



DE CENTRALE

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TU Delft, MSc Architecture



0 INTRODUCTION

1. PROBLEMS &
OPPORTUNITIES

2. RESEARCH

3. DESIGN GOALS

4. URBAN
STRATEGY

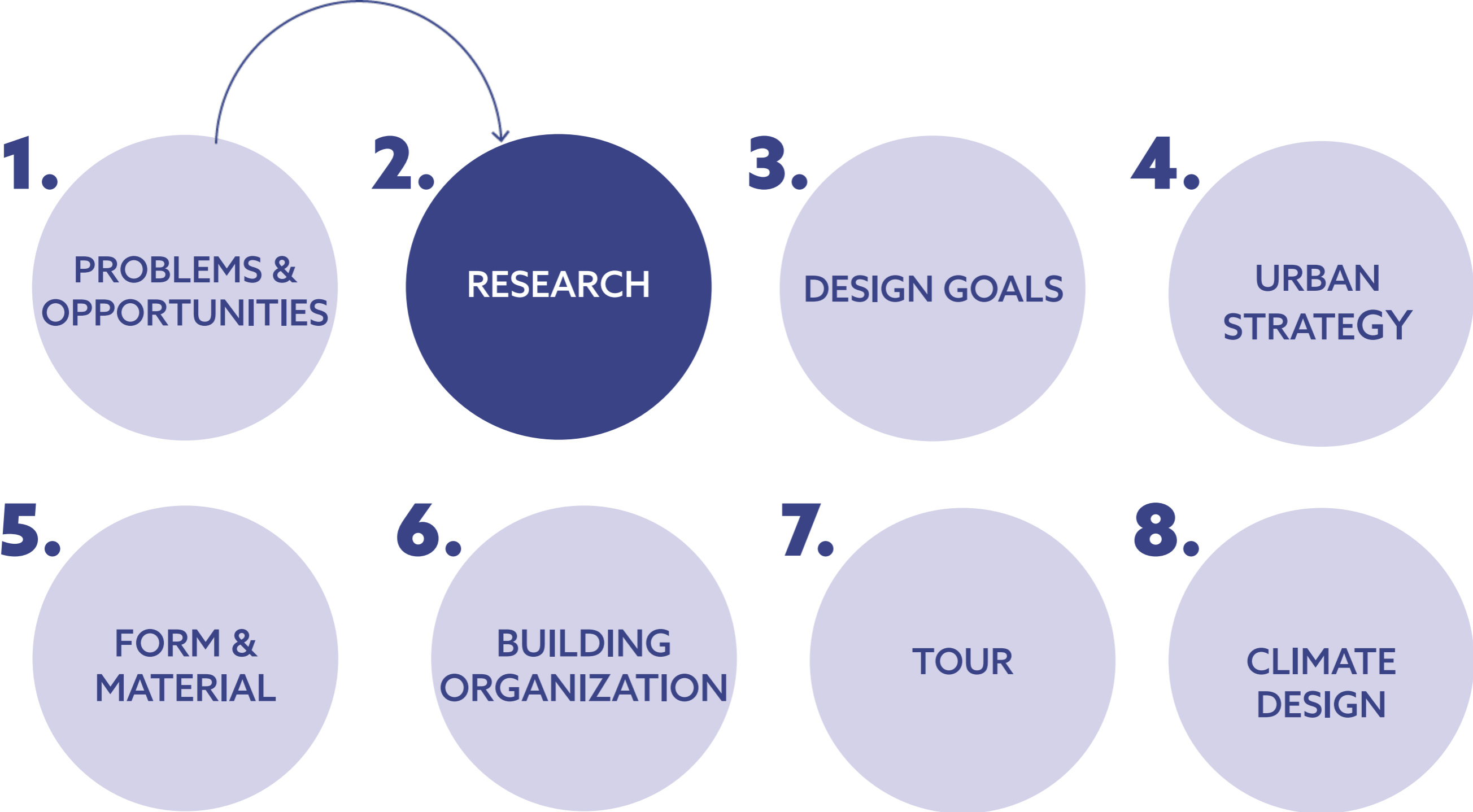
5. FORM &
MATERIAL

6. BUILDING
ORGANIZATION

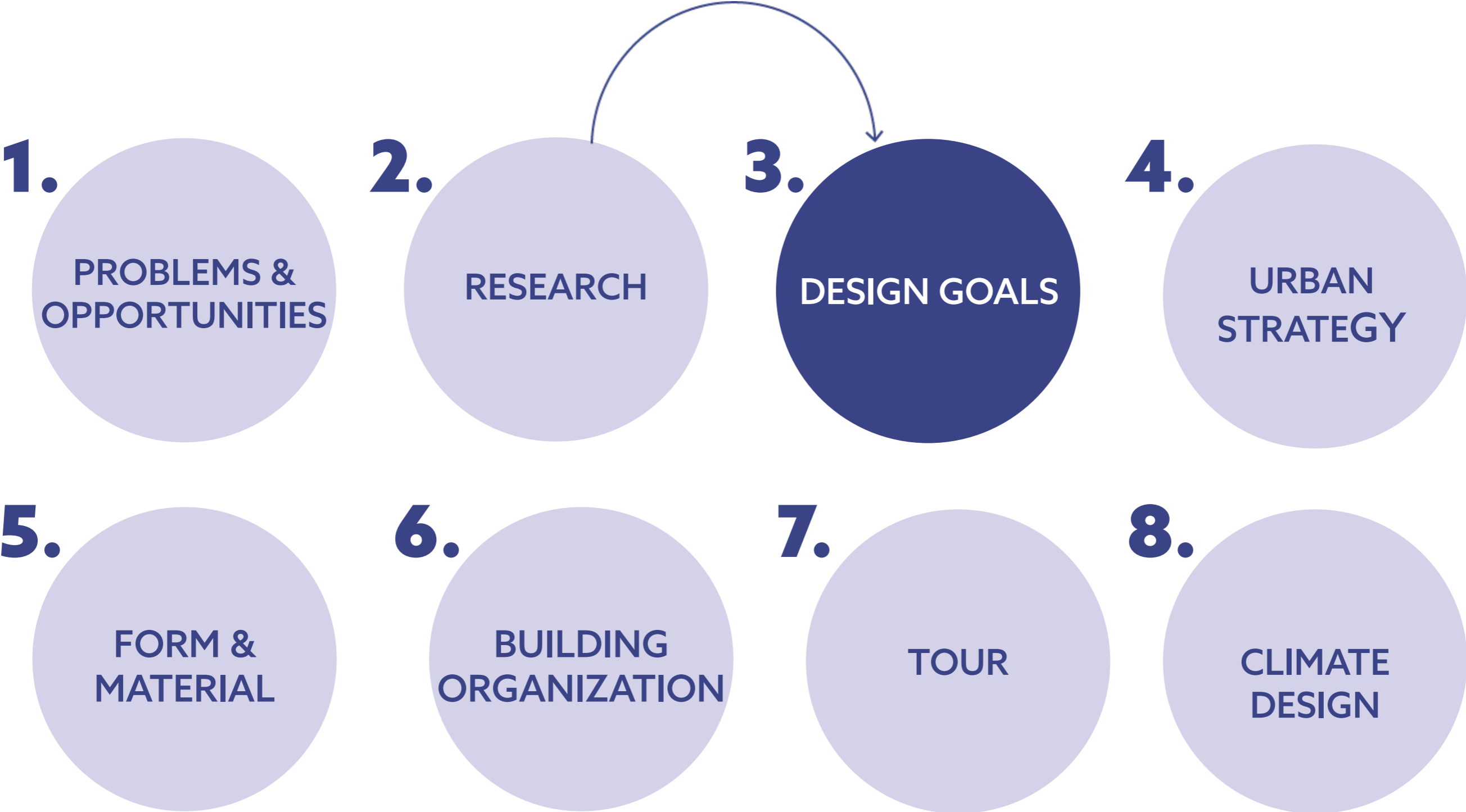
7. TOUR

8. CLIMATE
DESIGN

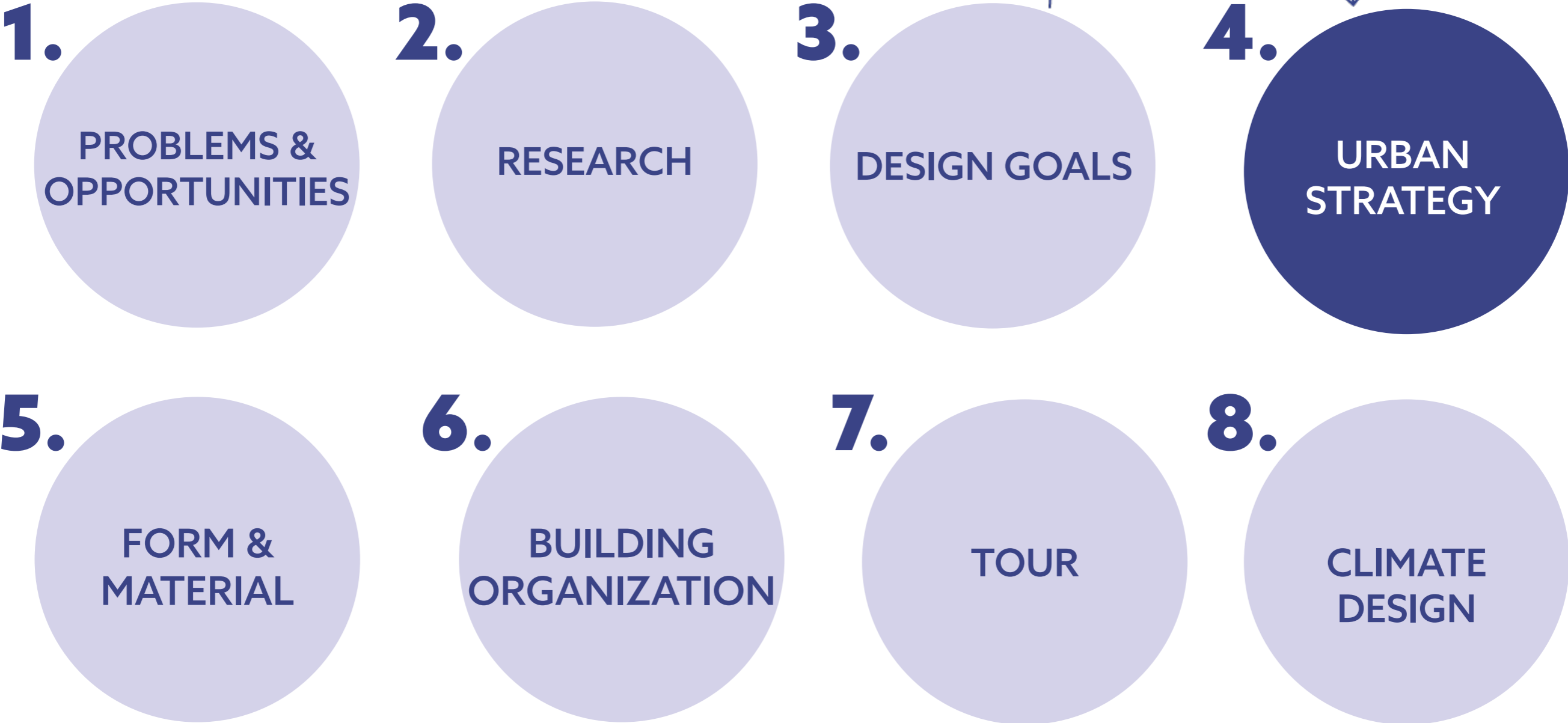
0 INTRODUCTION



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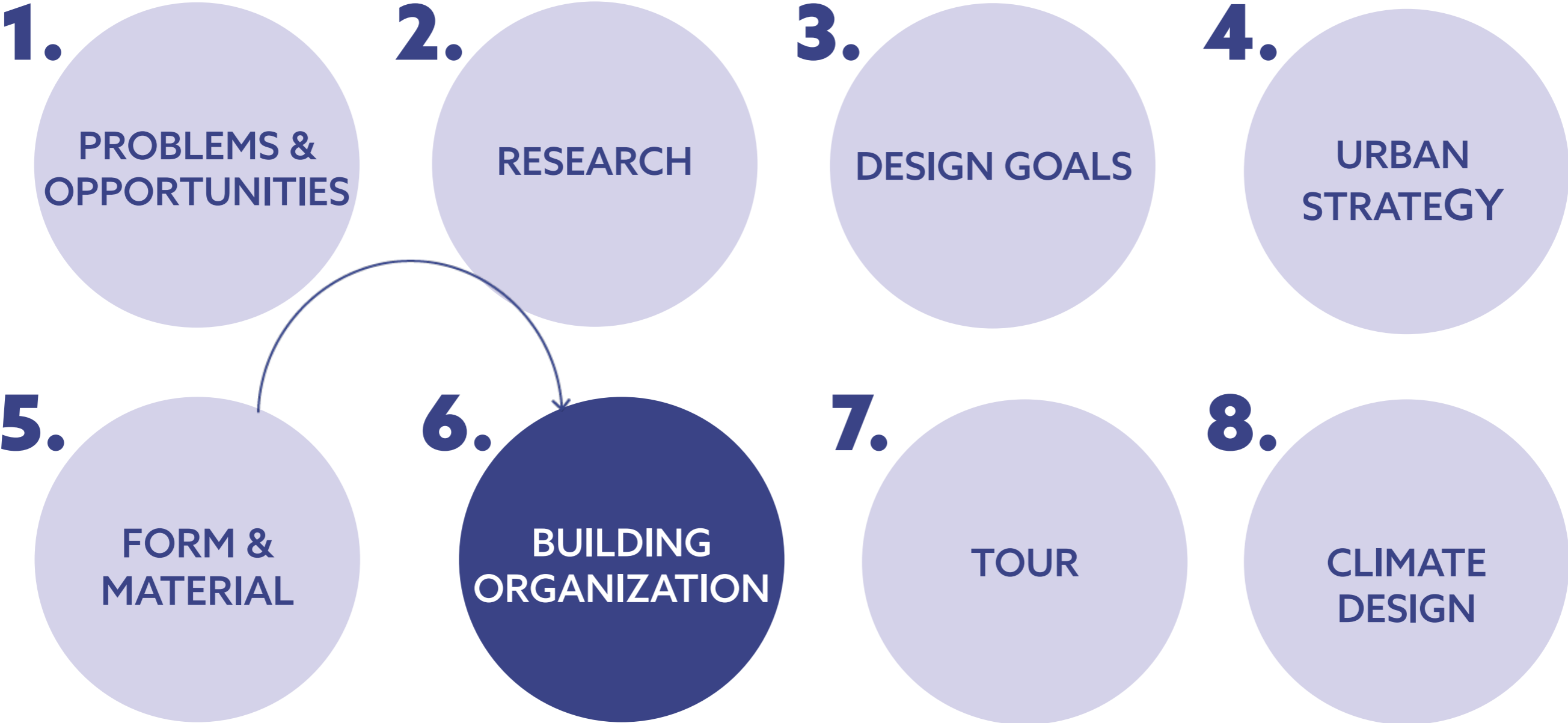
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TOUR

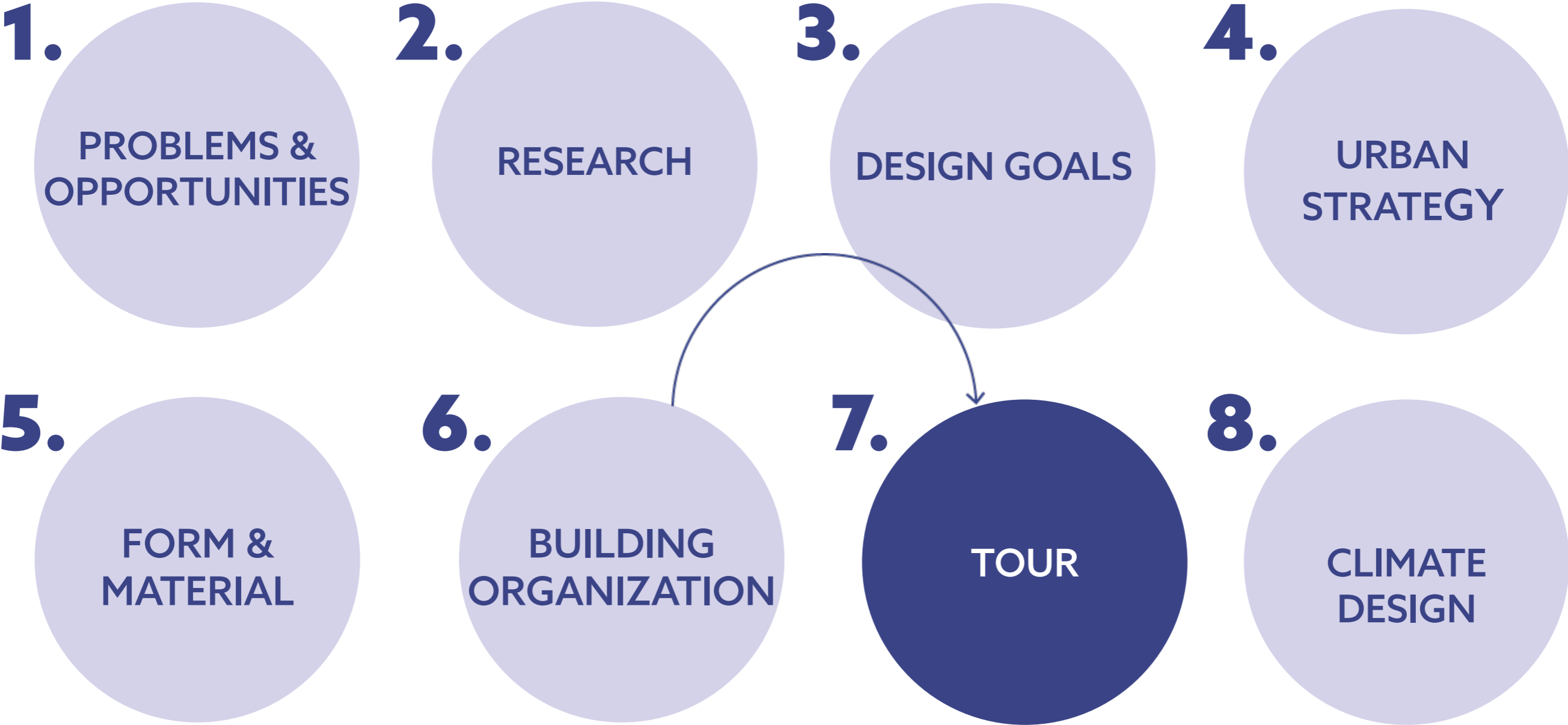
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CLIMATE
DESIGN

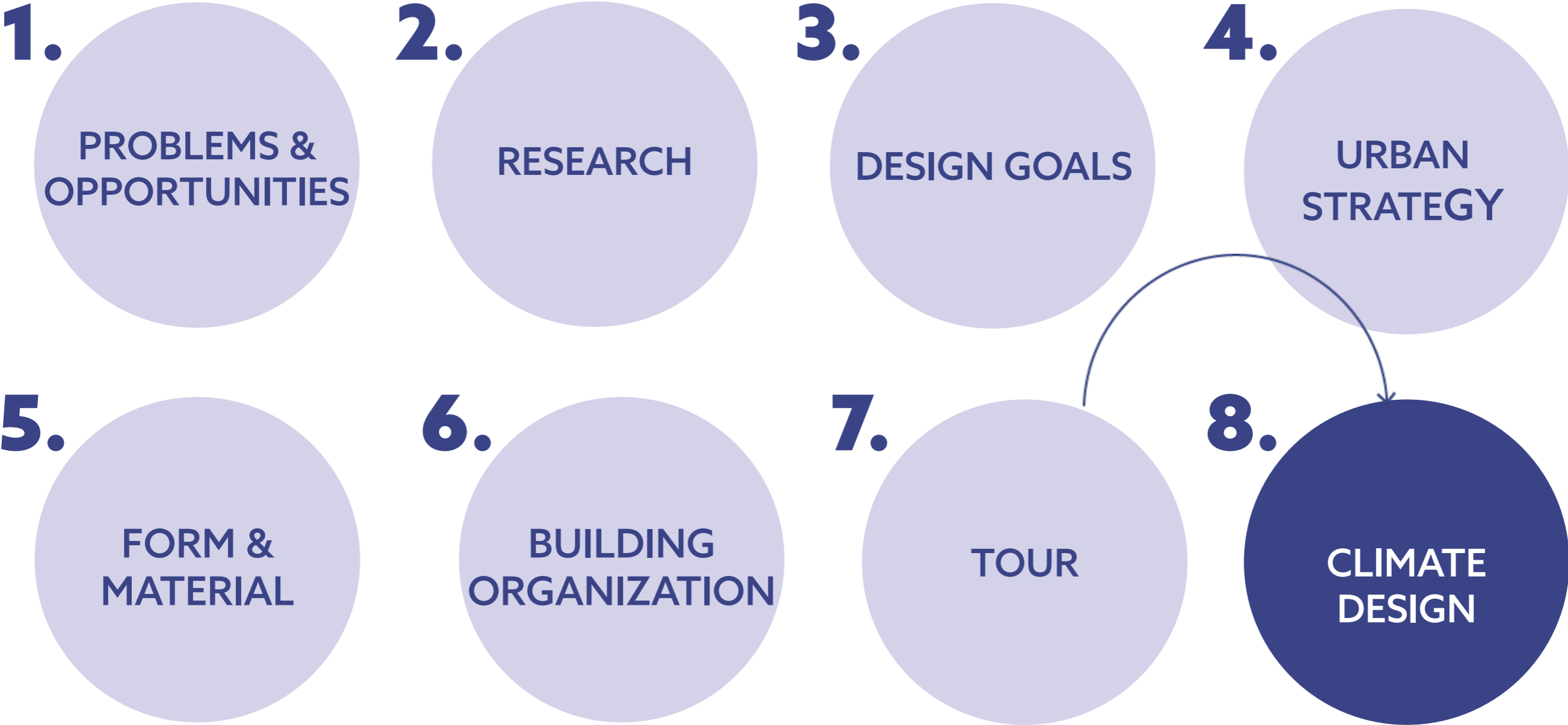
0 INTRODUCTION



0 INTRODUCTION



0 INTRODUCTION



1.

**PROBLEMS &
OPPORTUNITIES**

1 PROBLEMS & OPPORTUNITIES



1700



1847



2019

the relationship of city and port over time

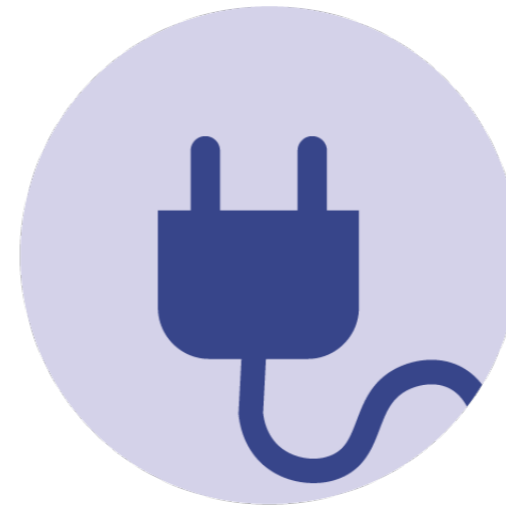
1 PROBLEMS & OPPORTUNITIES



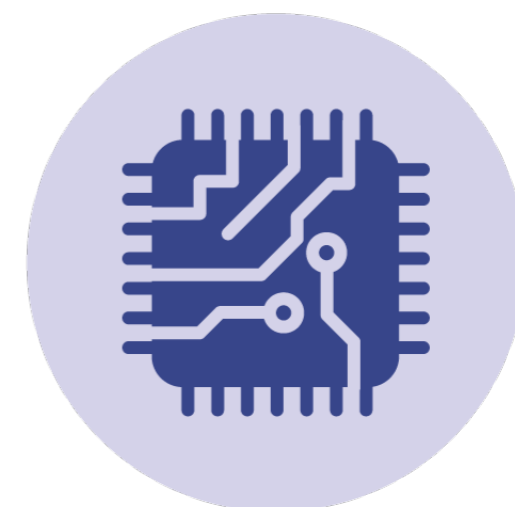
waste treatment



water treatment



energy supply



data services

large cities depend on a city-supporting industry close by

1 PROBLEMS & OPPORTUNITIES



a cleaner industry is reason to reconsider
their relationship

1 PROBLEMS & OPPORTUNITIES

DESIGN GOAL 1



city and port working in symbiosis,
instead of moving the port away

2.



RESEARCH

2 RESEARCH

2,3%

of the total Dutch energy consumption goes to datacentres.

500MW

is the capacity of datacentre that will be realized in the West Port of Amsterdam.

4x

as big as the Zeewolde datacentre.

82%

it will consume an equal amount of energy as 82% of the households in Amsterdam in 2040.

2 RESEARCH



50%

of the energy in datacentres goes to the cooling system, after which it is lost to the outside air.

2 RESEARCH

50%

of the energy in datacentres goes to the cooling system, after which it is lost to the outside air.

60%

in my research I found it is possible to recover 60% of the total energy consumption in the form of wasteheat.

partly by physically connecting a heat demanding building to the datacentre

2 RESEARCH

65%

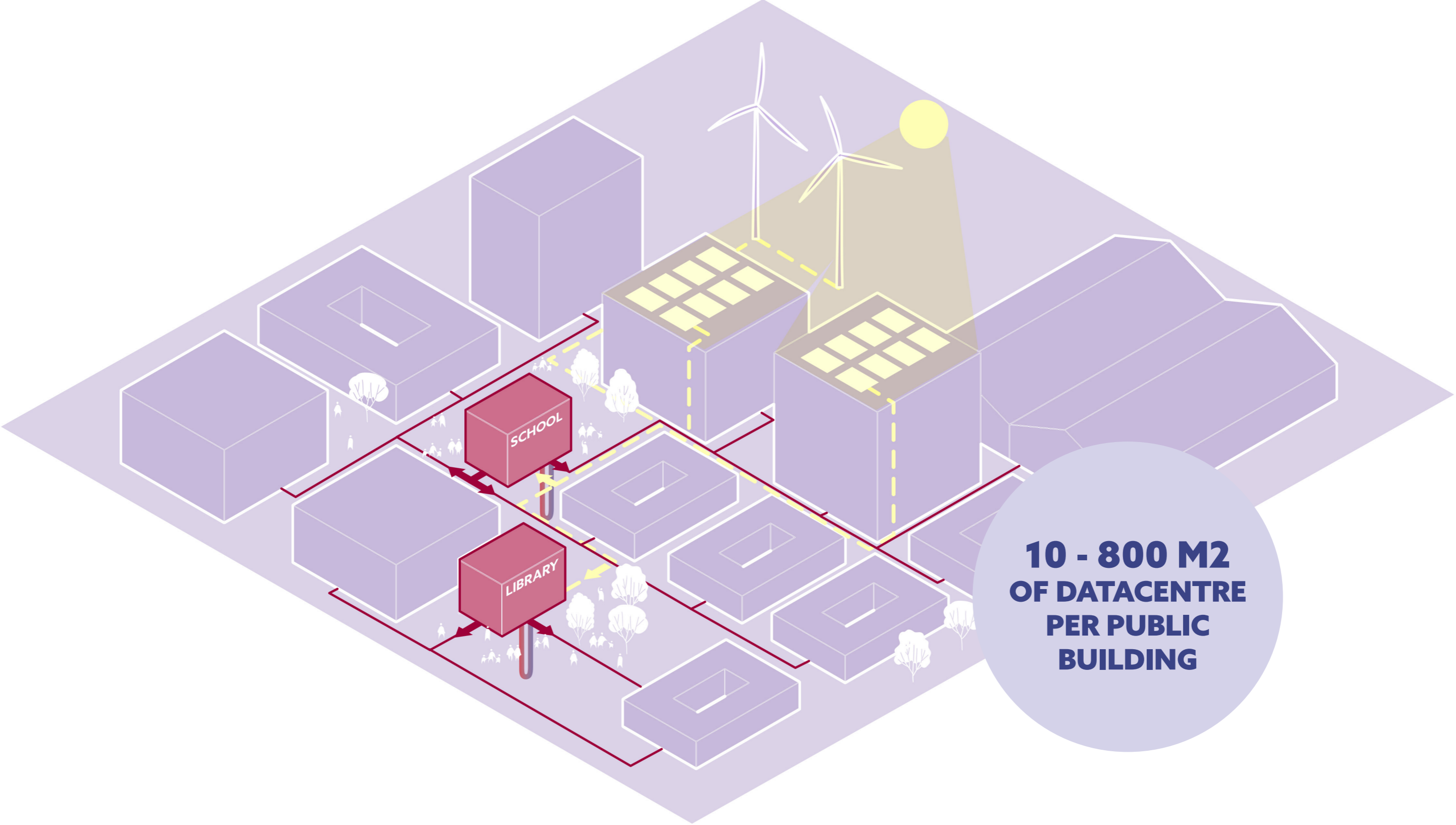
with this heat, 65% of the households in Amsterdam in 2040 can be heated 'for free'.

..but there is still the issue of space..

128.205M²

this 500MW datacentre would require 128.205m² of white space.

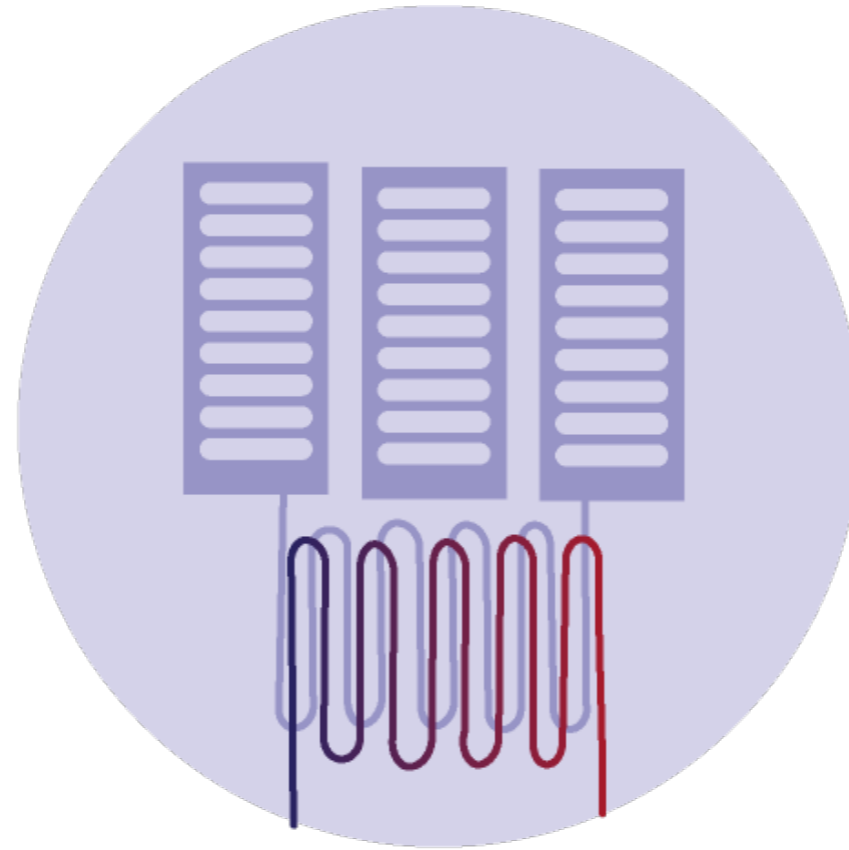
2 RESEARCH



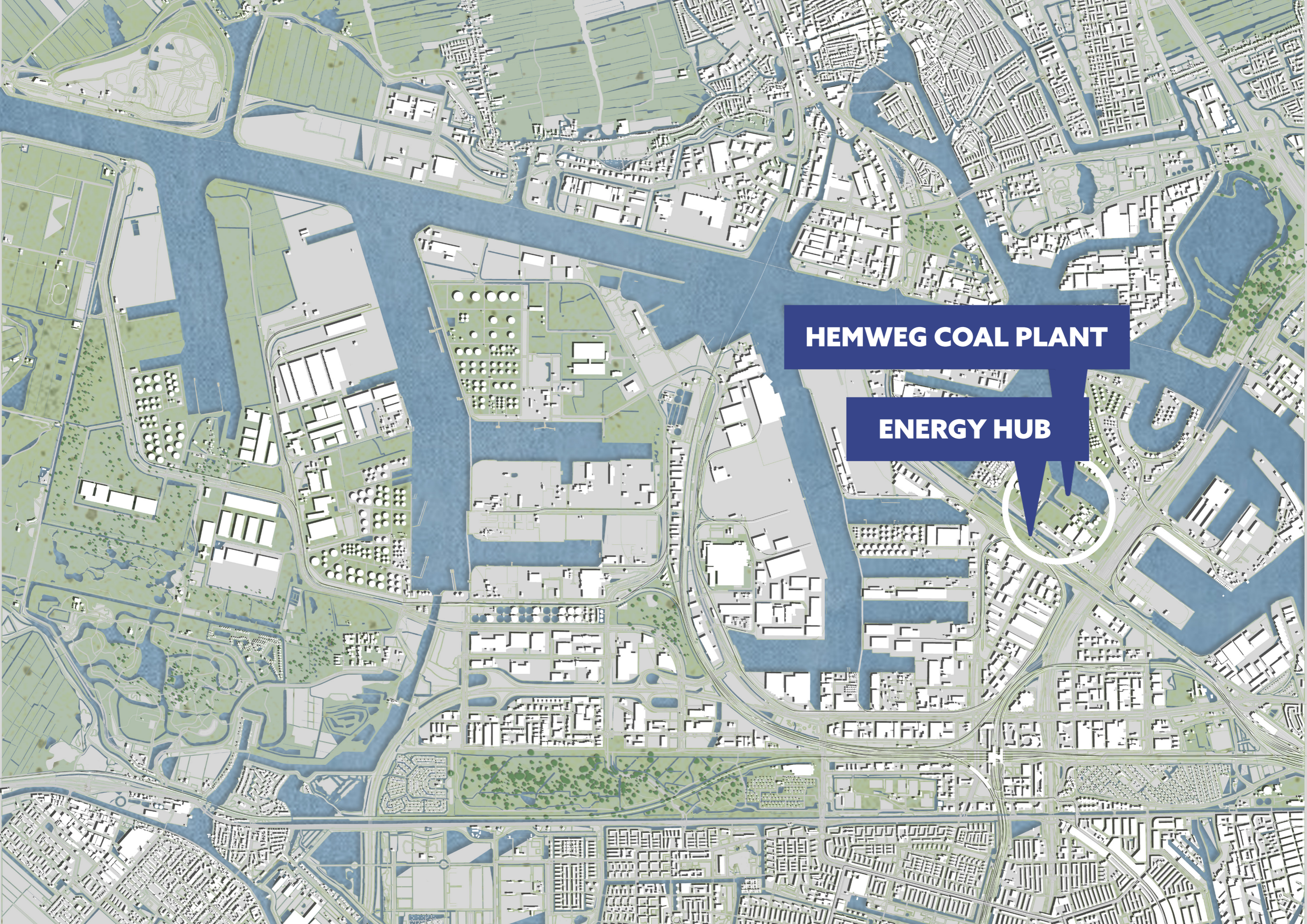
Decentralized datacentre microgrids heating the city

2 RESEARCH

DESIGN GOAL 2

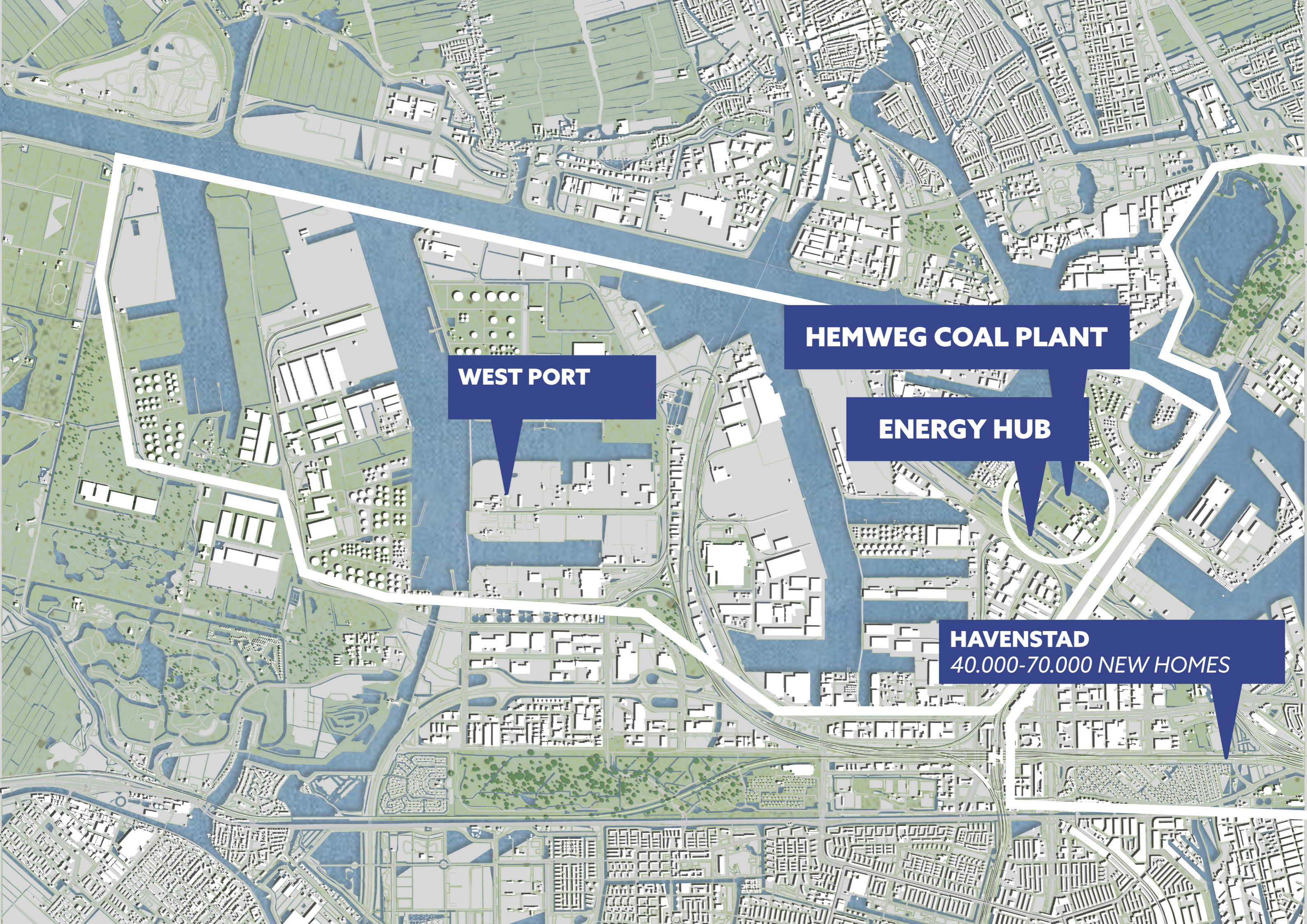


use datacentre waste heat to heat a
public building



HEMWEG COAL PLANT

ENERGY HUB

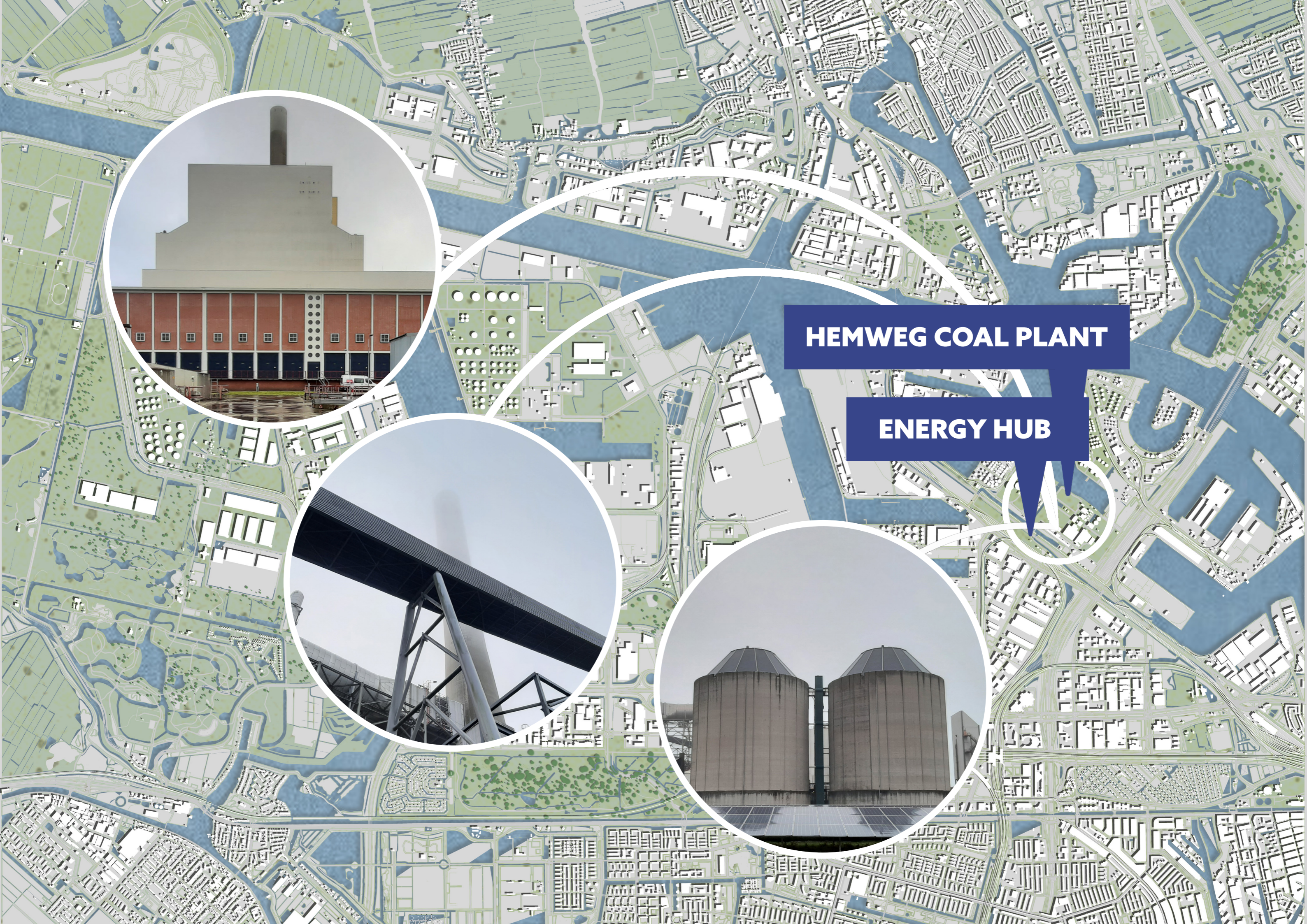


WEST PORT

HEMWEG COAL PLANT

ENERGY HUB

HAVENSTAD
40.000-70.000 NEW HOMES



HEMWEG COAL PLANT

ENERGY HUB

3.

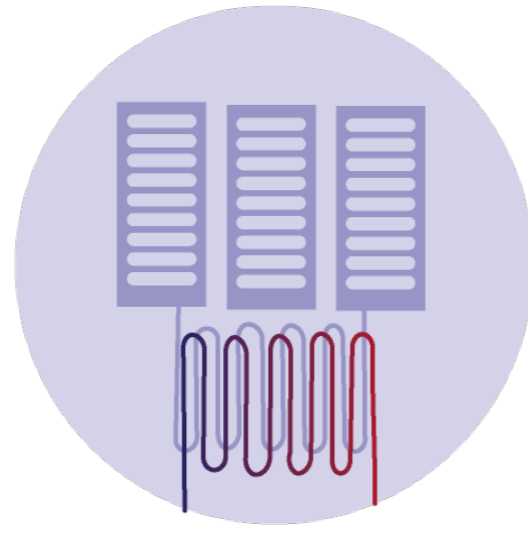


DESIGN GOALS

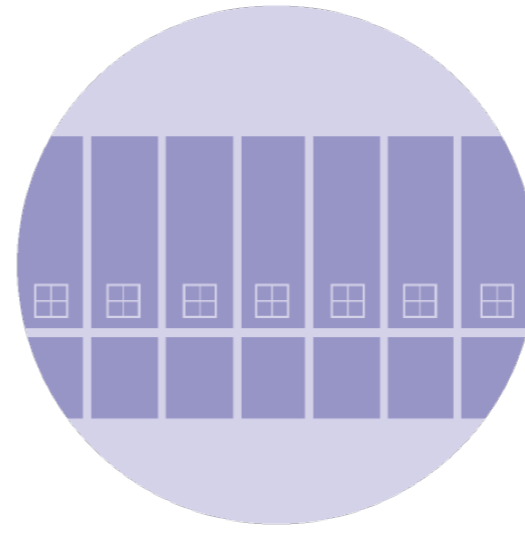
3 DESIGN GOALS



**symbiosis between
port and city**



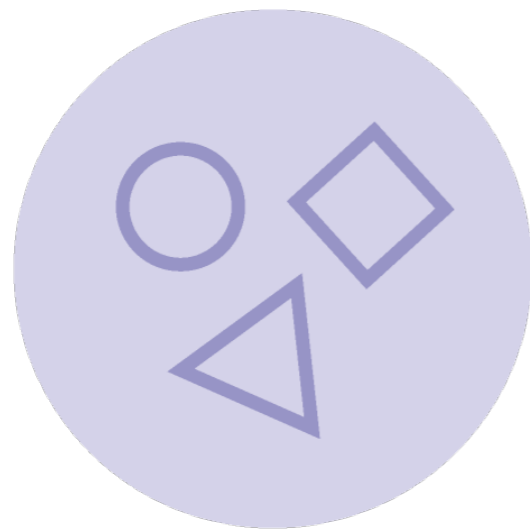
**use datacentre
waste heat**



**relate to industrial
context**



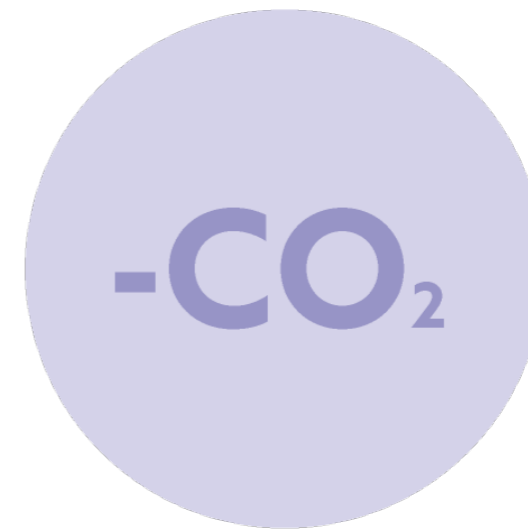
**open up the industry
to the public**



**spaces with variety
in experience**



**an accessible and
representative design
for everyone**



**sustainable design
minimal footprint**

4.



**URBAN
STRATEGY**

4 URBAN STRATEGY



HEMBRUG



WESTERGAS



DE PRAEL HOUTHAVENS

connecting the hubs



a new public space in the city



harbour water filtering

4 URBAN STRATEGY

INLET ZONE

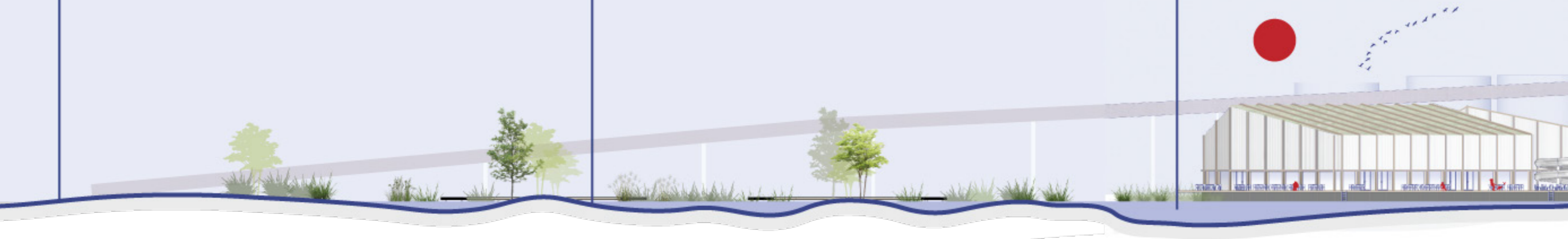
Removes coarse sediment with gravel.
Regulates flow into macrophyte zone.

MACROPHYTE ZONE

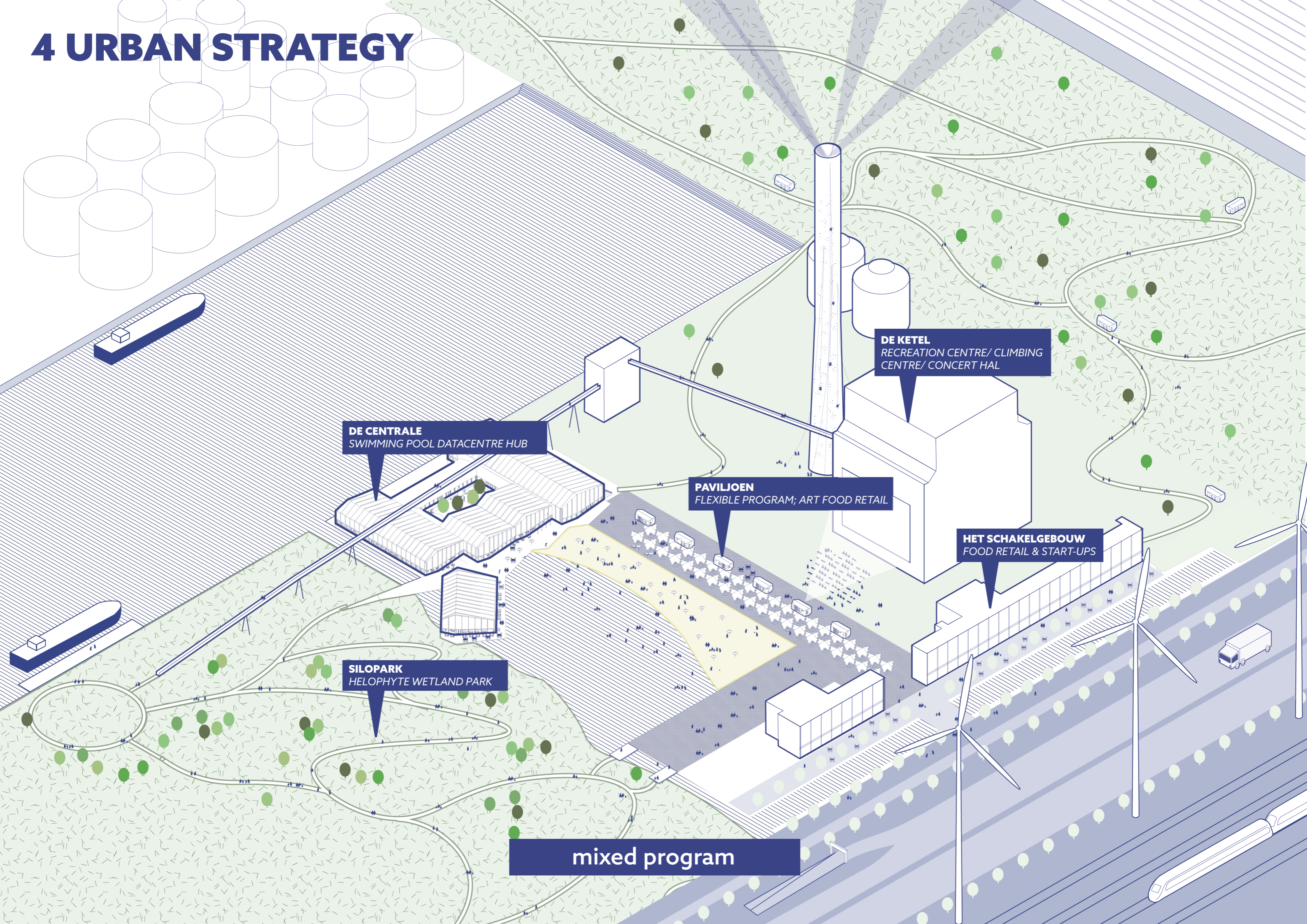
Significant coverage of aquatic planting 80% from various species.
Water treatment through sedimentation, filtration, absorption, biological and chemical translocation.
Habitat for small animals and insects.

HIGH FLOW BYPASS AND SWIMMING AREA

Water buffer swimming area with filtered harbour water.



4 URBAN STRATEGY



DE CENTRALE
SWIMMING POOL DATACENTRE HUB

PAVILJOEN
FLEXIBLE PROGRAM; ART FOOD RETAIL

DE KETEL
RECREATION CENTRE/ CLIMBING
CENTRE/ CONCERT HAL

HET SCHAKELGEBOUW
FOOD RETAIL & START-UPS

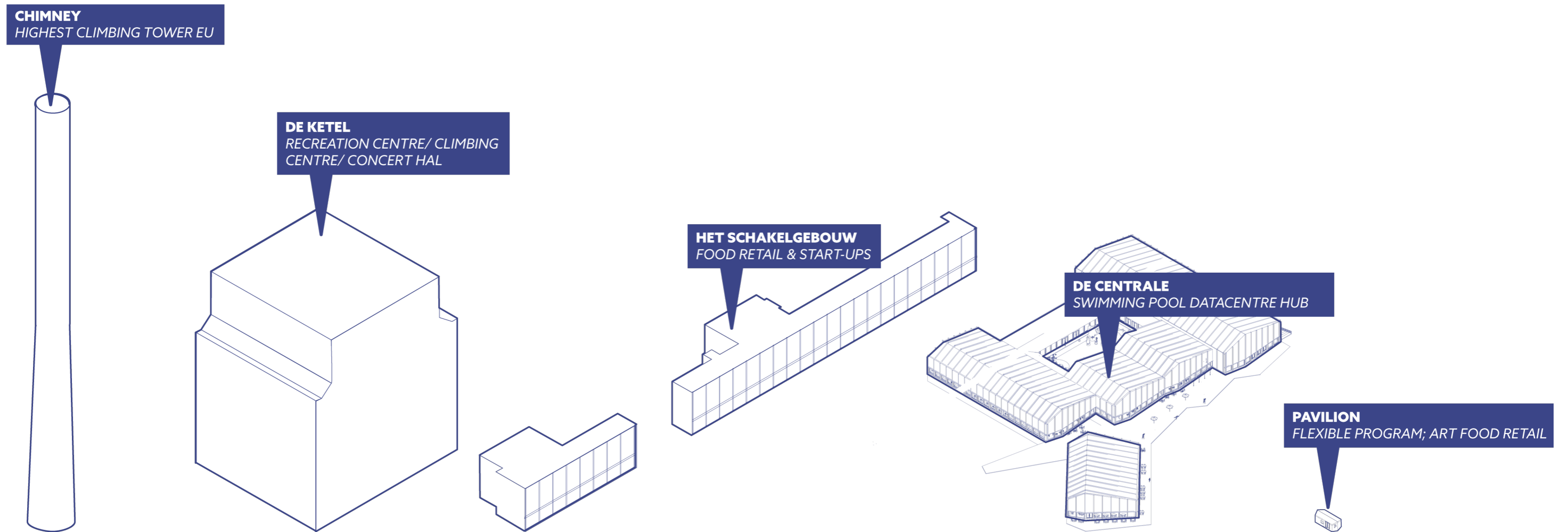
SILOPARK
HELOPHYTE WETLAND PARK

mixed program

5.

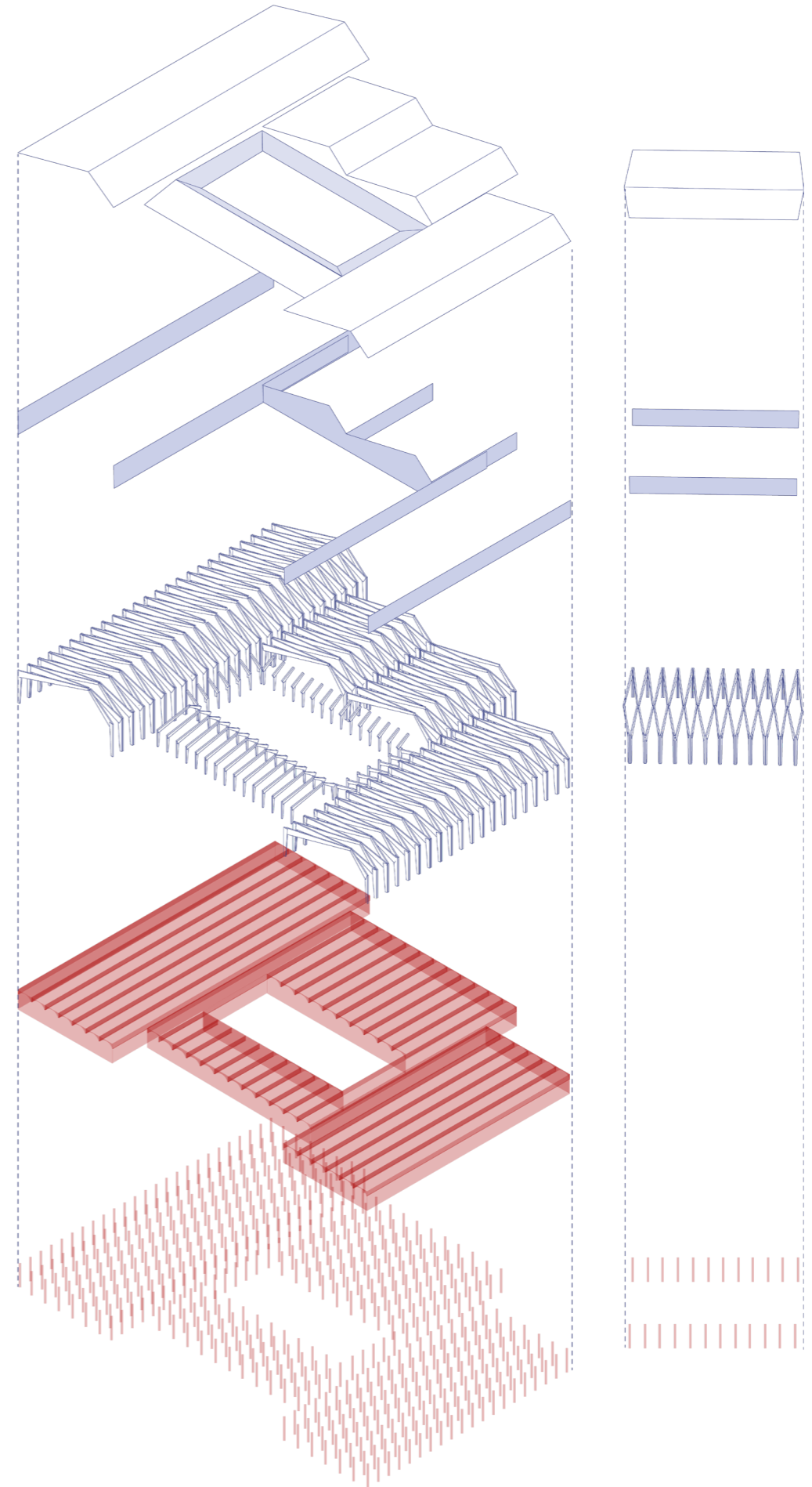
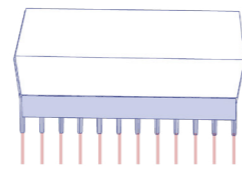
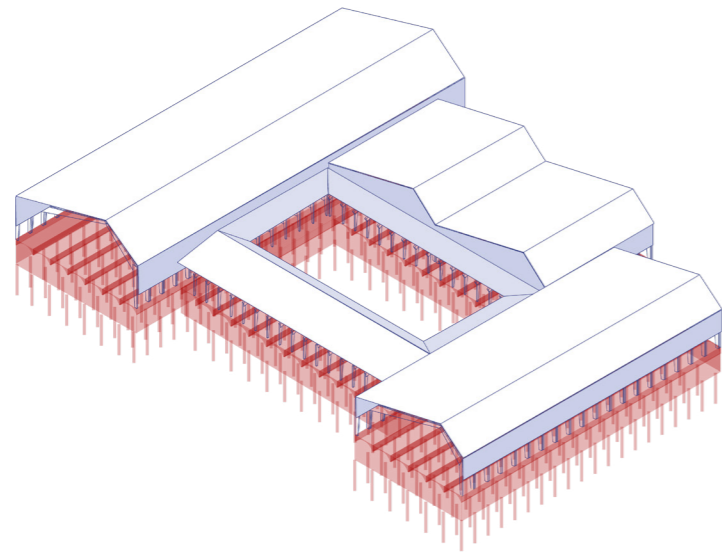
**FORM &
MATERIAL**

5 FORM AND MATERIAL



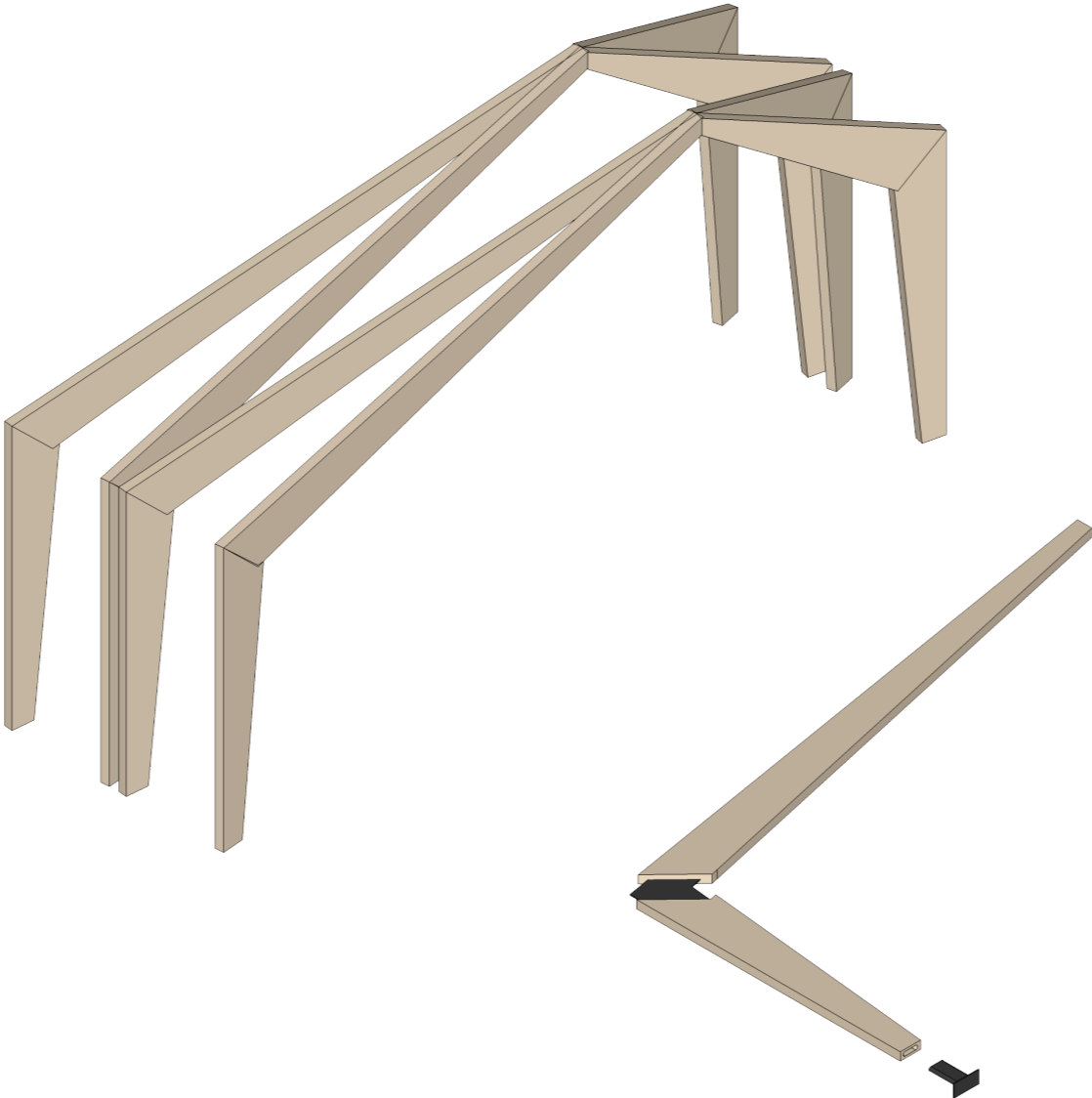
the form and scale relate to the existing context and industrial typology

5 FORM AND MATERIAL



the form and scale relate to the existing context and industrial typology

5 FORM AND MATERIAL

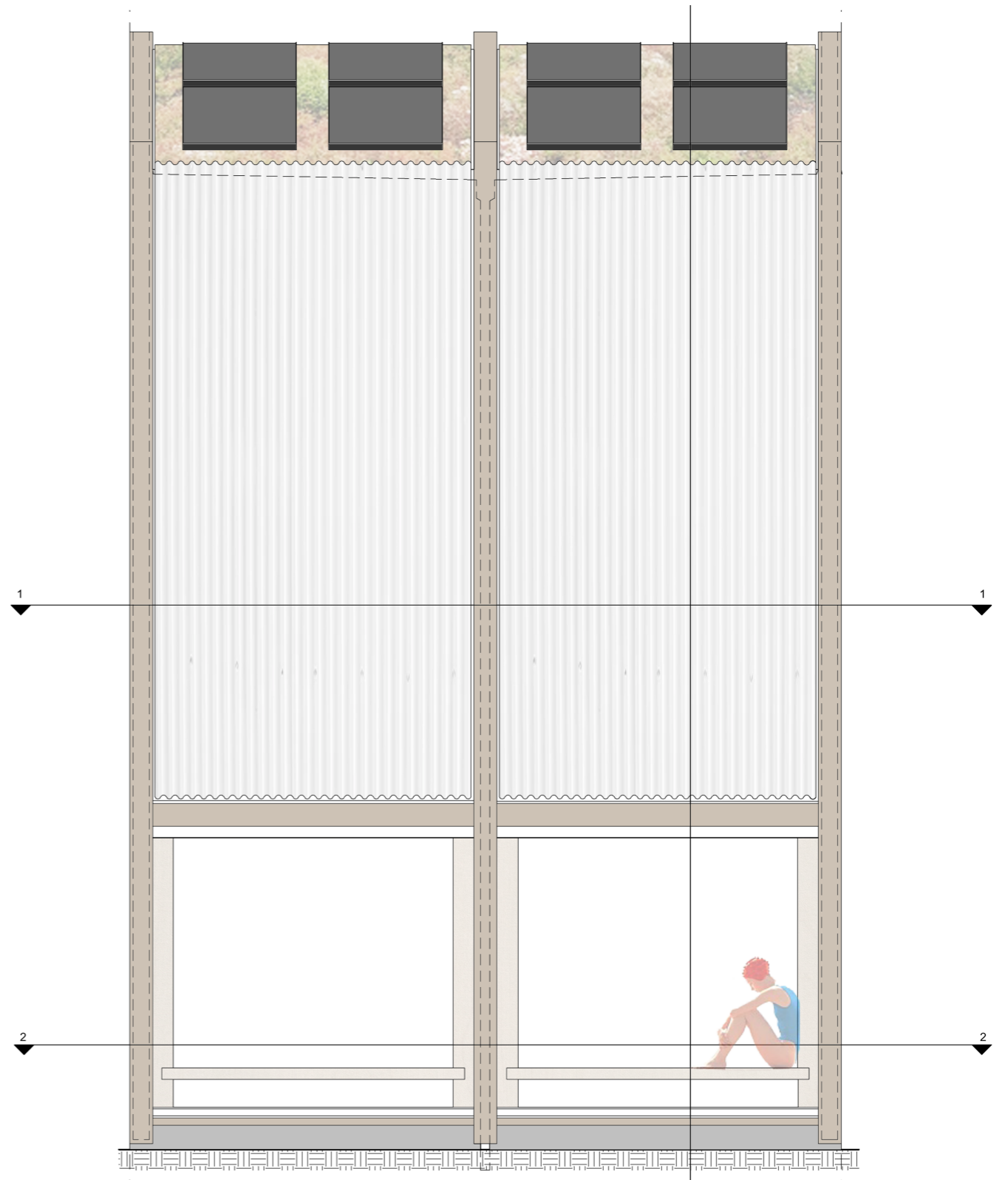


AROUND
100.932 ton CO₂
SAVED BY USING BIOBASED
MATERIALS



by choosing friendly soft and biobased materials, the building becomes more approachable and sustainable

5 FORM AND MATERIAL

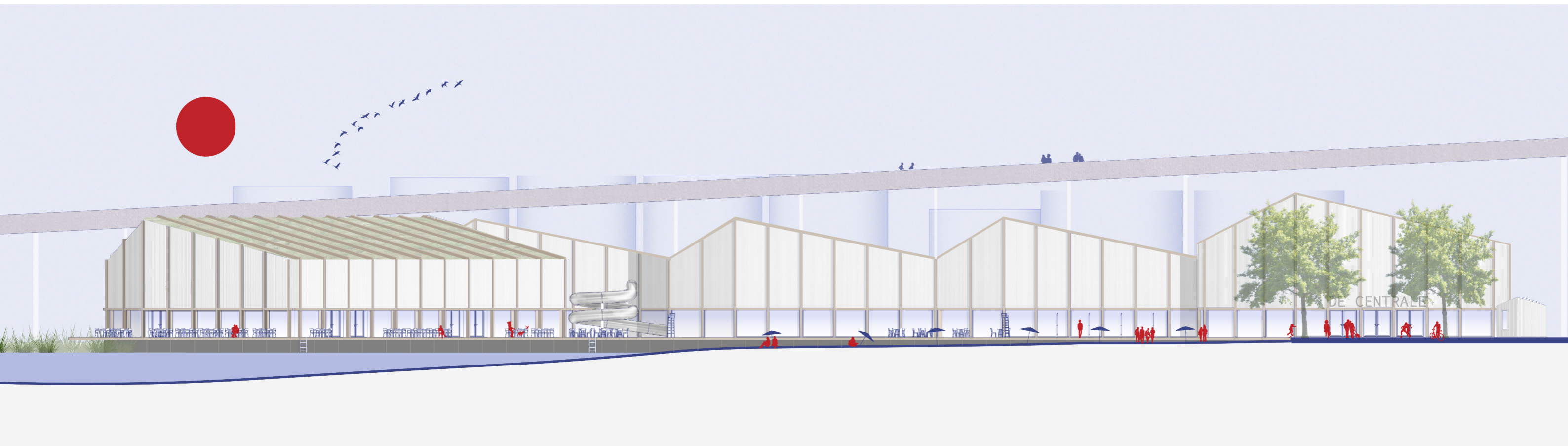


the repetition of the form and facade also relate to the existing industrial heritage

6.

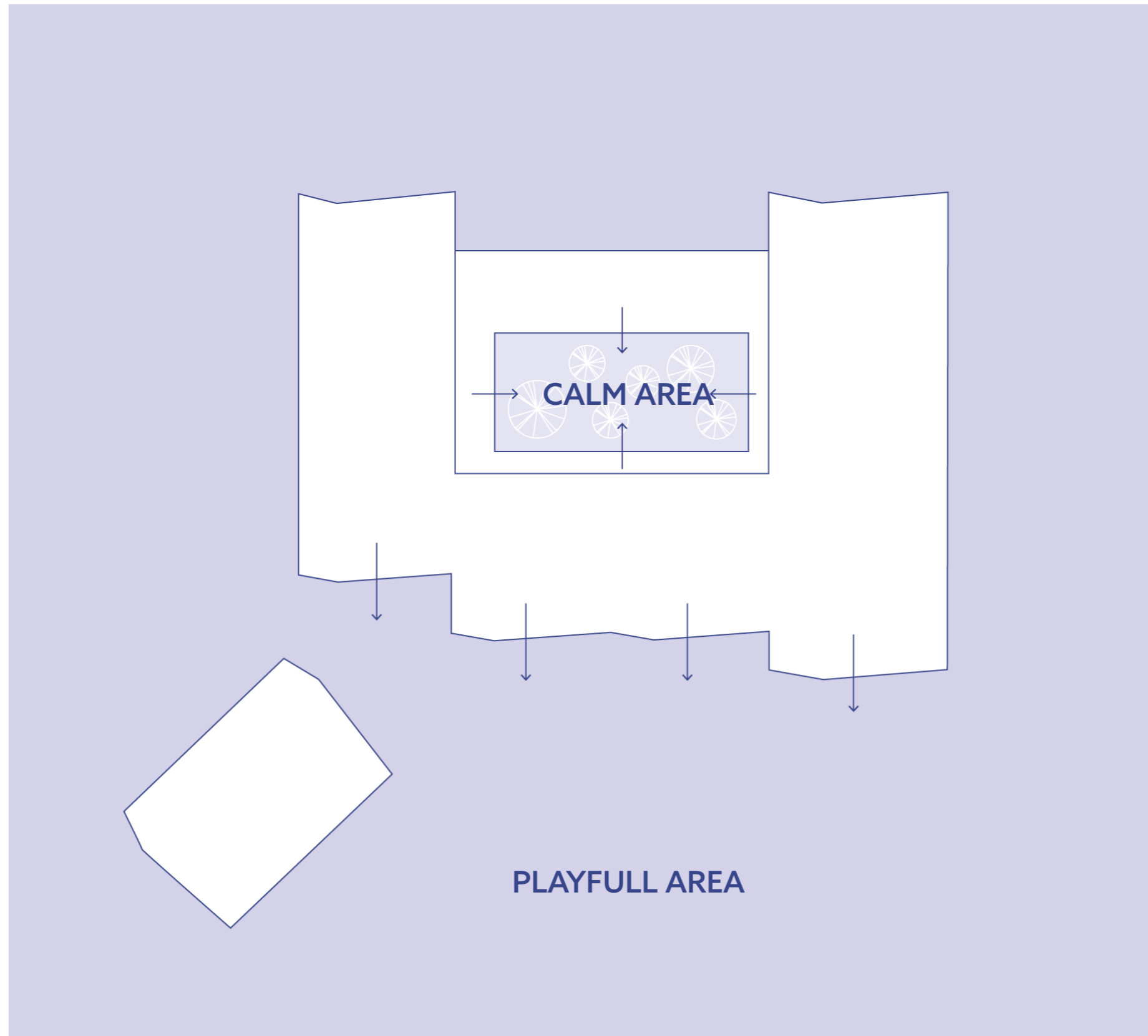
**BUILDING
ORGANIZATION**

6 ORGANIZATION OF THE BUILDING



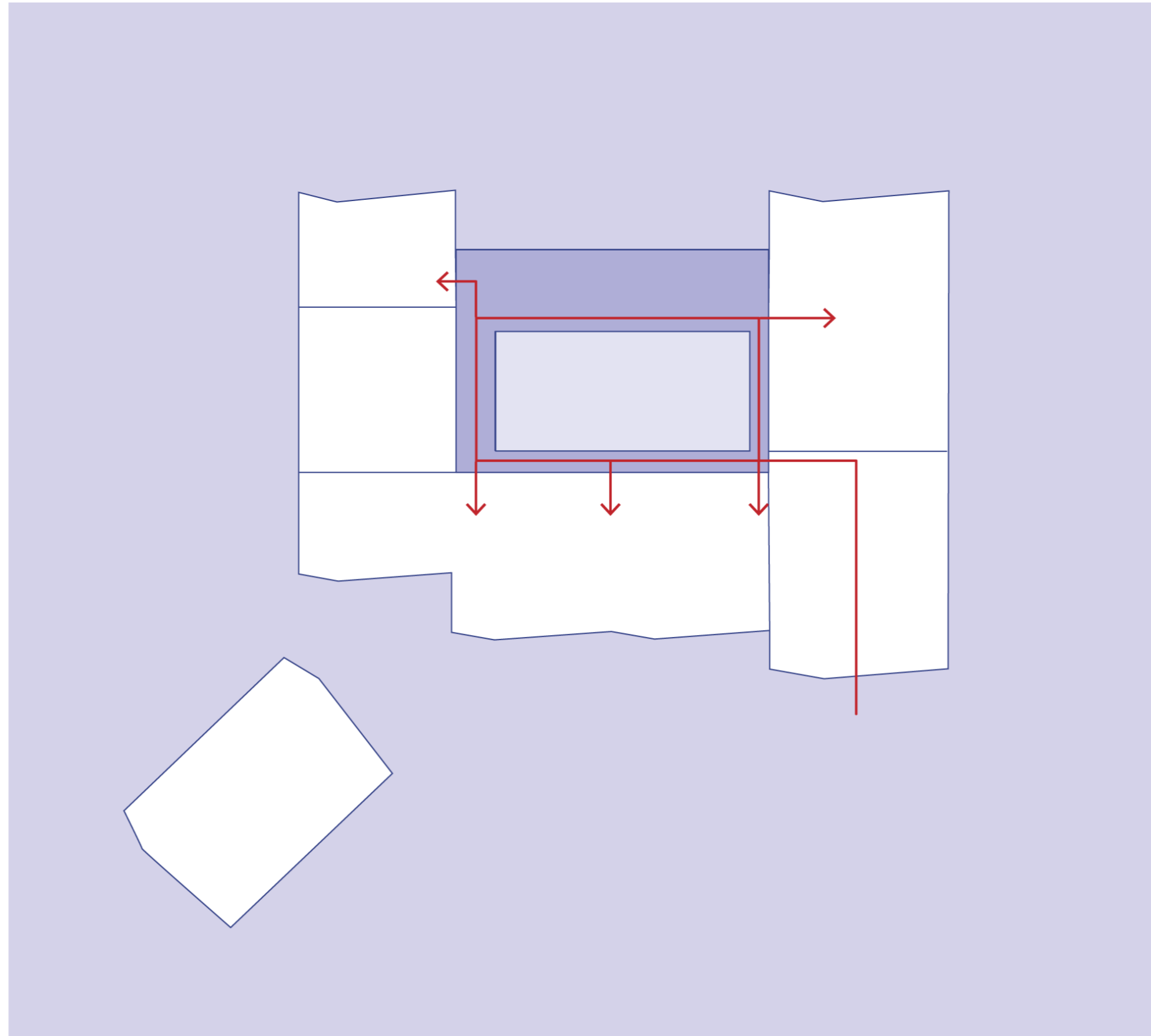
the building consists of 4 segments of timber trusses with large spans

6 ORGANIZATION OF THE BUILDING



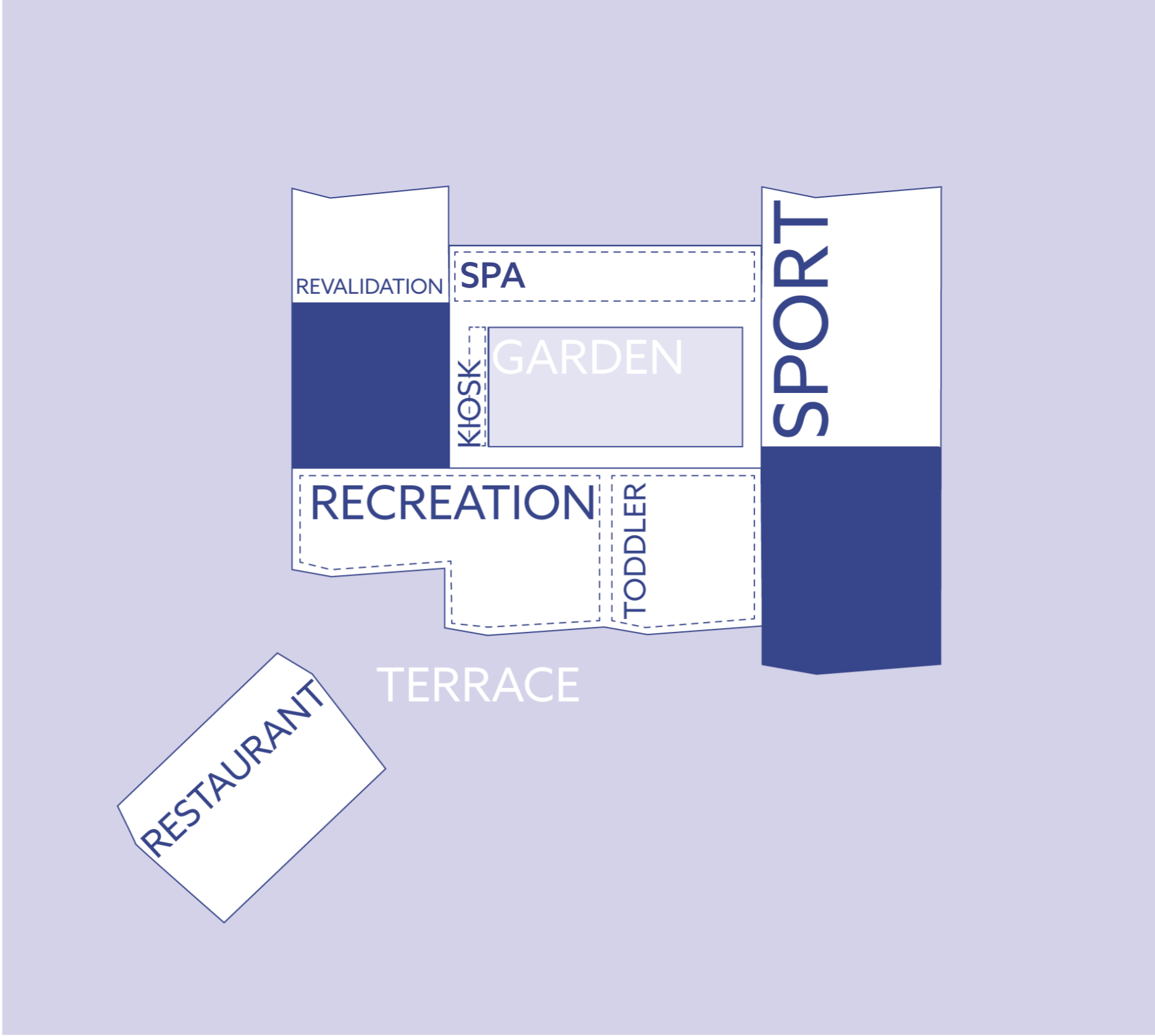
the courtyard as central space

6 ORGANIZATION OF THE BUILDING



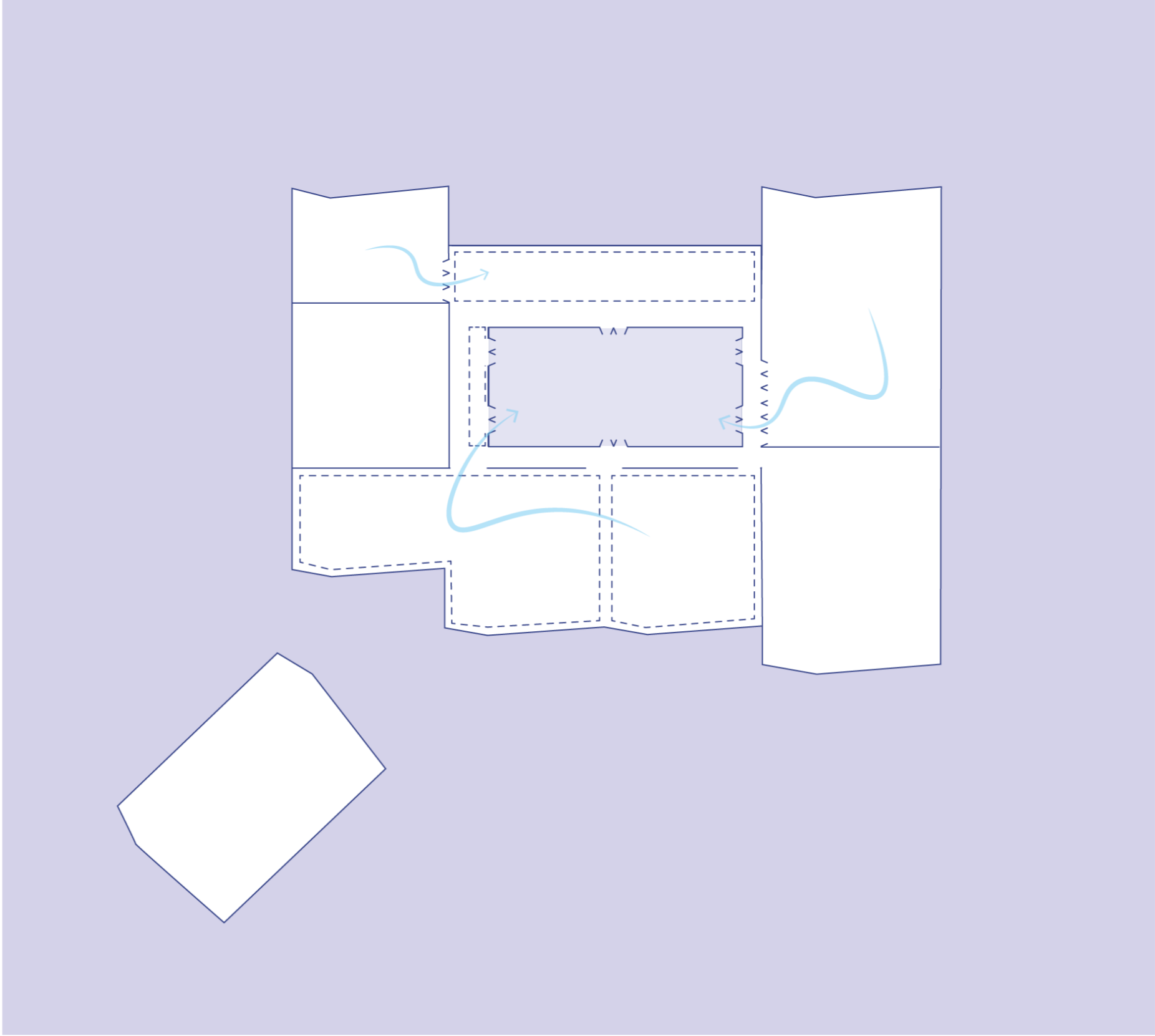
cloister typology as circulation

6 ORGANIZATION OF THE BUILDING



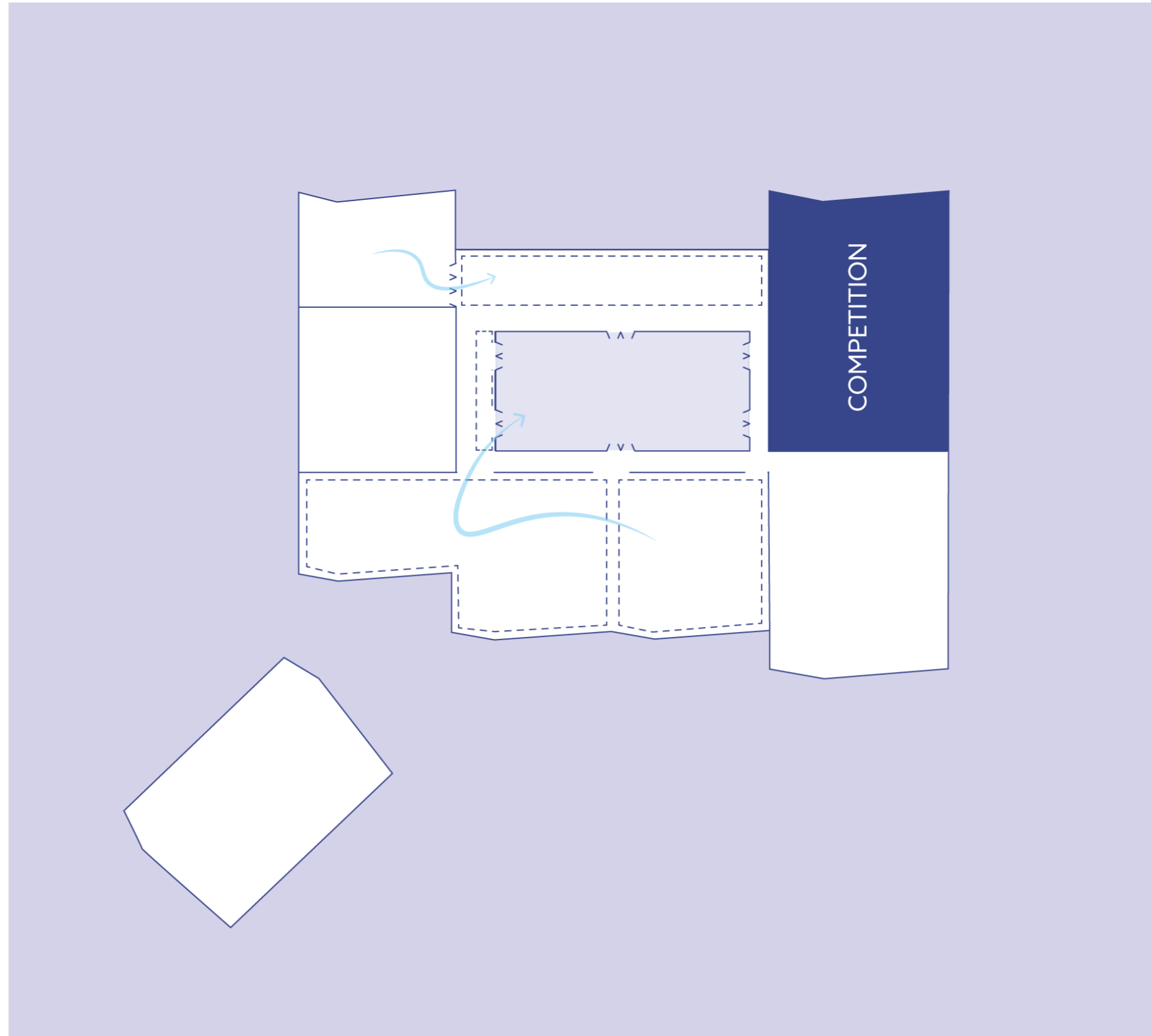
program

6 ORGANIZATION OF THE BUILDING



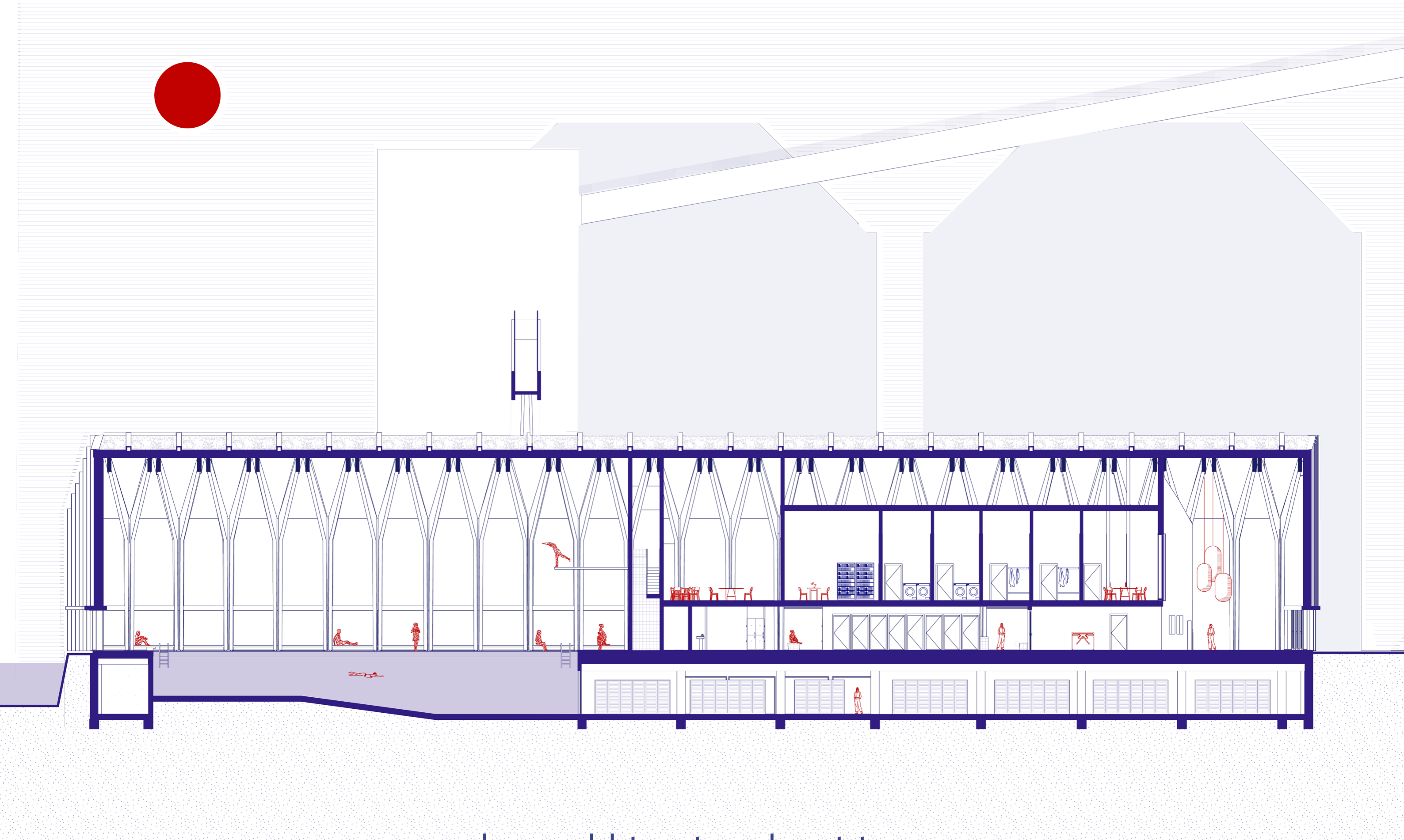
open/closed

6 ORGANIZATION OF THE BUILDING



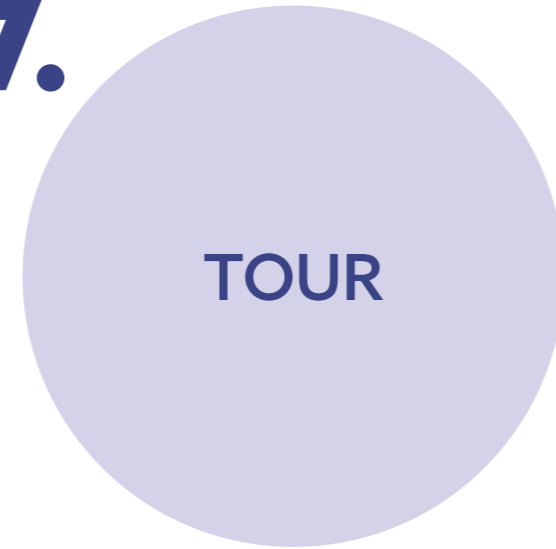
functioning of program

6 ORGANIZATION OF THE BUILDING



underground datacentre and spectator room

7.

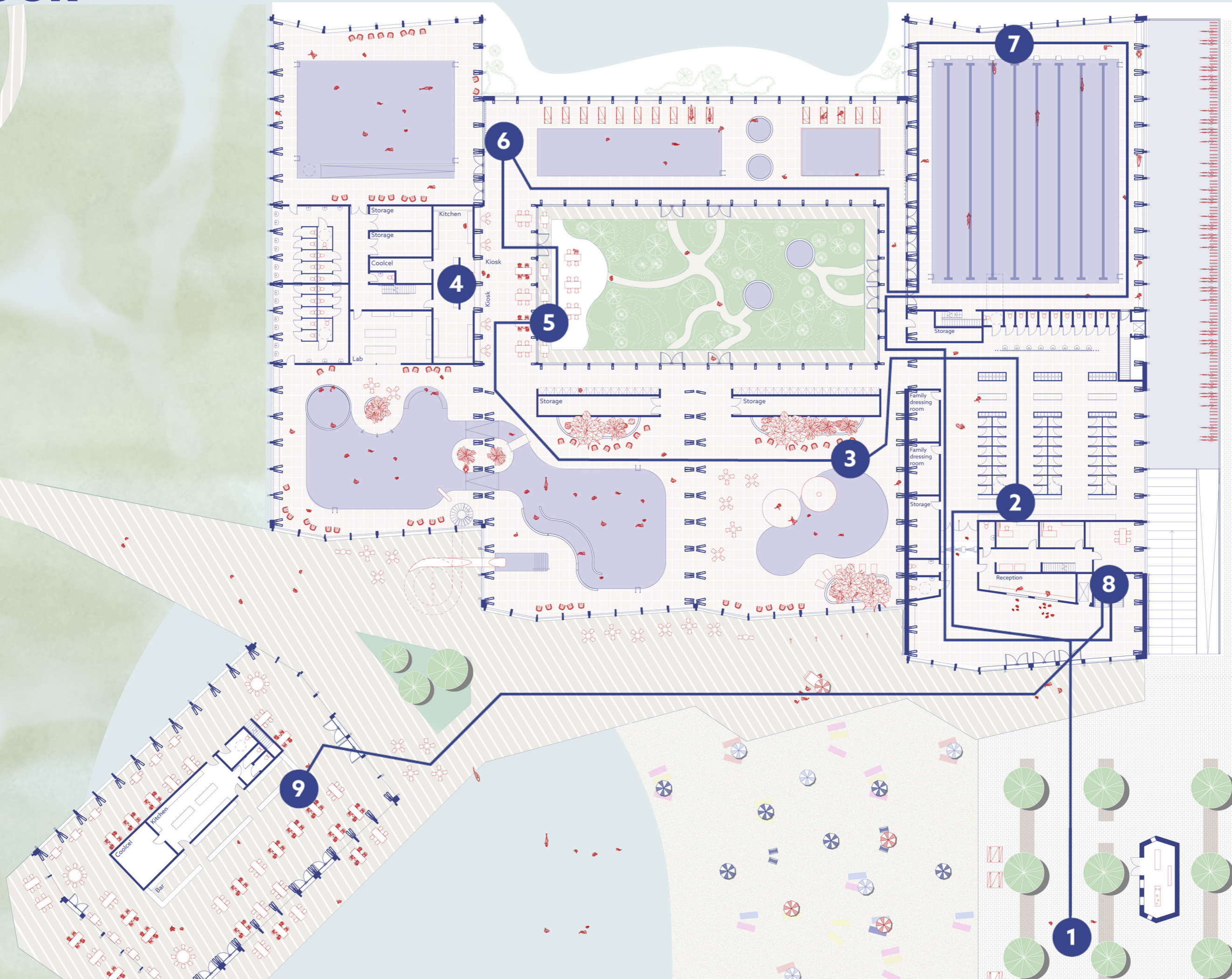


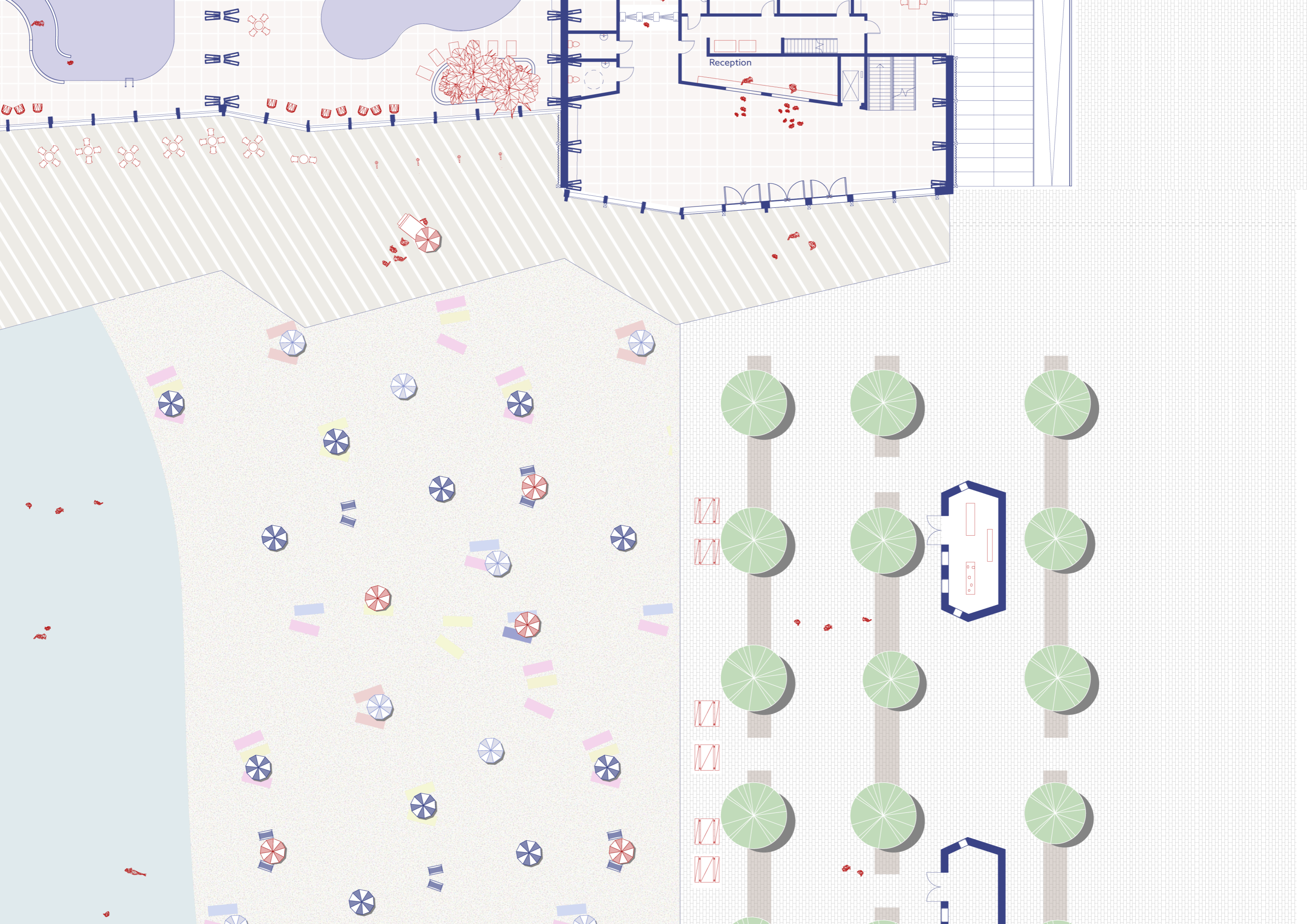
TOUR

7 TOUR



7 TOUR

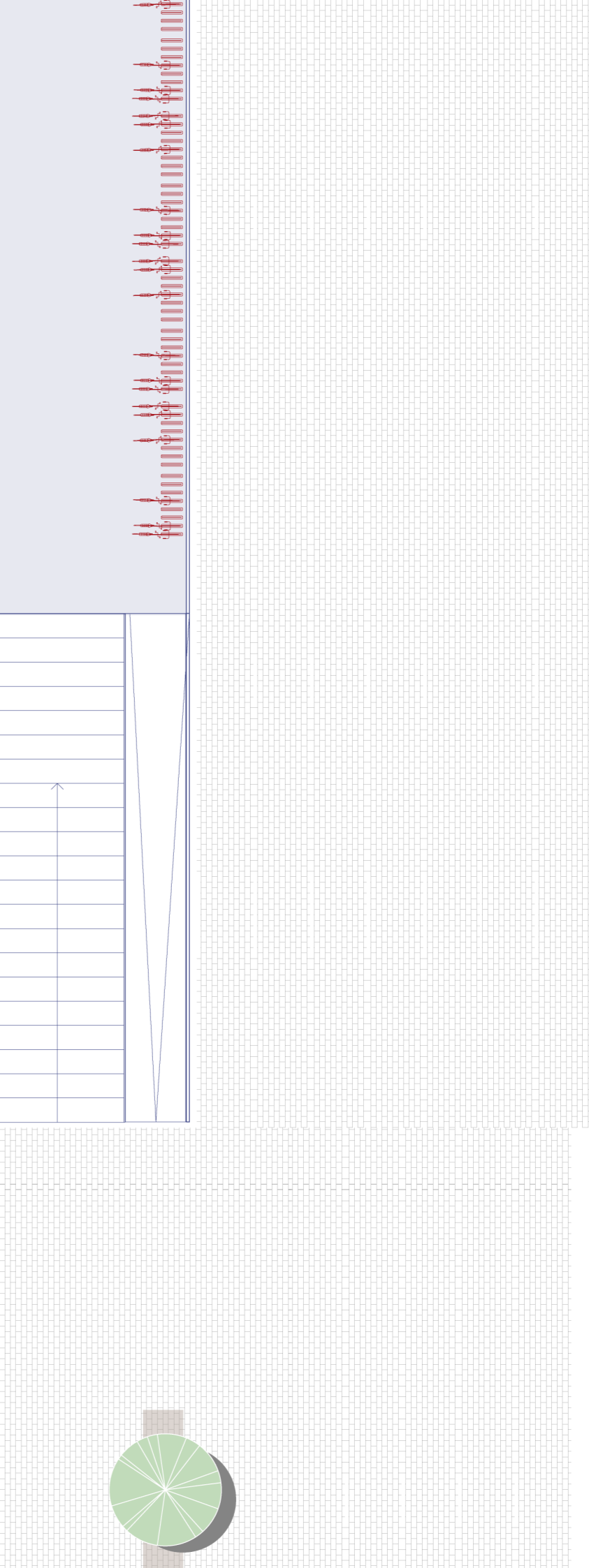
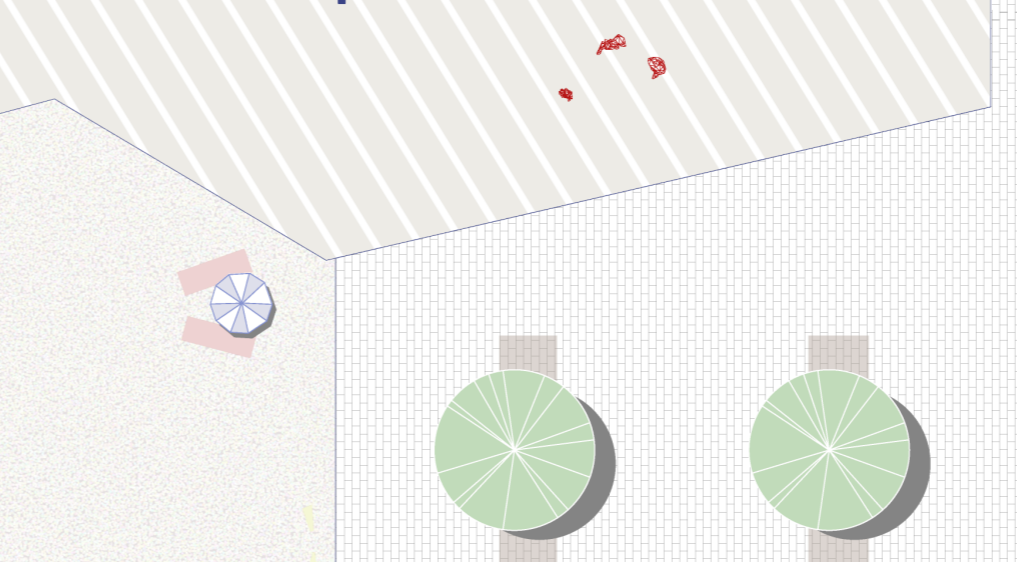
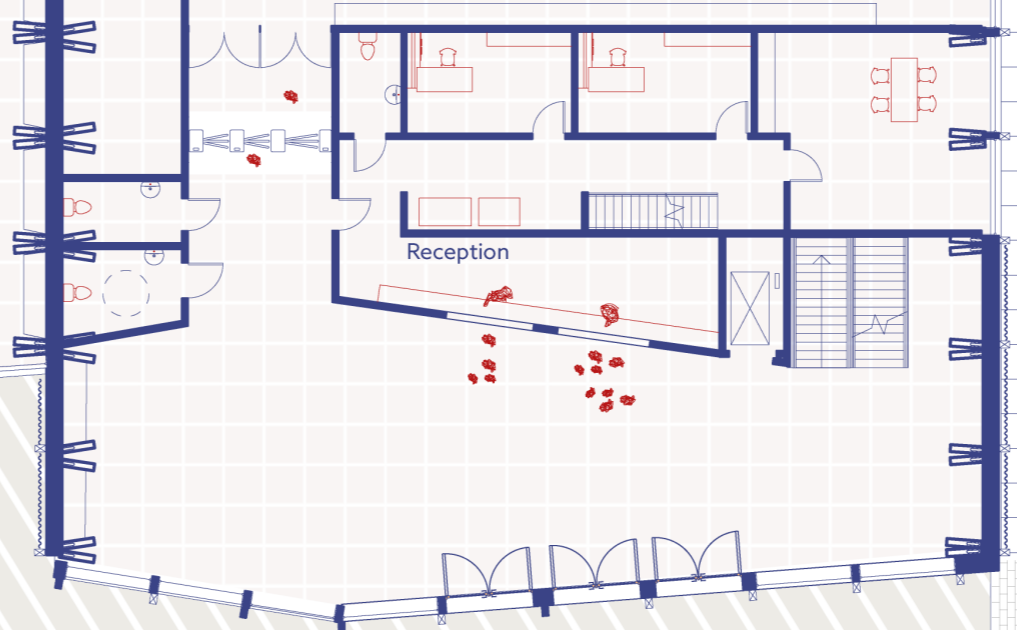
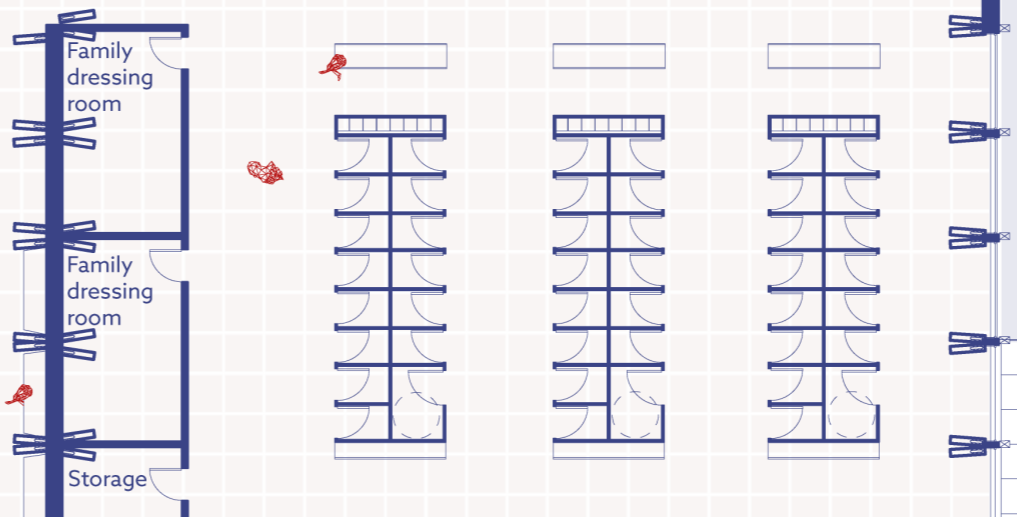
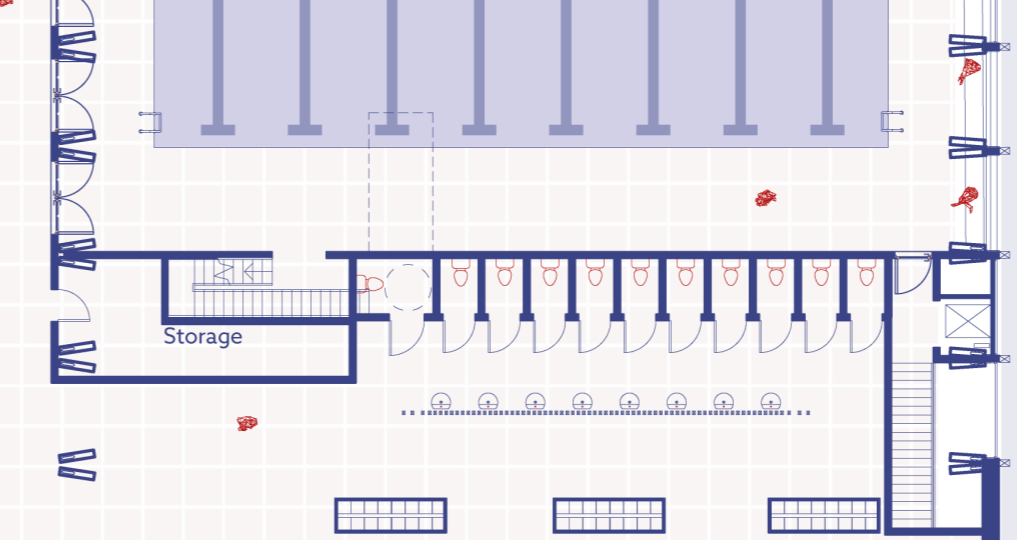
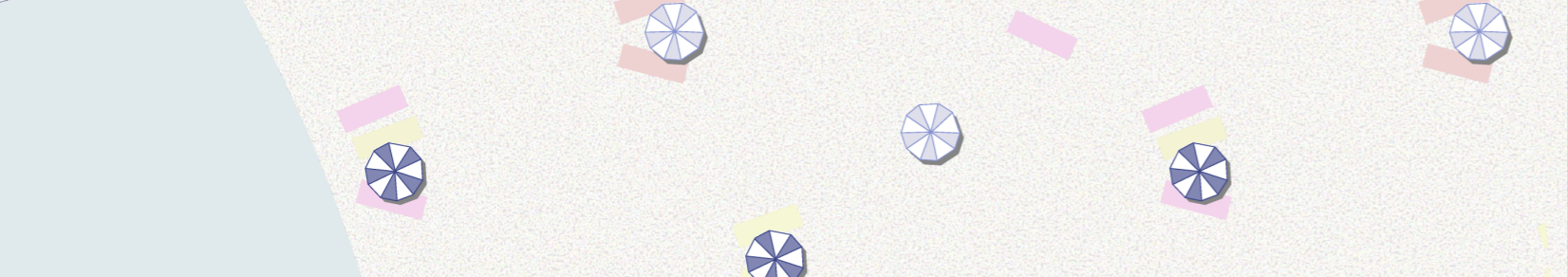
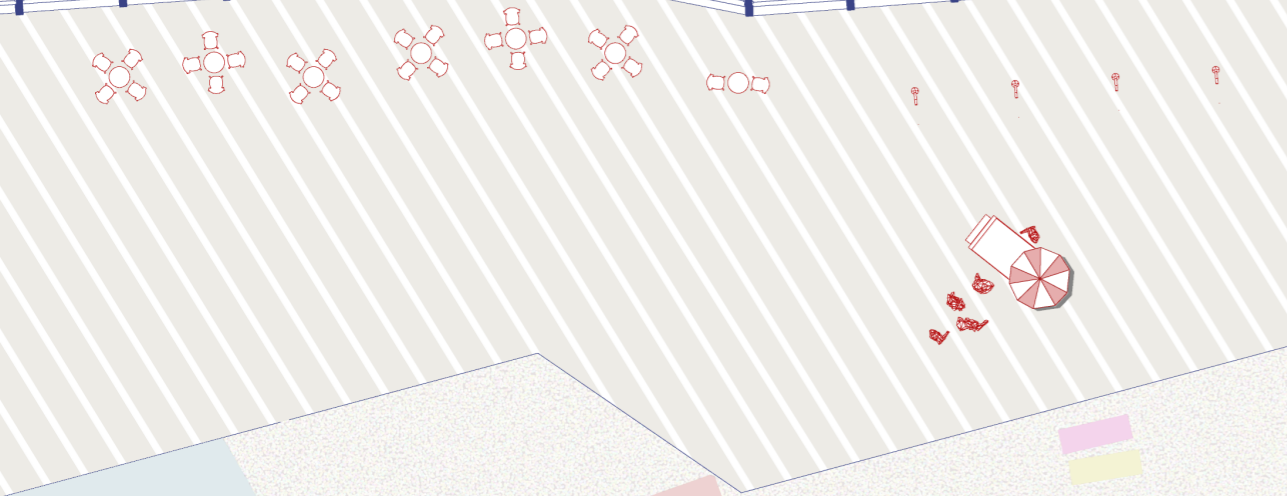
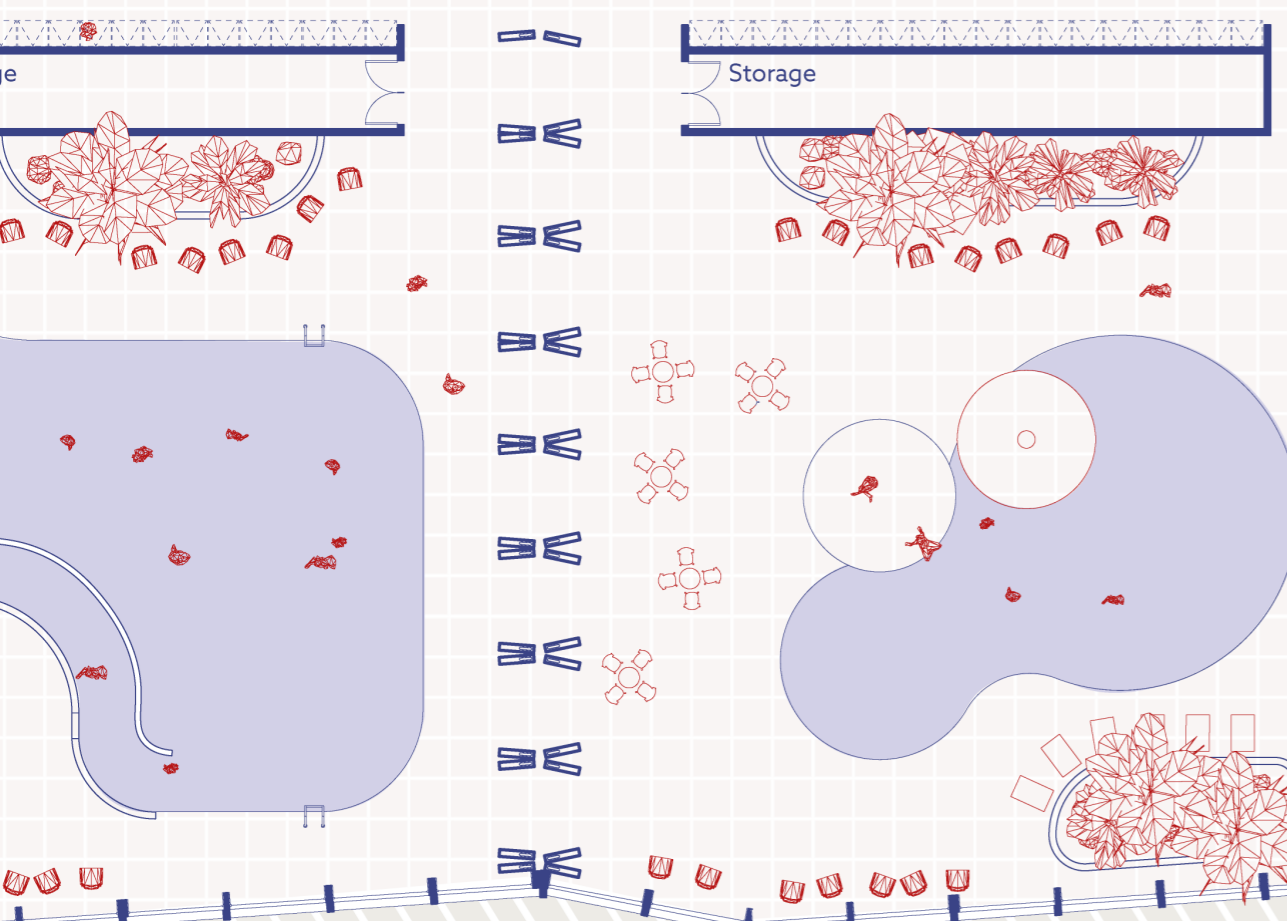
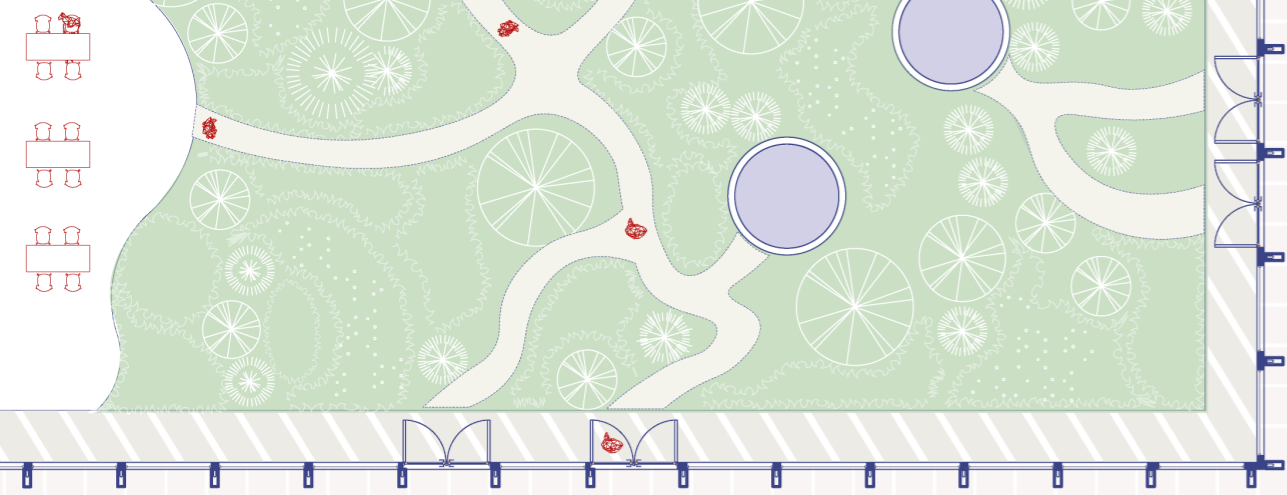




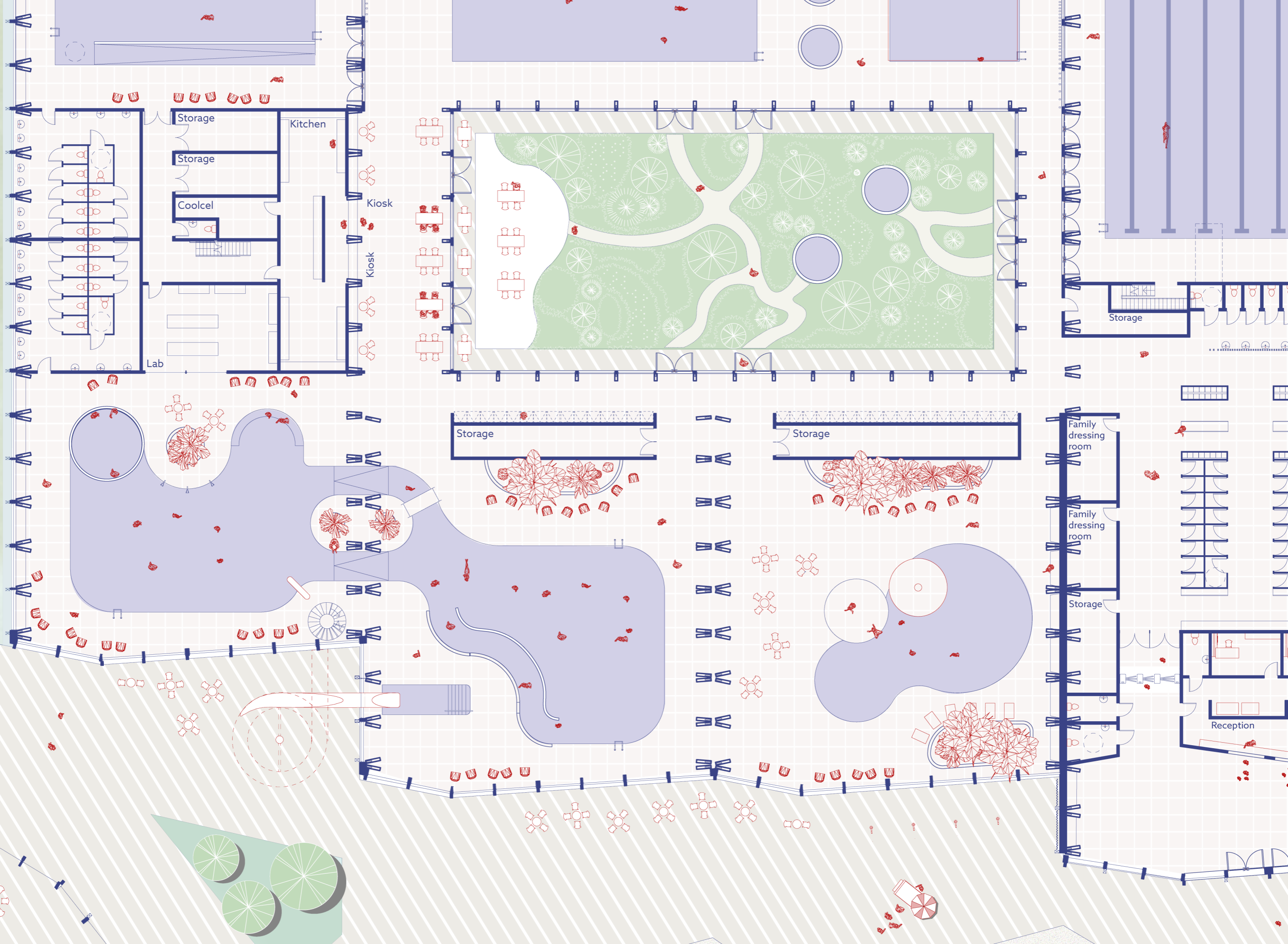


DE CENTRALE

1

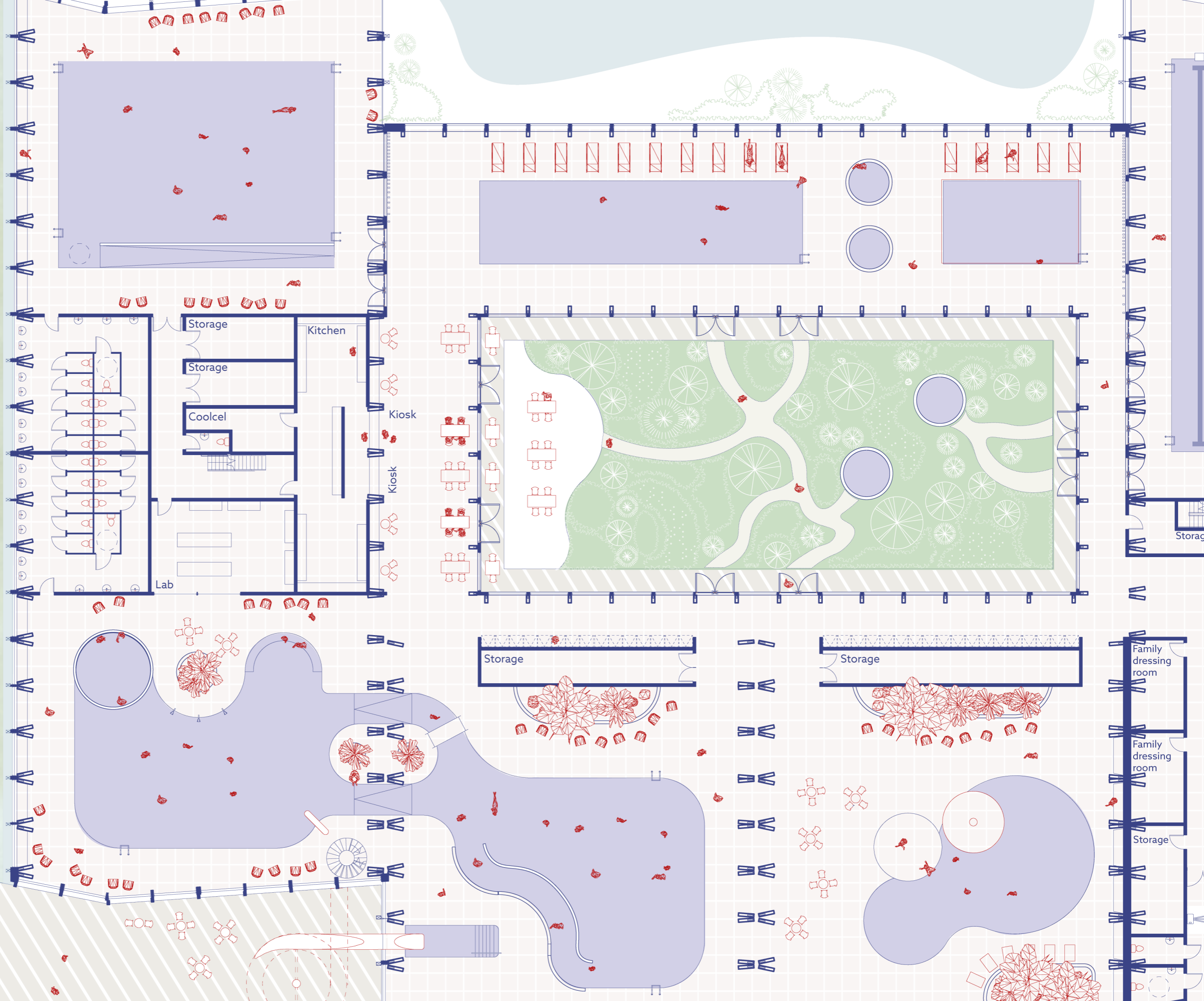








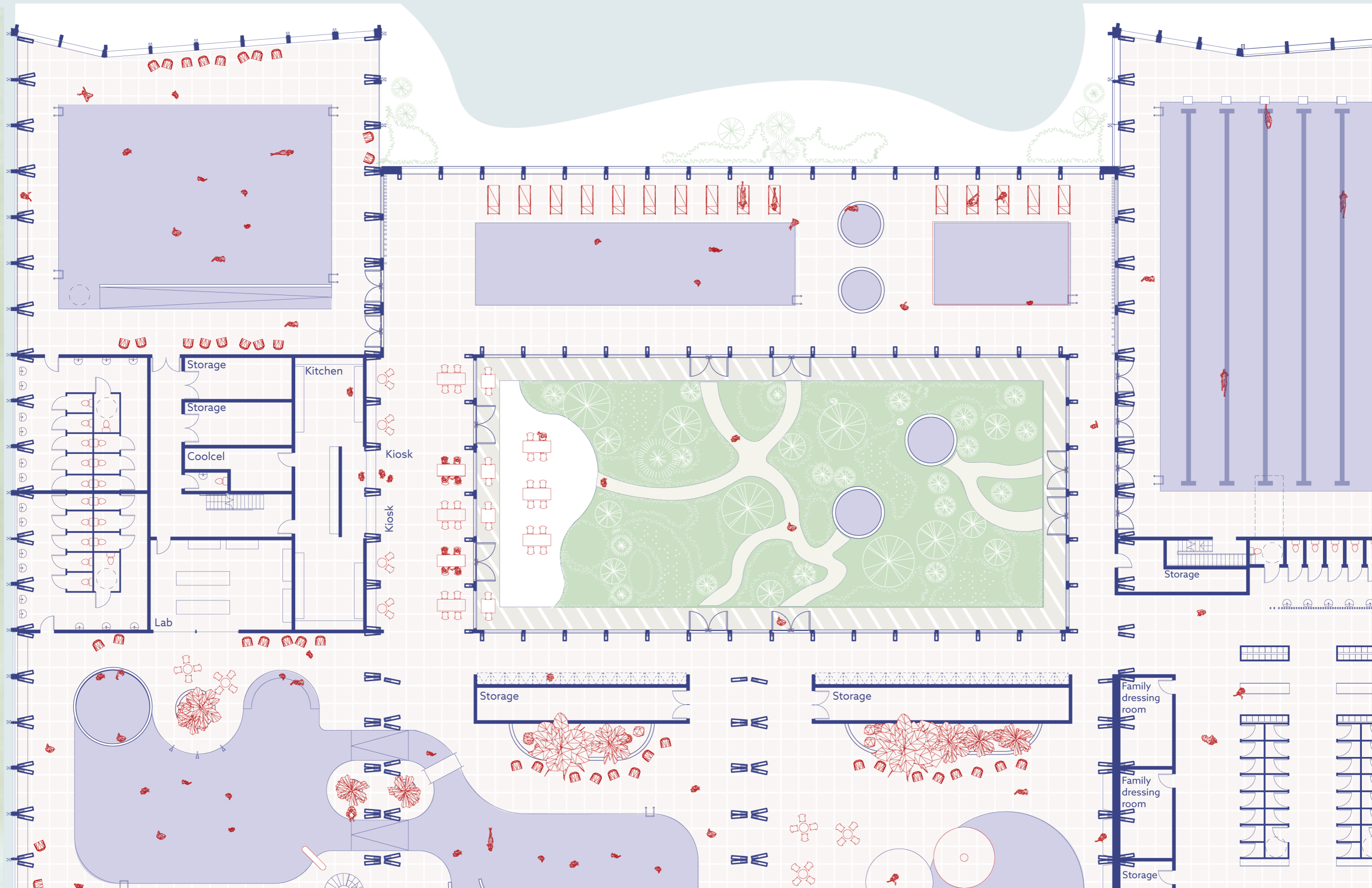
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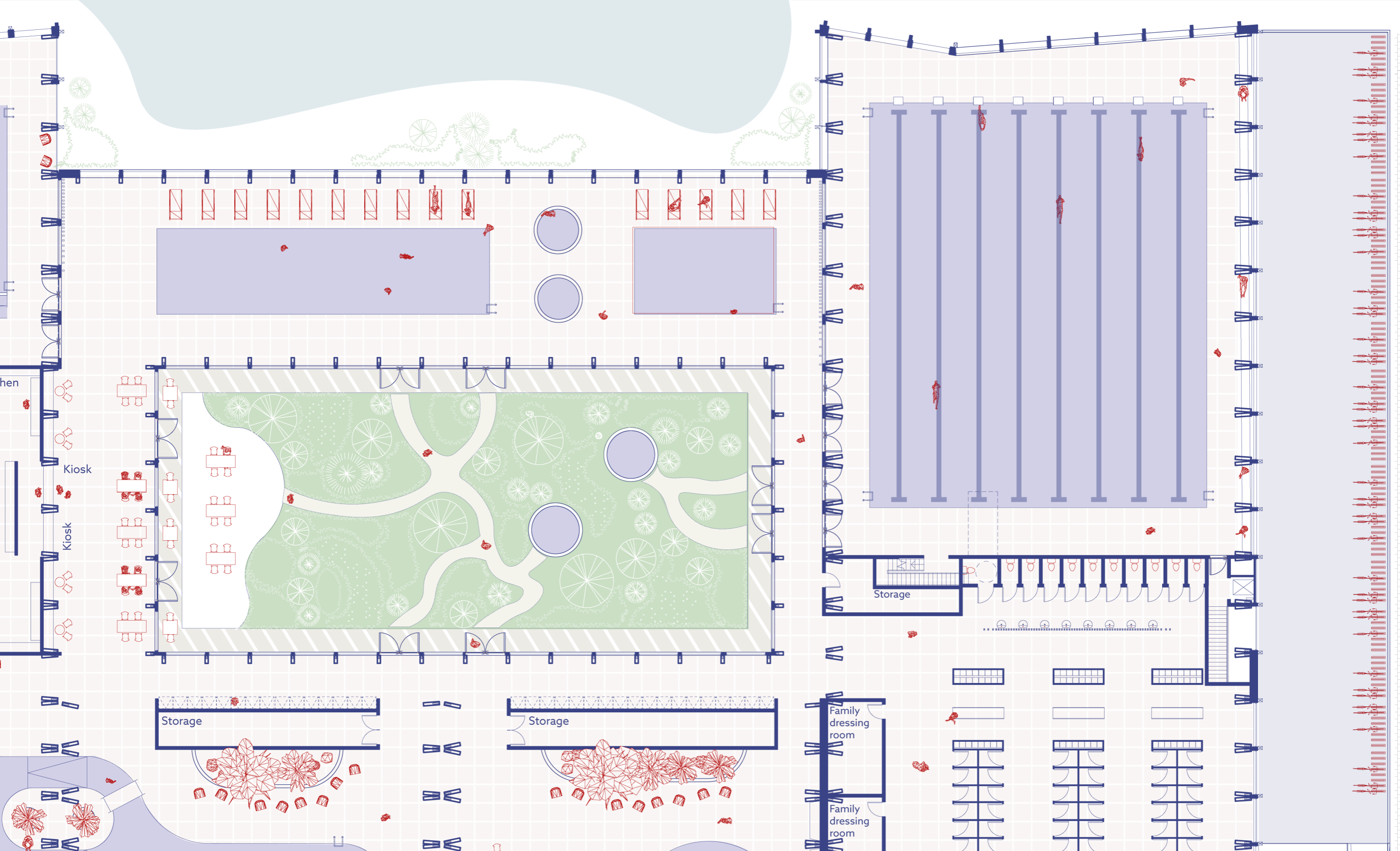




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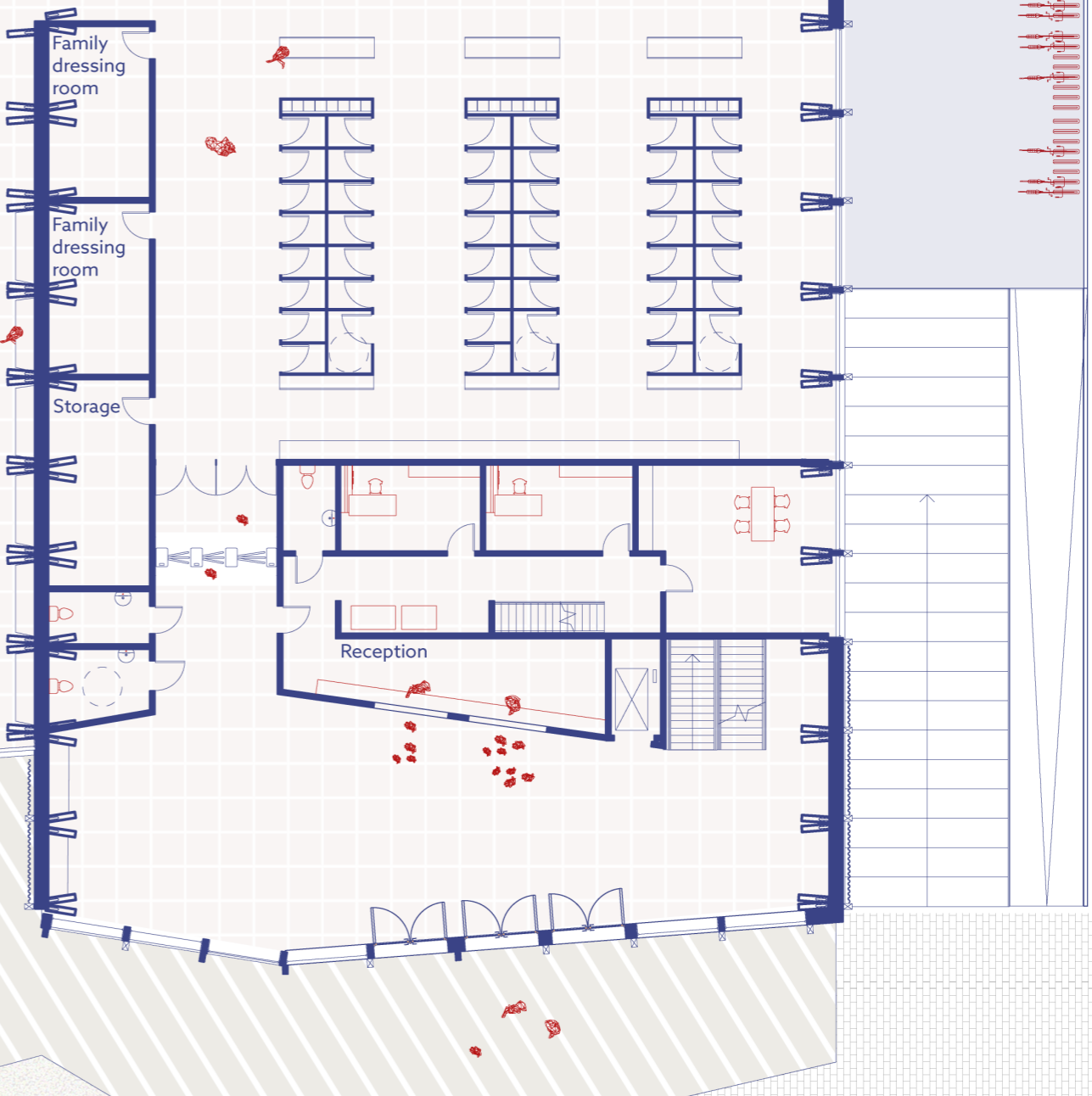
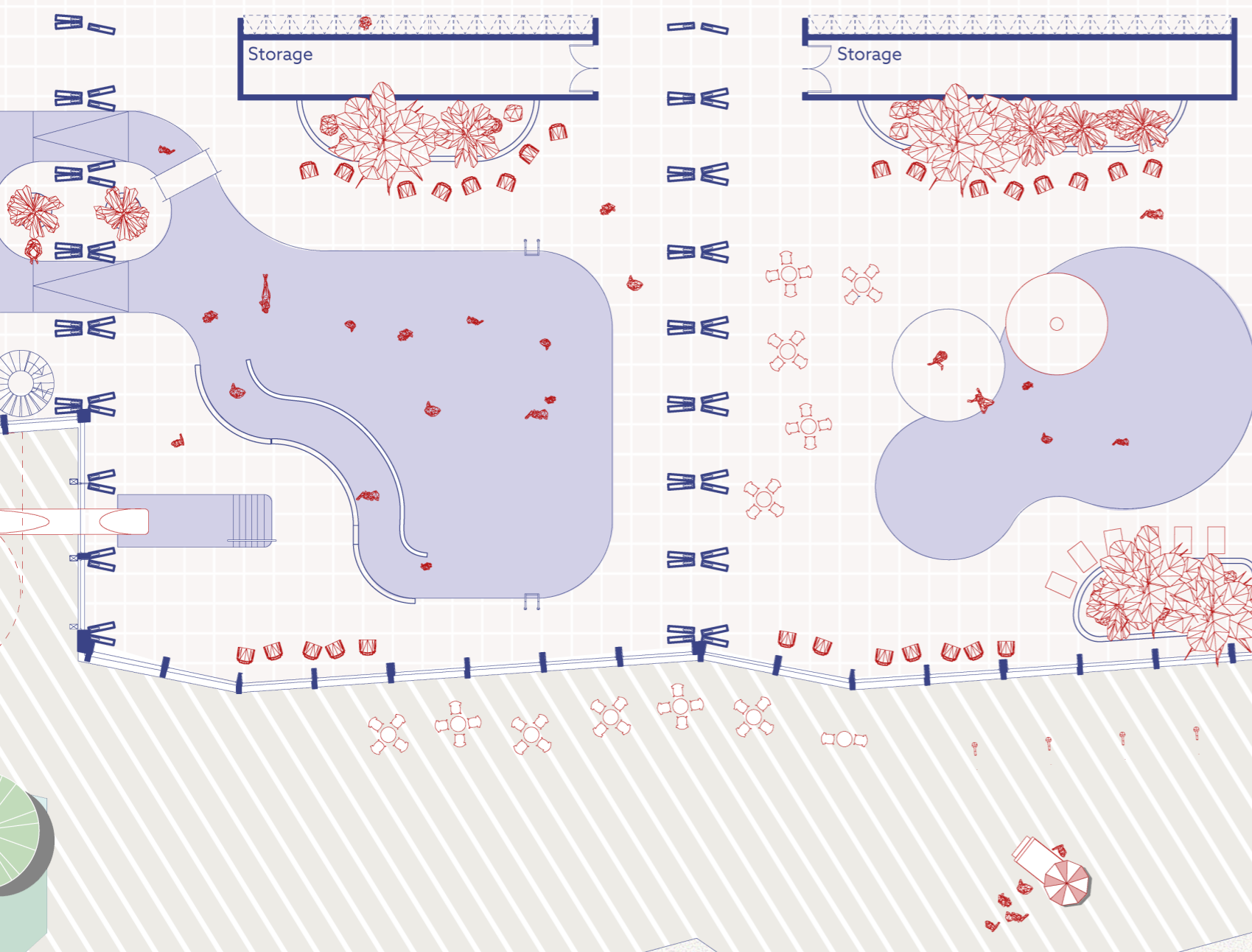
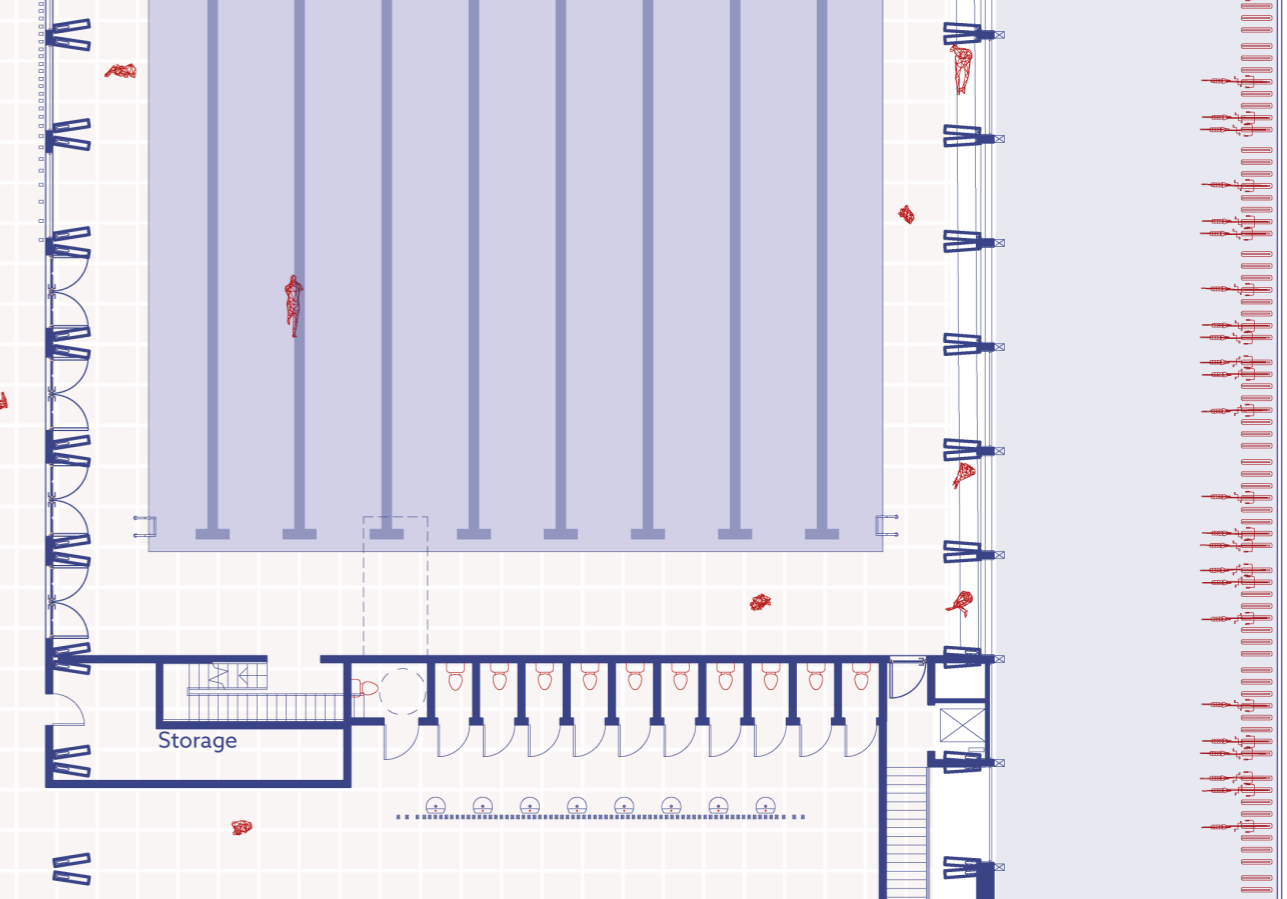
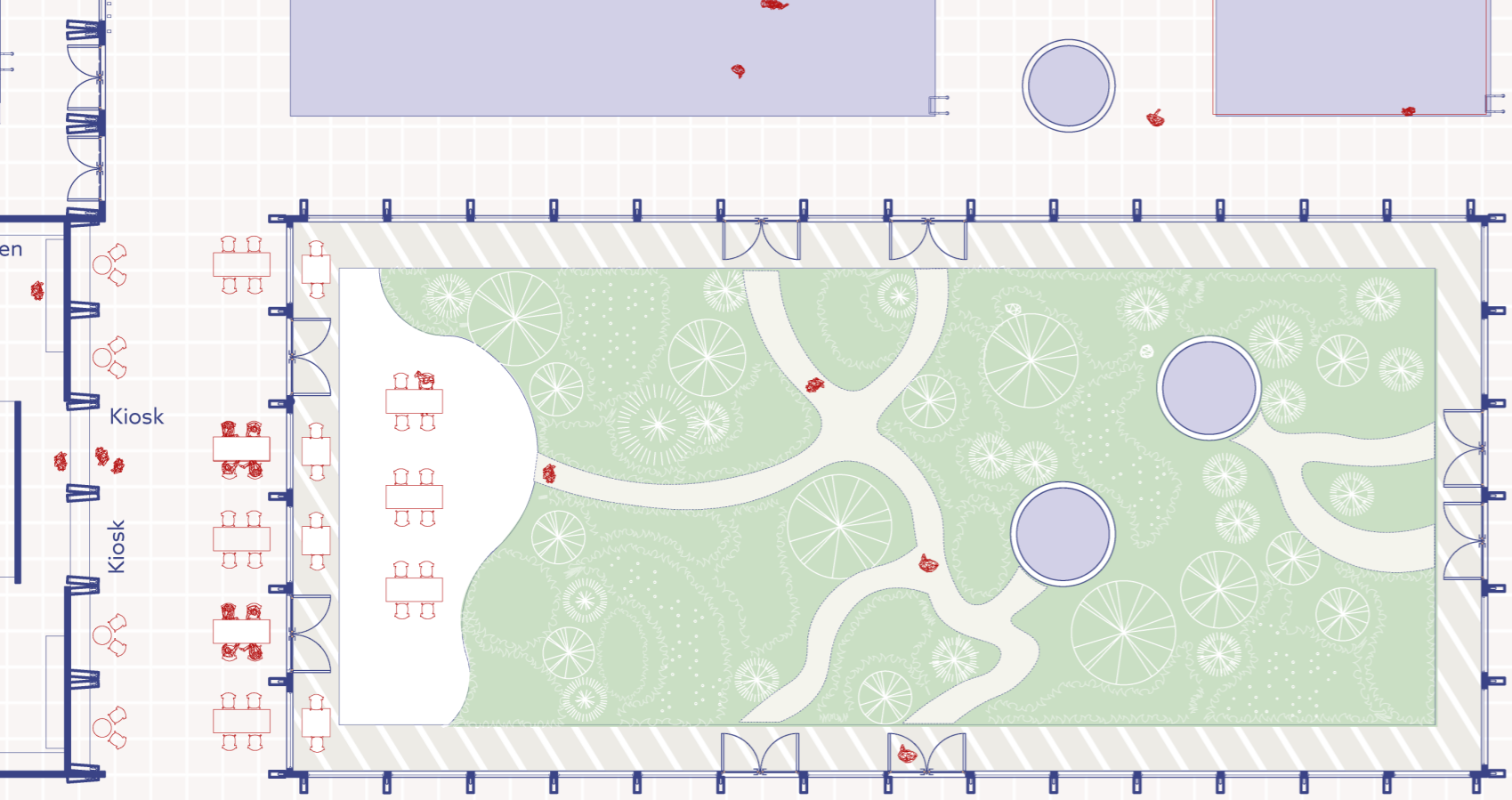


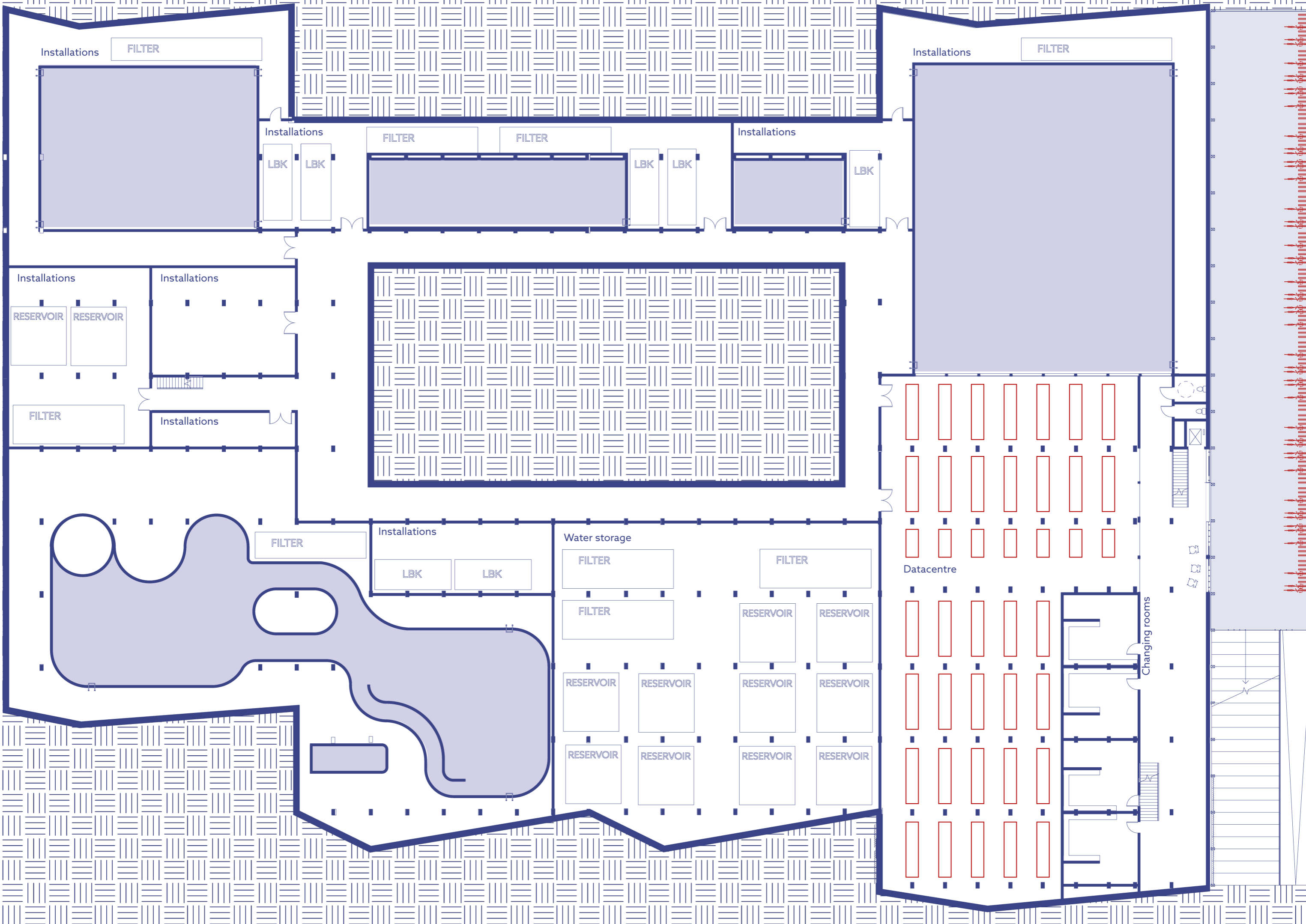






7







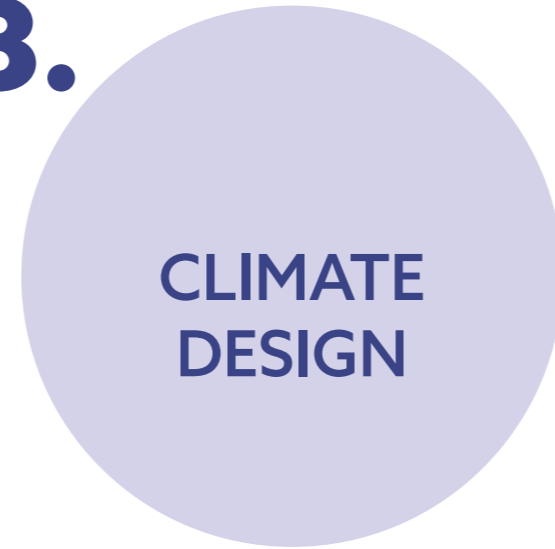




COFFEE	2.5	COFFEE	2.5
ESPRESSO	2.5	ESPRESSO	2.5
MACCHIATO	3	MACCHIATO	3
CAPPUCCINO	3.5	CAPPUCCINO	3.5
LATTE	4	LATTE	4
MOCHA	5	MOCHA	5
HAND POURS COFFEE	A.Q.	HAND POURS COFFEE	A.Q.
TEA	4	TEA	4
CHAI	4	CHAI	4
COLD BREW BOTTLE	6	COLD BREW BOTTLE	6

GELATO

8.



**CLIMATE
DESIGN**

8 CLIMATE

AIR

- 1 Fresh warm air from below (prevent condensation)
- 2 Fresh dry warm air from above
- 3 Exhaust air below
- 4 Dry air pushes humid air down to pool
- 5 Air handling unit preheated by servers

WATER

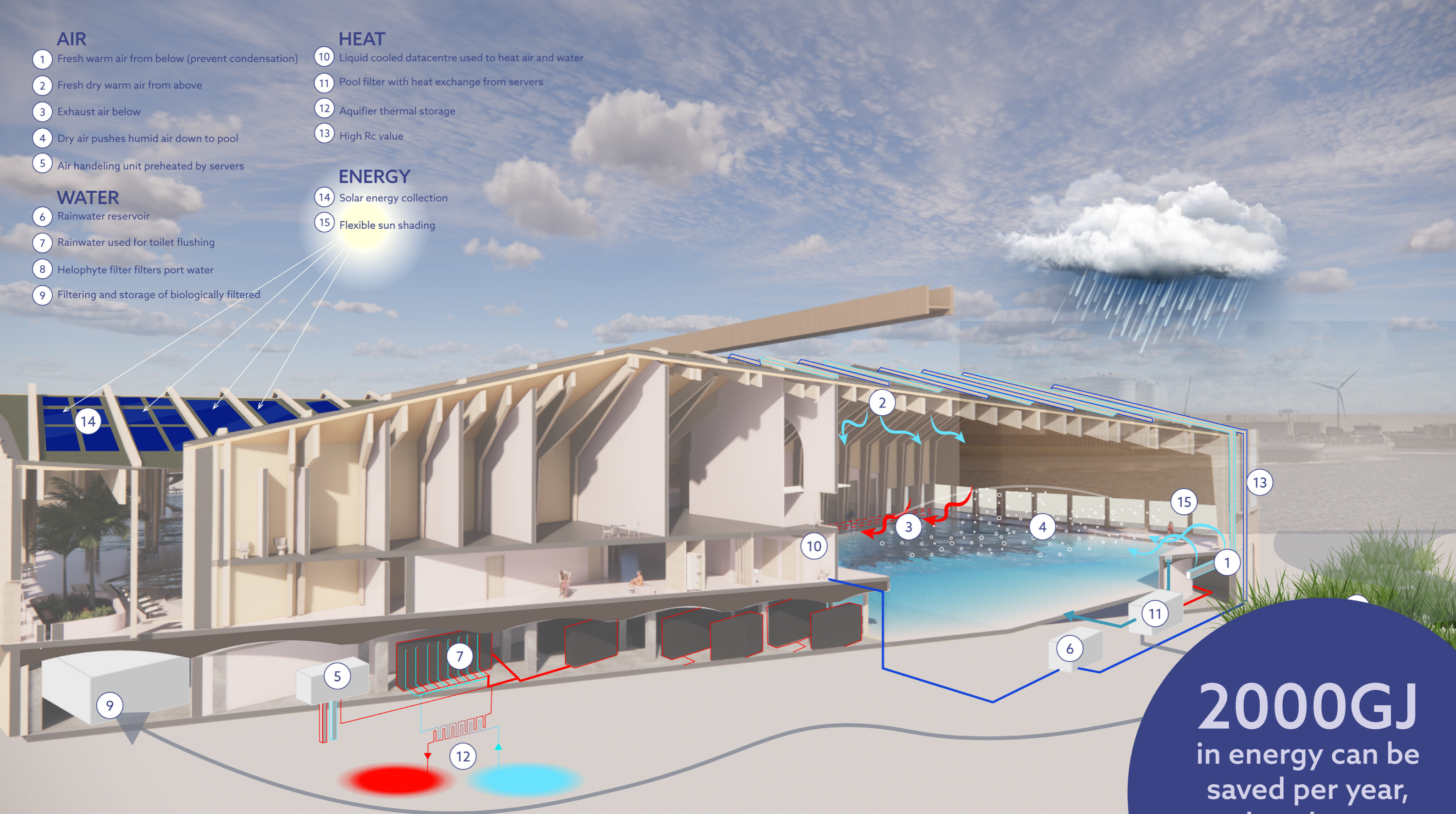
- 6 Rainwater reservoir
- 7 Rainwater used for toilet flushing
- 8 Helophyte filter filters port water
- 9 Filtering and storage of biologically filtered

HEAT

- 10 Liquid cooled datacentre used to heat air and water
- 11 Pool filter with heat exchange from servers
- 12 Aquifer thermal storage
- 13 High Rc value

ENERGY

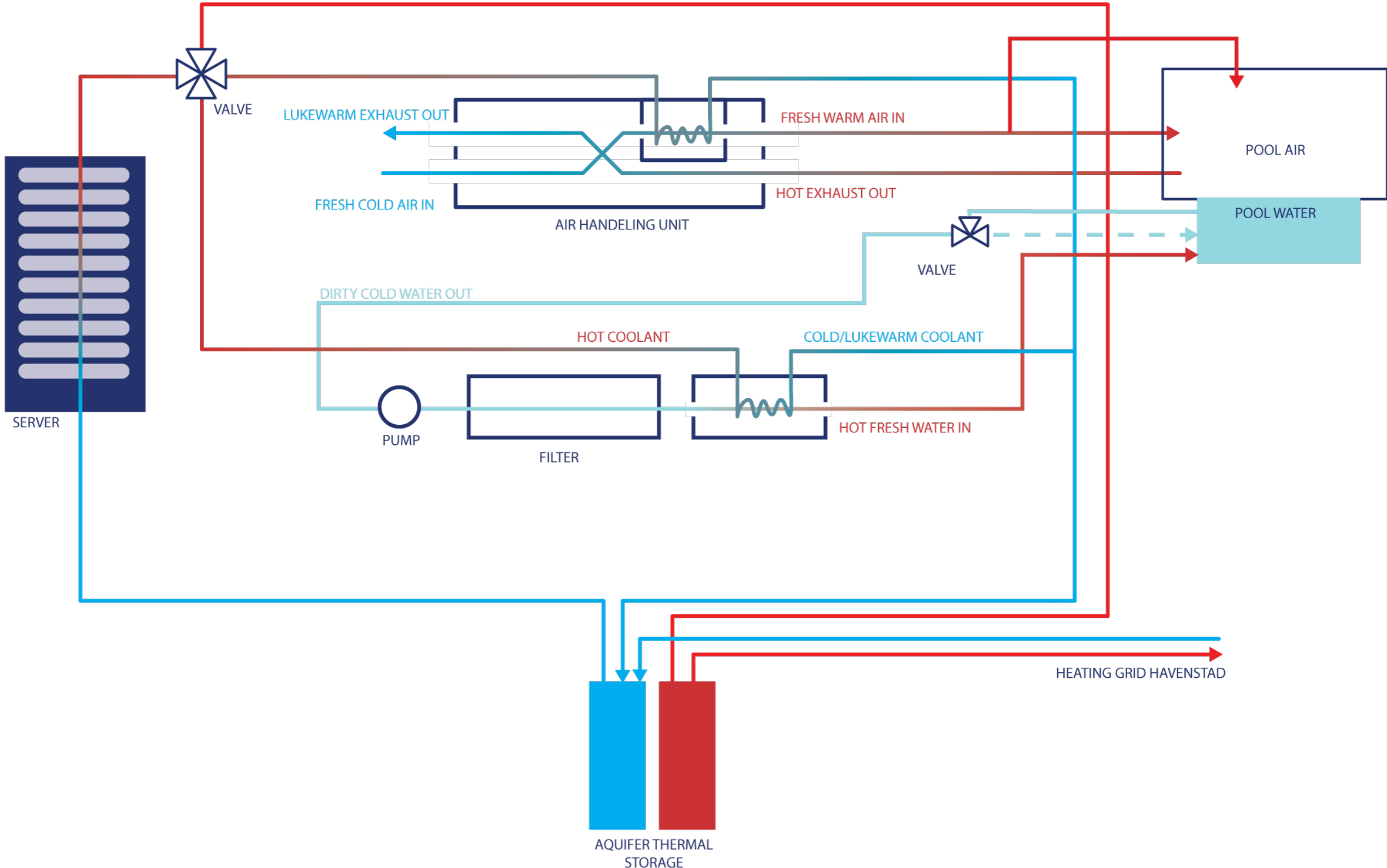
- 14 Solar energy collection
- 15 Flexible sun shading



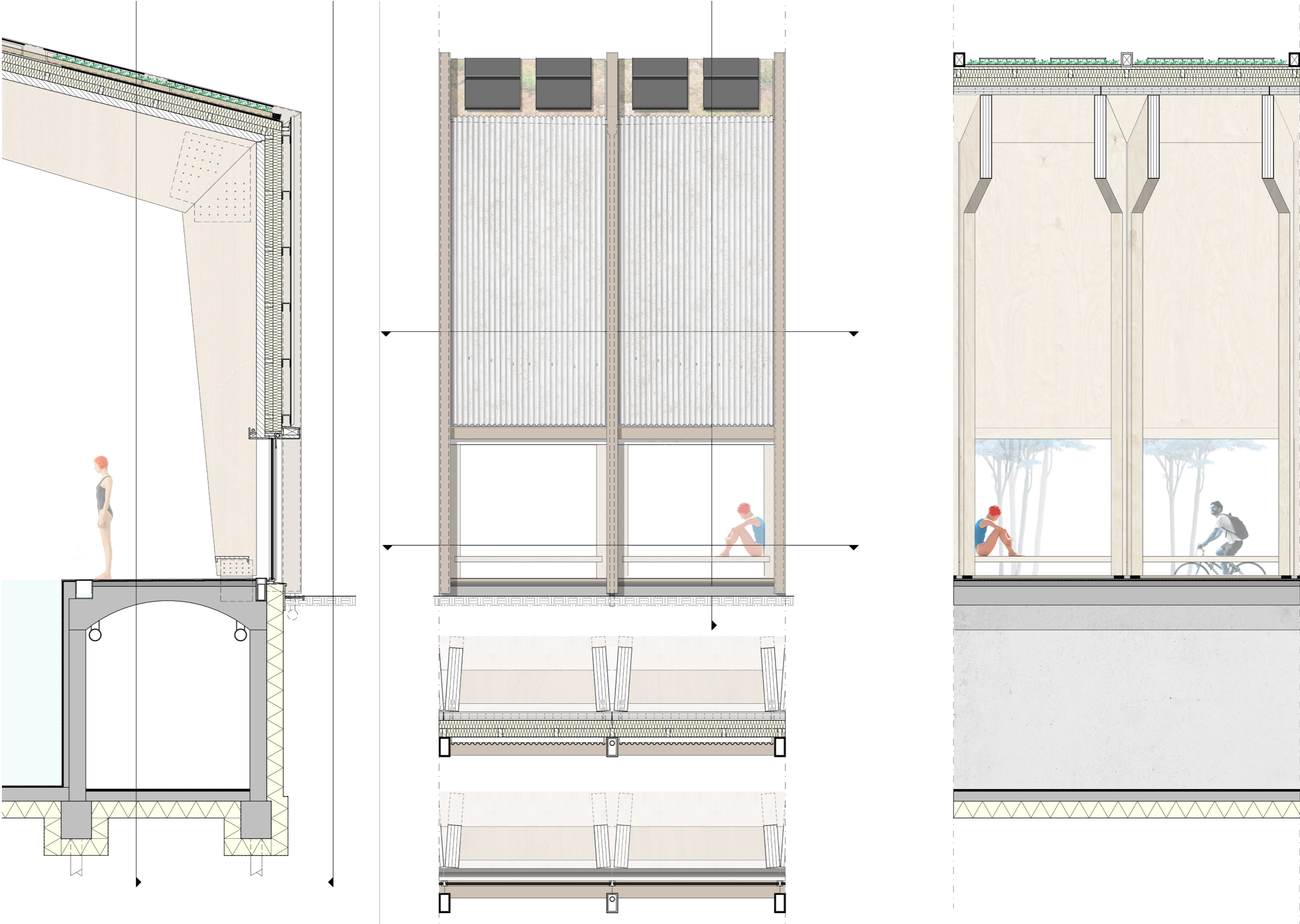
2000GJ
in energy can be saved per year, equal to the energy demand of 97 households

heat exchange datacentre

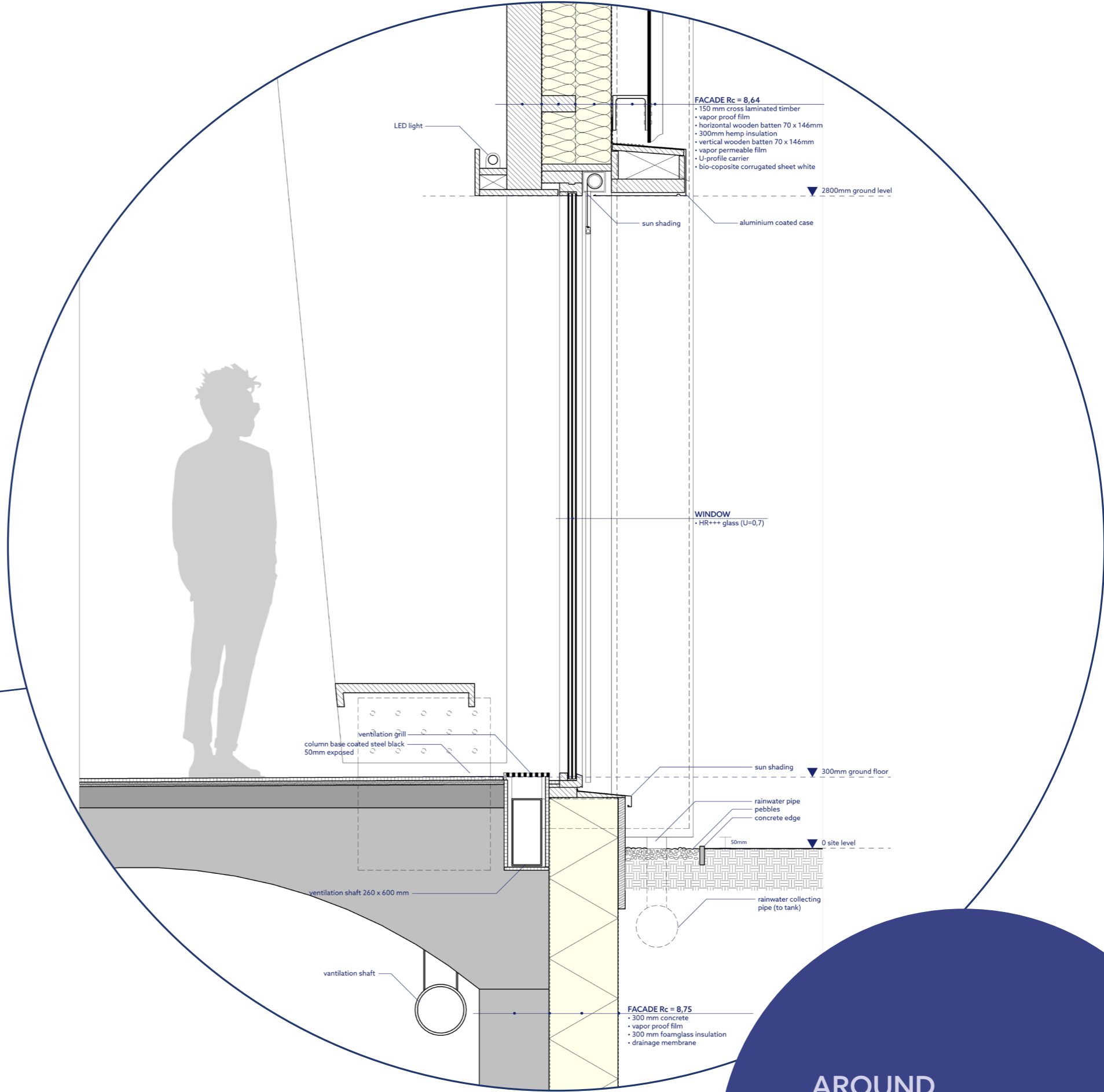
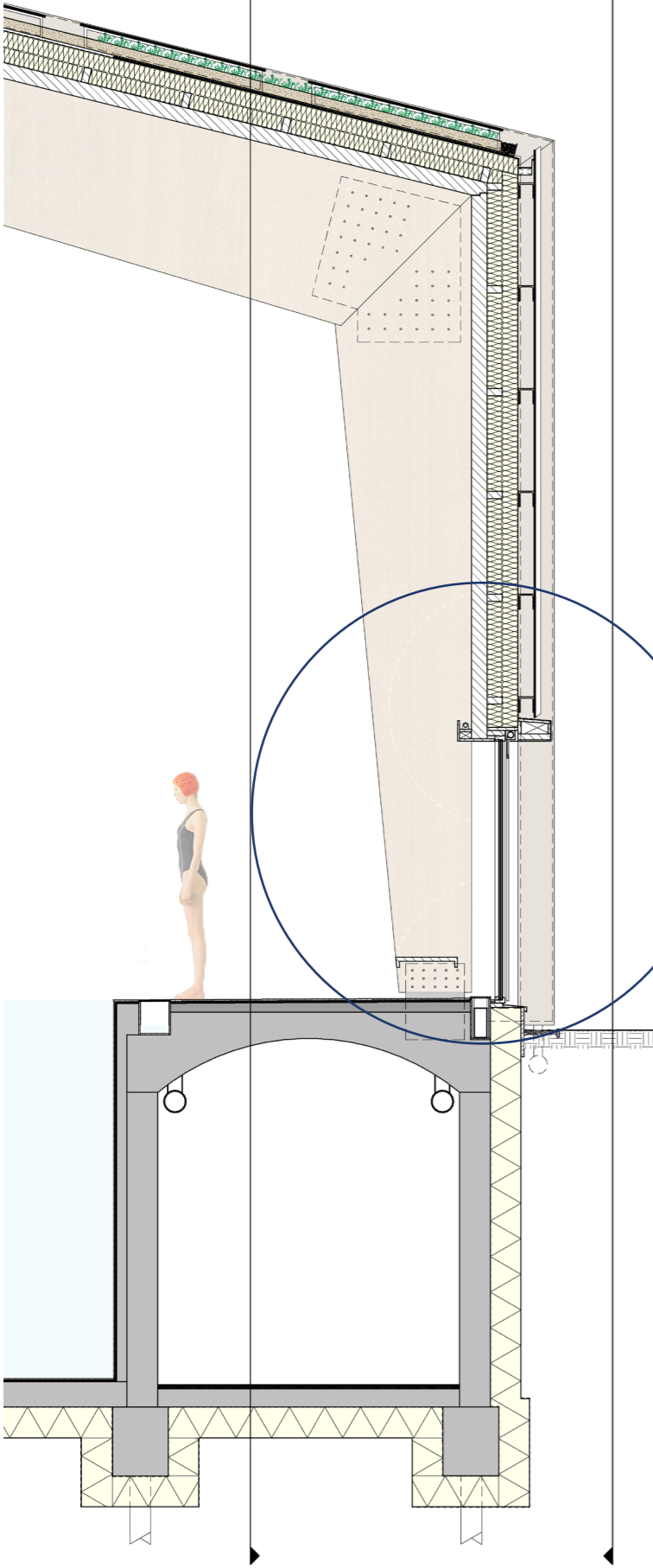
8 CLIMATE



8 CLIMATE



8 CLIMATE



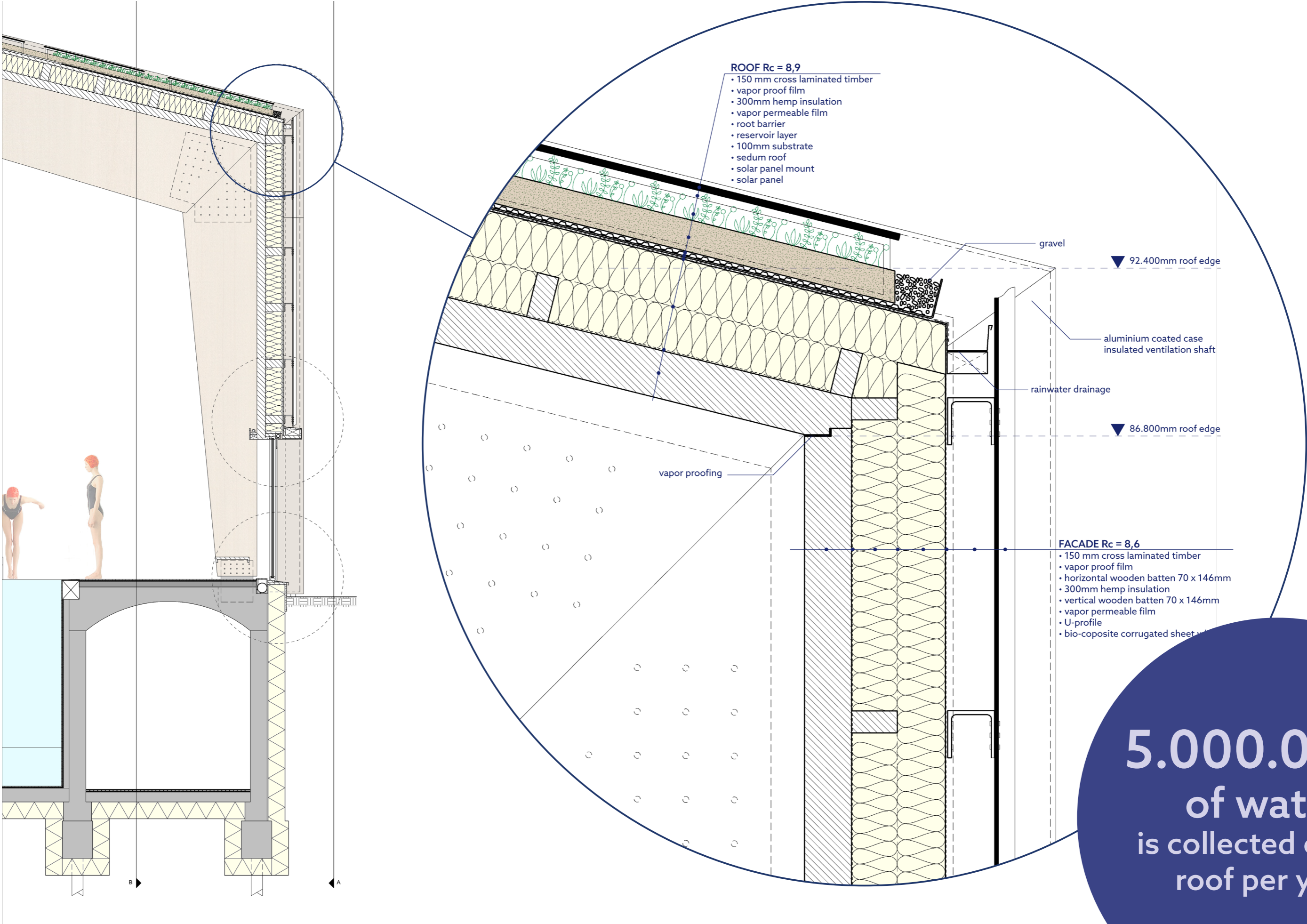
FACADE Rc = 8,64
 • 150 mm cross laminated timber
 • vapor proof film
 • horizontal wooden batten 70 x 146mm
 • 300mm hemp insulation
 • vertical wooden batten 70 x 146mm
 • vapor permeable film
 • U-profile carrier
 • bio-composite corrugated sheet white

WINDOW
 • HR+++ glass (U=0,7)

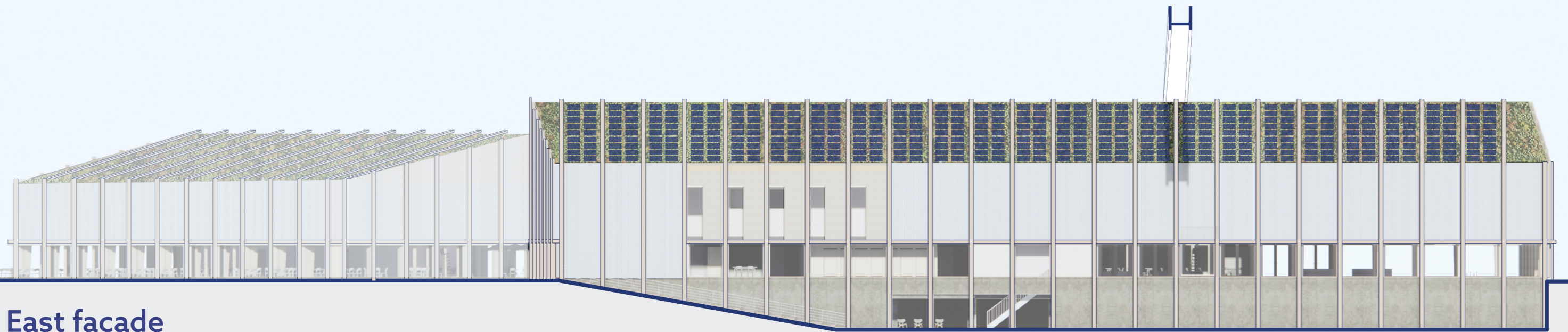
FACADE Rc = 8,75
 • 300 mm concrete
 • vapor proof film
 • 300 mm foams-glass insulation
 • drainage membrane

AROUND
100.932 ton CO₂
 SAVED BY USING BIOBASED
 MATERIALS

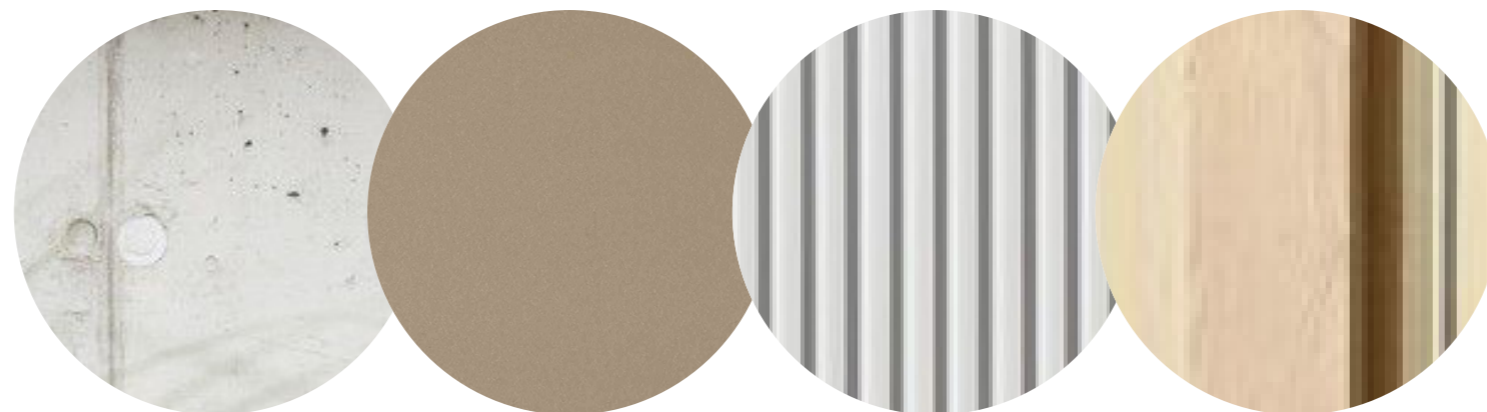
8 CLIMATE



8 CLIMATE



East facade





KE
HU

THANK YOU FOR LISTENING

