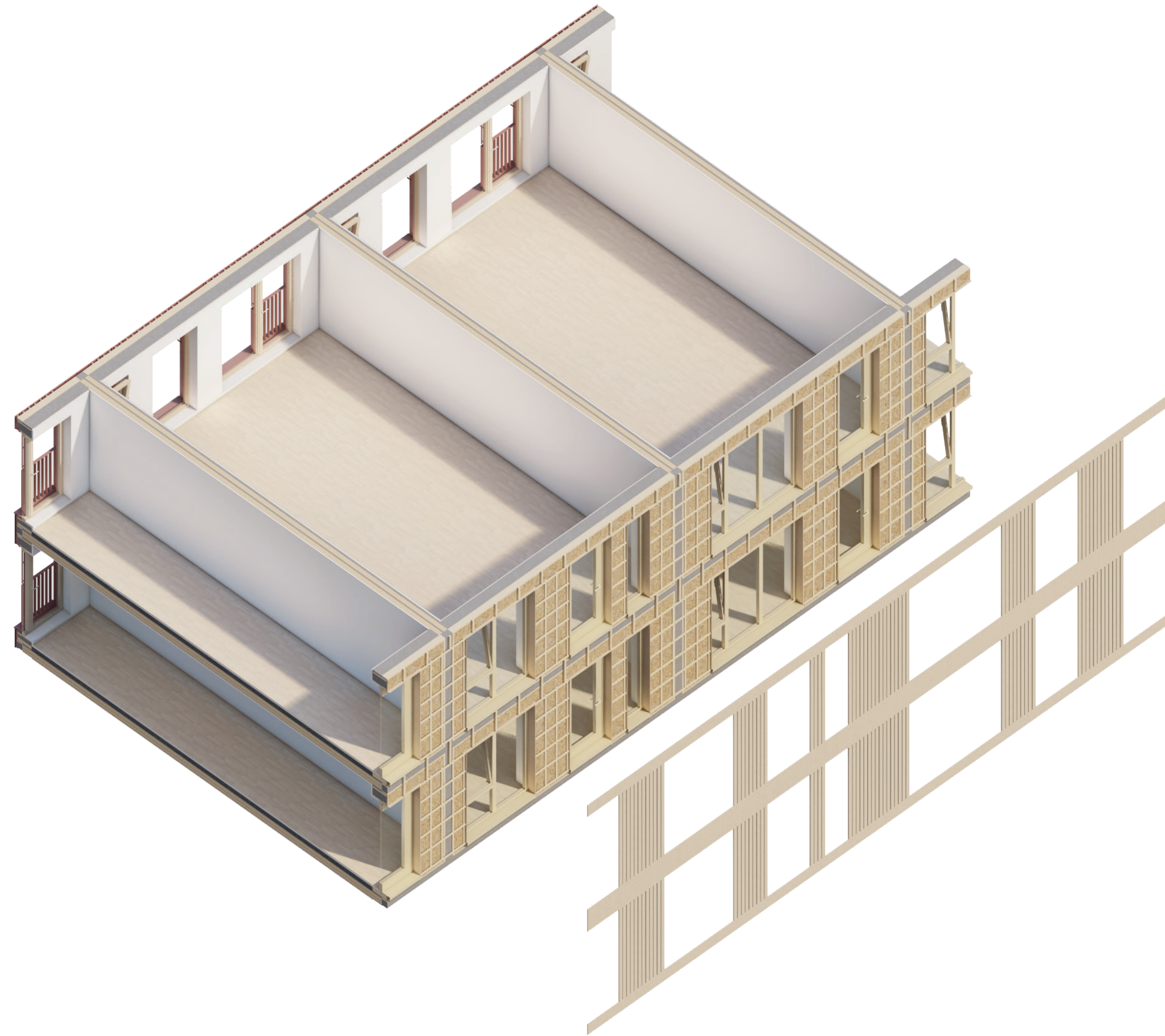
Skin



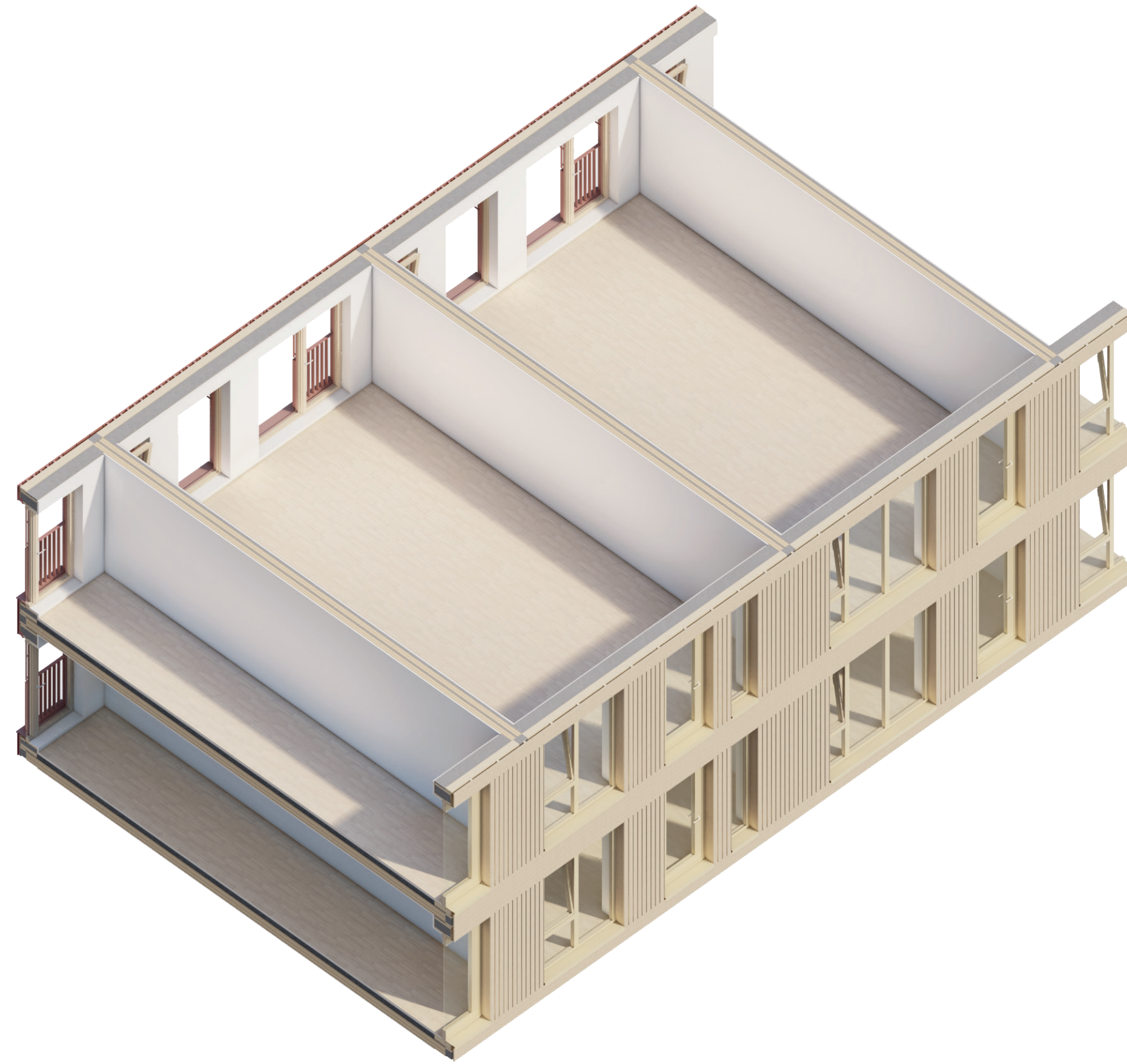
Skin



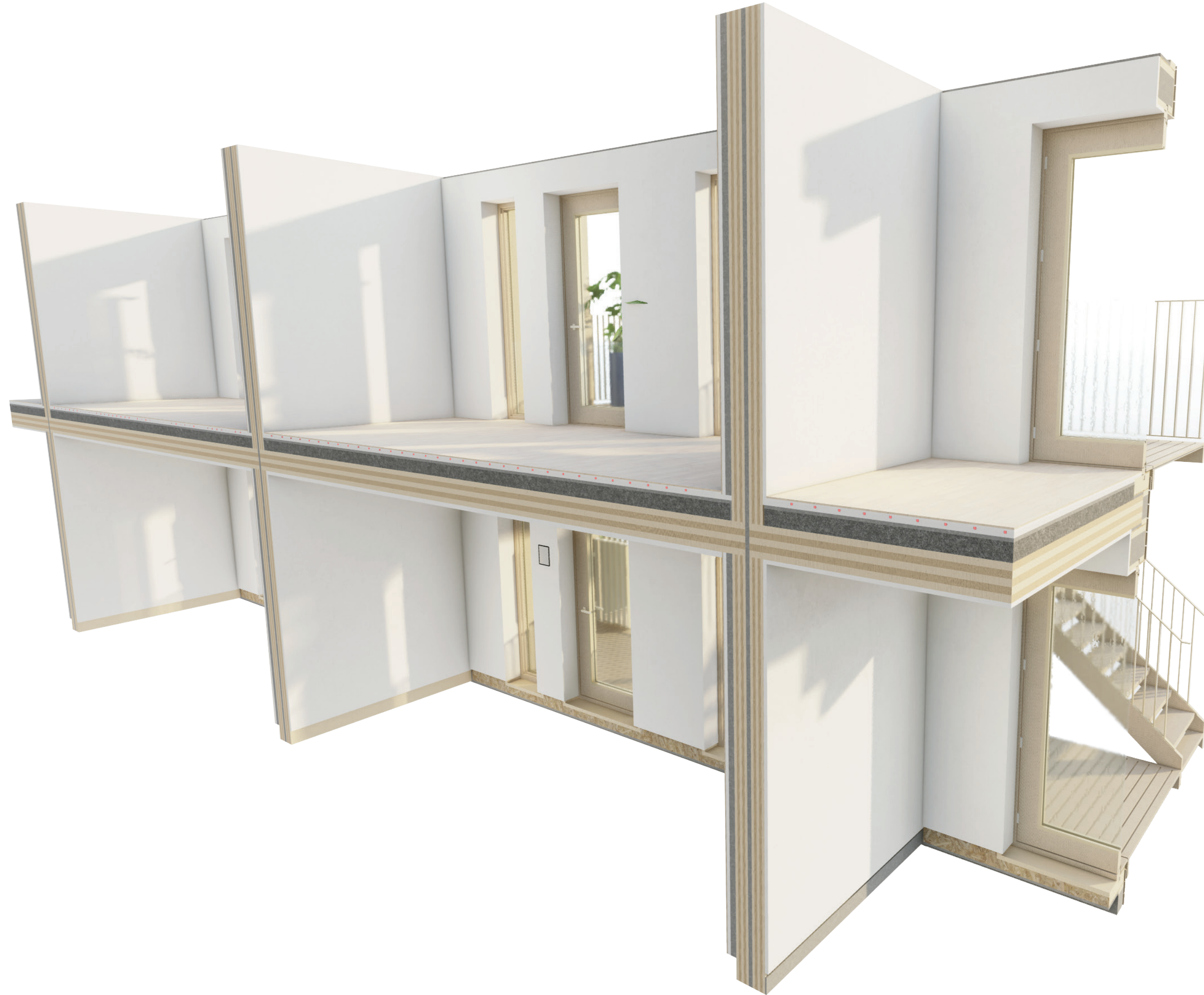
Skin



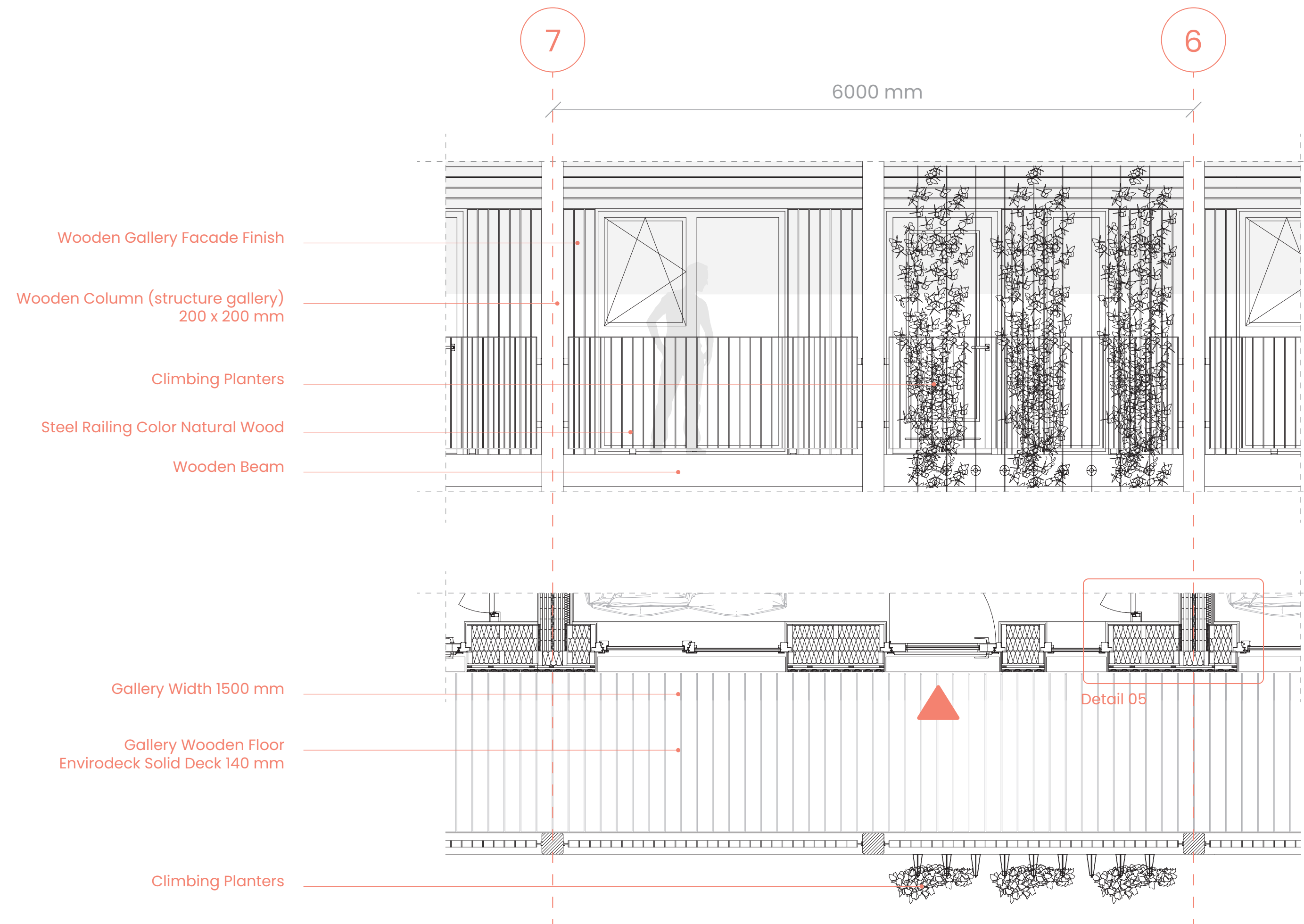
Skin



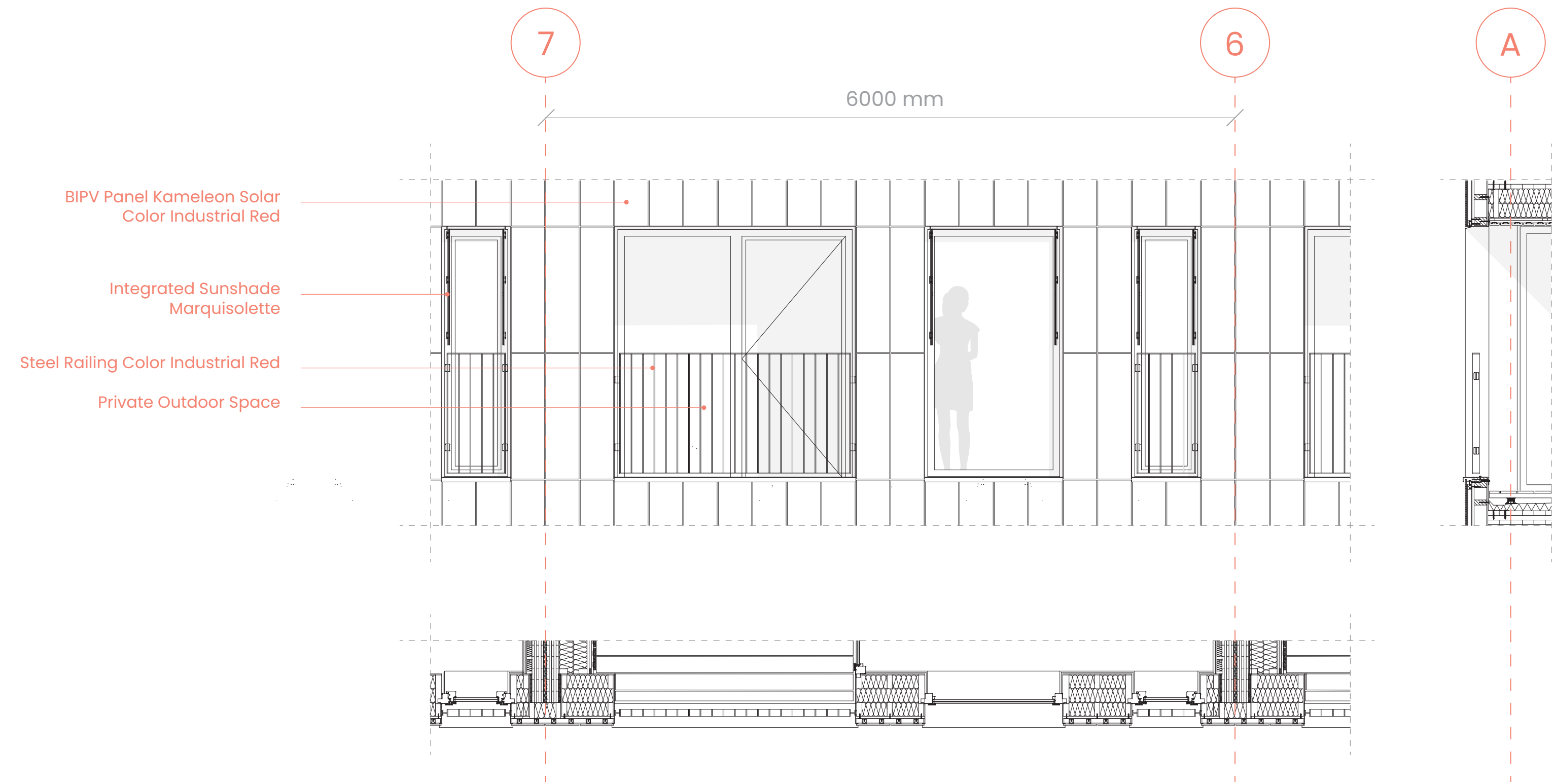
Skin



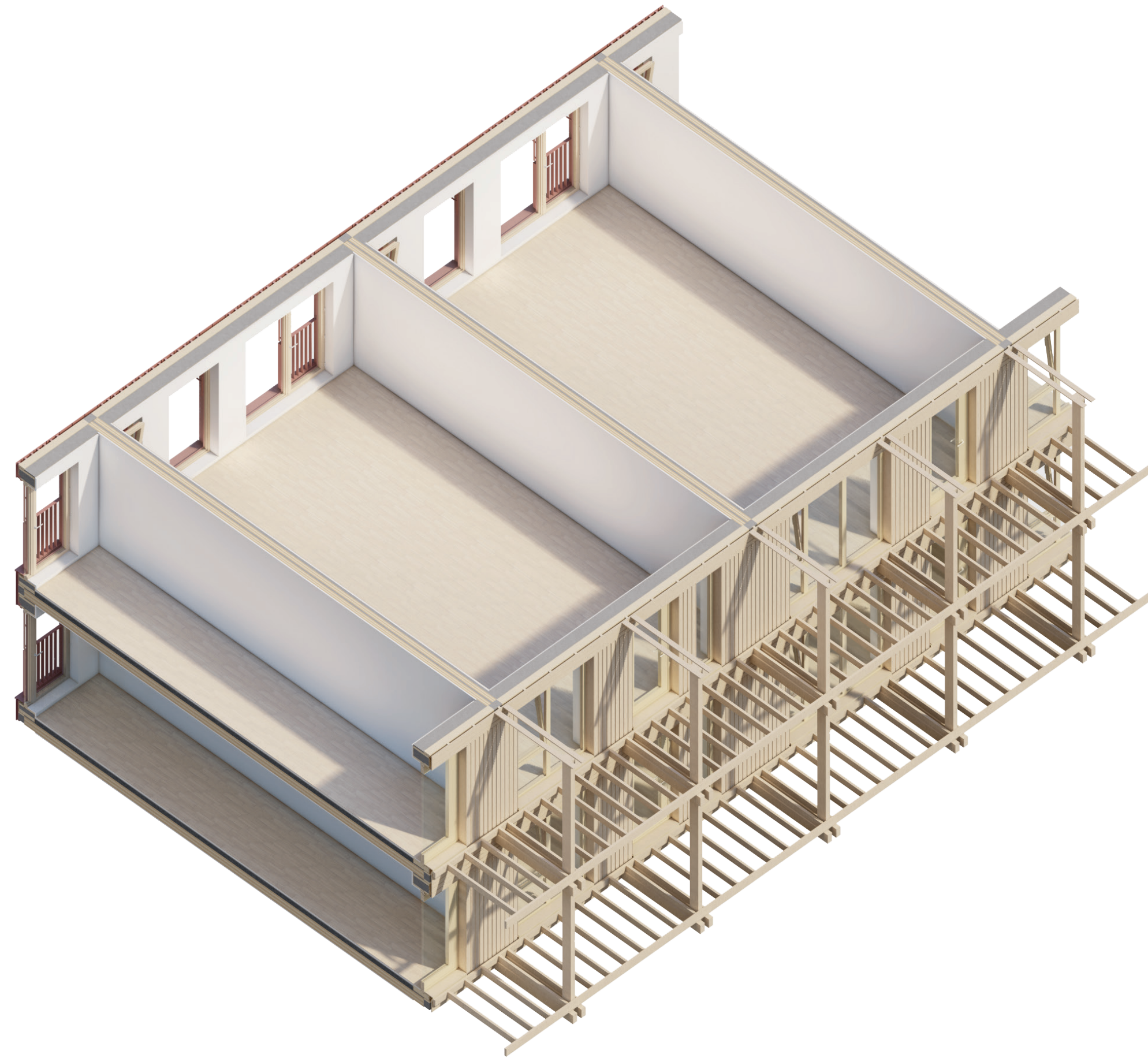
Gallery



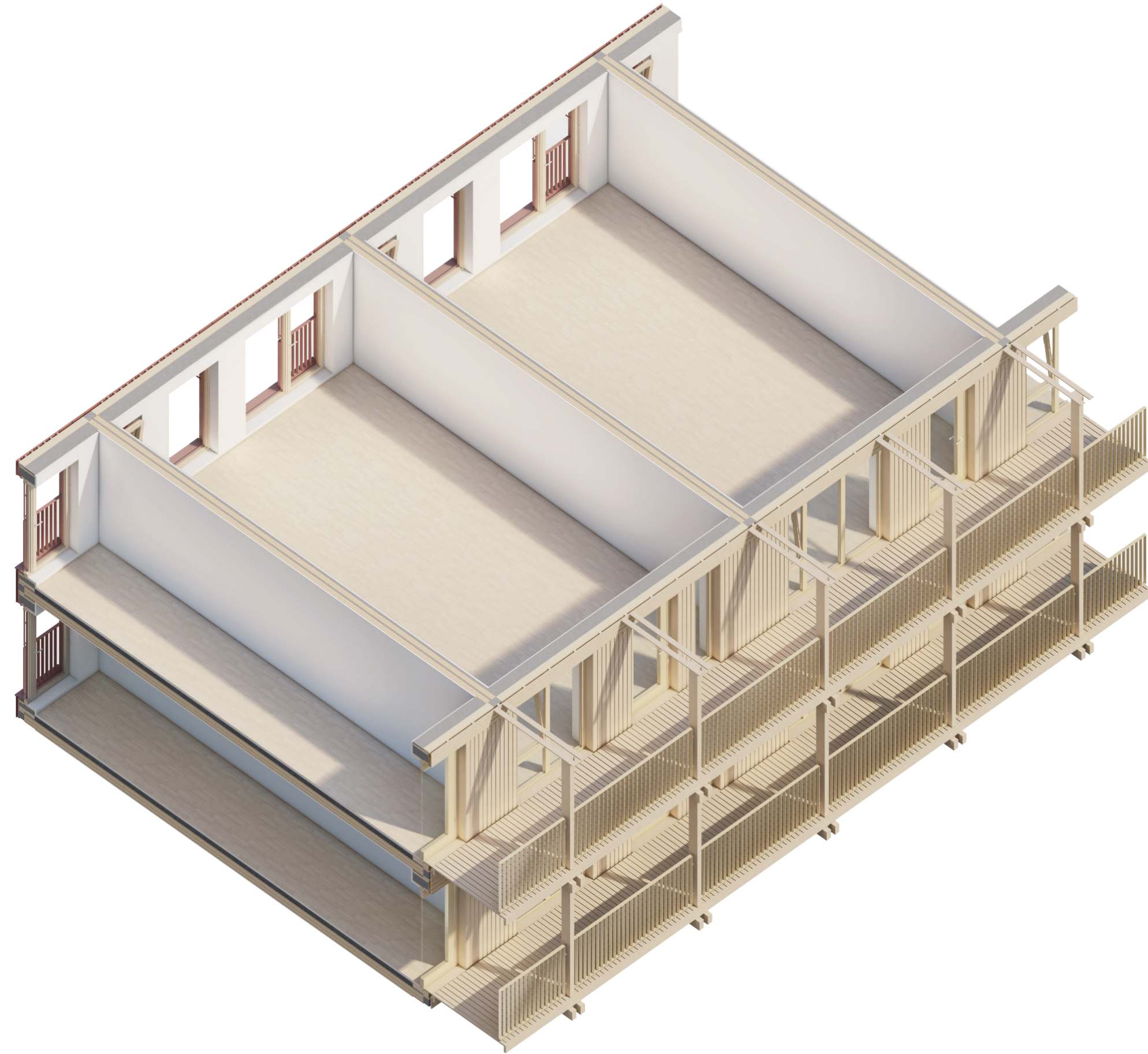
Facade



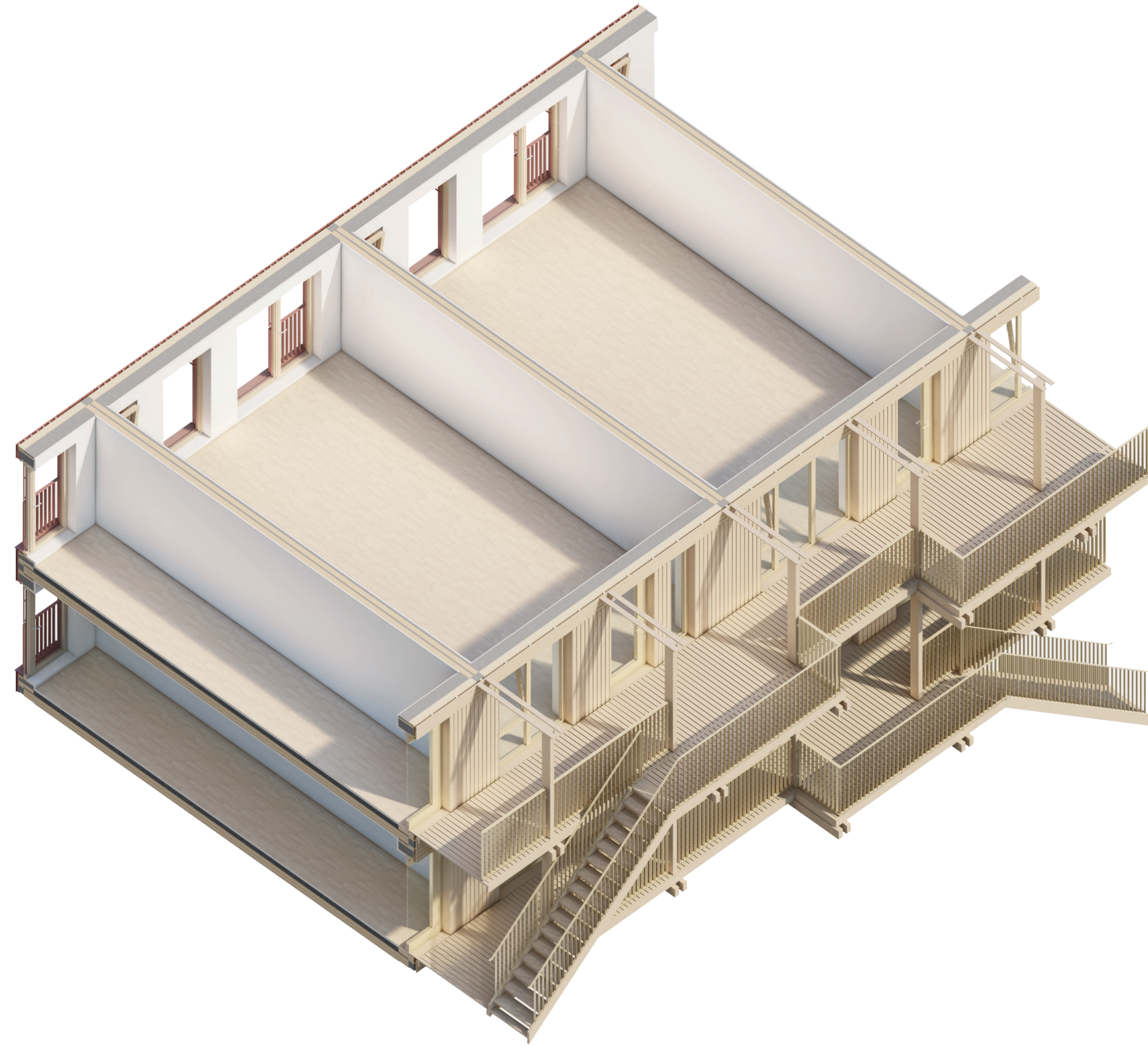
Gallery



Gallery



Gallery









Artificial daylight, visual connection with gallery

Natural wooden elements

Adding green elements

Gallery as horizontal connection, social support

Social Interaction Points



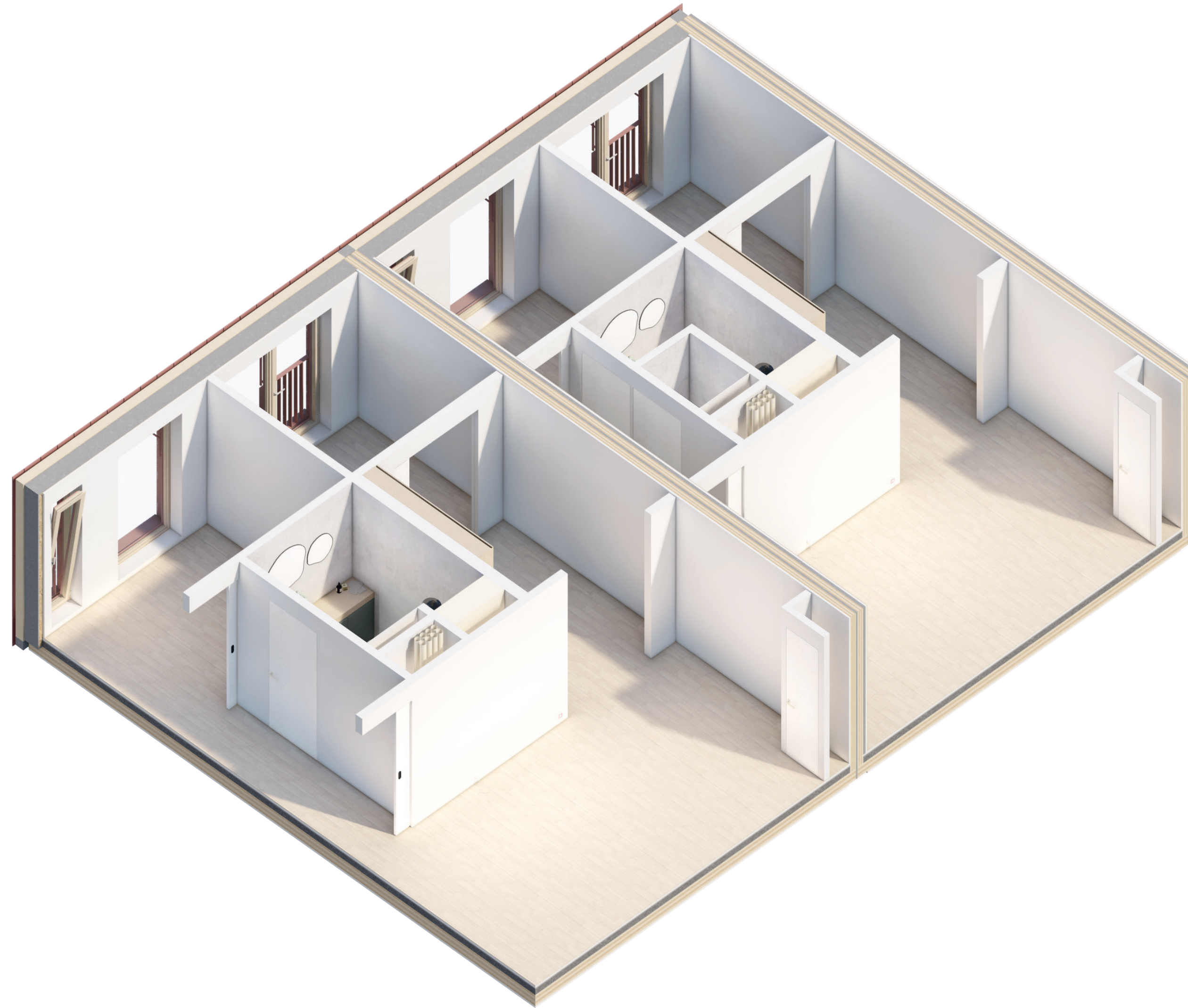
Building Integrated PV
Panels, industrial color

Automatic sun shading
system, Default Mode

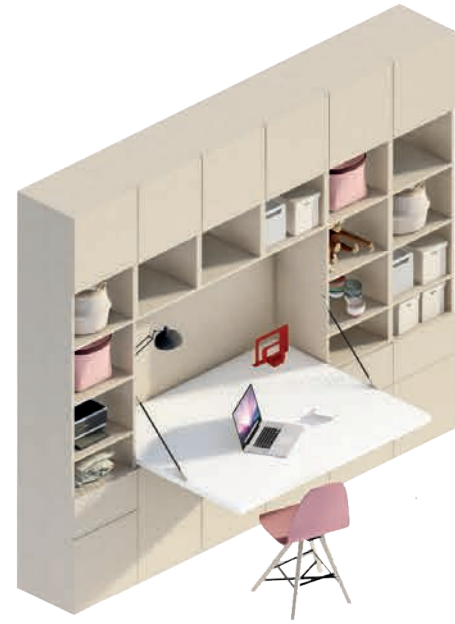
Artificial daylight, visual
conneciton with street

Operable windows

Interior



Interior



Interior



Interior



Interior



Default mode,
temperature of lighting

Fresh air in, balanced
ventilation

Mechanical outlet,
automatic

Information about
sustainable building

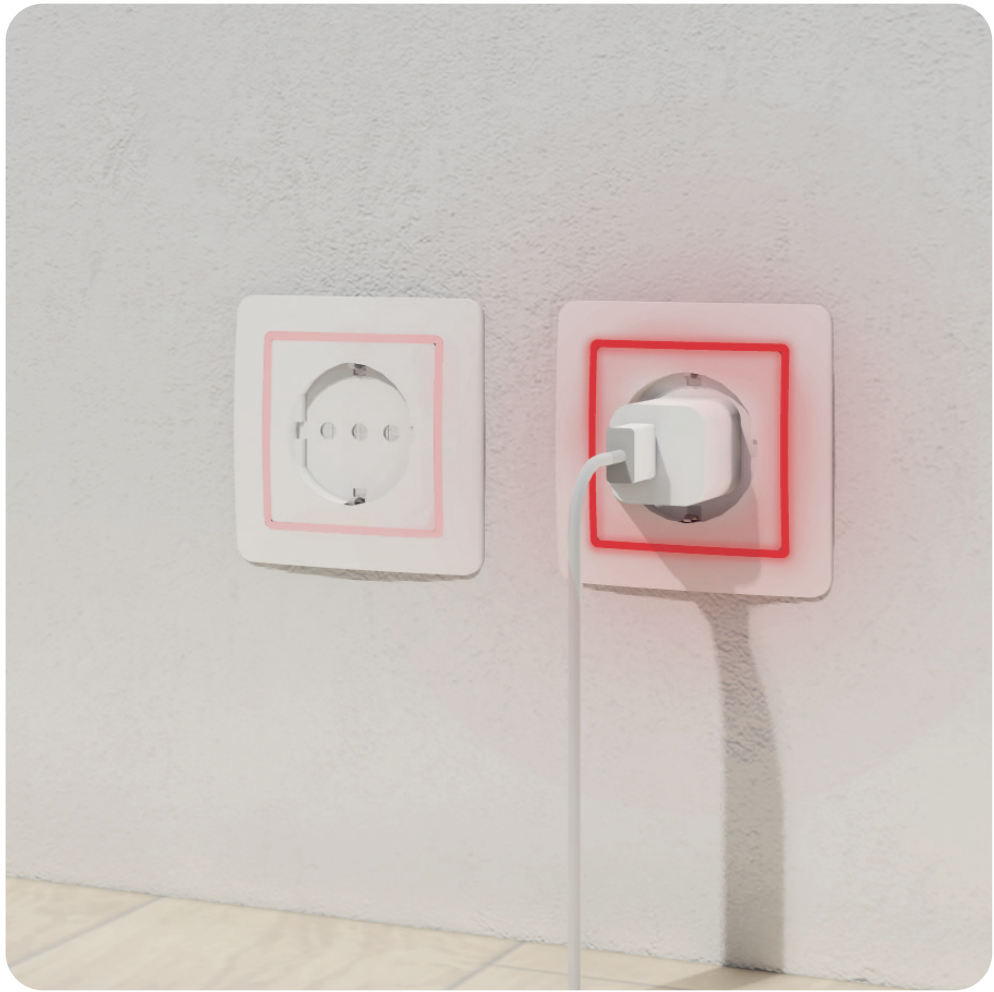
Sliding doors,
behavioral control

Electrical outlets light
up when in use

Small fridge

Smarte waste
system drawer





Electrical outlets light up when in use

Visual connection with other residents

Energy dashboard provides feedback and rewards

Information about sustainable building

Operable windows

Adjustable lighting, behavioral control

Wooden wall plywood finish, natural material

Light on electrical outlets increases awareness

Flexible dining module

Applying natural materials, wooden floor finish



Color lighting with warmer hues increase the feeling of temperature in a space, while cooler colors are able to decrease the perceived temperature, default mode

Wooden window frame, natural element

Information about sustainable building

Flexible dining module, behavioral control

Energy dashboard provides feedback and rewards

Visual connection with other residents

Applying natural materials, wooden floor finish





Sliding doors,
behavioral control

Light on electrical outlets
increases awareness

Three burner stove,
induction

Applying natural materials,
wooden floor finish

Flexible interior
modules



Automatic sun shading system, Default Mode

Information about sustainable building

Possibility to open up windows, behavioral control

Applying natural materials, plywood wall finish

Flexible interior module, Bed module

Collective Spaces



Shared Living Room



Shared Laundry Room



Shared Tool Shed



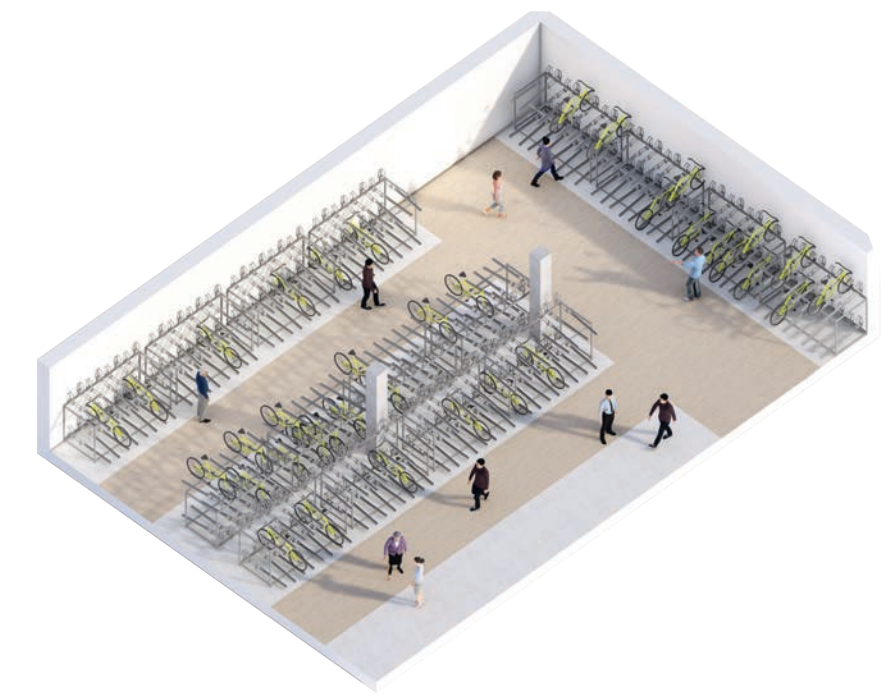
Meditation and Yoga Room



Makerspace

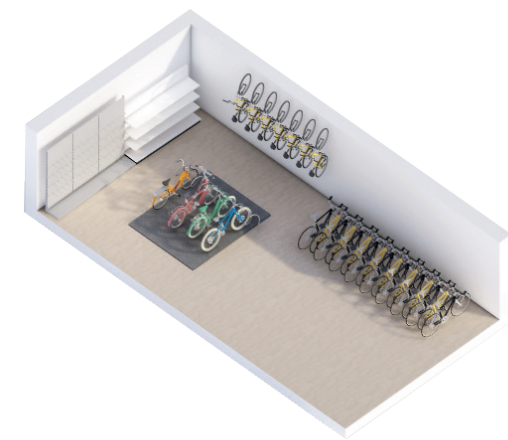


Communal Dining Area and Shared Kitchen



Shared Bike Storage

Public Spaces



Rental Bike Shop



Fitness Room



Event Space

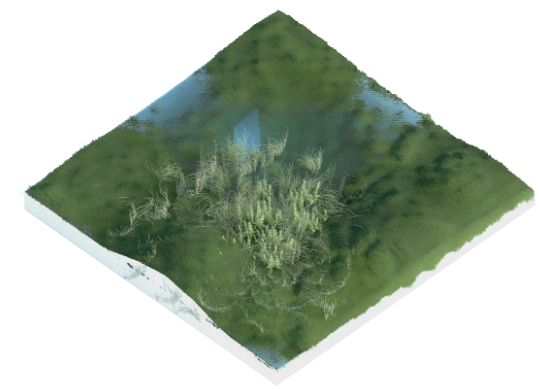


Biological Supermarket



Co-Working Area

Green Spaces



Water Area



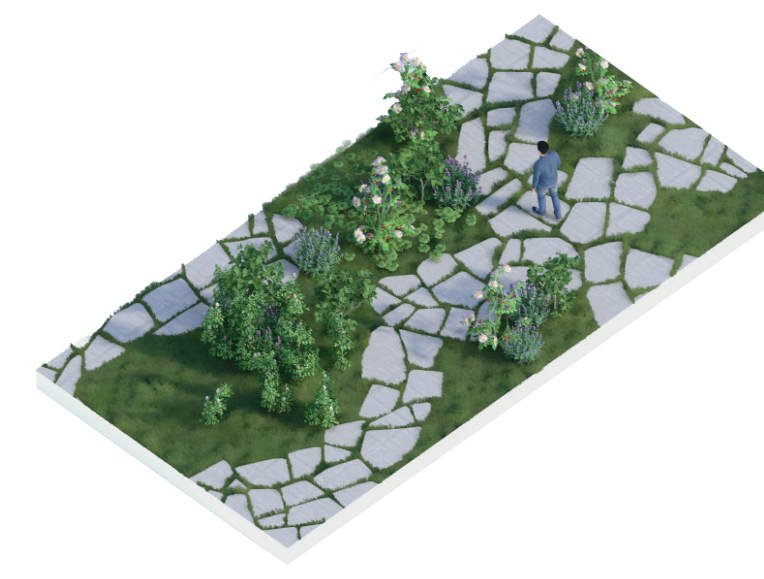
Play Ground



Green Roof



Recreational Space

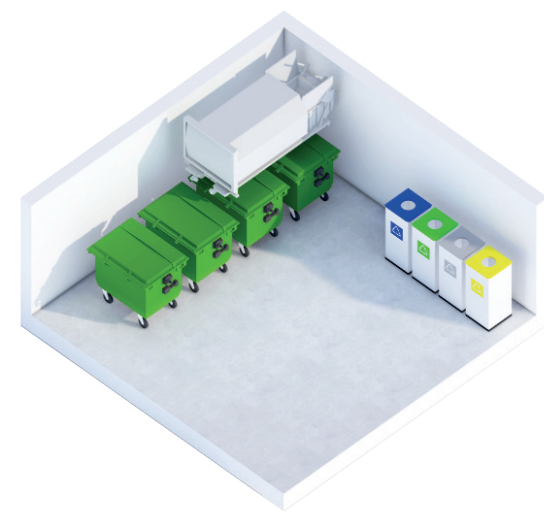


Green Courtyard



Social Space

Utility Spaces



Waste Centre



Technical Room

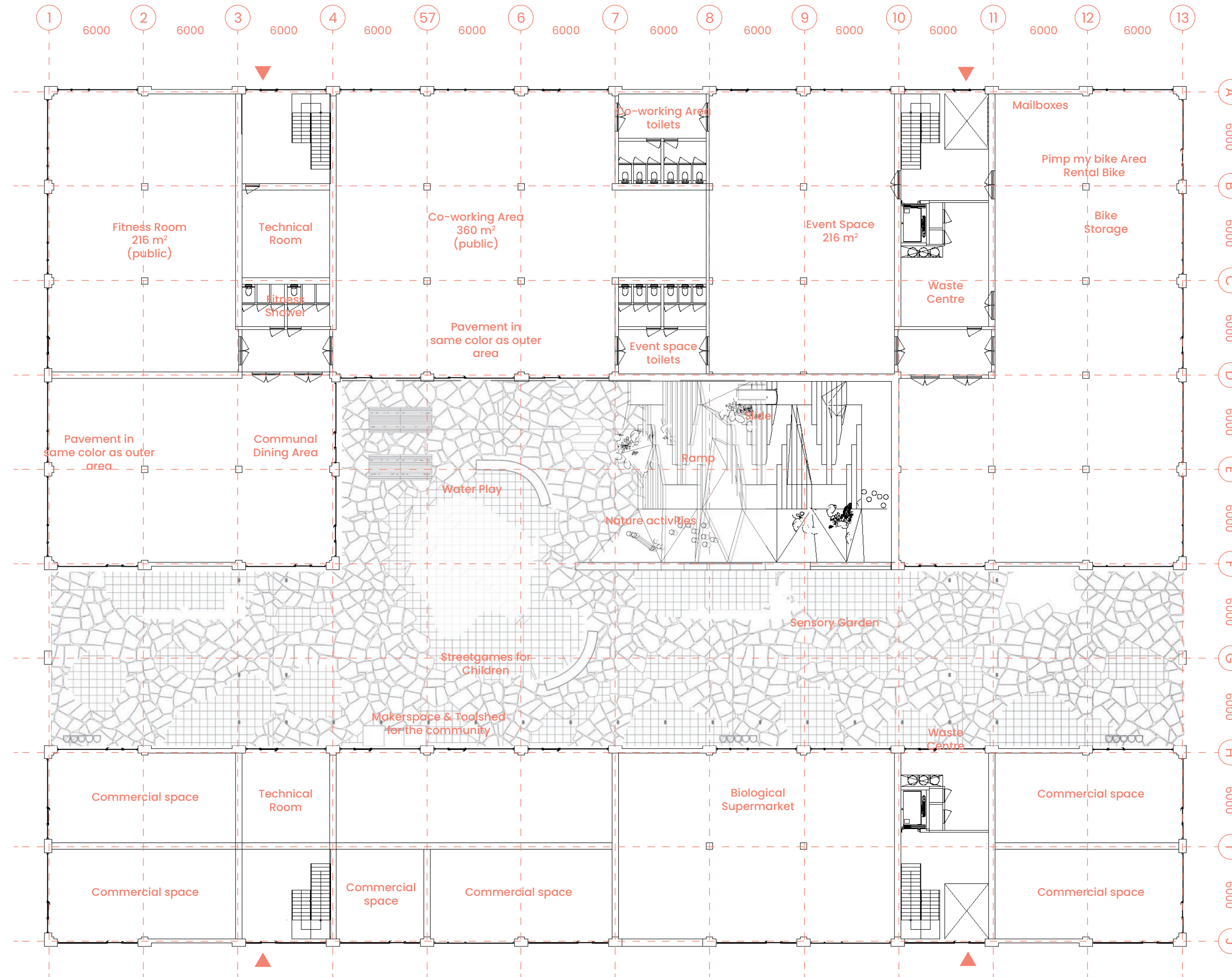


Urban Farming



Energy Roof

Ground Floor



Scale 1:250 Page No. 76

Drawing Content
 Floor Plans
 Ground Floor

First Floor

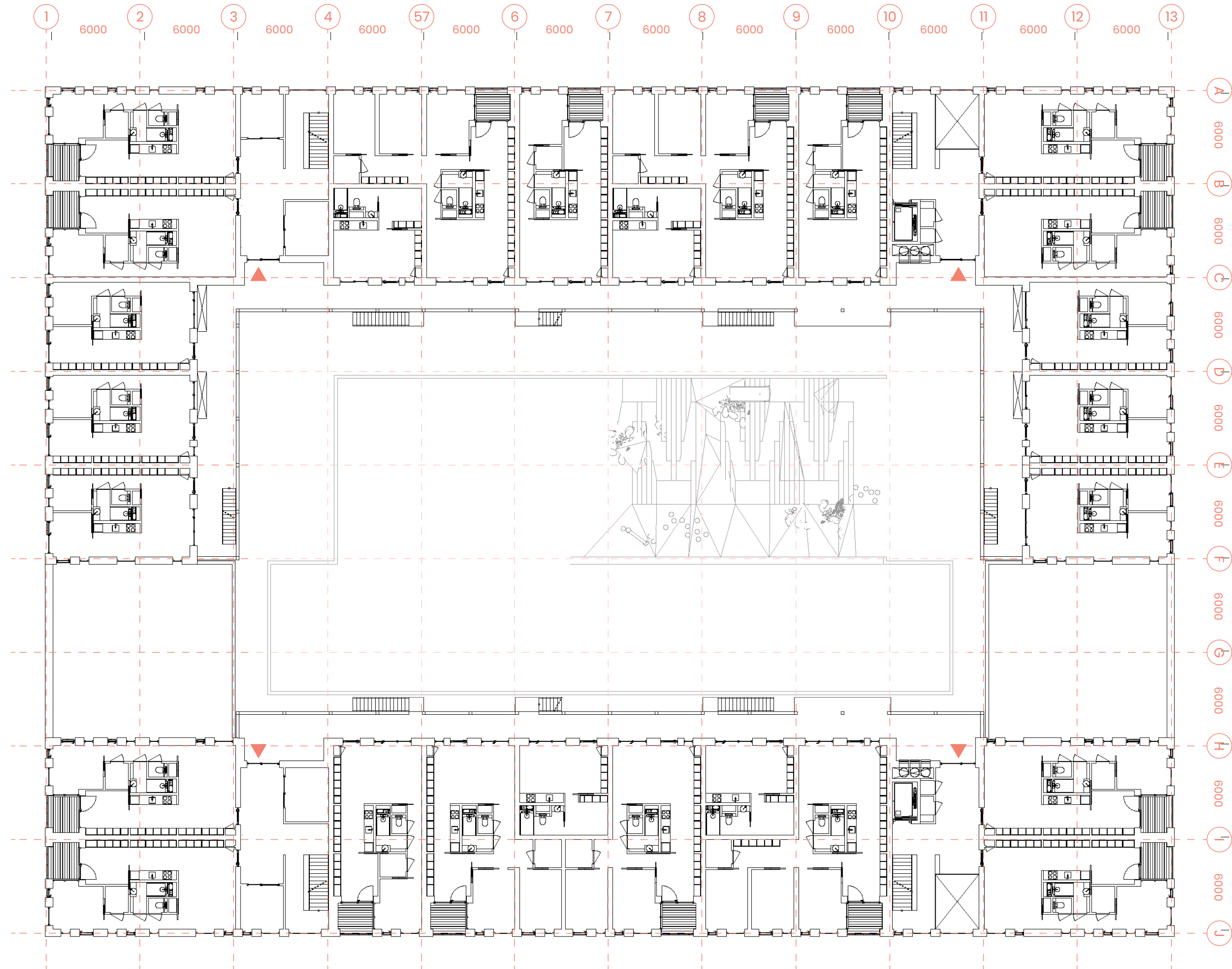


Scale
1 : 250

Page No.
77

Drawing Content
Floor Plans
First Floor

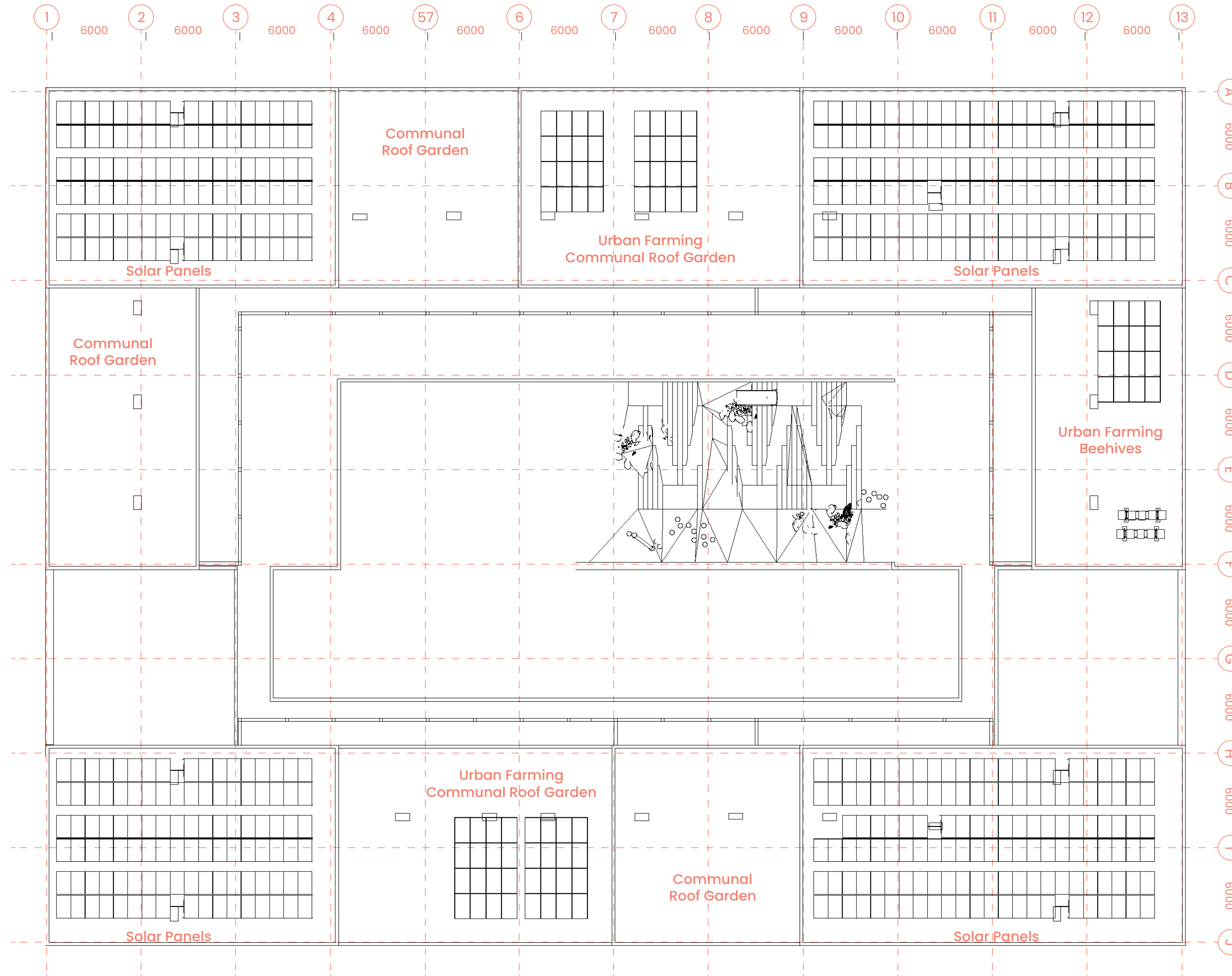
Second Floor



Scale 1 : 250
Page No. 78

Drawing Content
Floor Plans
Second Floor

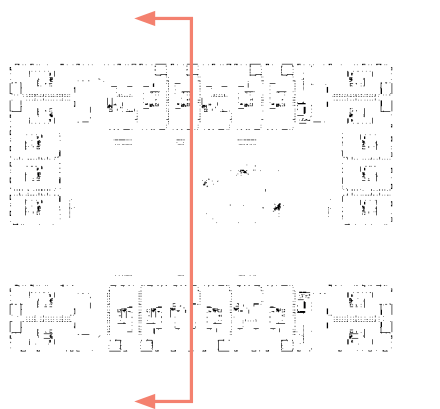
Roof Plan



Scale 1 : 250 Page No. 79

Drawing Content
Floor Plans
Roof

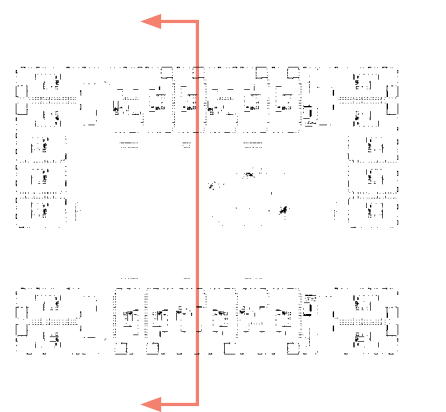
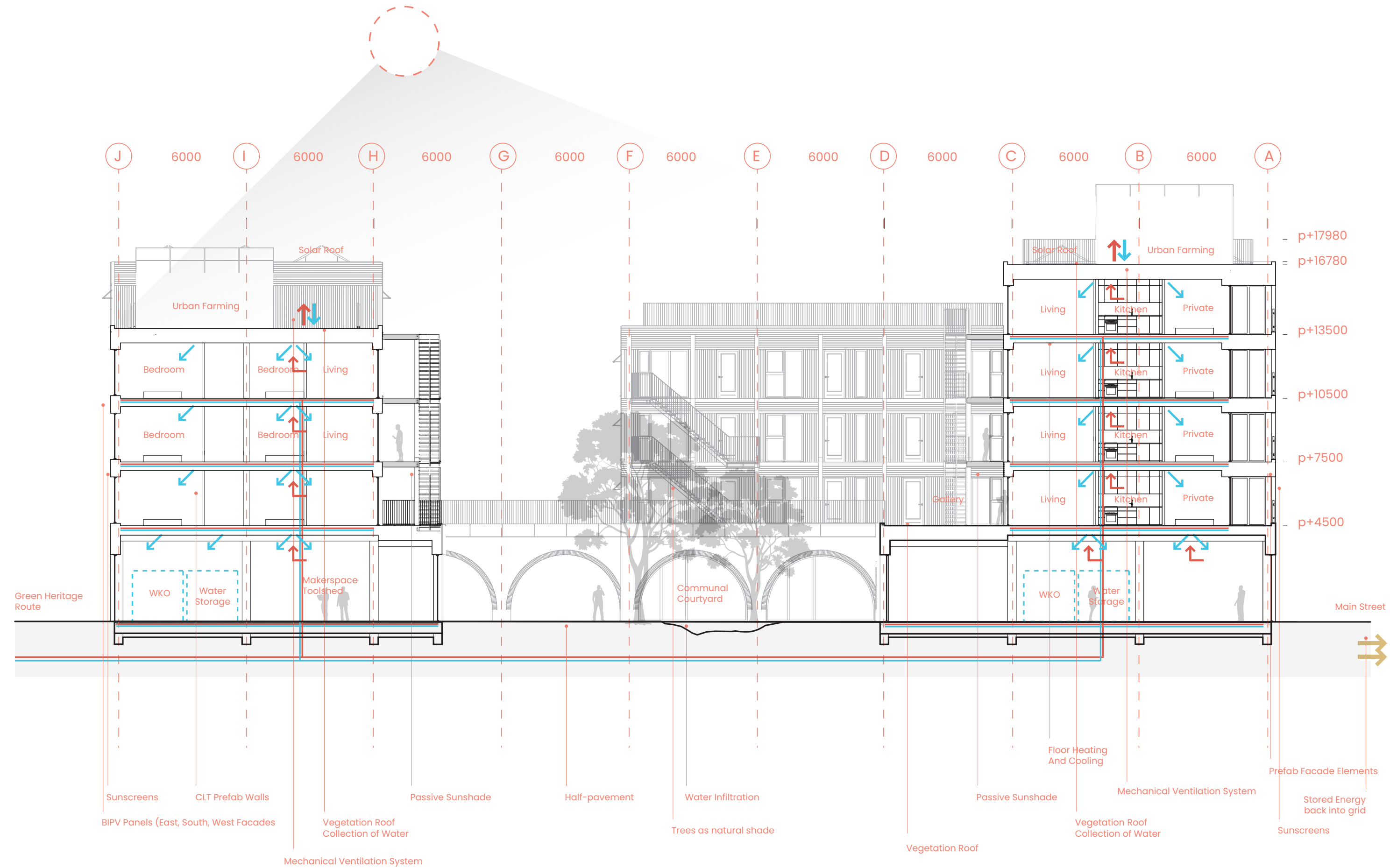
Section



Scale 1:250 Page No. 80

Drawing Content Section A-A

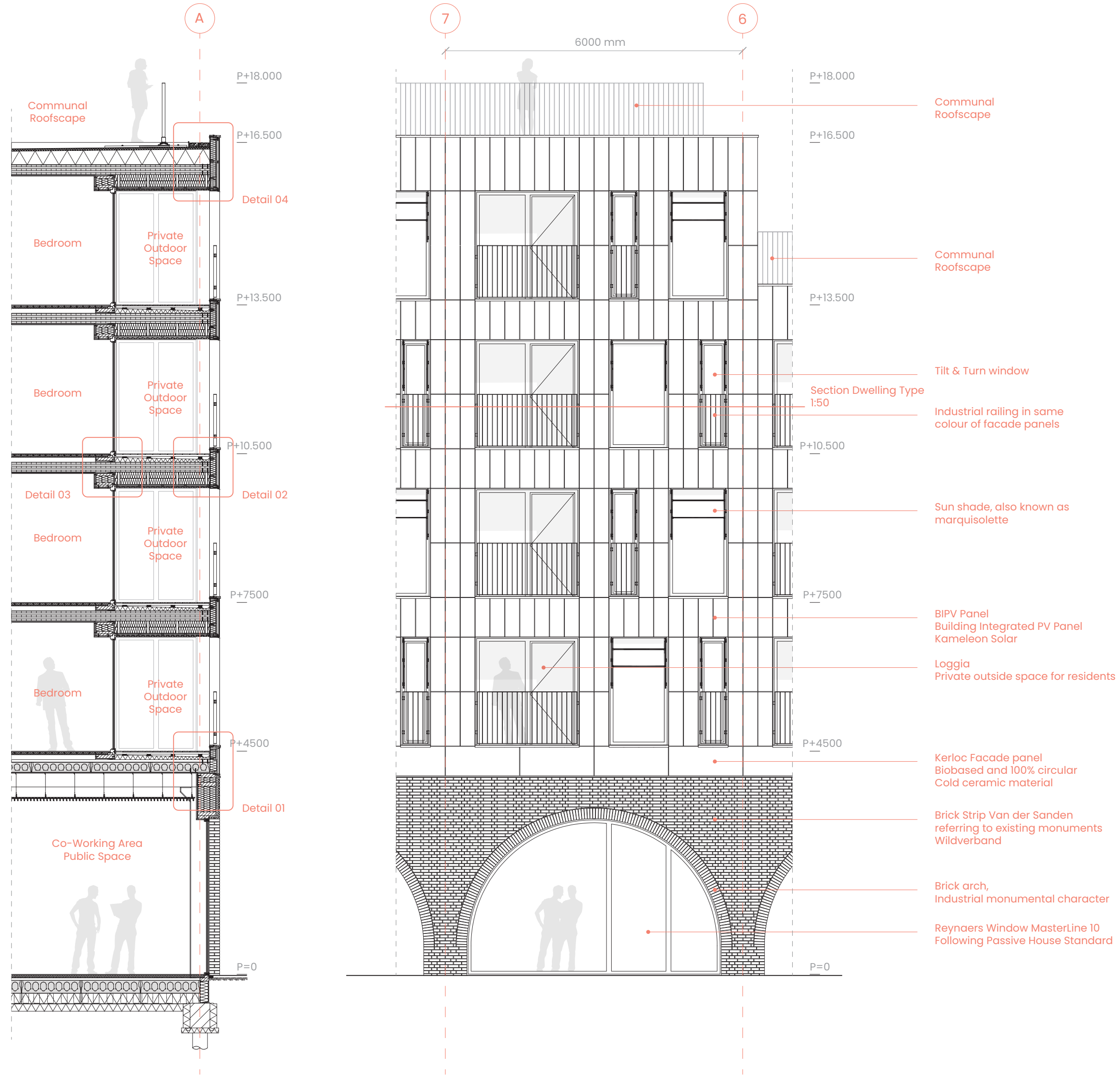
Section Climate



Scale 1 : 250 Page No. 81

Drawing Content Climate Section A-A

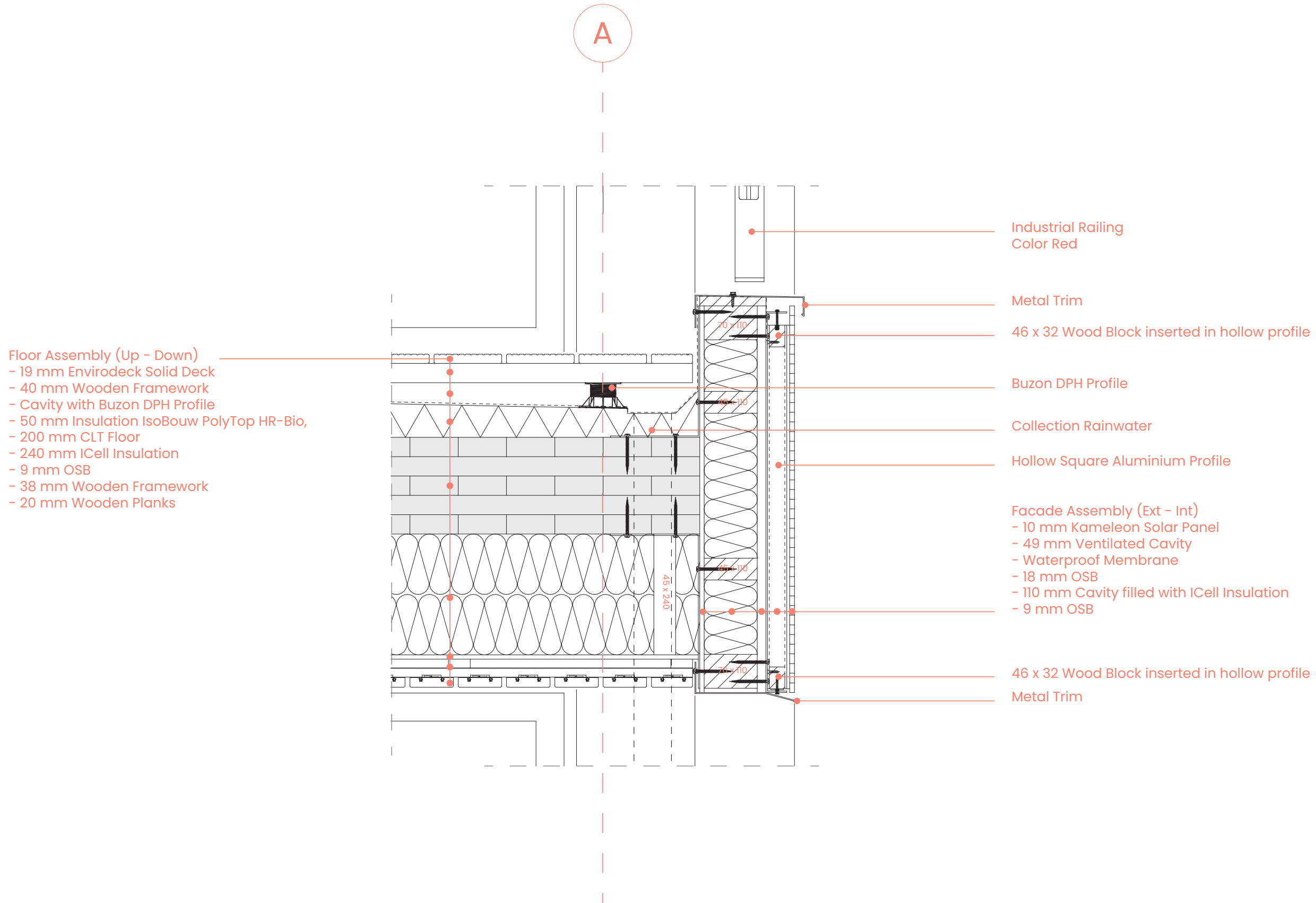
Facade Fragment



Scale 1:100 Page No. 82

Drawing Content
Facade Fragment
Elevation

Detail



- Floor Assembly (Up - Down)
- 19 mm Envirodeck Solid Deck
 - 40 mm Wooden Framework
 - Cavity with Buzon DPH Profile
 - 50 mm Insulation IsoBouw PolyTop HR-Bio,
 - 200 mm CLT Floor
 - 240 mm ICell Insulation
 - 9 mm OSB
 - 38 mm Wooden Framework
 - 20 mm Wooden Planks

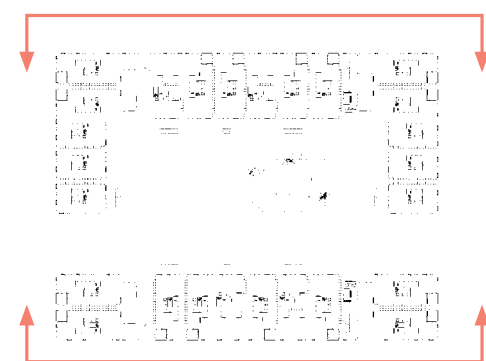
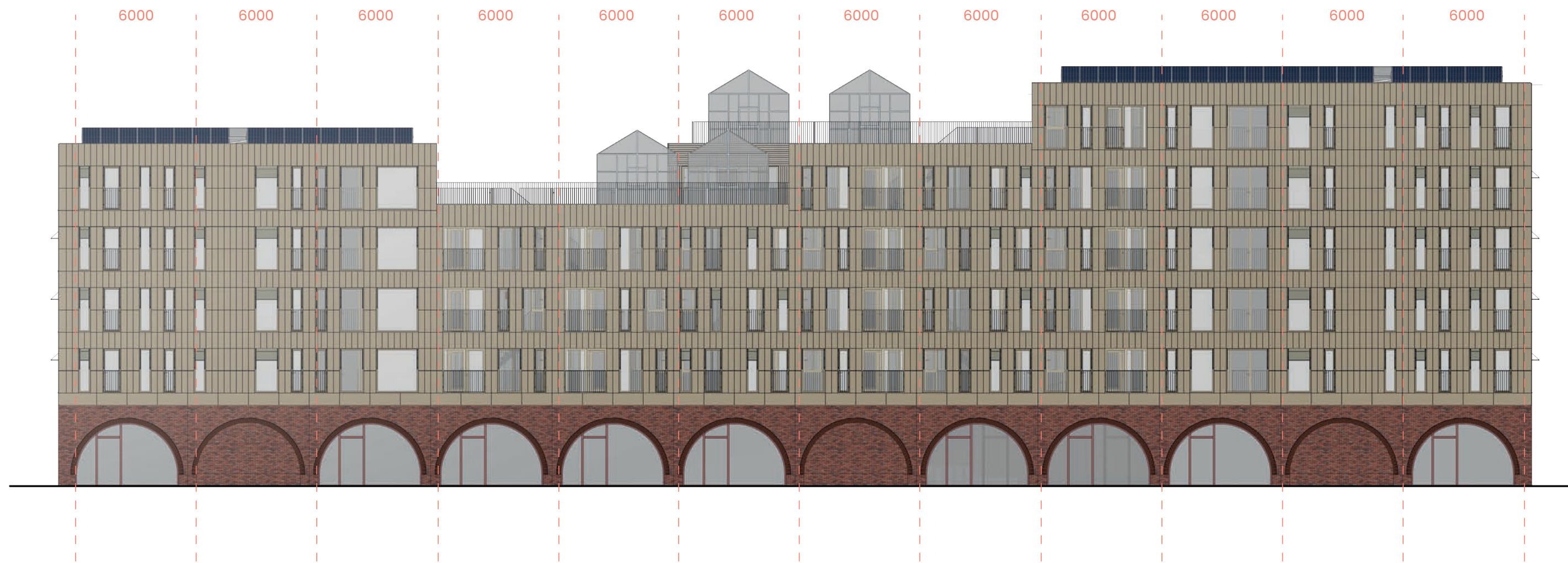
- Industrial Railing
Color Red
- Metal Trim
- 46 x 32 Wood Block inserted in hollow profile
- Buzon DPH Profile
- Collection Rainwater
- Hollow Square Aluminium Profile
- Facade Assembly (Ext - Int)
- 10 mm Kameleon Solar Panel
- 49 mm Ventilated Cavity
- Waterproof Membrane
- 18 mm OSB
- 110 mm Cavity filled with ICell Insulation
- 9 mm OSB
- 46 x 32 Wood Block inserted in hollow profile
- Metal Trim



Scale: 1 : 10
Page No.: 83

Drawing Content: Detail 02

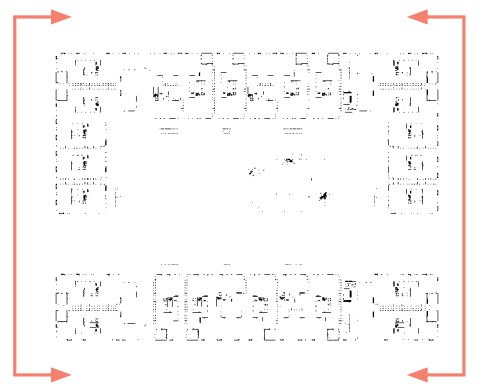
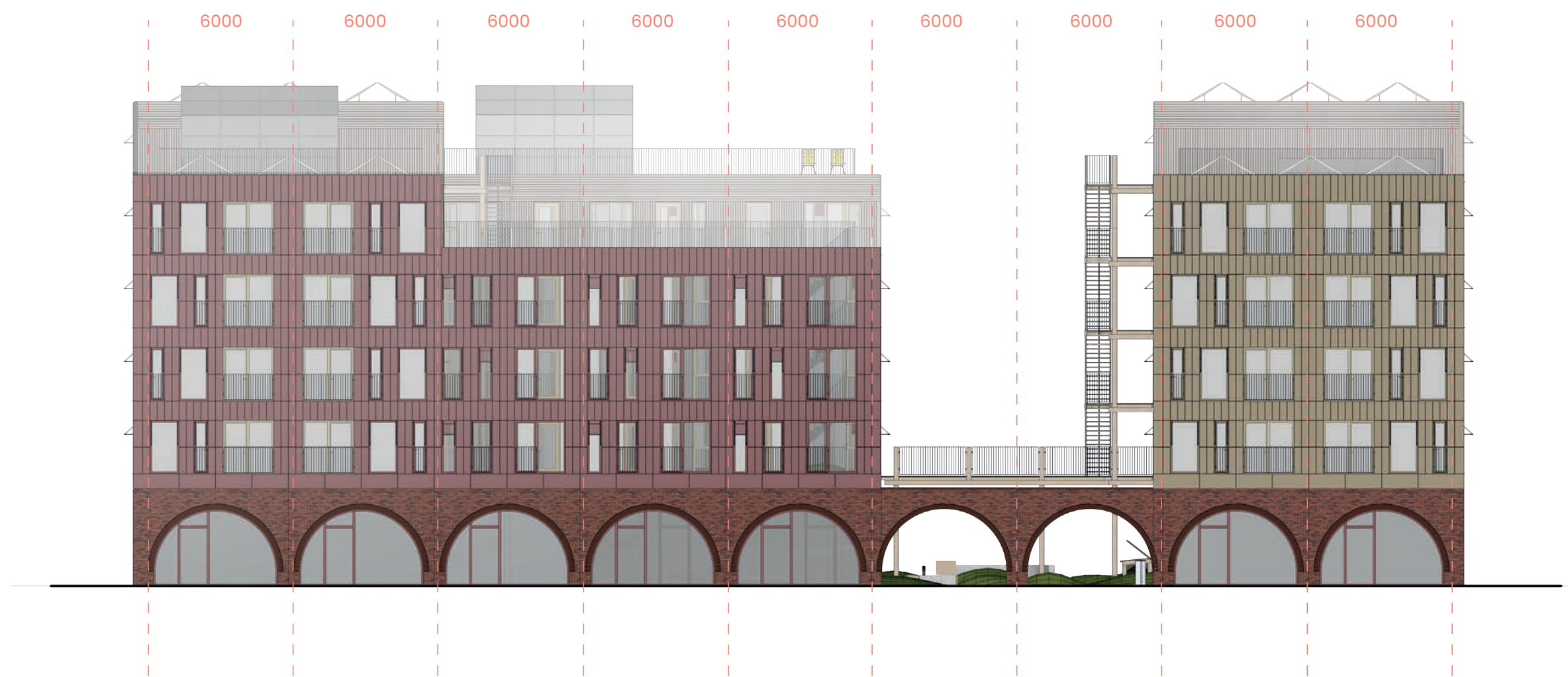
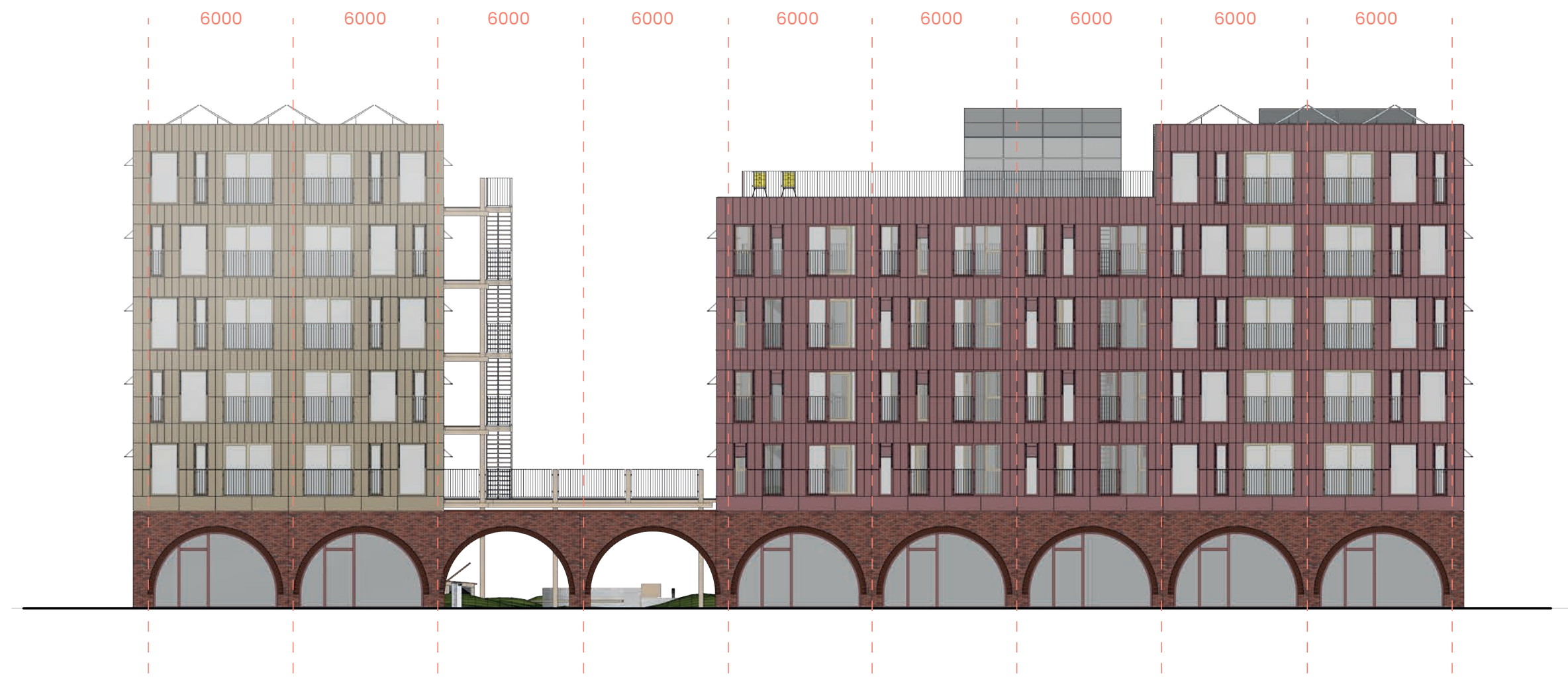
Facade Elevations



Scale 1 : 250 Page No. 84

Drawing Content
Facade Elevation
Outer Facades

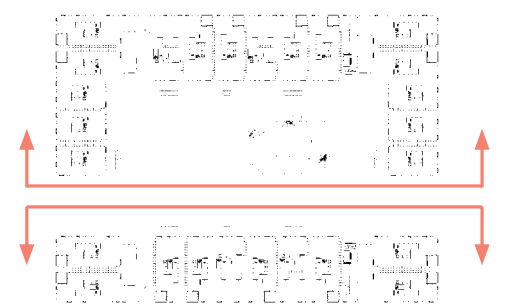
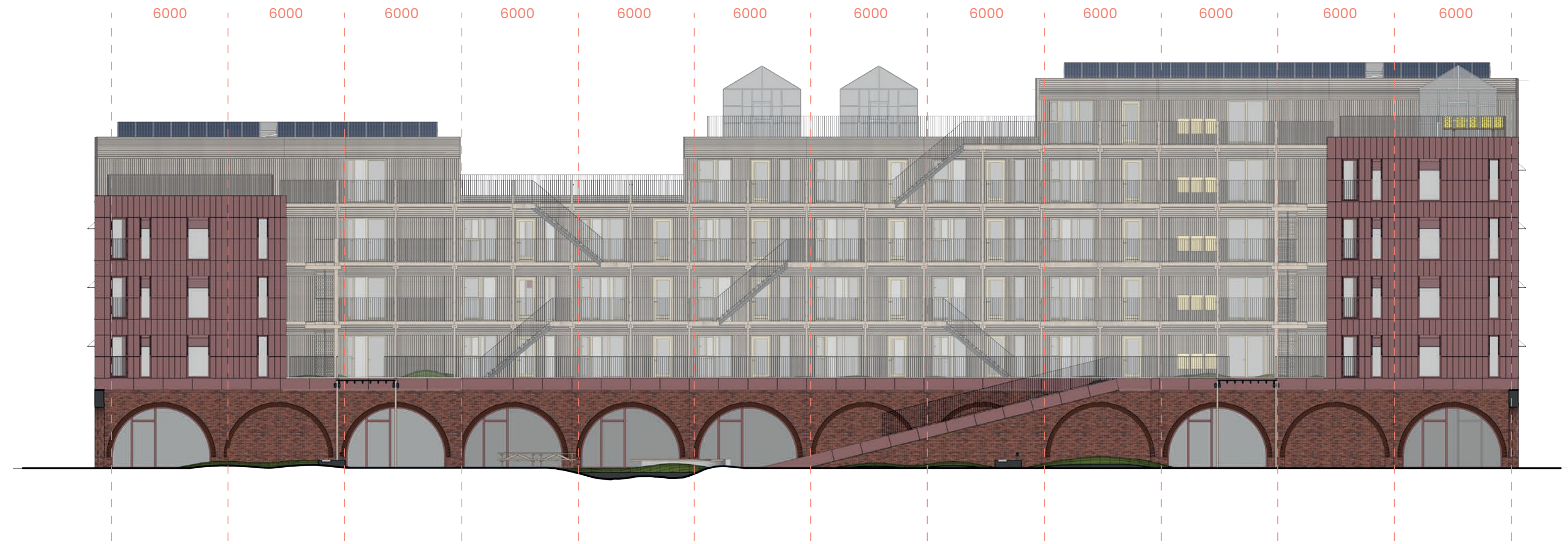
Facade Elevations



Scale 1 : 250 Page No. 85

Drawing Content
Facade Elevation
Outer Facades

Facade Elevations



Scale 1: 250 Page No. 86

Drawing Content
Facade Elevation
Inner Facades







Green Heritage Route,
mental vitality



Green Heritage Route,
mental vitality

Shared street, bikes
and cars

Recyclable bins,
increasing convenience
for residents and visitors






Automatic sun shading system, Default Mode

Friendly inviting brick arches

Vision towards nature increases mental vitality





Horizontal connection
increases social support

Visions towards nature
increases mental vitality

Recyclable bins,
increasing convenience
for residents and visitors





Natural ramp increases vertical connection

Urban furniture for people to sit and relax

Makerspace, collective space for residents

Compost Centre

Integrating water, mental vitality

Half paved courtyard



Horizontal and vertical connection, social support

Vision towards nature on the first floor

Half paved gallery scape

Delft University of Technology
Faculty of Architecture and the Built Environment

Course:
AR3AD100
Dutch Housing Graduation Studio
Chair of Architecture and Dwelling

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A Recipe for Sustainable Living

An Architectural Recipe for Nudging Towards Pro-Environmental Behavior in Housing

Danny Westerink
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