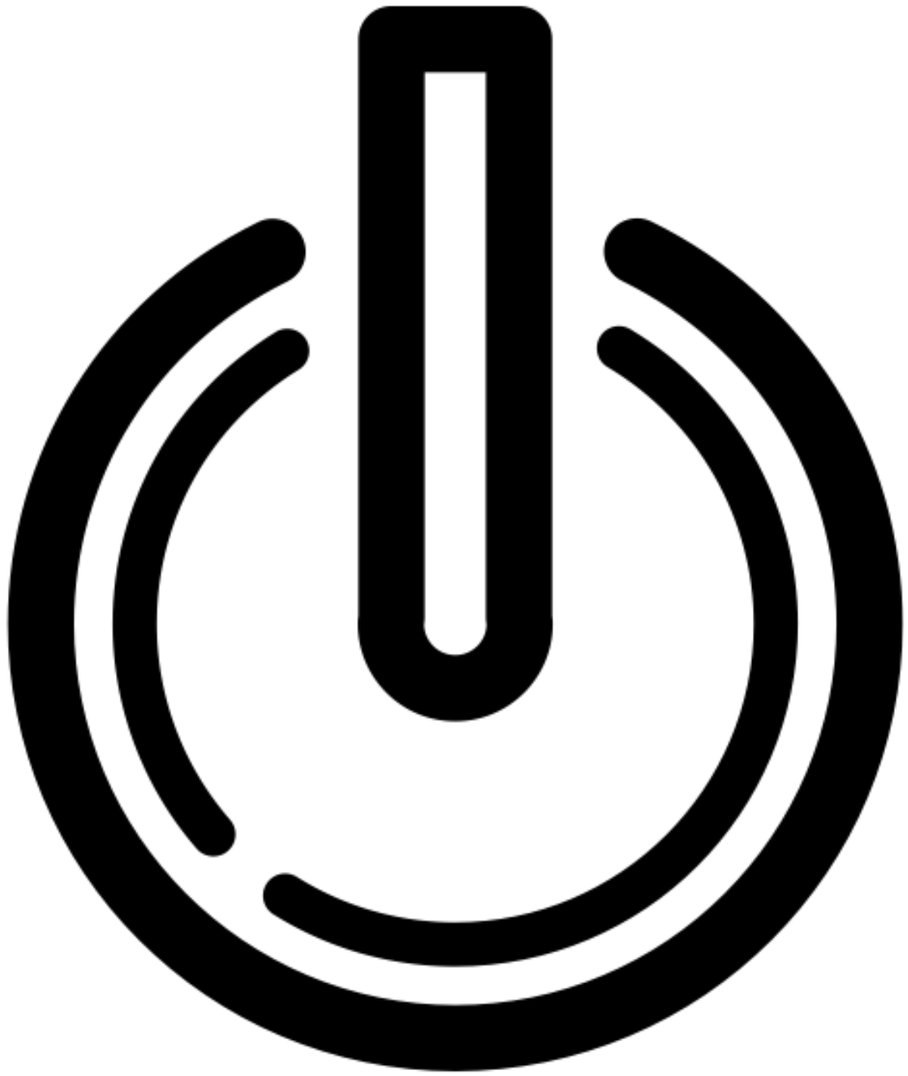
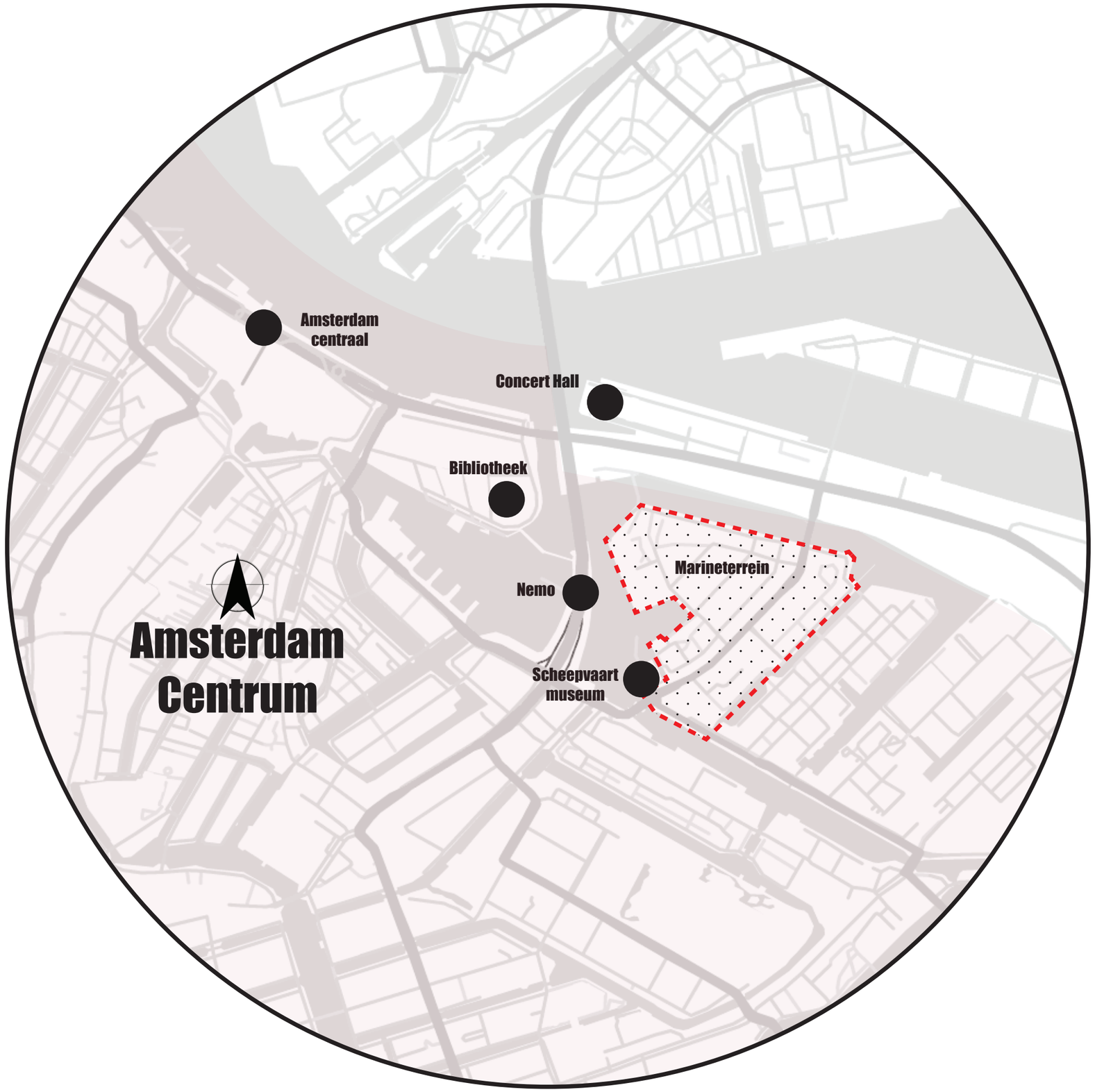
The power transition

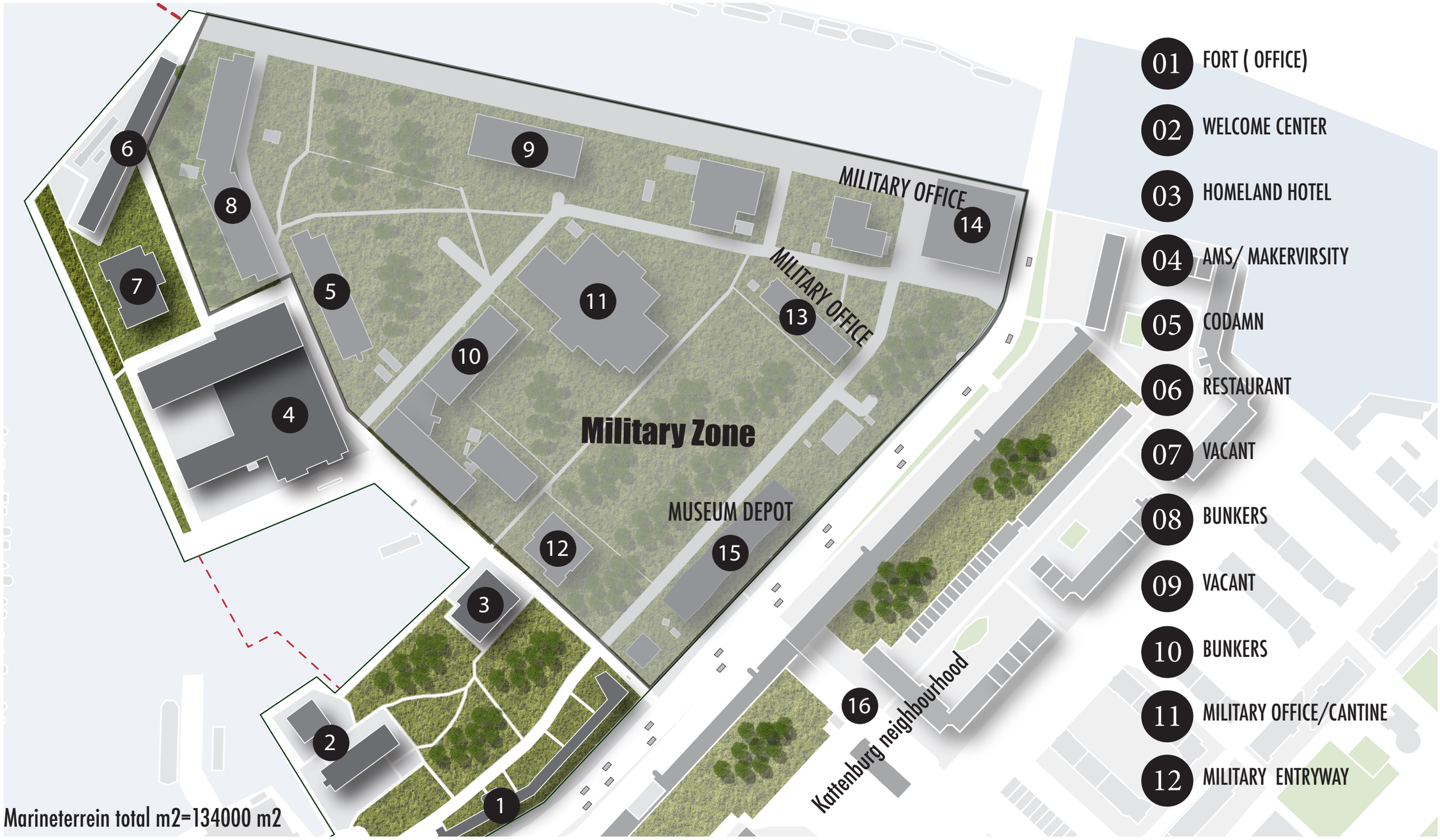


Marineterrein


Marineterrein
Amsterdam


Amsterdam
centraal
Concert Hall
Bibliotheek
Marineterrein
Nemo
Scheepvaart
museum
Amsterdam
Centrum

Marineterrein



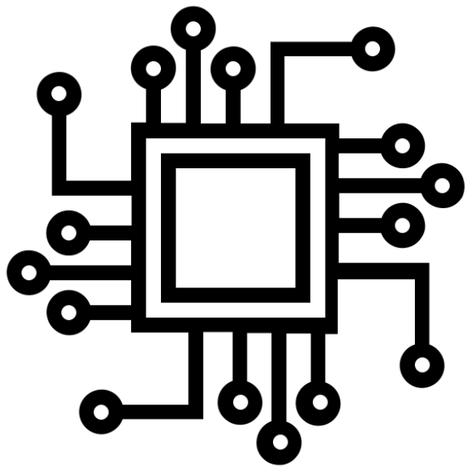
Marineterrein total m2=134000 m2

Ambition

The Marineterrein wants to develop itself into a future-proof city district featuring open innovation, accessible and flexible living and working spaces, unique housing, sports, recreation, and greenery.

Marineterrein users

Inhabitants and users see Marineterrein as an oasis within the big city, where man can work and relax simultaneously.



Technology driven

Marineterrein sees itself as an area for innovation, where technology can be tested and showcased within a futuristic society.

Community

Marineterrein sees itself as an area for innovations where progressive companies and individuals could join a community of forward thinkers.

The transition

Public buildings

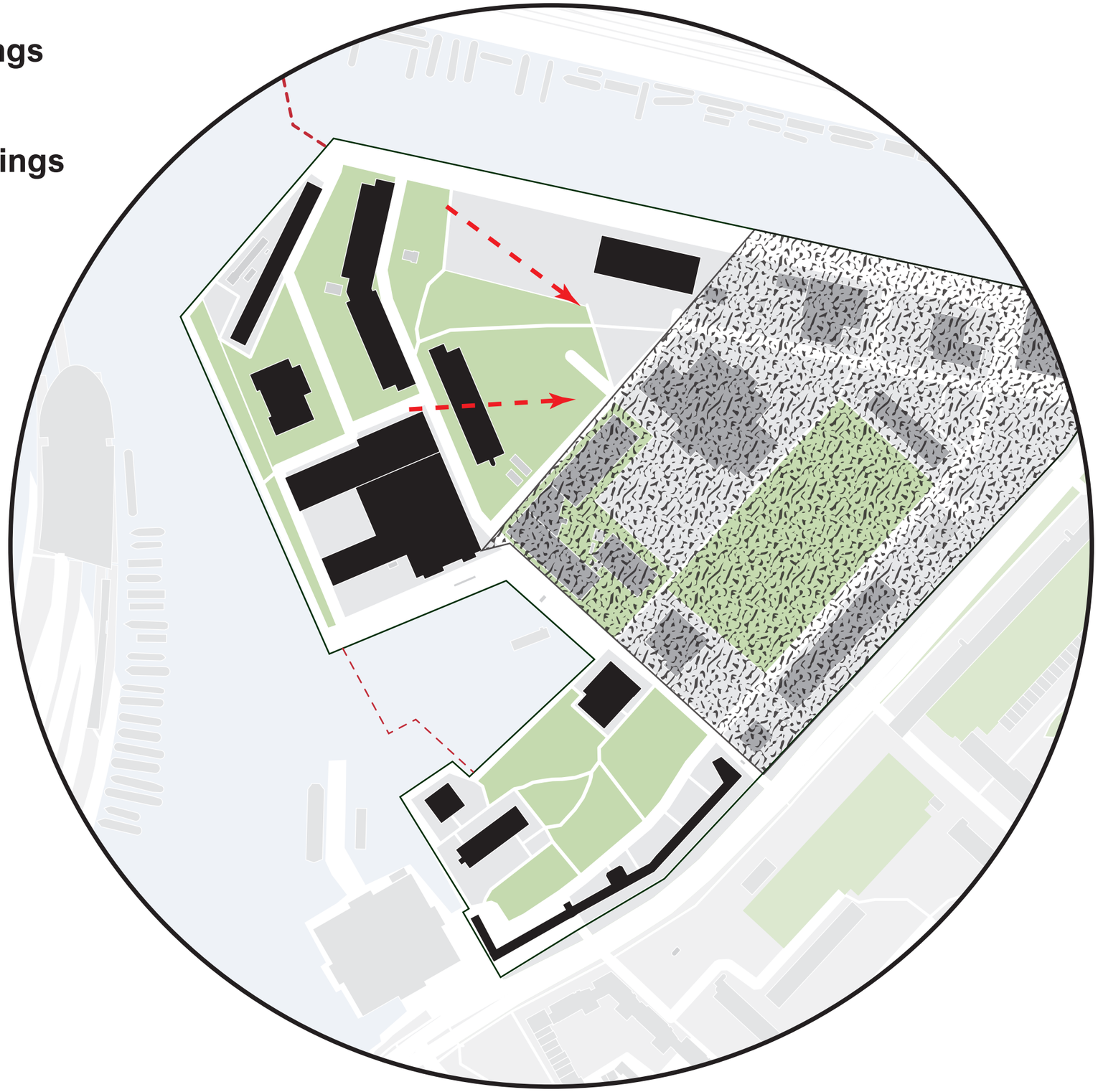
Military buildings

Private zone

Public buildings

Military buildings

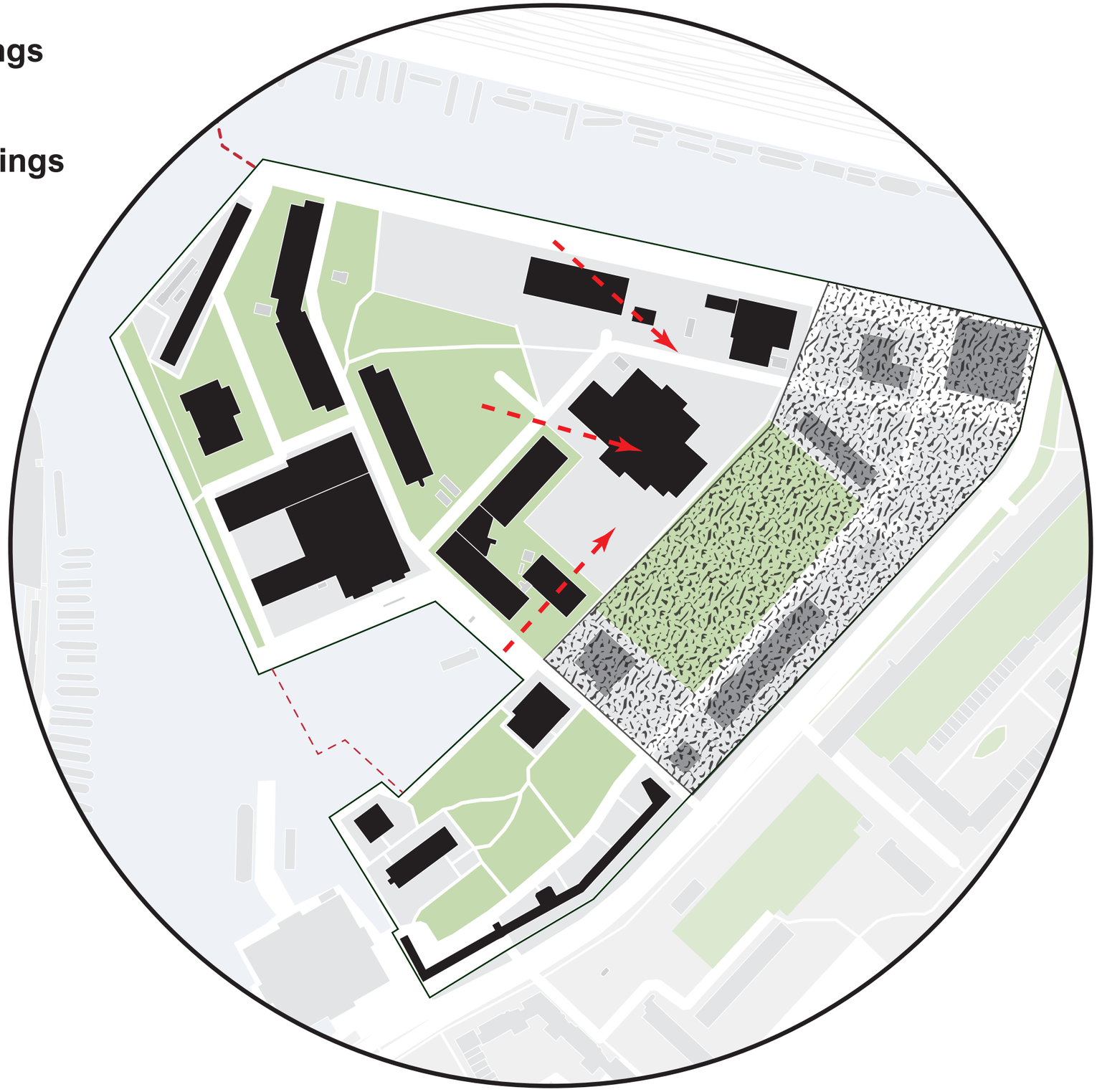
Private zone



Public buildings

Military buildings

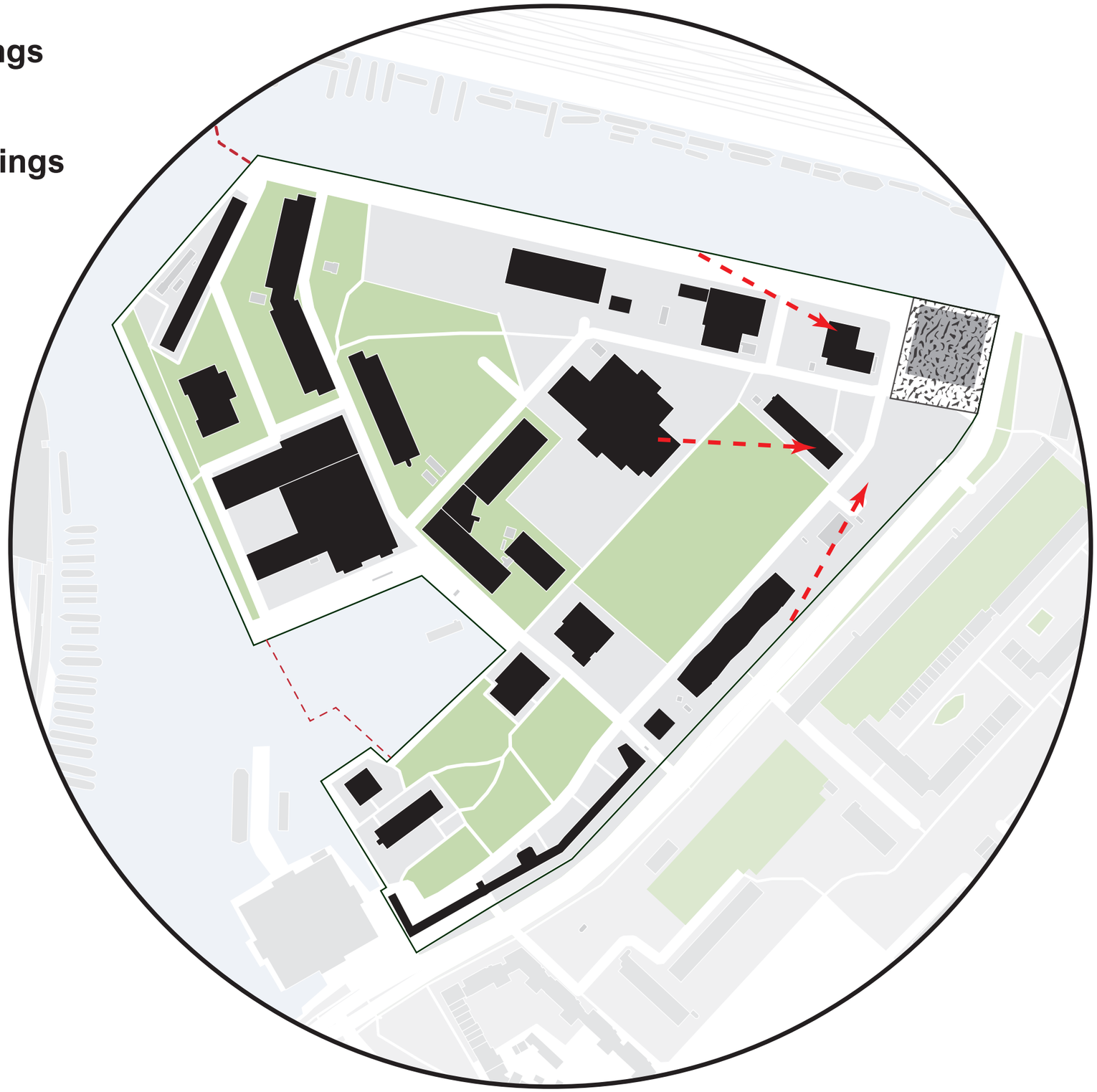
Private zone



Public buildings

Military buildings

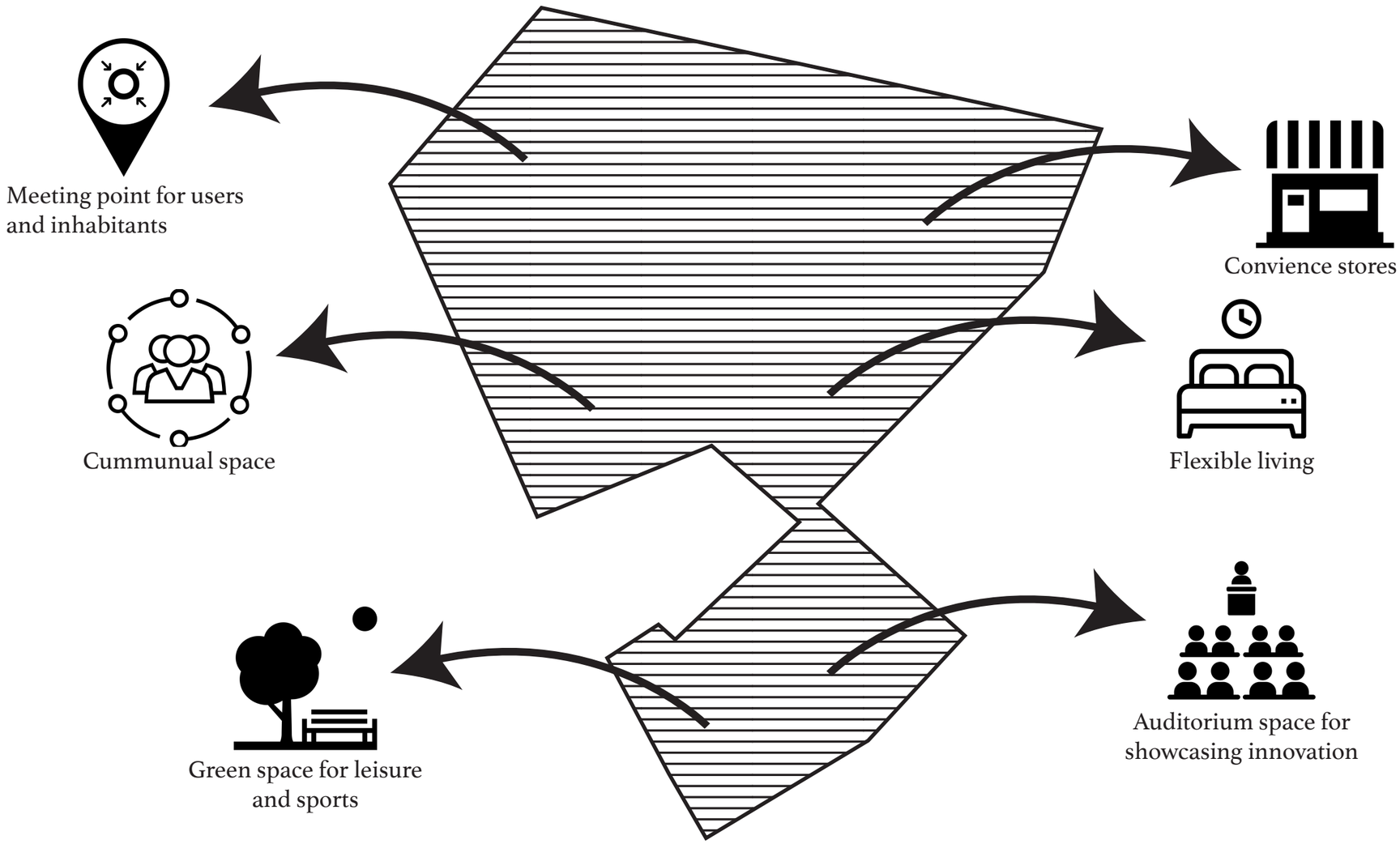
Private zone



What does Marineterrein need for this transition?

Ambition
-Startups
-Small businesses
-Sports
-Recreation
-Flexible Living

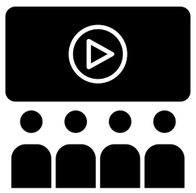
Future city
-Innovation
-Autonomous
-New style of working
-Sustainable
-Combining living and working



A catalyst building

Co-working Space

Convience stores



Auditorium

Workout area

Public area

Business opportunities

Park

Beacon

Building location

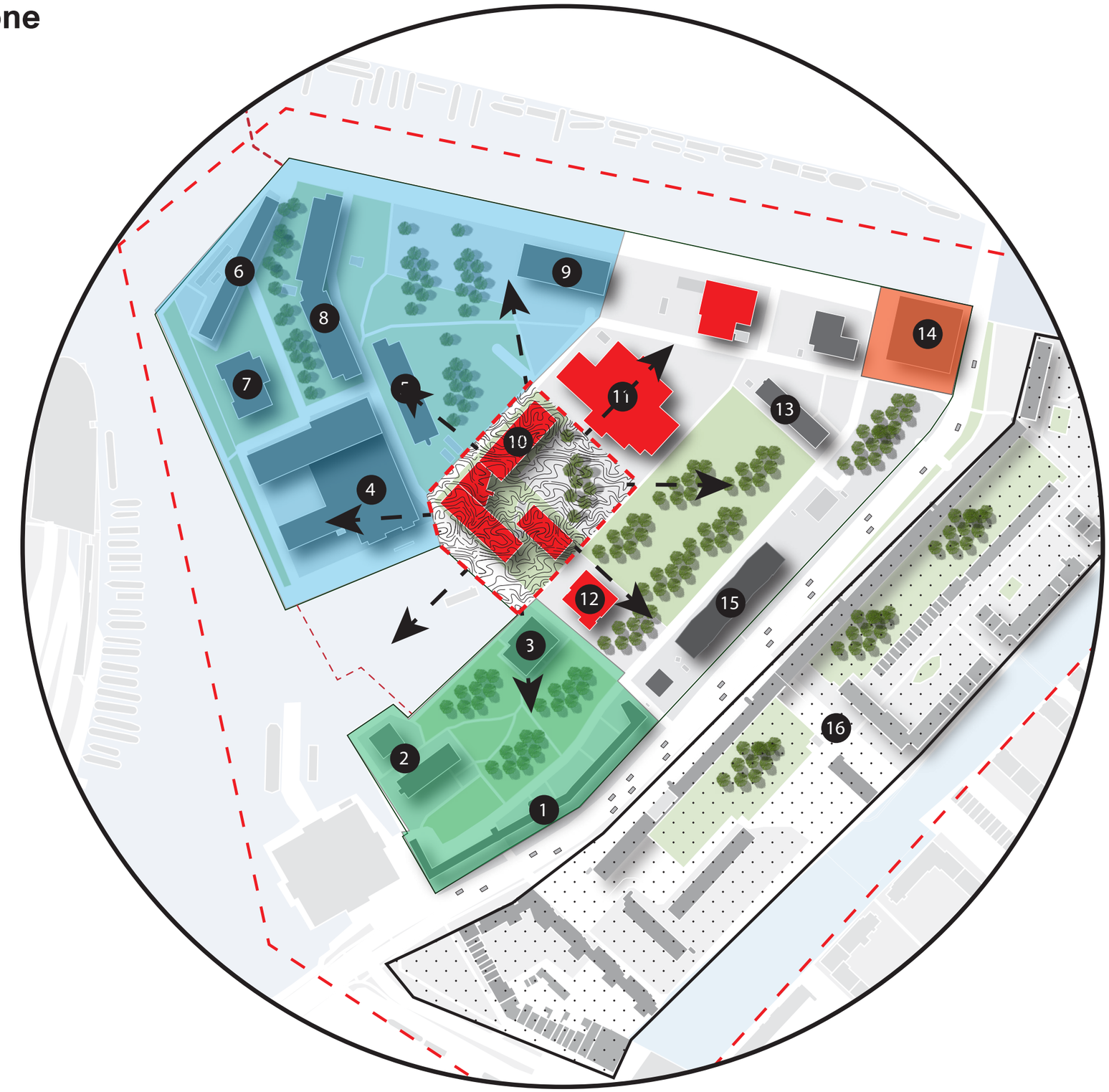
Innovation zone

Military zone

Park zone

to demolish

new building zone



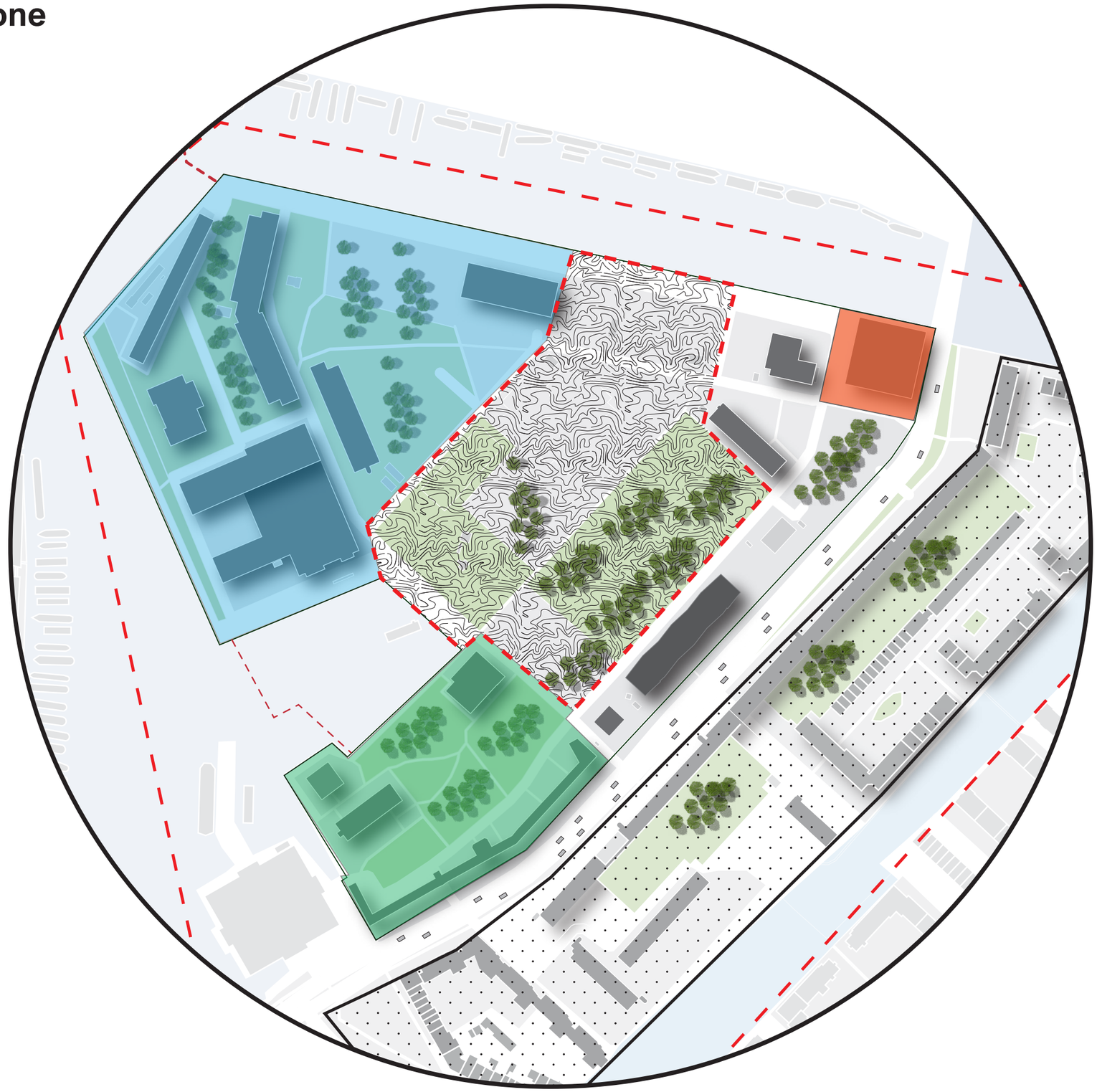
Innovation zone

Military zone

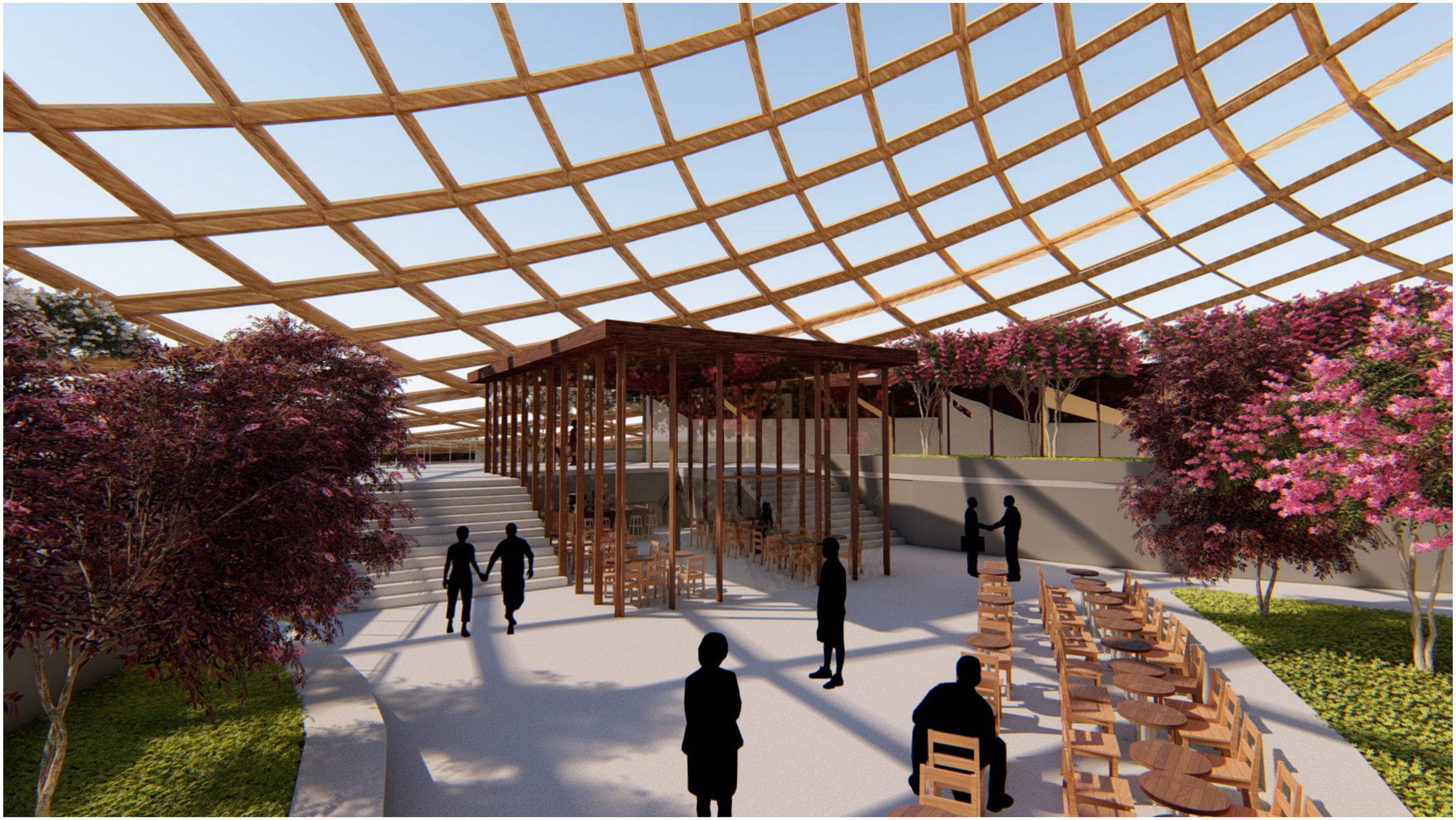
Park zone

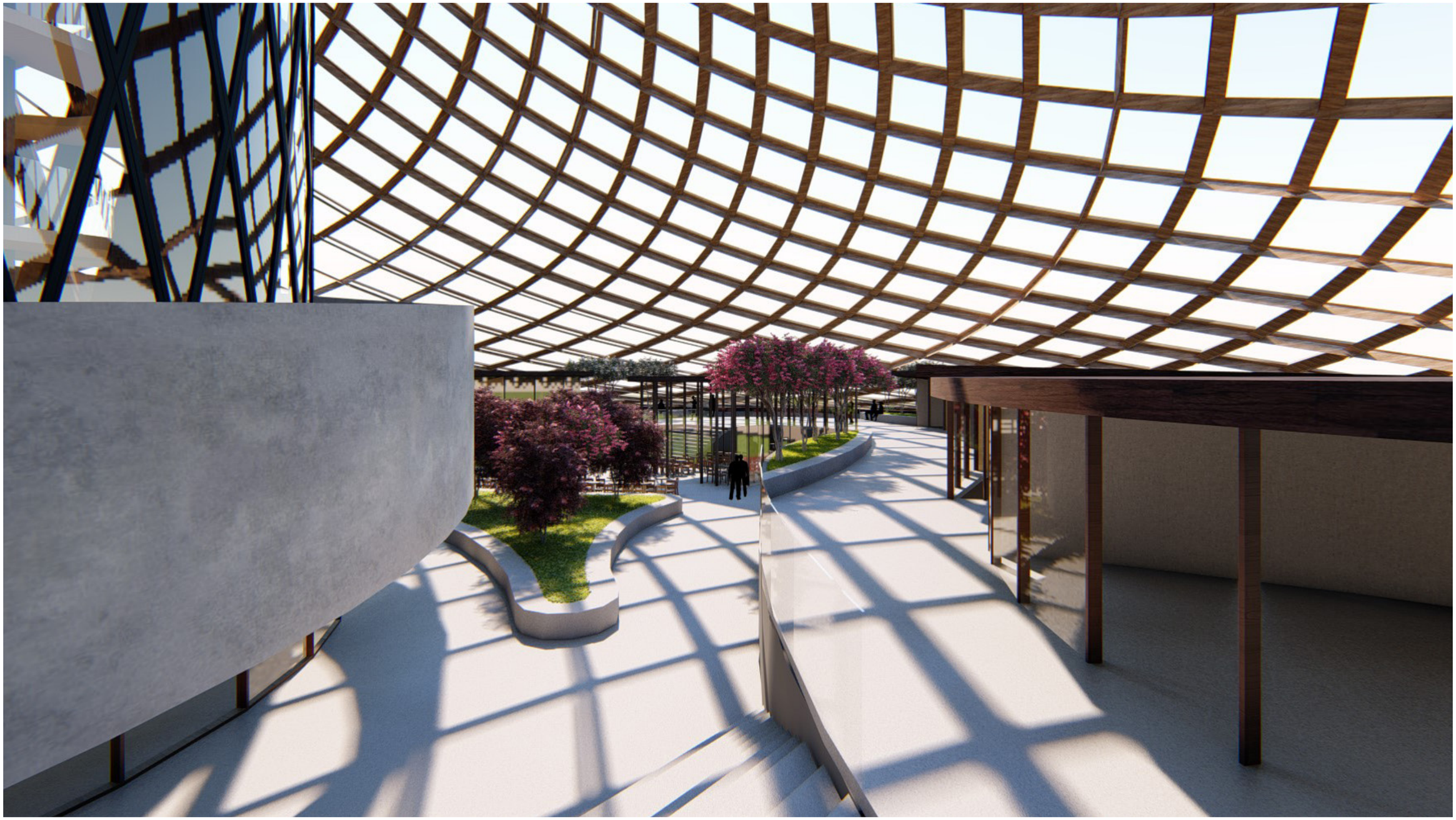
to demolish

Buffer zone



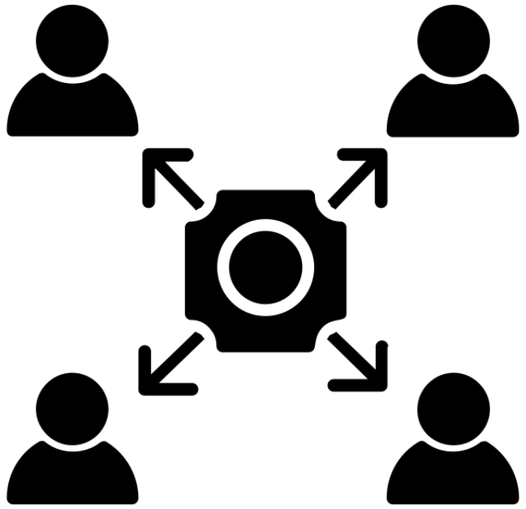
The BA





The BA

Marineterrein
Shopping district



The new epicenter for
Marineterrein

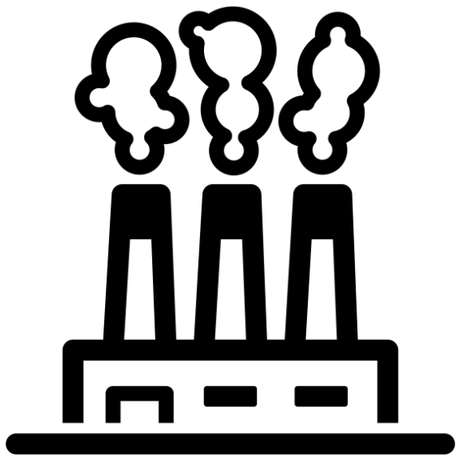
A beacon
for new begginnings

A Powerplant?

Perception

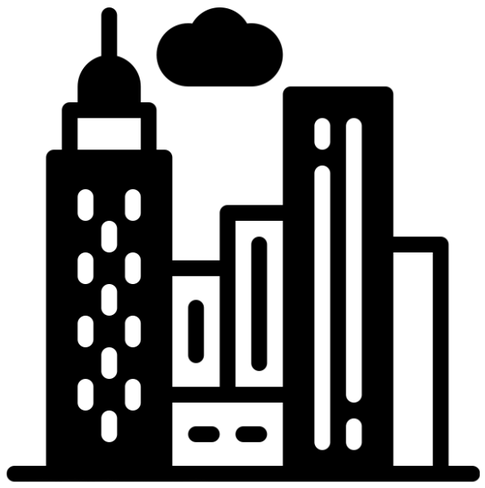
Power plants are perceived as private identities within our landscape, where energy is being produced for our day to day life. Thus, asking ourselves the question, how and where will our city's energy be produced in the future and how will it affect our daily lives?

The problem



59%

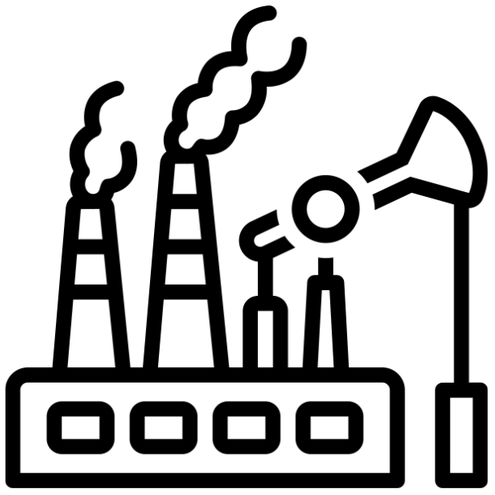
Energy counts for 59% of our wold’s total emissions



68%

68% of the world’s population will live in urban areas in 2050.

The problem



Created by priyanka
from Noun Project

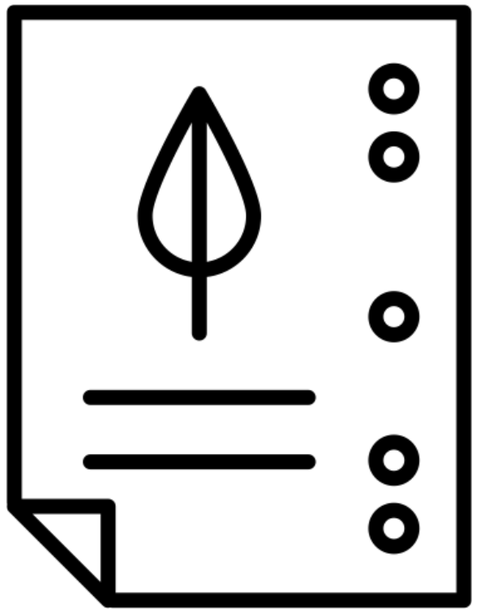
80%

80% of the world's energy comes from fossil fuel

12%

Only 12% of the Netherlands' energy comes from renewables

The Energy transition



Paris agreement
EU energy packages

The 2020 climate & energy package

-20% cut in greenhouse gas emissions (from 1990 levels)

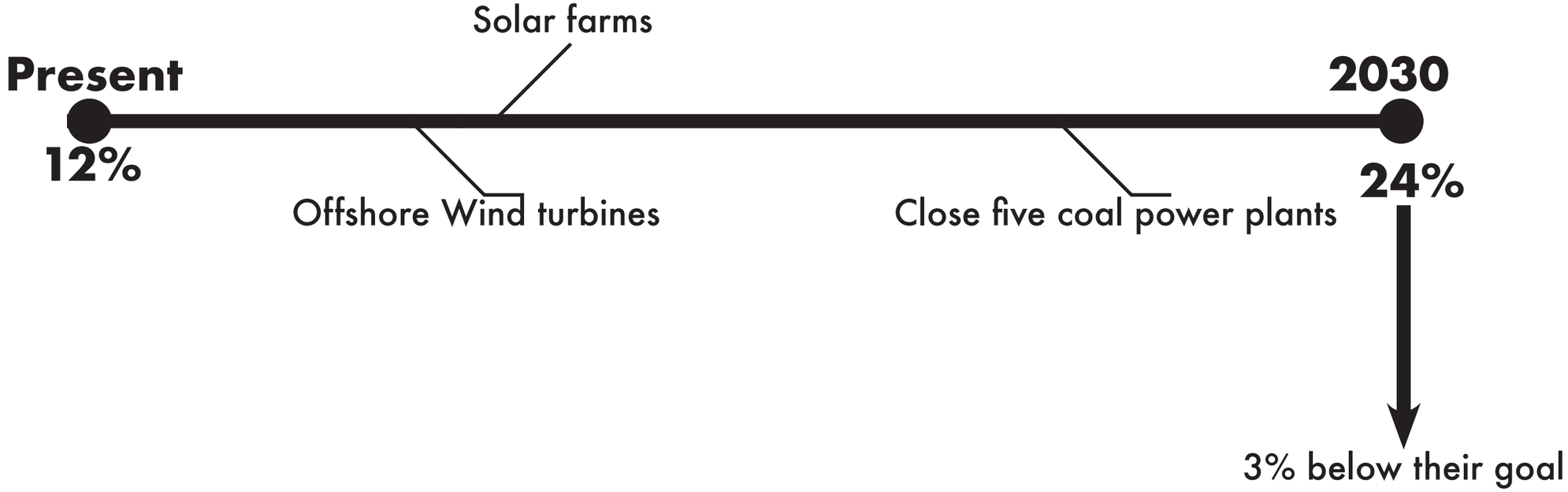
-20% of EU energy from renewables

-20% improvement in energy efficiency.

Netherlands' revision

Netherlands plans on planning a more ambitious plan to roll-out of wind turbine farms in the North Sea. Increasing spending on renewables creating more jobs in the renewable energy sector.

Revised plan



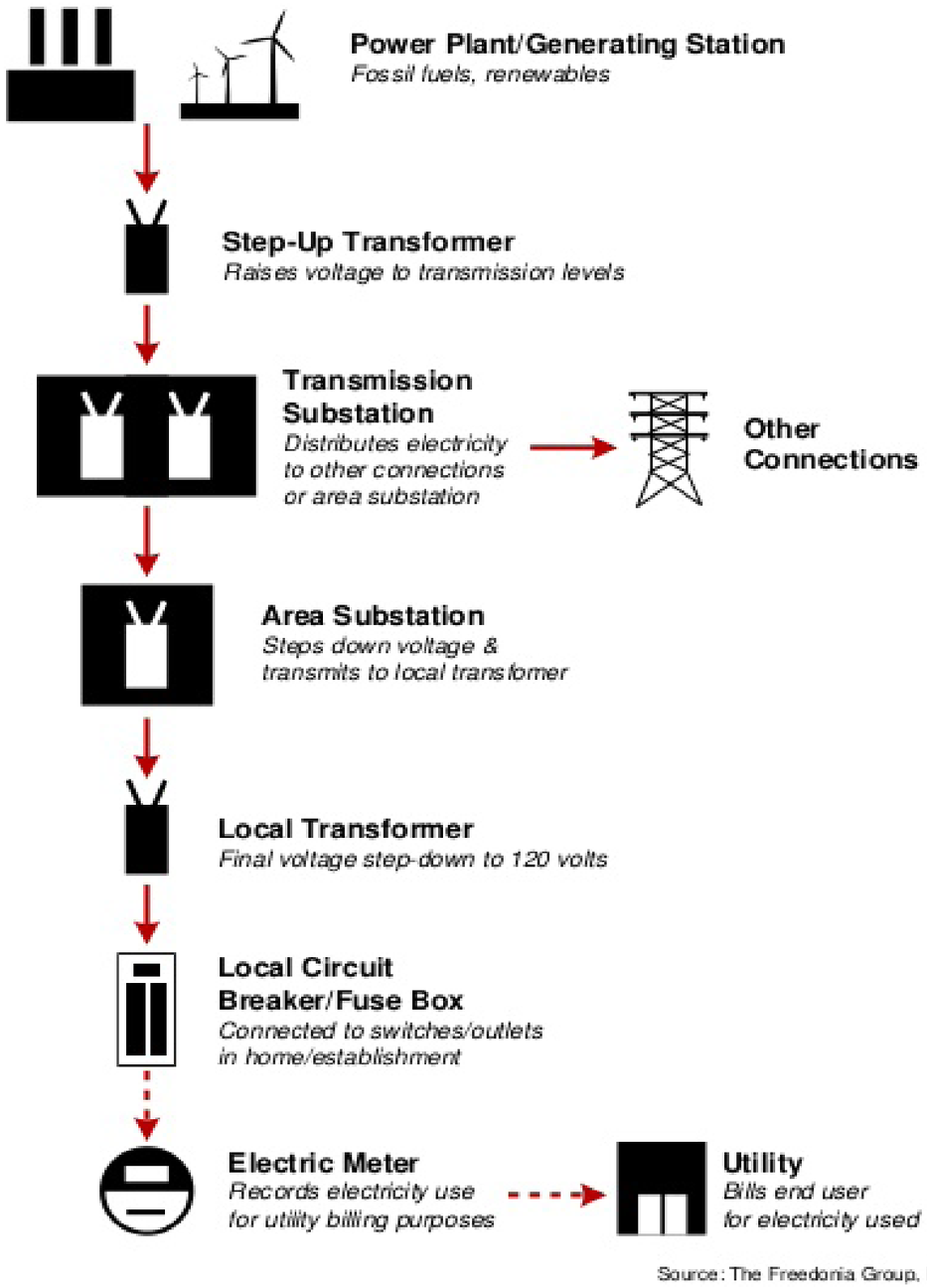
Research

Thematic question

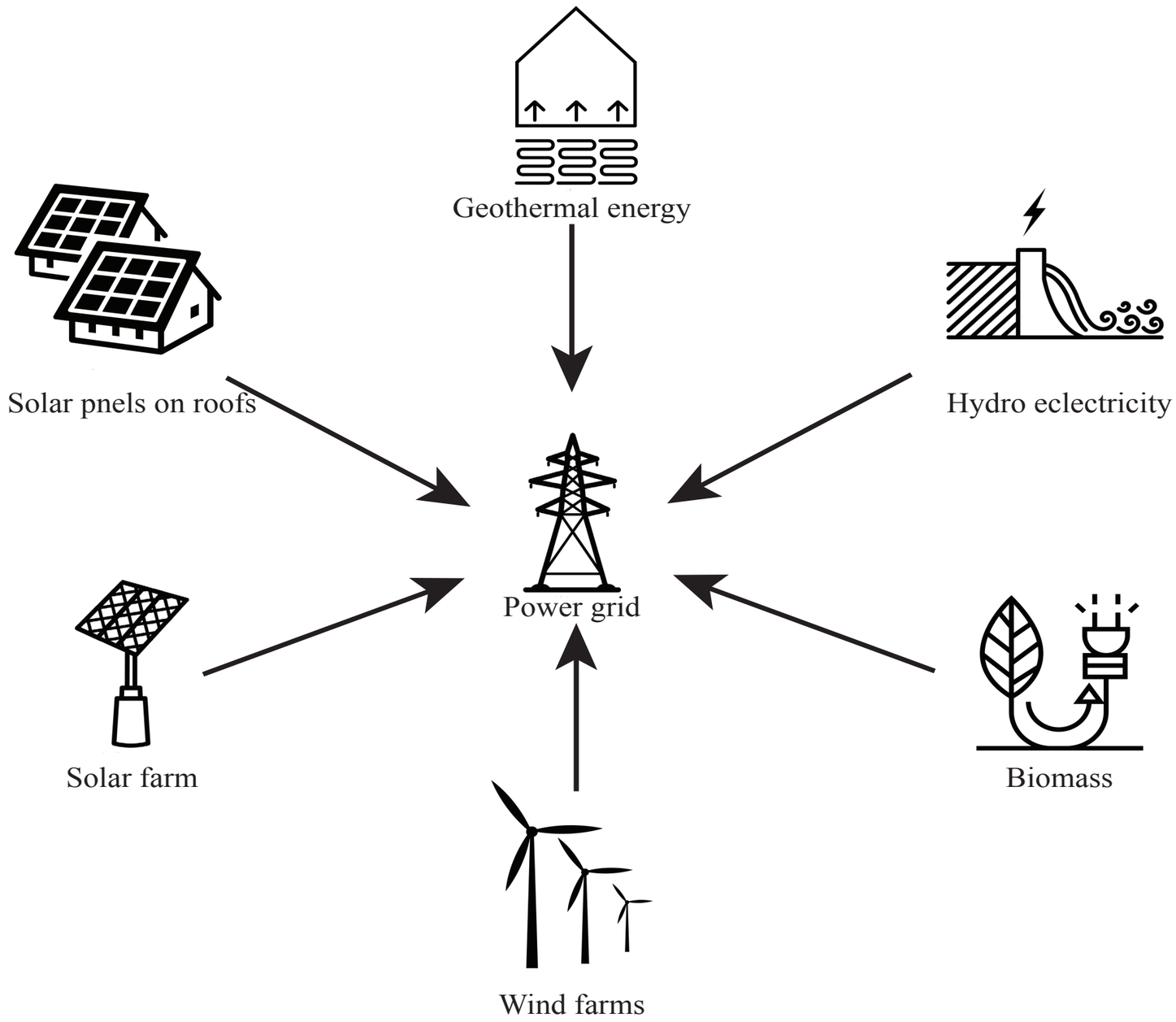
How can renewable energy be produced in our future city and how would It change our public perception of power plants?

The Transition

Centralised



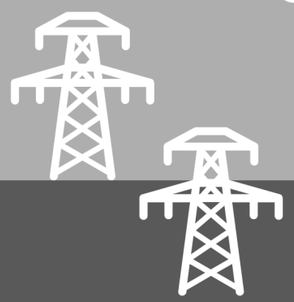
Decentralised



ON EUROPE'S ENERGY TRANSITION

1 Energy has historically been a key driver of European **COOPERATION**. But current EU proposals are not enough. To comply with the Paris Climate Agreement, we **MUST GIVE UP** fossil fuels altogether by 2050.

2 A **100%** renewable energy system in Europe is now technically possible using existing **STORAGE** and **DEMAND RESPONSE** technologies.



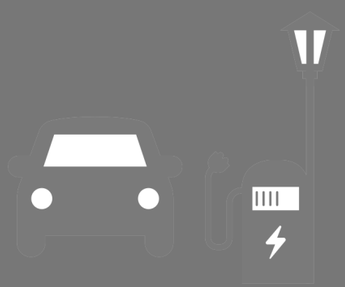
3 Stronger **INTERCONNECTIONS** of markets and infrastructure across Europe will make the energy transition cheaper for all Europeans.

7 Digitalization can make this transformation more **DEMOCRATIC AND EFFICIENT**, and can reduce the bill for the end consumer.

8 The European energy transition promises to increase **PROSPERITY** in a sustainable way (creating more local jobs) and boost Europe's global **LEADERSHIP** in green innovations.

9 Since 2013, renewables have helped **SLASH** Europe's import bill for fossil fuels by more than a third, **CUTTING ITS DEPENDENCY** on unstable and unpleasant regimes.

4 The biggest potential lies in **INCREASING EFFICIENCY**. Europe-wide we could reduce our energy demand by half by 2050.



5 A switch to 100% renewables in Europe will trigger **SYSTEM CHANGE** – away from centralized, monopolistic utilities to decentralized, community power projects and innovative business models.

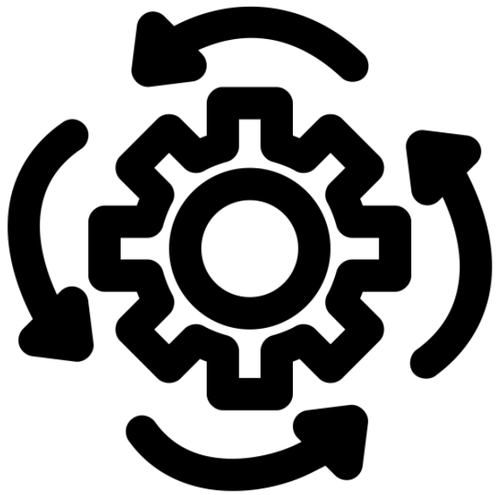
6 Framed by smart strategies and legislation, this system change can be driven by **CITIZENS, CITIES AND ENERGY COOPERATIVES**, leaving much more wealth in communities.

10 **A SOCIALLY JUST TRANSITION** is both essential and viable: all over Europe, the renewables sector already provides more well-paid, secure local jobs than the coal industry.

11 **ENERGY POVERTY** is being tackled by pioneering community power projects, acting in solidarity with those in their own community addressing this challenge.

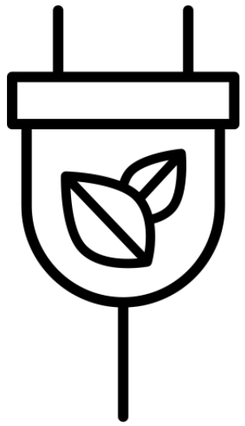
12 Europe's Neighbourhood Policy should **INSPIRE AND SUPPORT** other countries to decarbonize their economies. A socially just energy transition in Europe's neighbouring regions can stimulate their progress and stability.

The 3 Keys

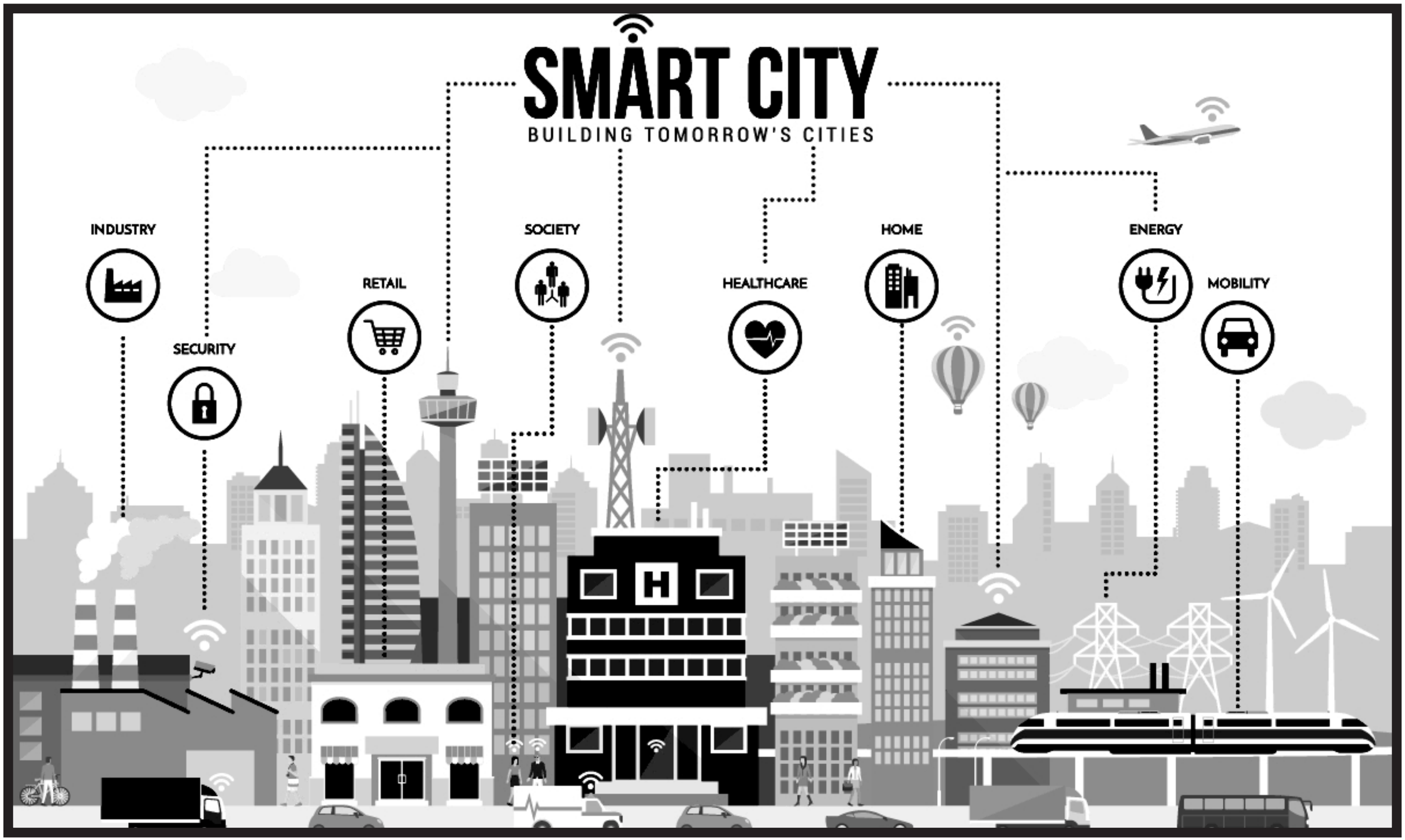


efficiency

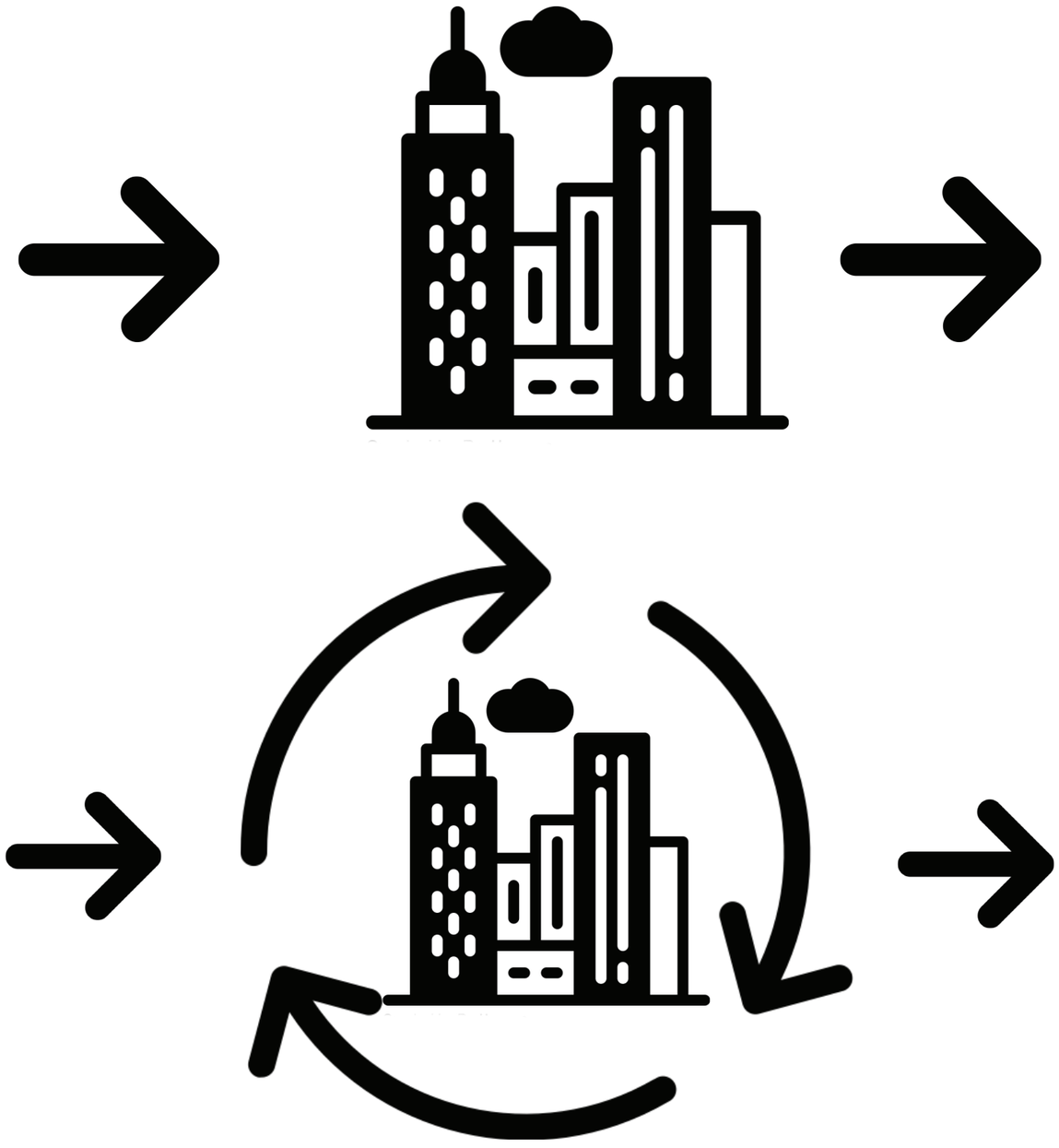
sustainable business investments



decentrilized sustainable production


SMART CITY
BUILDING TOMORROW'S CITIES
INDUSTRY
SECURITY
RETAIL
SOCIETY
HEALTHCARE
HOME
ENERGY
MOBILITY

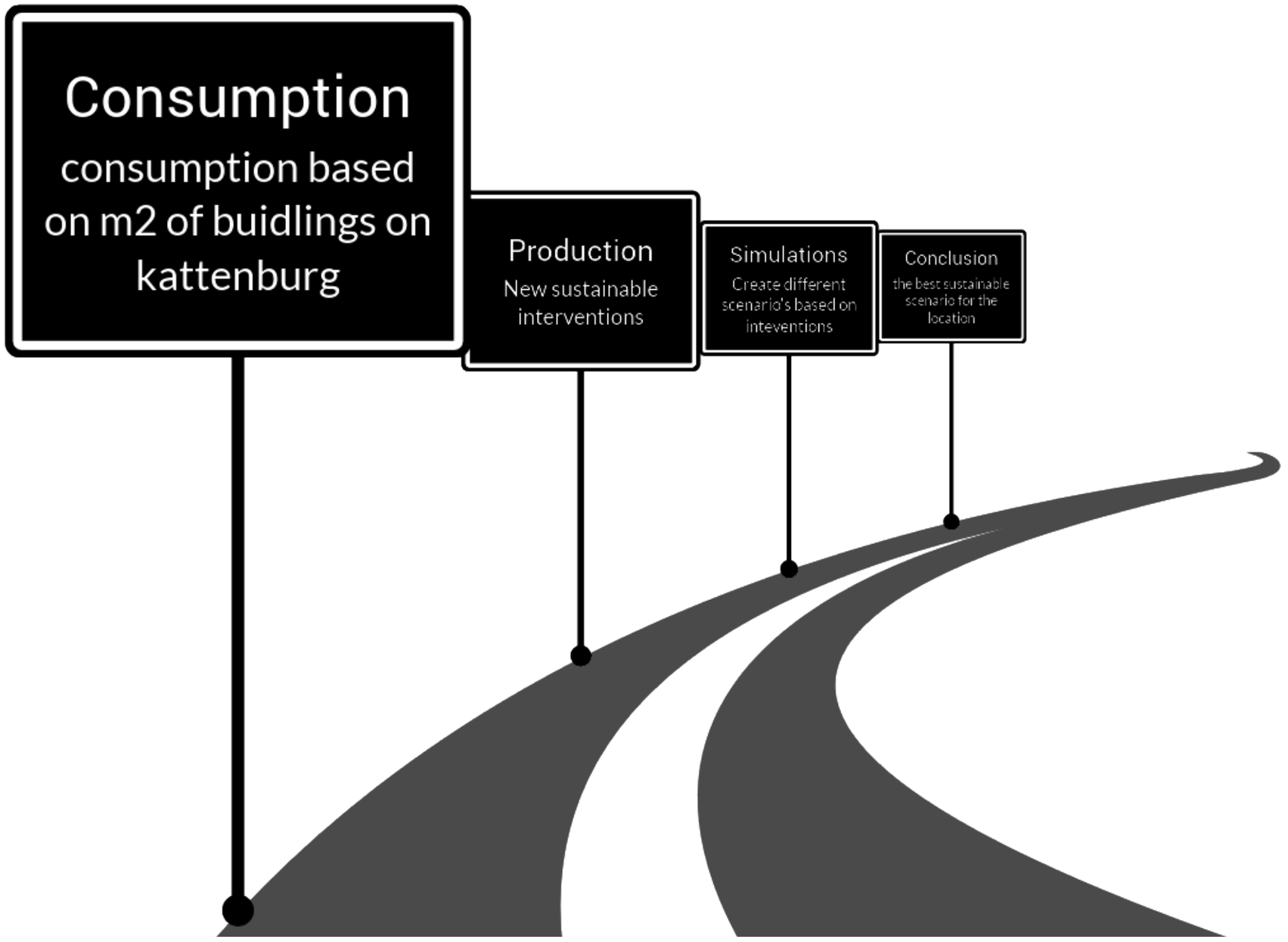
Urban metabolism



Urban metabolism is a model to facilitate the description and analysis of the flows of the materials and energy within cities, such as undertaken in a material flow analysis of a city.

Kattenburg as an organism

Creating a scenario program



Kattenburg as an organism

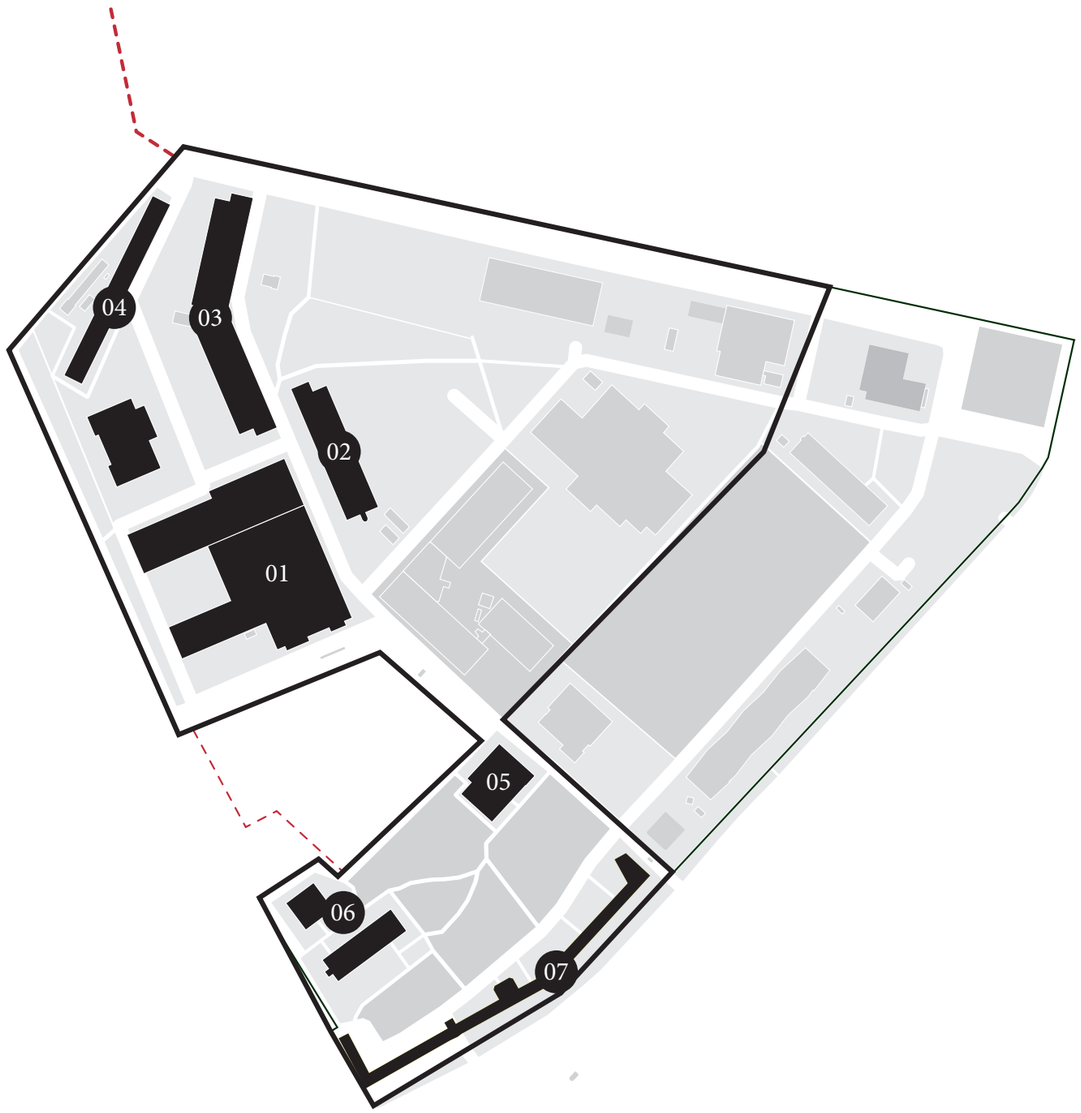
3 step process for a
better performance city

Create a clear sustainable
city vision

Create a city flow analysis
of all key city elements

Apply sustainable inter-
ventions where possible.

A sustainabler city



01 Makerversity/AMS institute
usable space: 7780 m2

02 Codam
usable space: 5760 m2

03 vacant
usable space: 9680 m2

04 Restaurants/leisure
usable space: 2400 m2

05 Hotel
usable space: 1833 m2

06 Welcome center
usable space: 1176 m2

07 Fort
usable space: 14114 m2

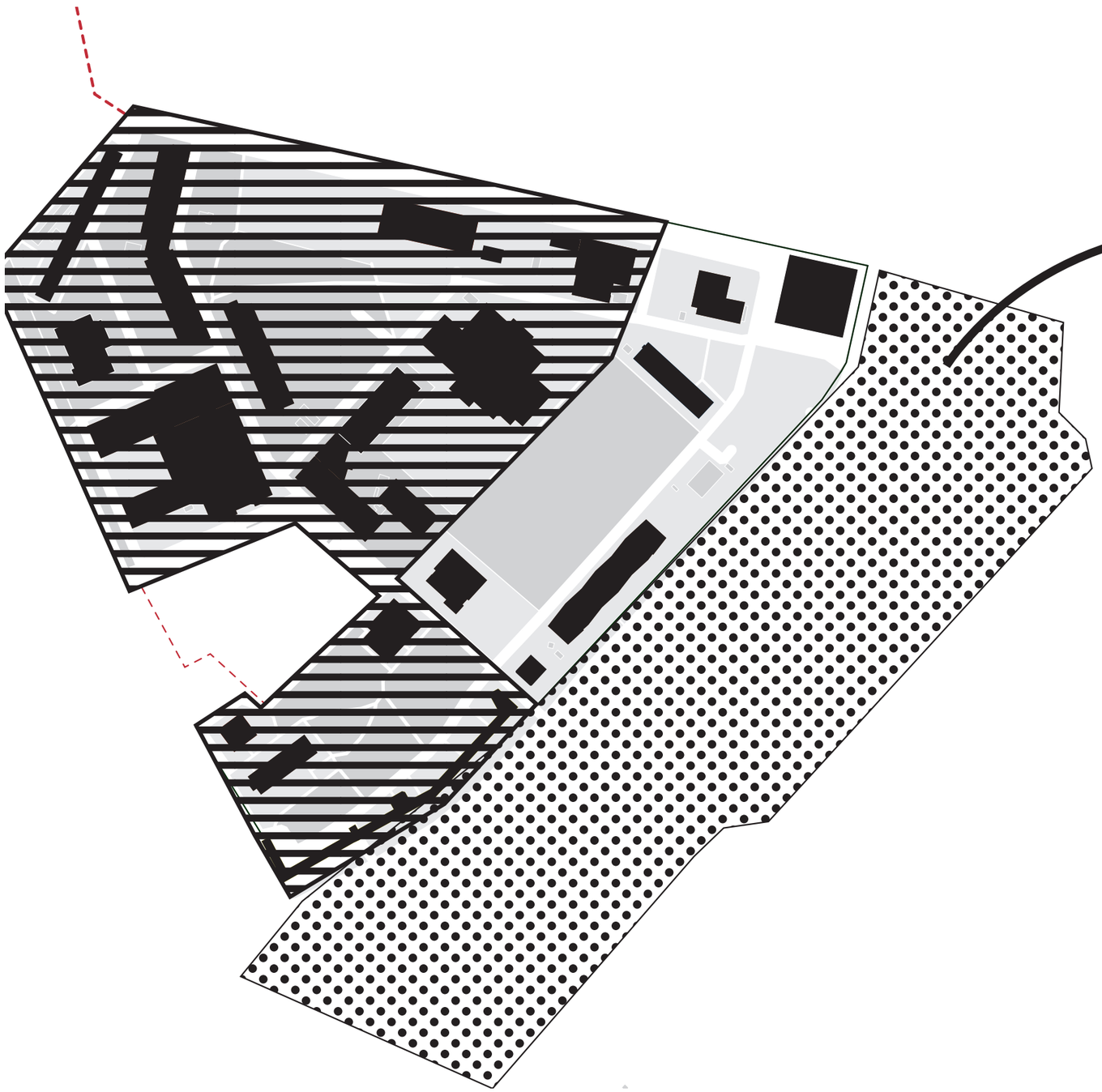
0.5

26571 m2

Total space that is currently being used: 33.063 m2

Energy consumption(roughly):
=3.587.195 kWh

Marineterrein total m2=134000 m2



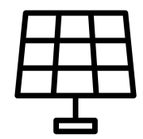
Marineterrein total m2=134000 m2

Housing on Kattenburg
785 woningen
63024 m2

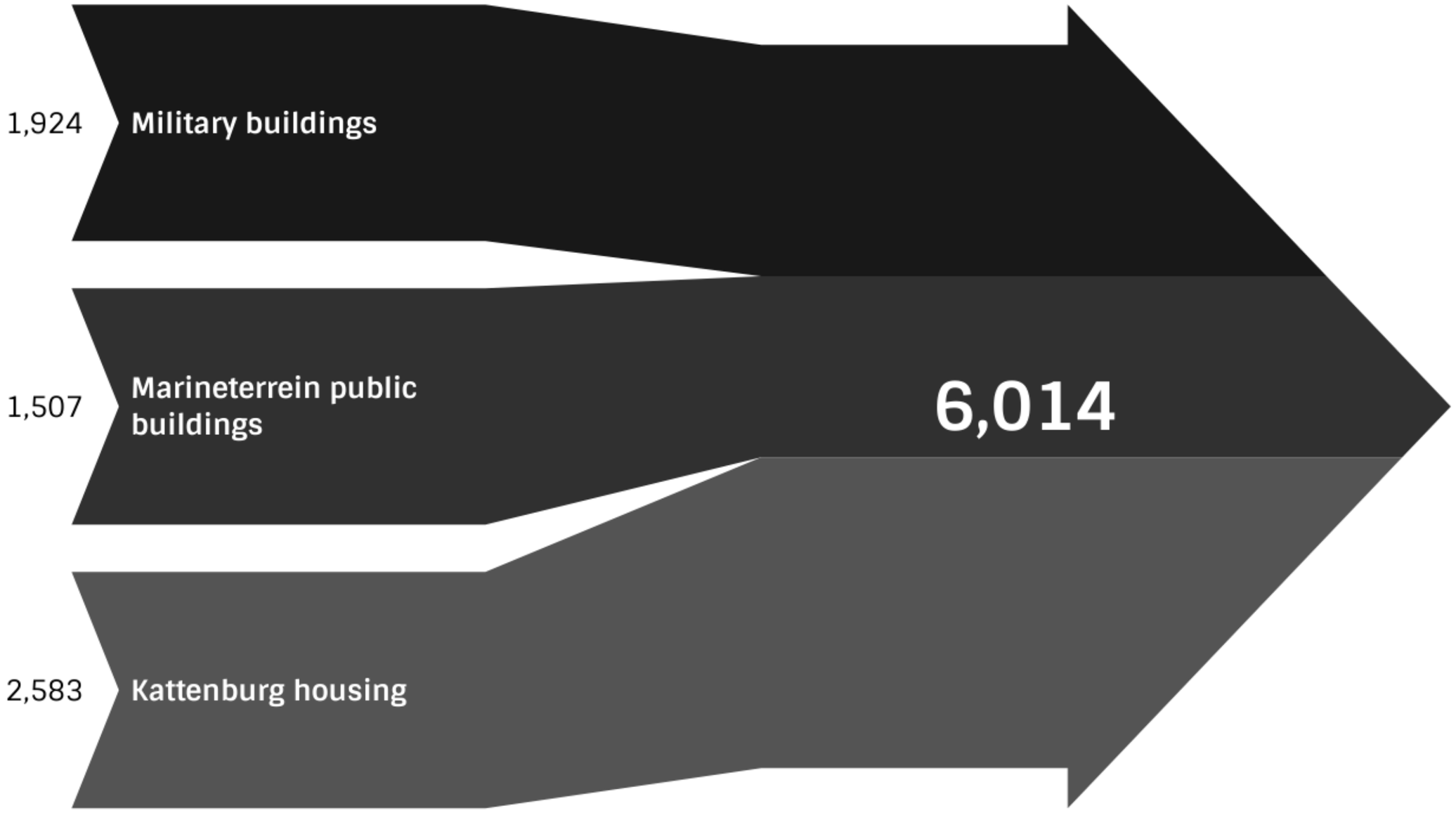
Energy consumption(roughly):
2623394 kWh

0.4

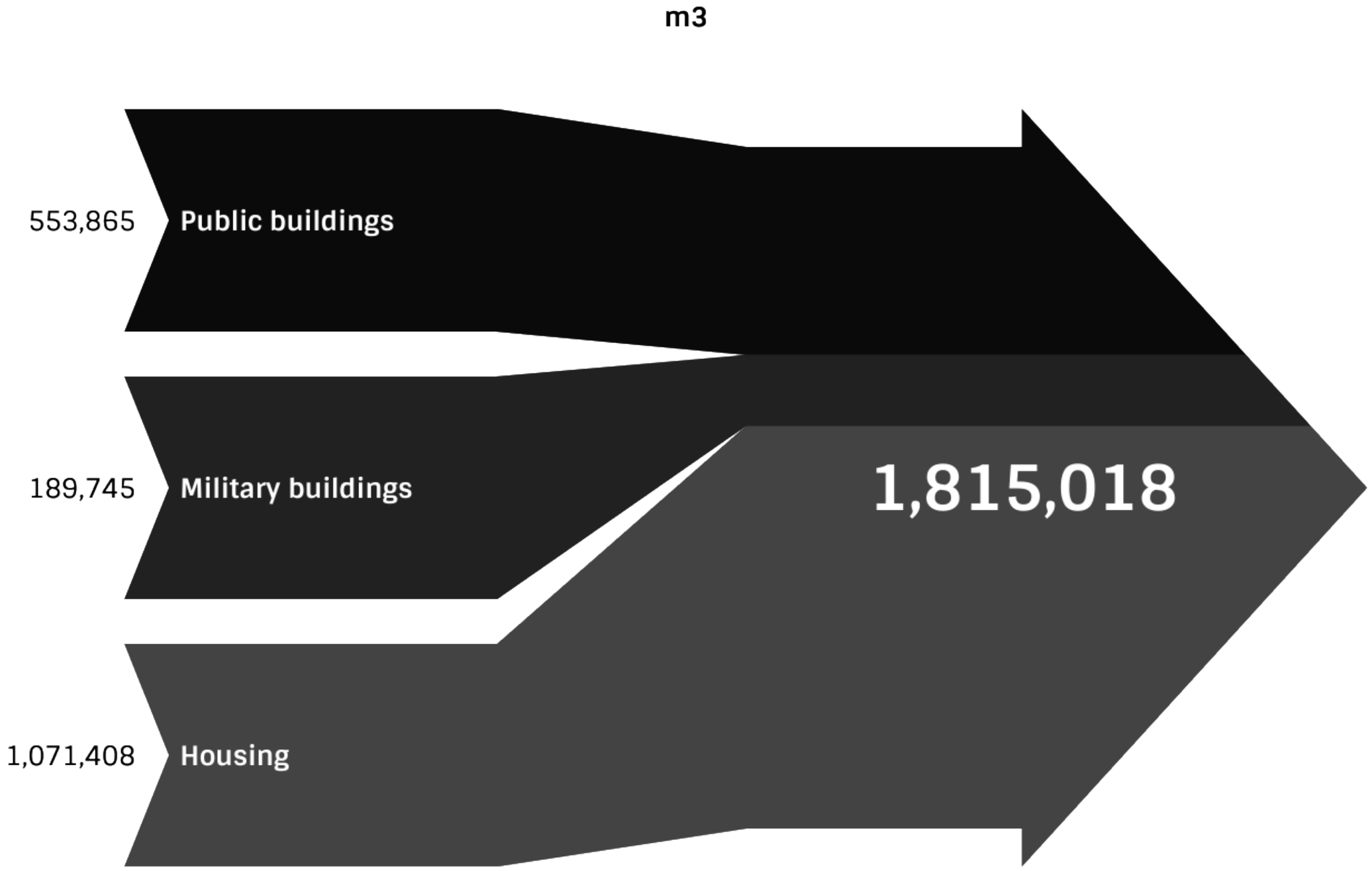
19290 m2



Kattenburg Gwh consumption



Kattenburg heating consumption

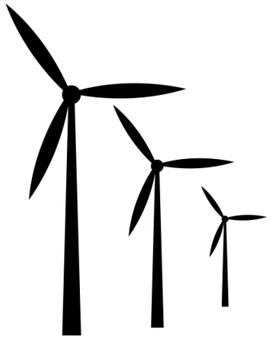


Kattenburg cooling consumption

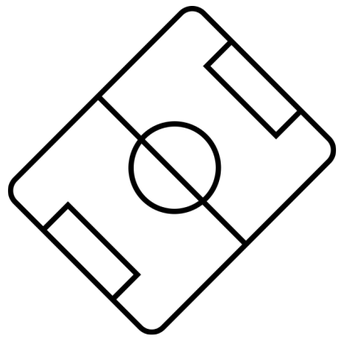
Consumption

6 Gwh

Enough for 15033 houses



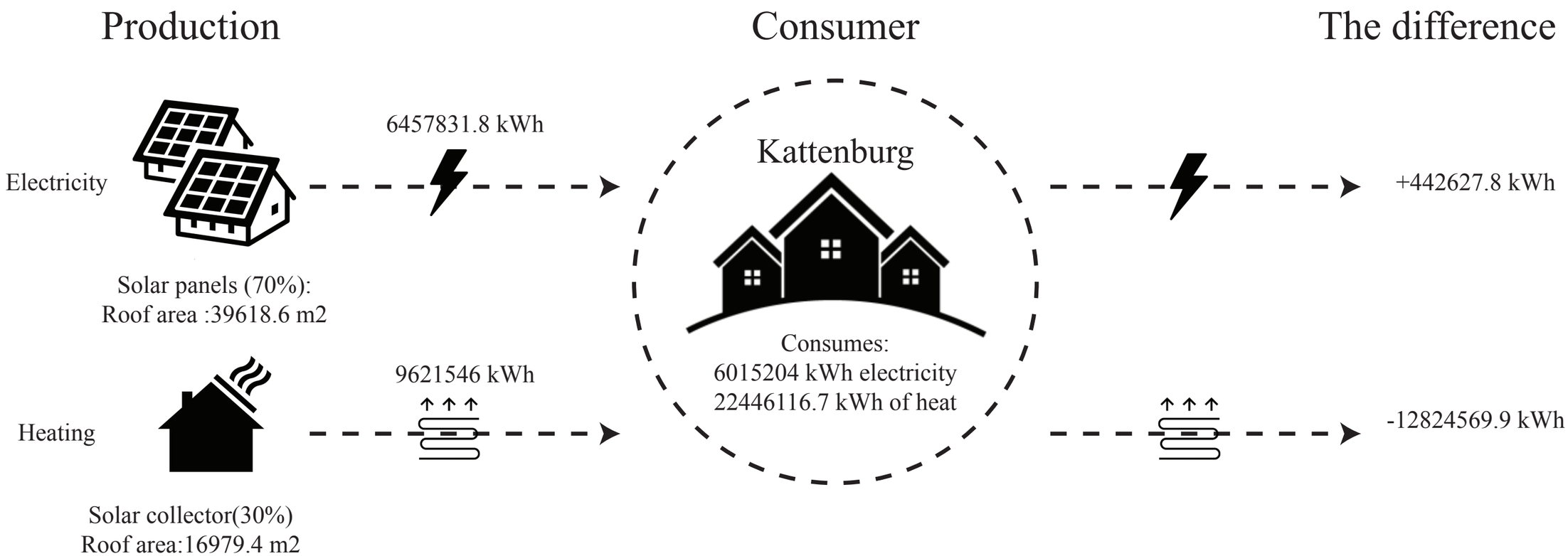
1 Windturbine



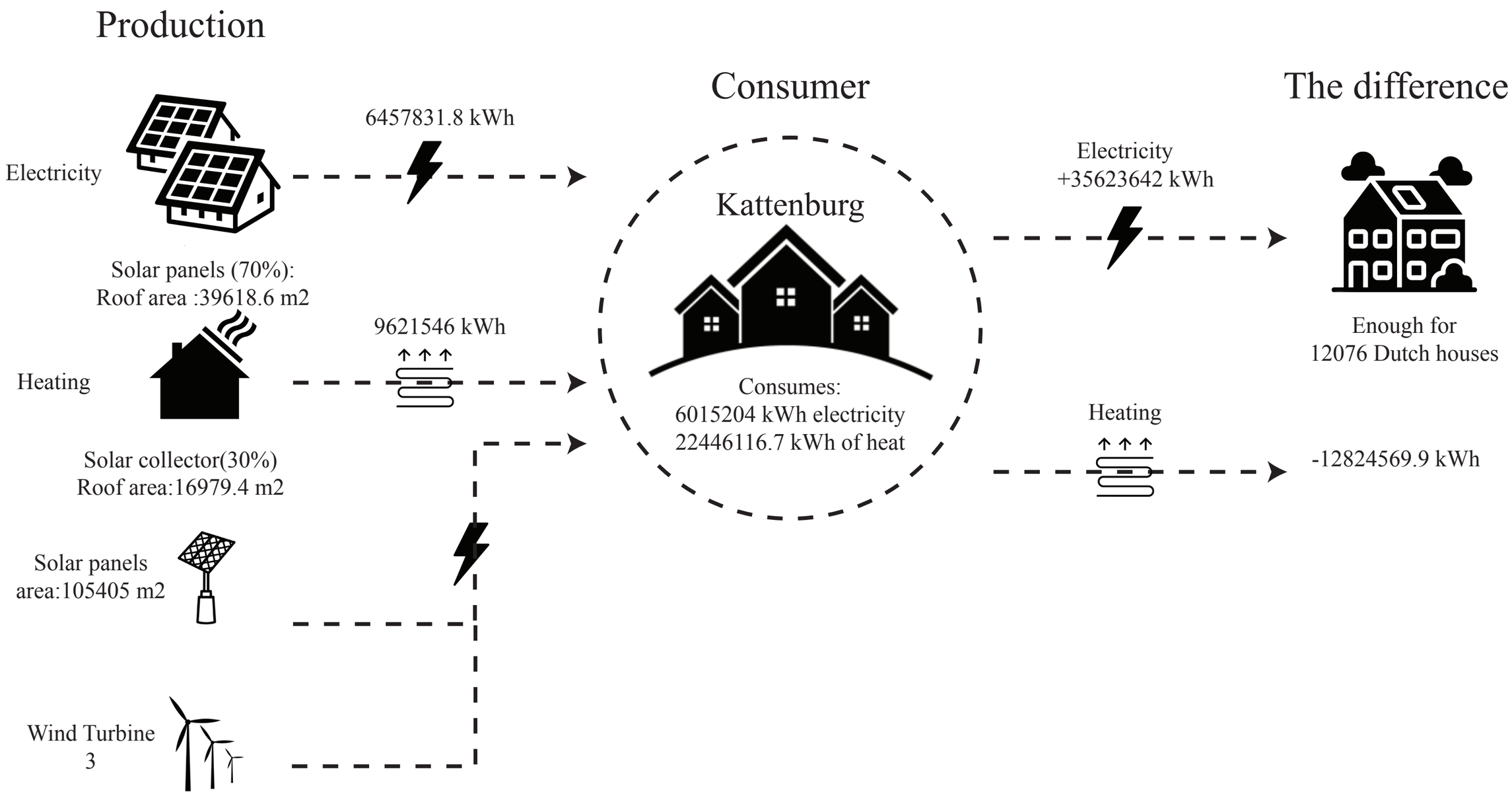
2/3 of a football field

4000 m2 of solar panels

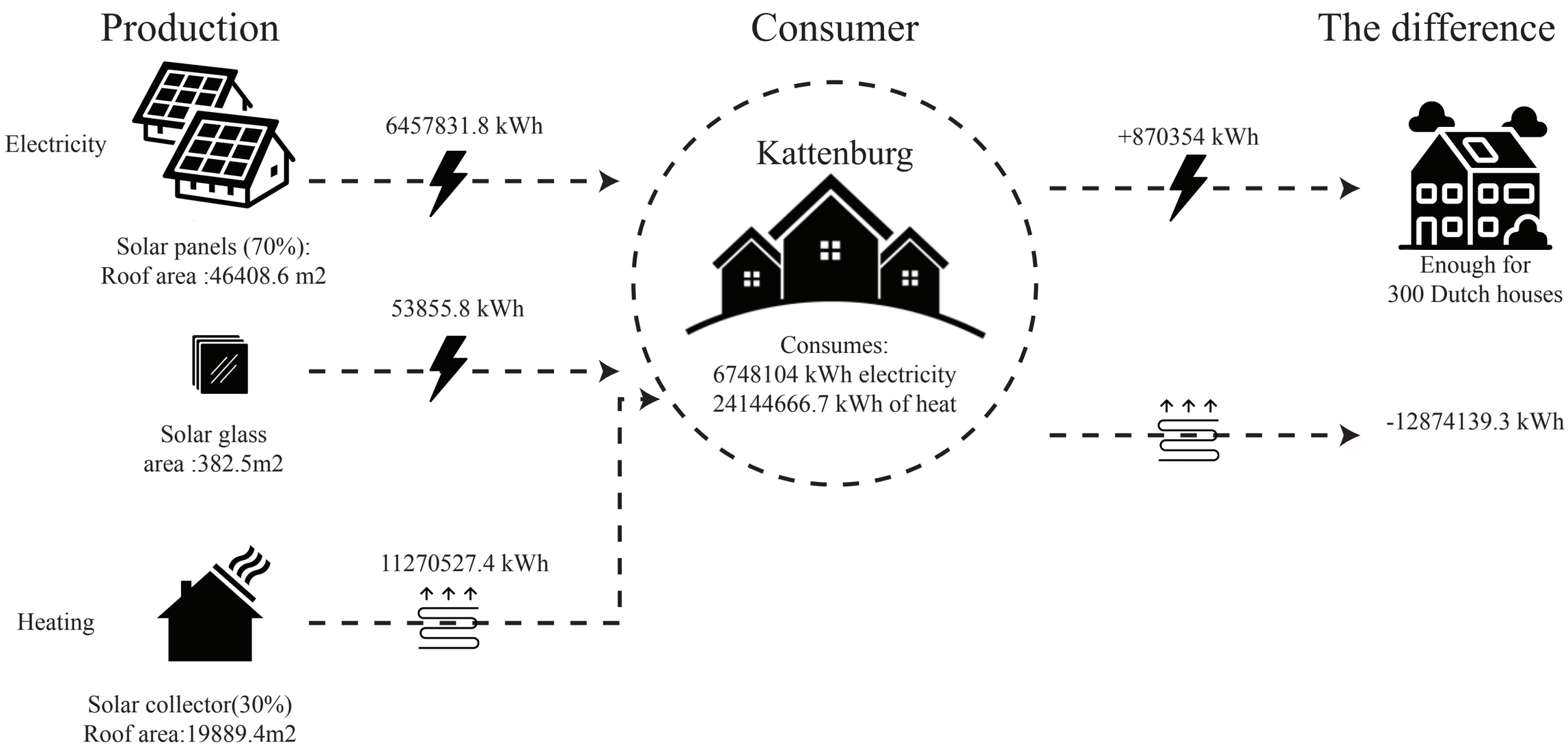
Minimal implications



Kattenburg as a “powerplant”

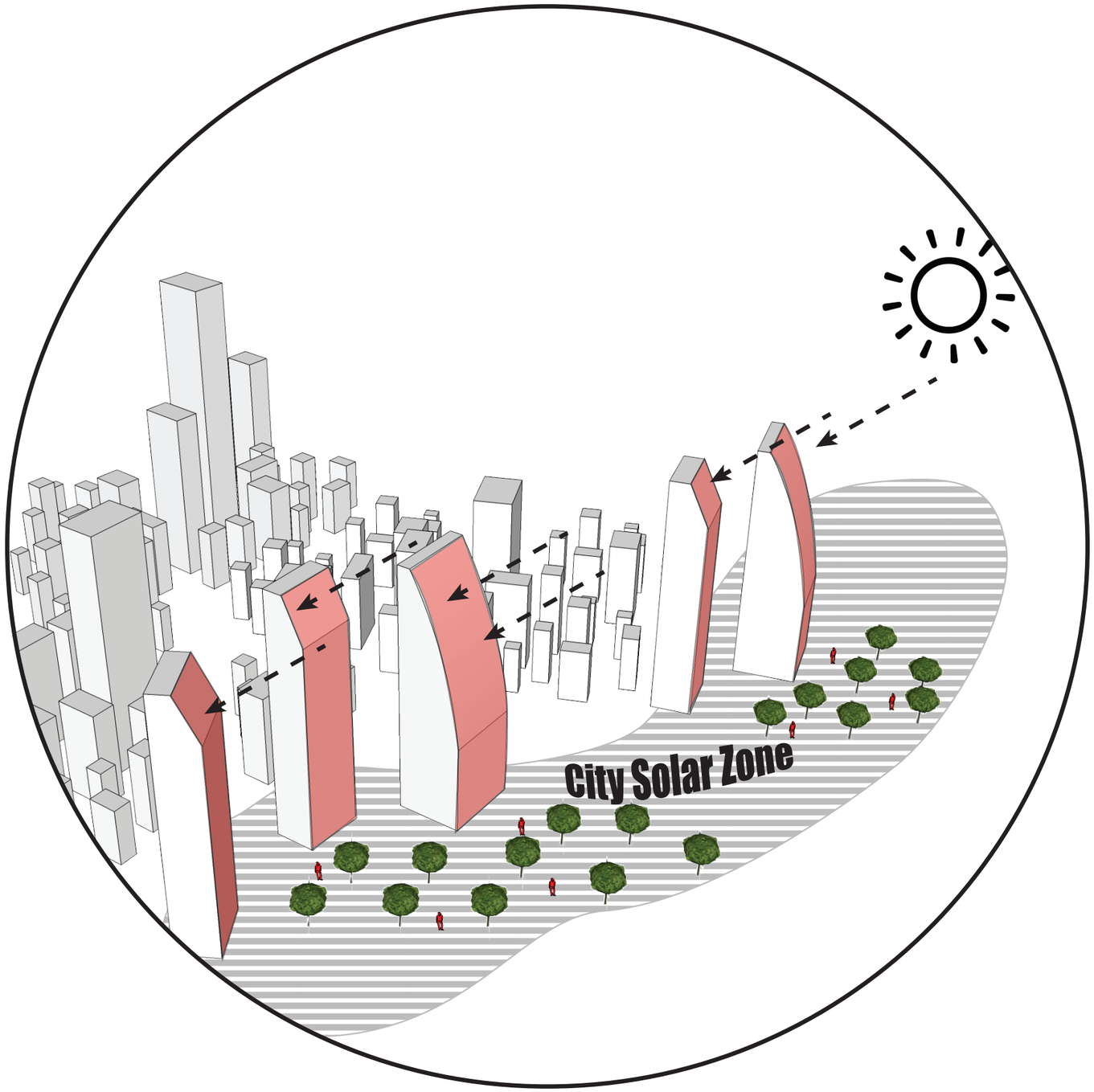


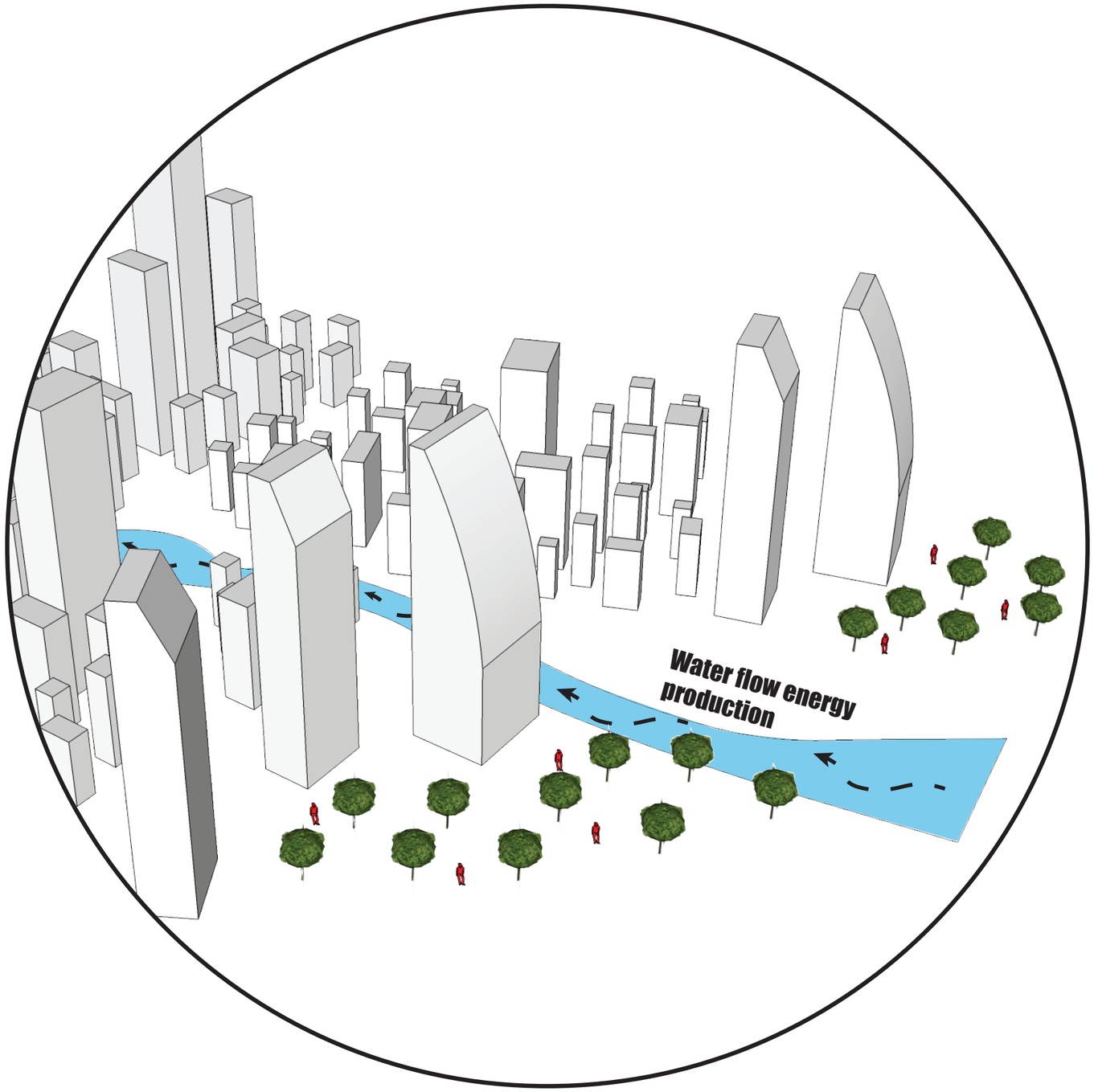
Future scenario 1

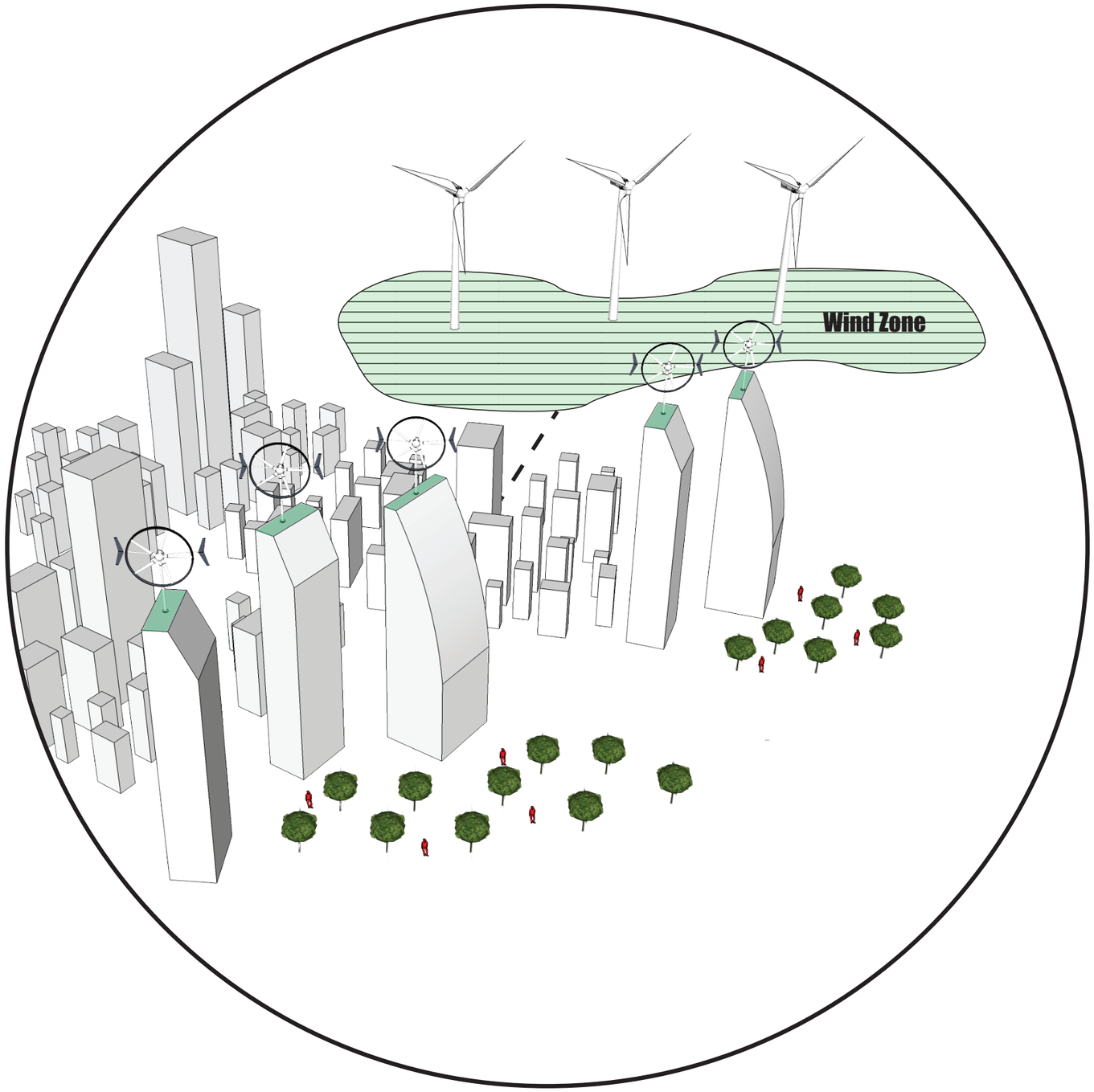


Conclusion

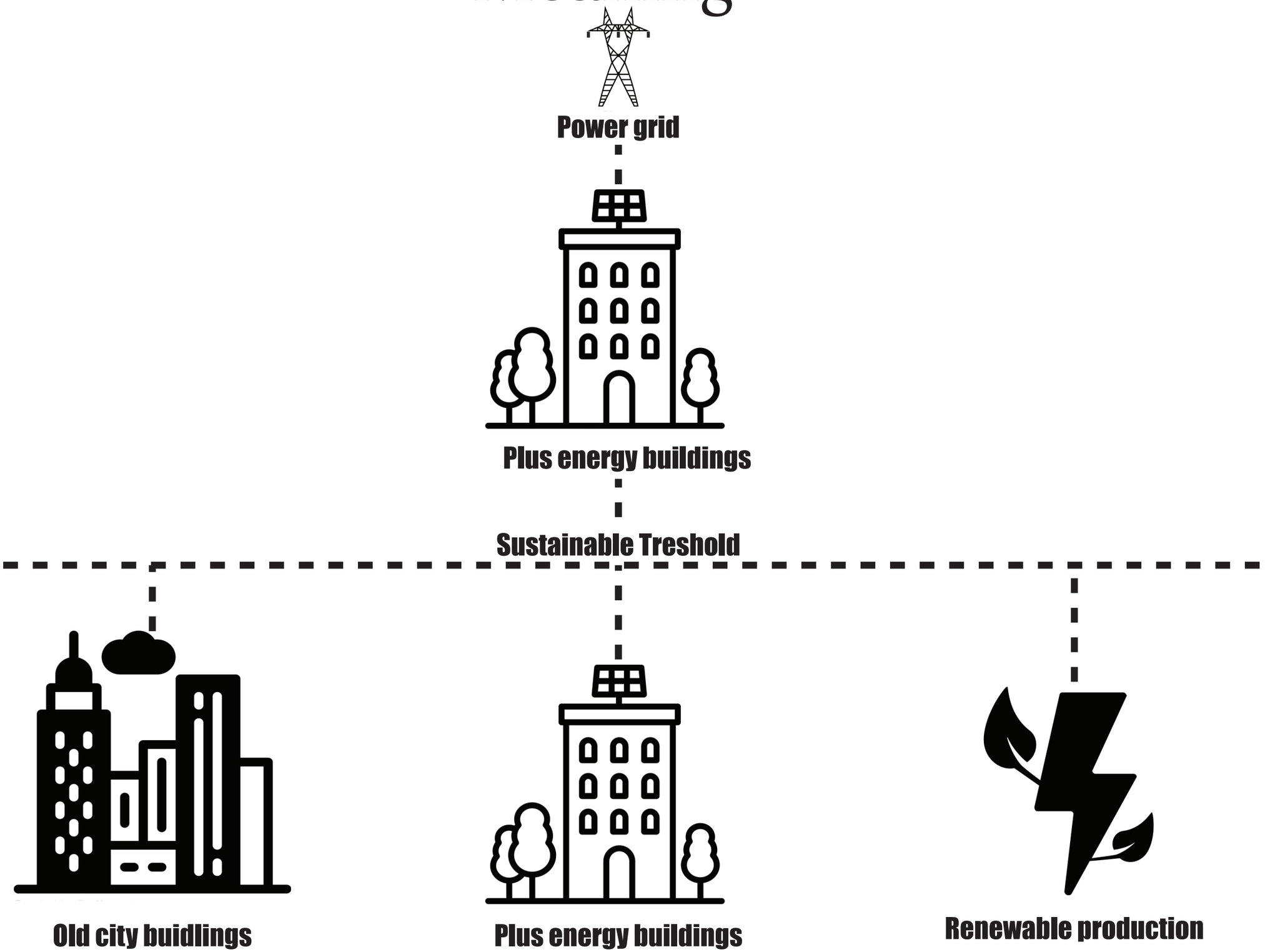
How can renewable energy be produced in our future city and how would It change our public perception of power plants?


City Solar Zone

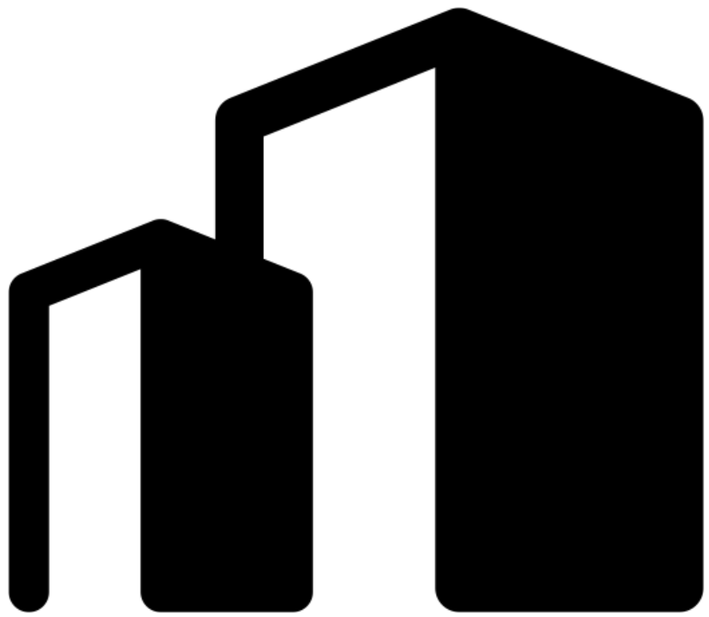

Water flow energy
production


Wind Zone

Meaning

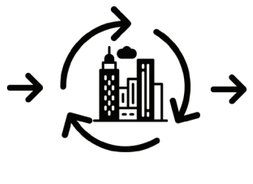

Power grid
Plus energy buildings
Sustainable Treshold
Old city buidlings
Plus energy buildings
Renewable production

The Concept

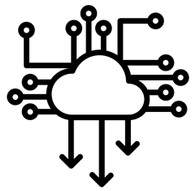


Smartcity Kattenburg

Marineterrein sees itself as becoming a future proof city , Creating a new city within Amsterdam. By applying the research's implications, Marineterrein could become an energy smart city, utilising energy flows in order to transform Kattenburg into an energy resilient city oasis.



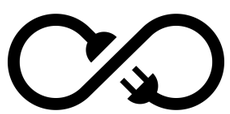
Circle metabolism energy strategy



Smart city technologies

Connected city

Sustainable innovations



Sustainable Distributed energy production

green space within community

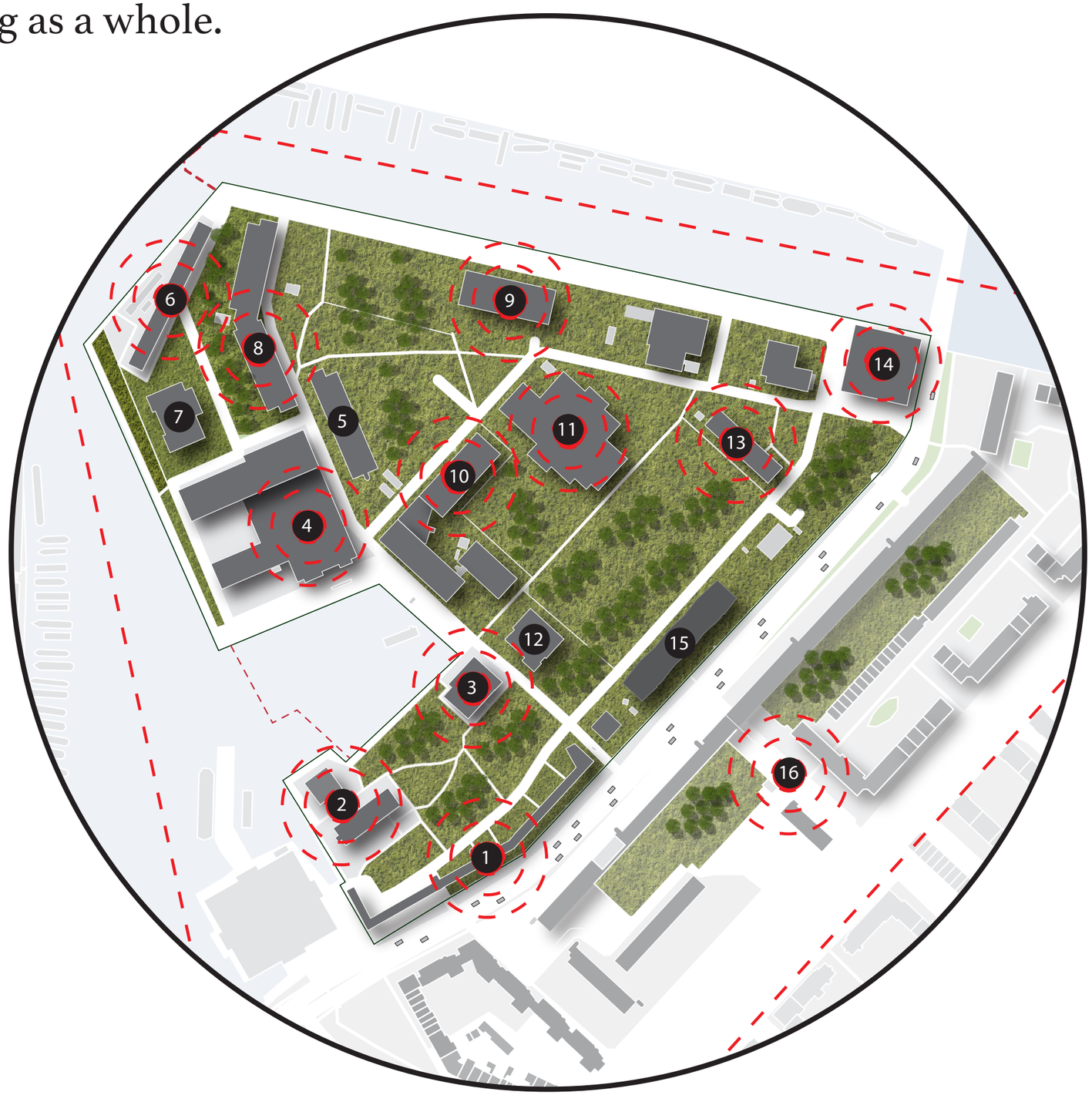
new sustainable business opportunities

performance based implications

a recycle oriented city

Distributed generation

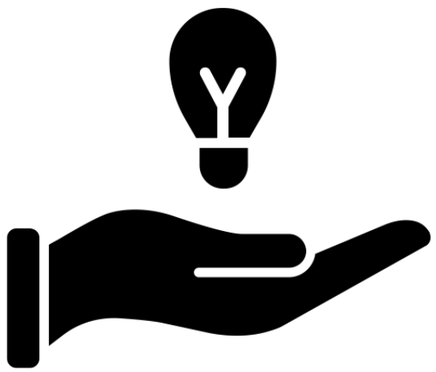
Based on the future energy city trends, Smart city Kattenburg could become a future city where sustainability is one of the highest priority. Turning every building into a powerplant, producing energy for Kattenburg as a whole.



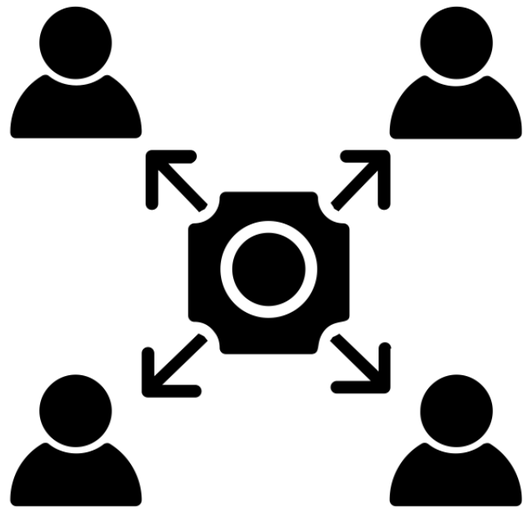
Catalyst building concept

How can a design become an energy production facility, while simultaneously being the catalyst building between the different offices and housing on Marineterrein?

Producing 2/3 more energy then it uses

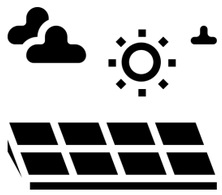


A beacon of sustainability

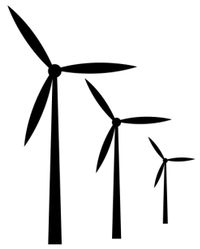


Centre building for district utilities

Renewable production

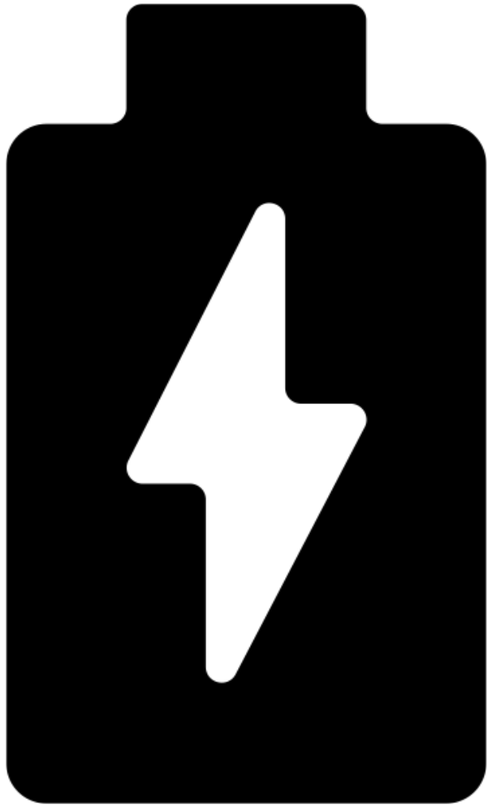


Solar panels produces 72% of its total production in the summer



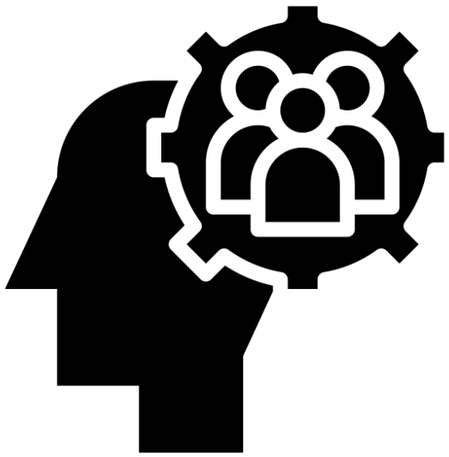
Wind mills produces 64% of its total production in the Winter

Most renewable prodocution DG's do not supply a constant energy basis.

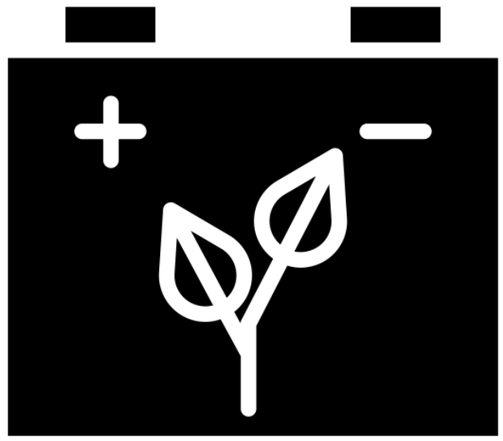


Storing energy is the real problem

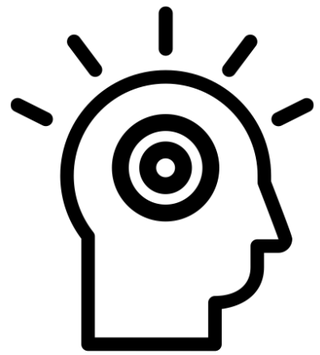
Tangibility



Human interaction with Energy



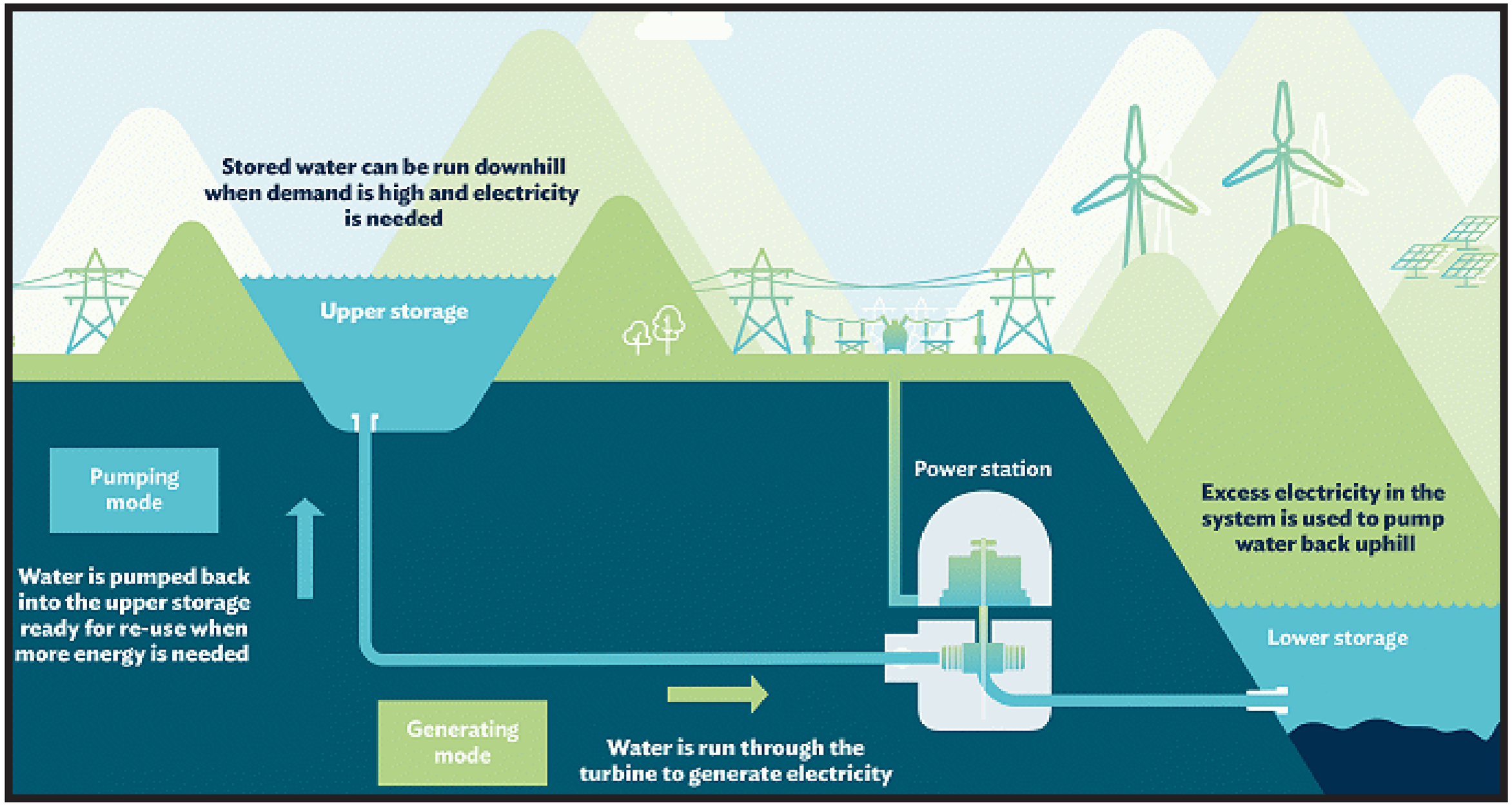
Sustainable battery



sustianably contious

Hydro Energy

Hydro pump storage

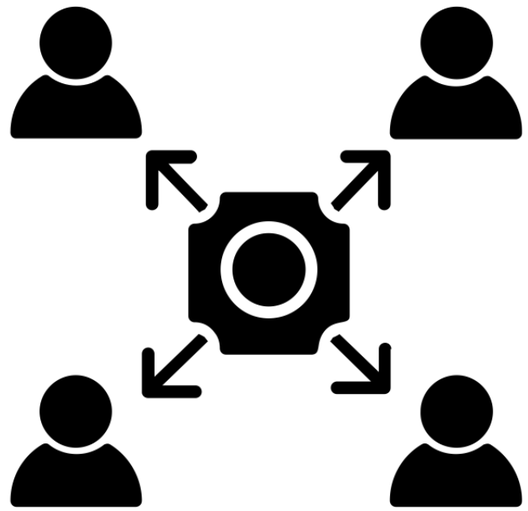


The idea

Battery

Energy for Marineterrein

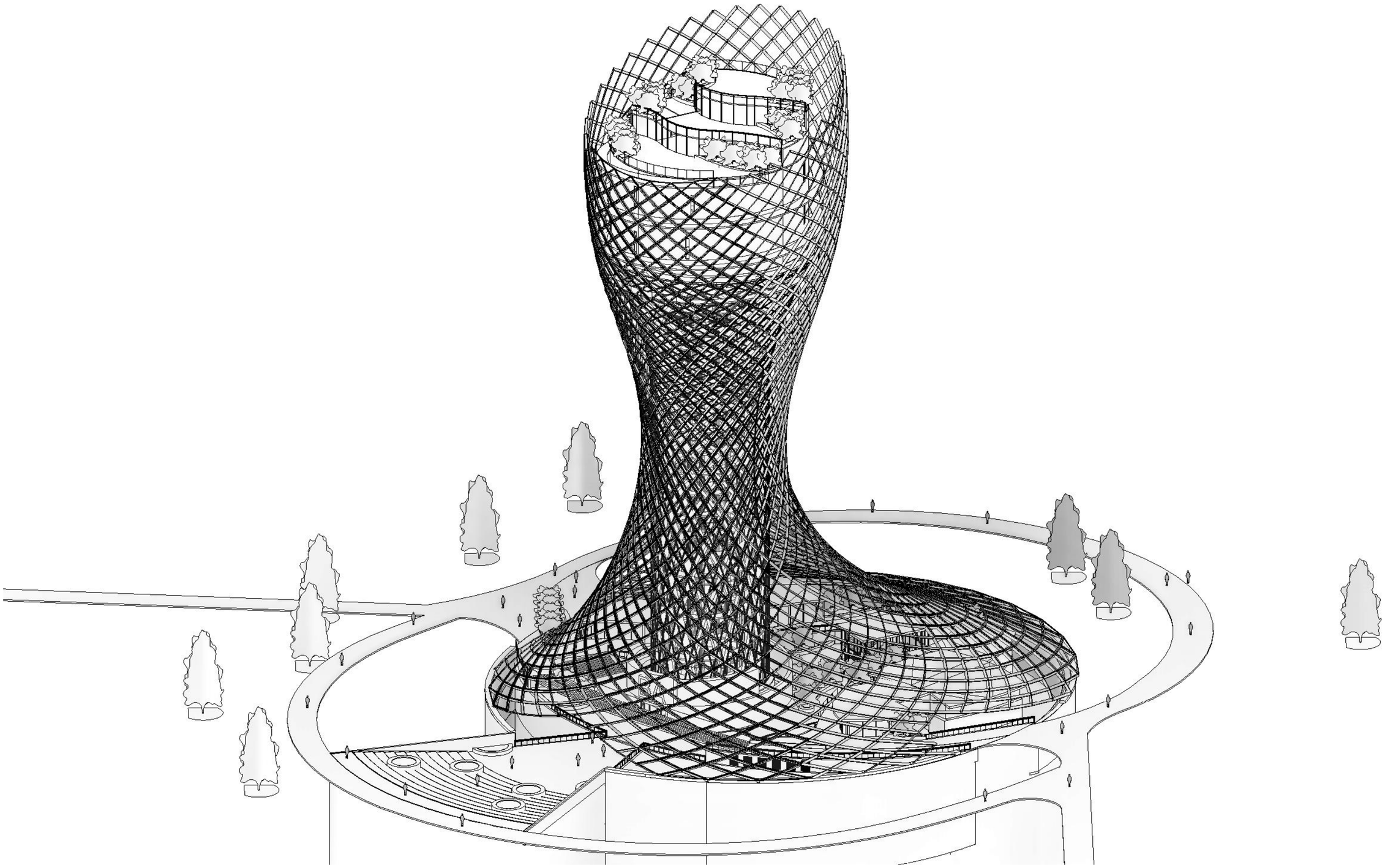
100 meter high water tower

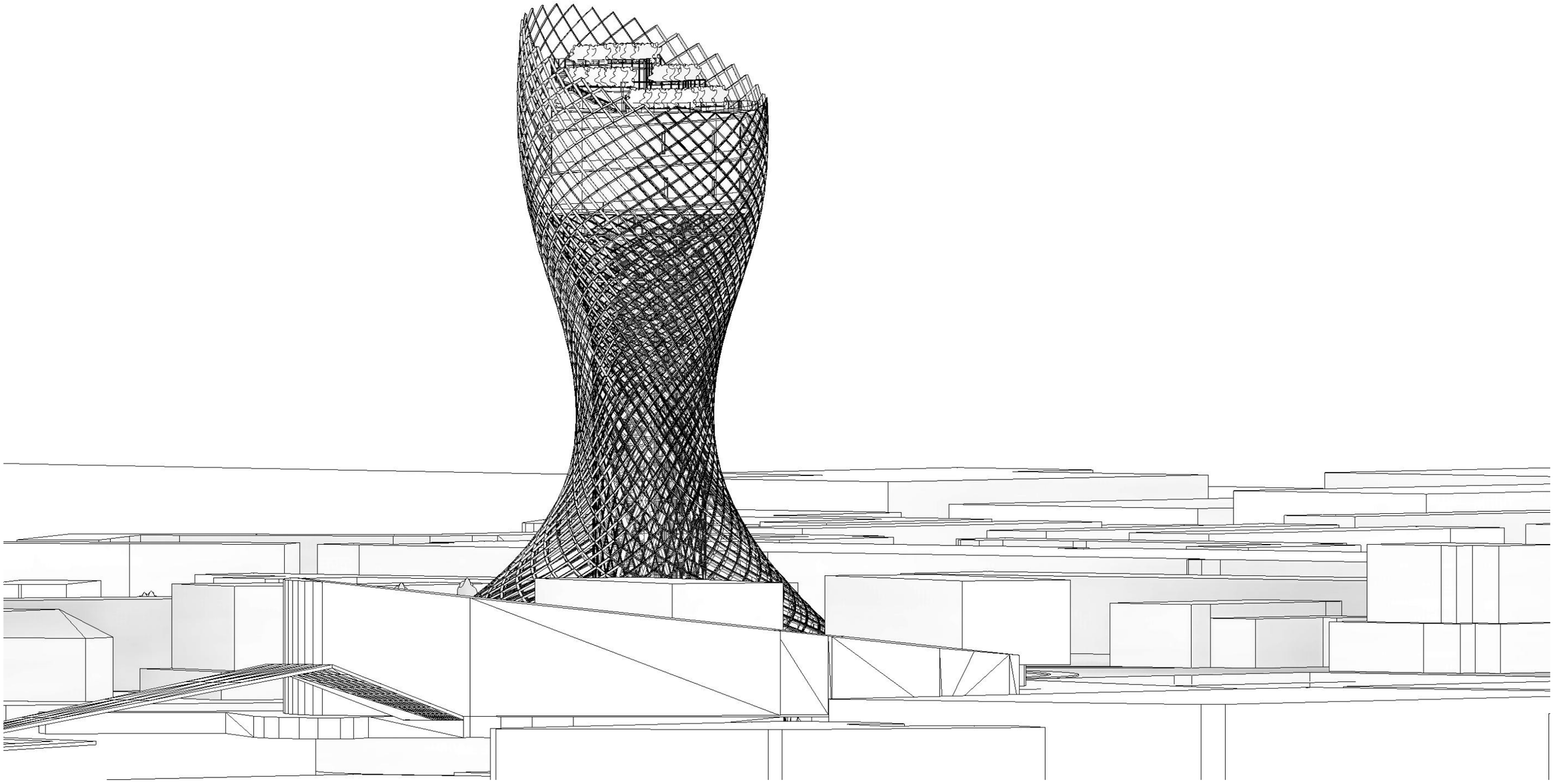


Centre building for district utilities

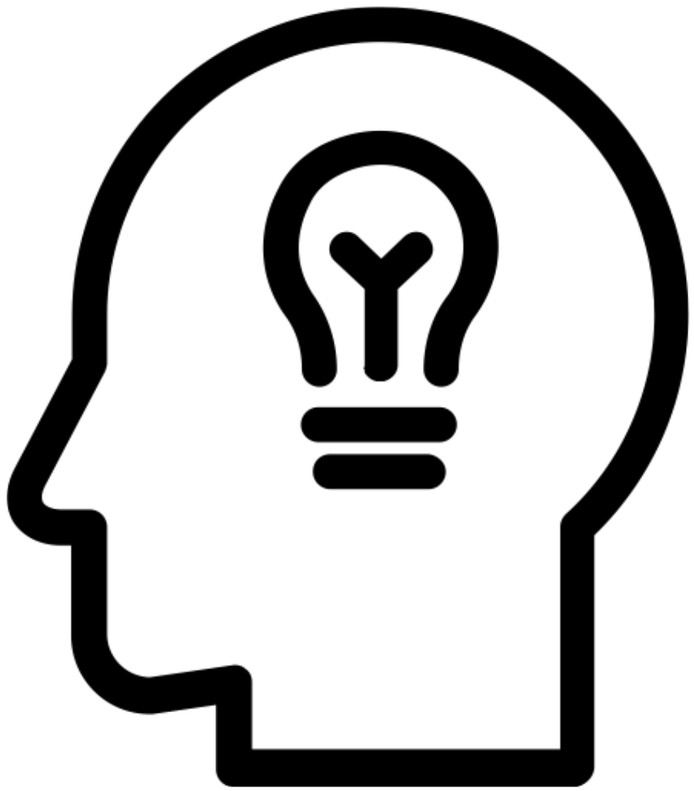
Renawable Power plant

The Battery of Amsterdam





The Concept



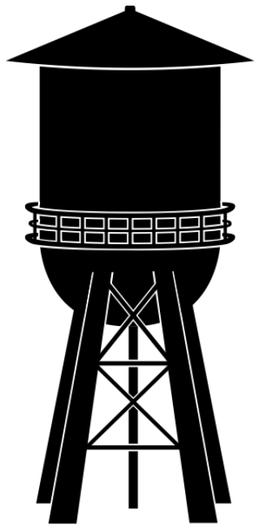
Water Tower

Watertowers has had a rich history within our society, soaring high within our communities, giving fresh water to our citizens. This idea of a water tank soaring high within the skyline of the city was one of the key inspirations for the BA.

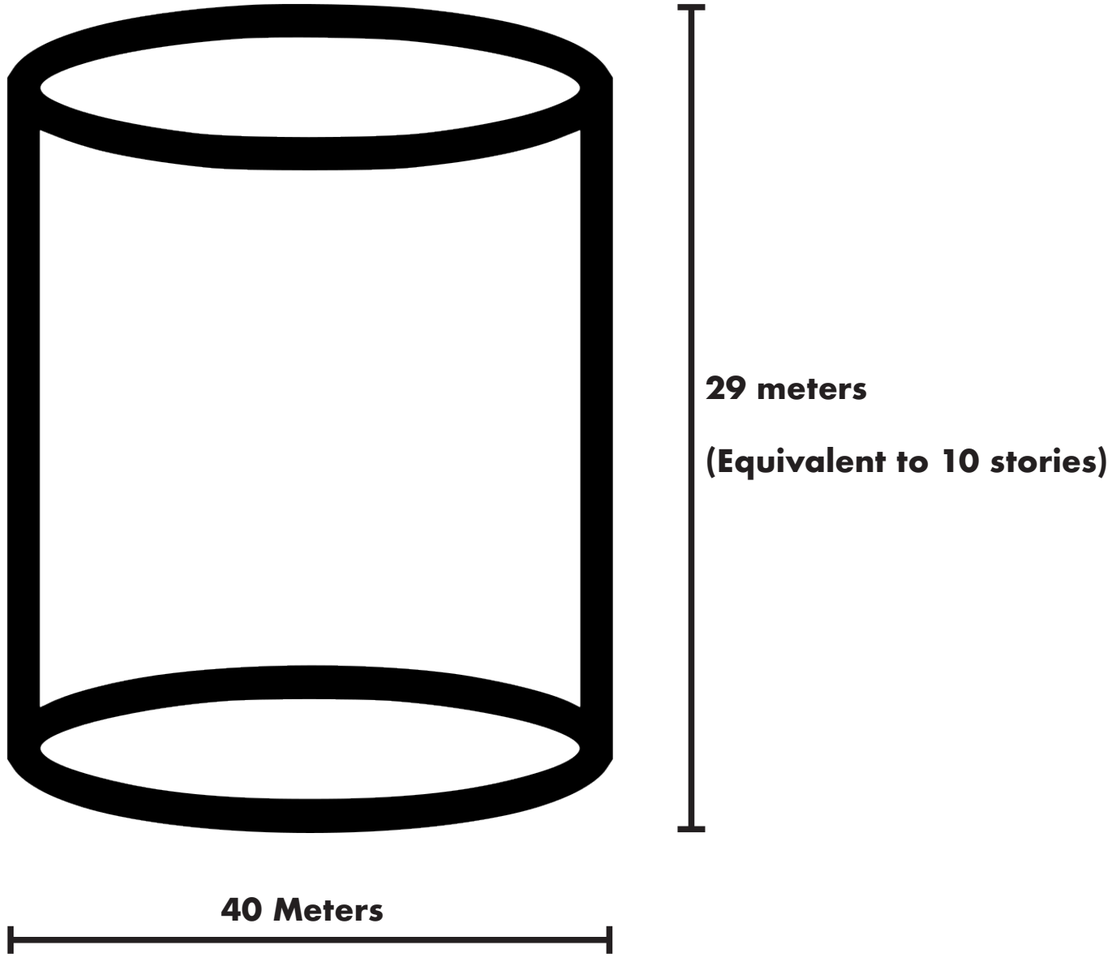
The Battery

Crunching the numbers

Enough energy for Kattenburg



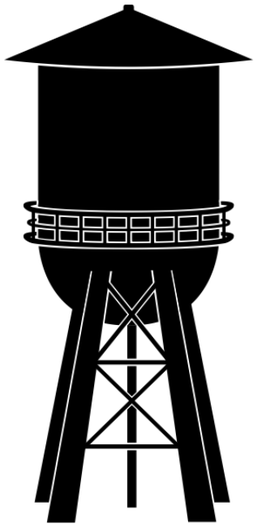
33609m3 of water



Tangibility

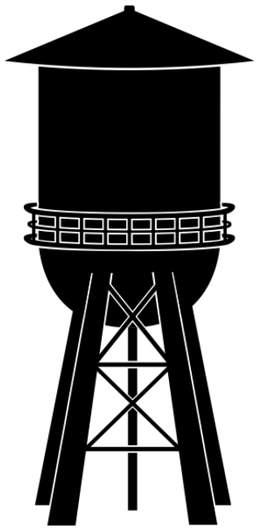
Seeing and believing

Tank for the citizens of kattenburg



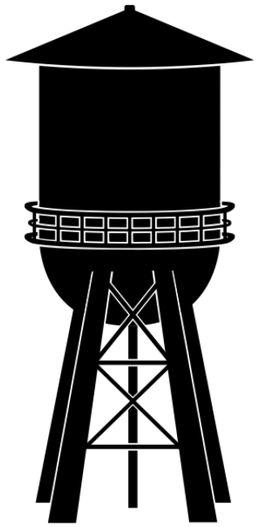
11204 m3 of water

Tank for the future of Marineterrein

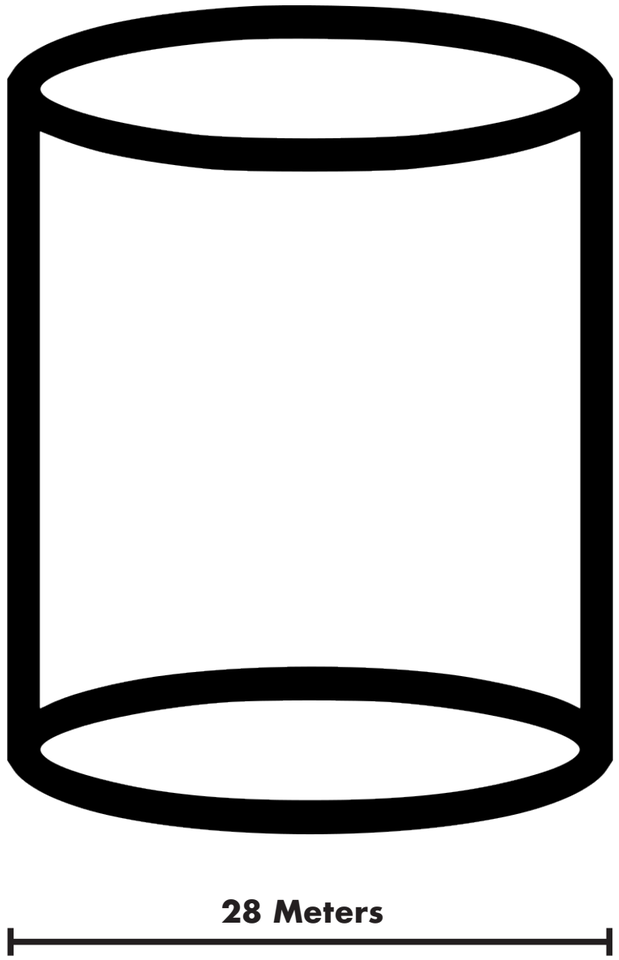


22406 m3 of water

Kattenburg's Watertower



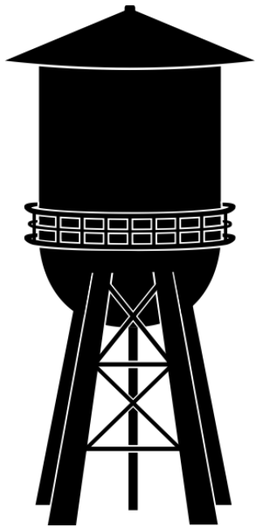
11204 m3 of water



FLES

Flat land Large scale energy storage

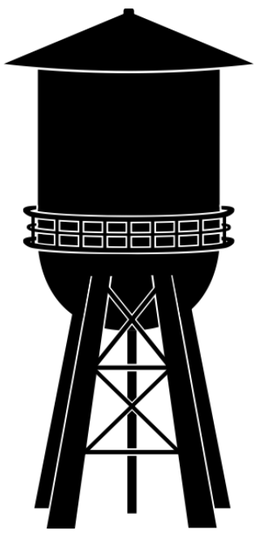
Tank for the future of Marineterrein



22406 m3 of water (future expectations)

+

Storage for other buroughs

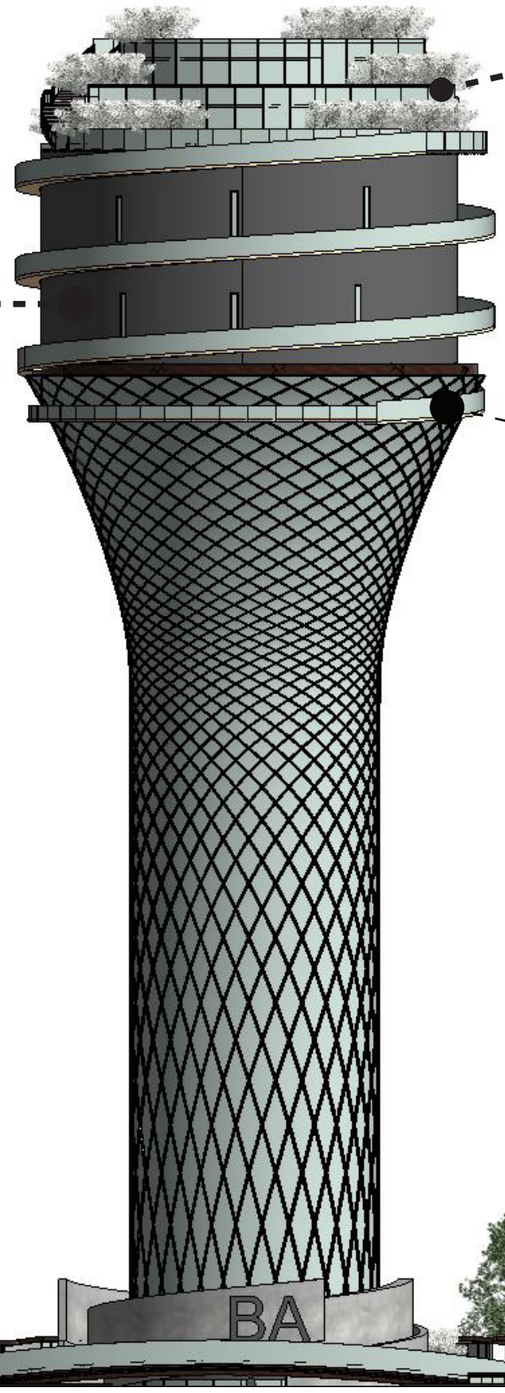


10000 m3 of water

The program

Kattenburg tank
11204 m3

440 m2
event space

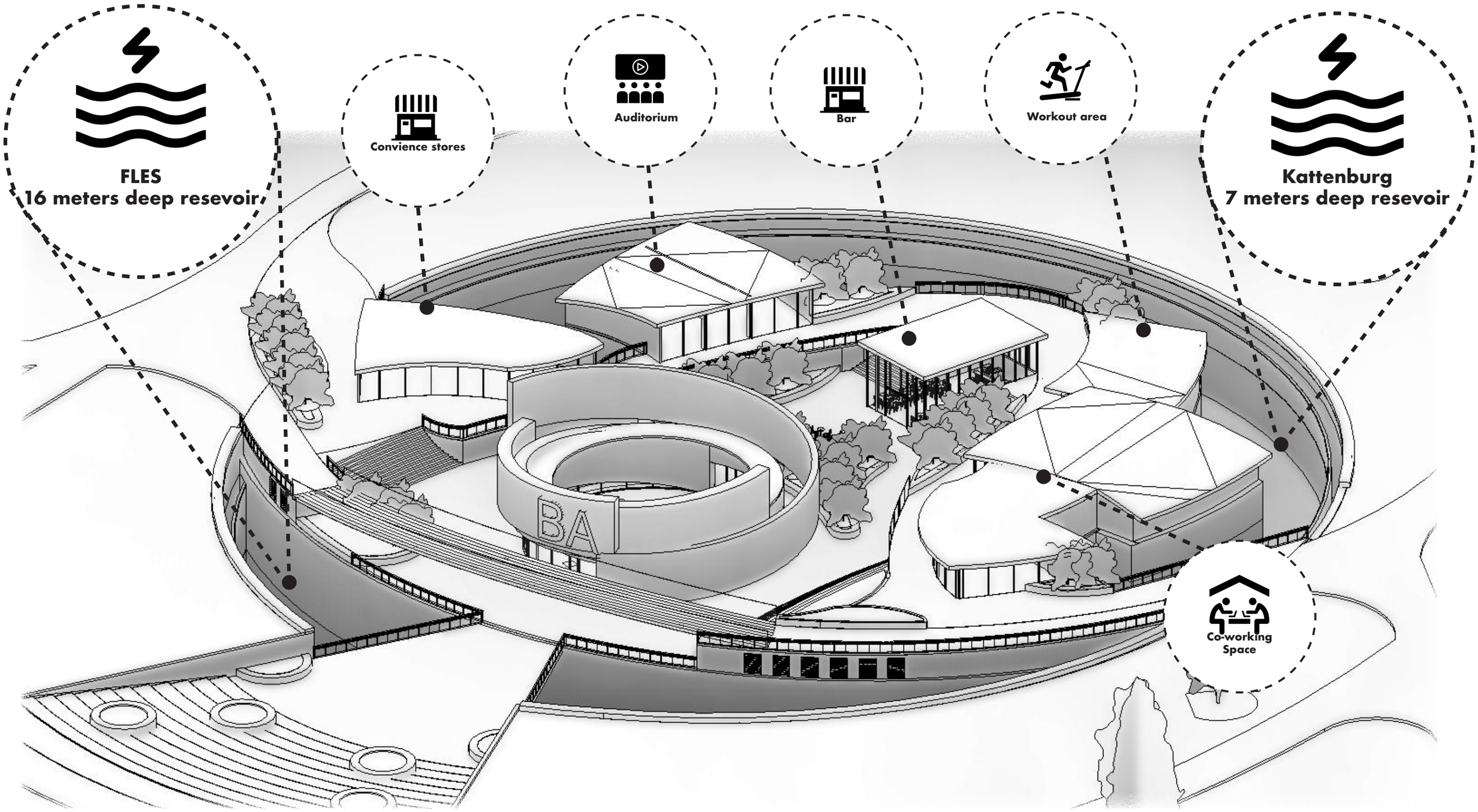


500 m2
observation and
restaurant space

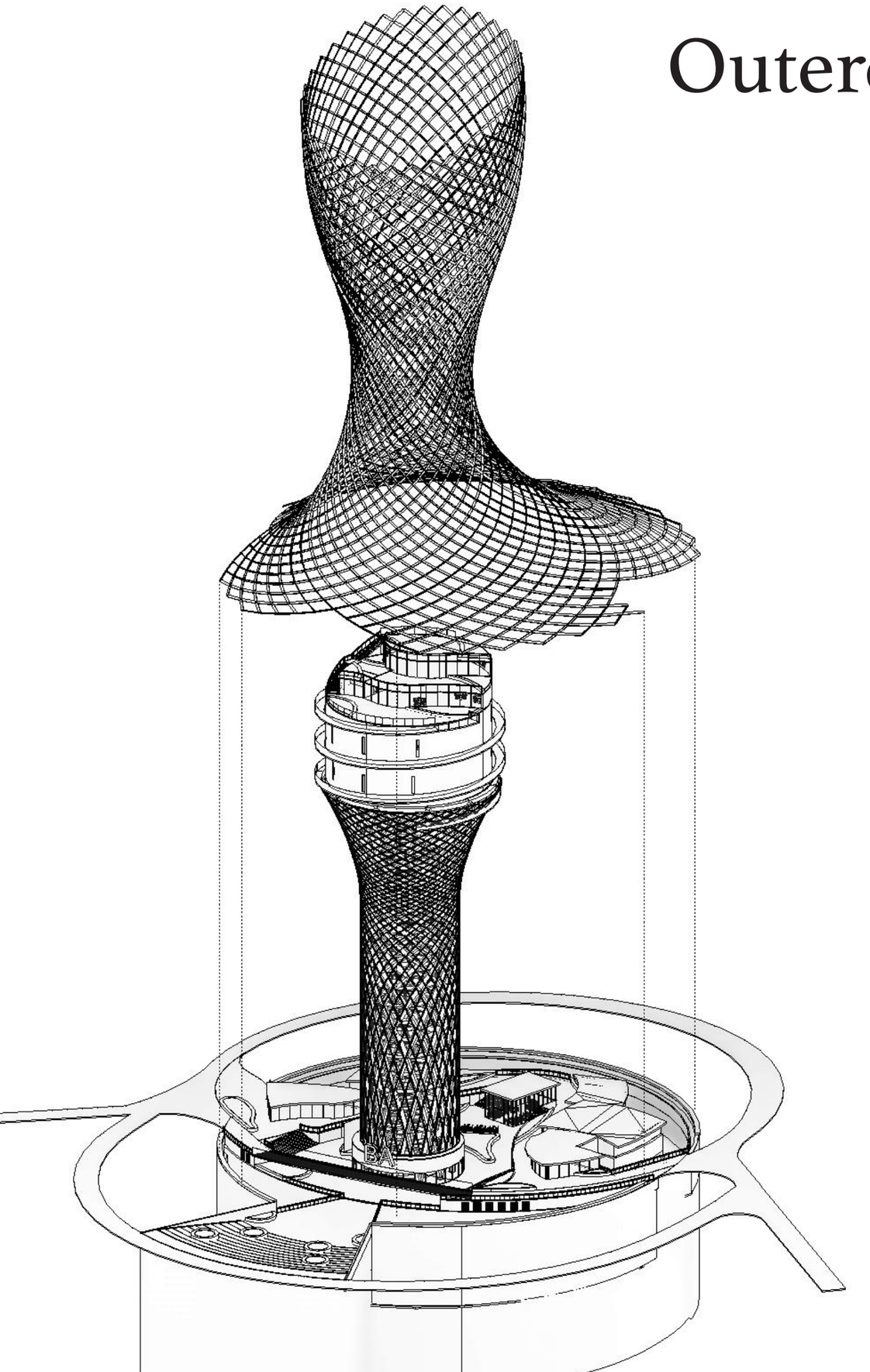
2 Water resevoirs
33609 m3 +

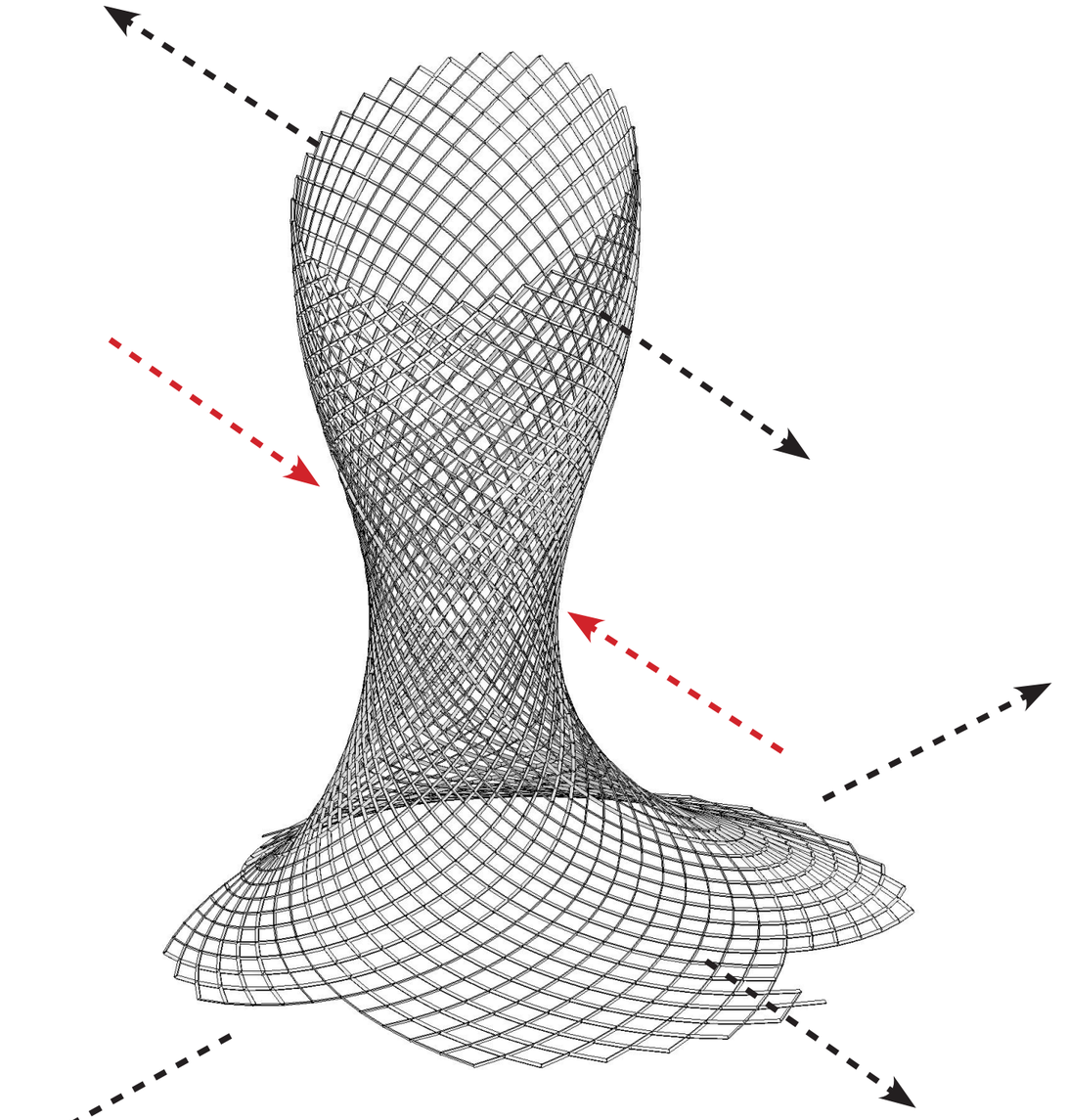
BA Springs
700 m2
commercial space

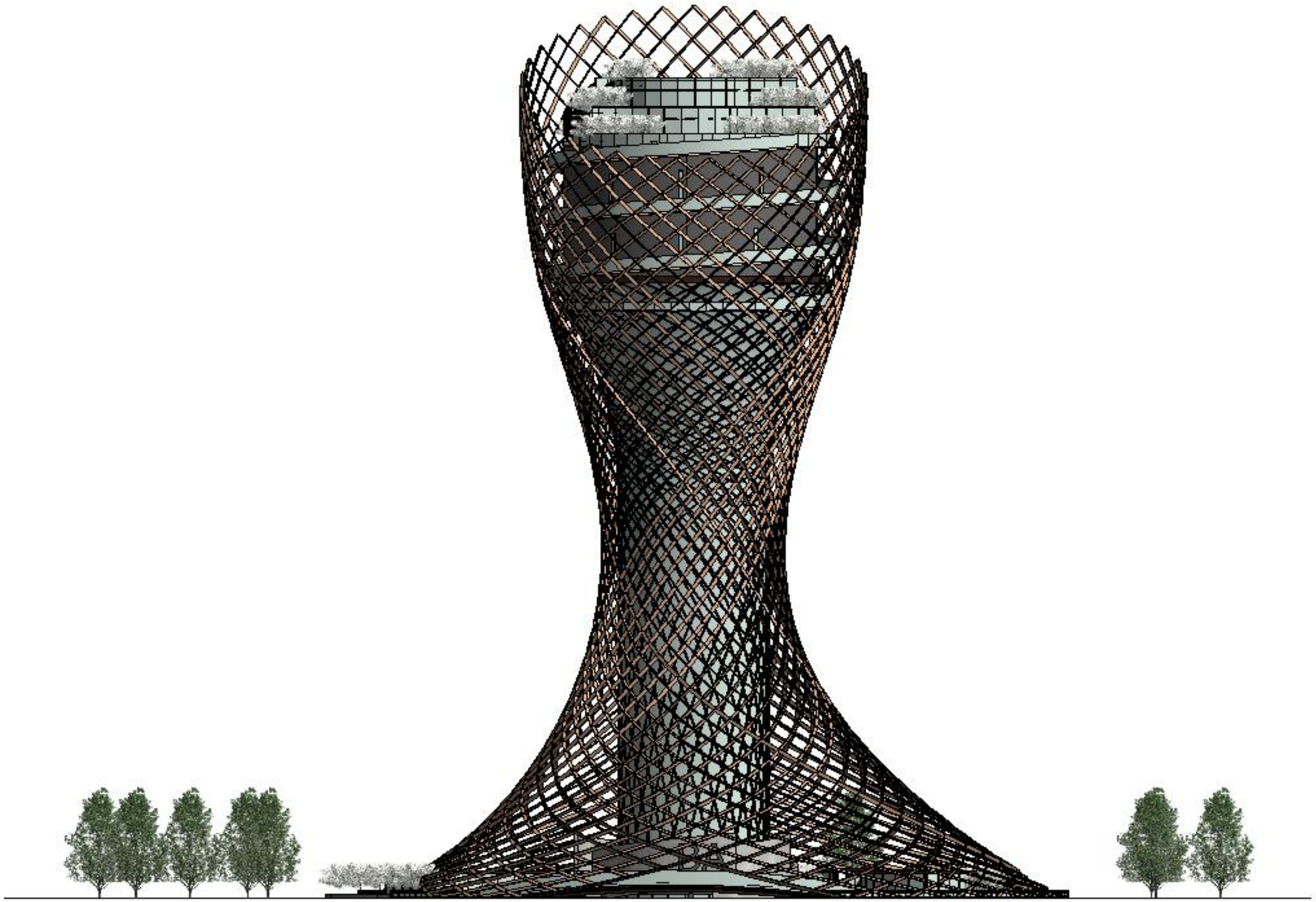
BA Springs


FLES
16 meters deep resevoir
Convience stores
Auditorium
Bar
Workout area
Kattenburg
7 meters deep resevoir
BA
Co-working
Space

Outercore structure



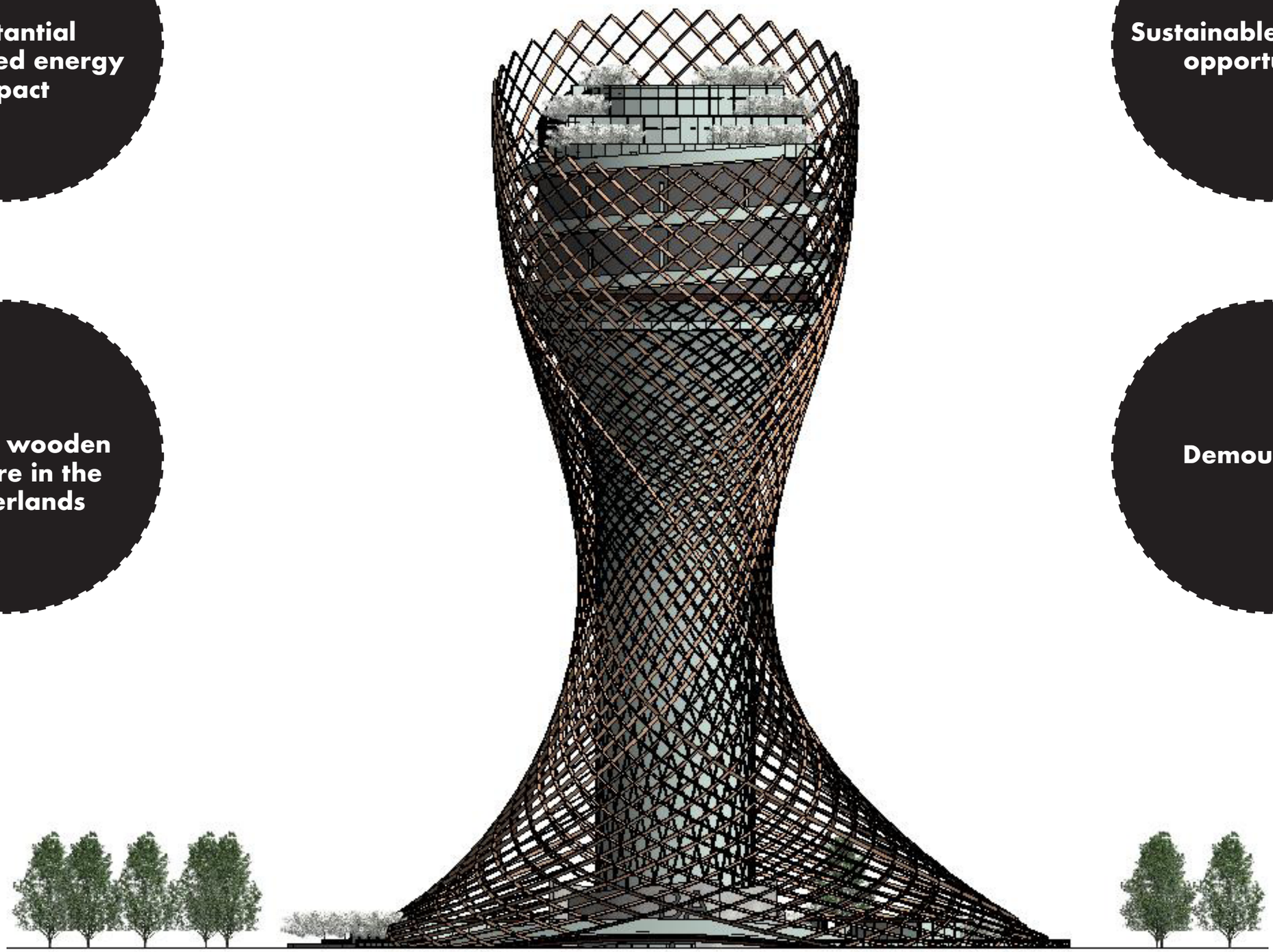




Sustainable impact

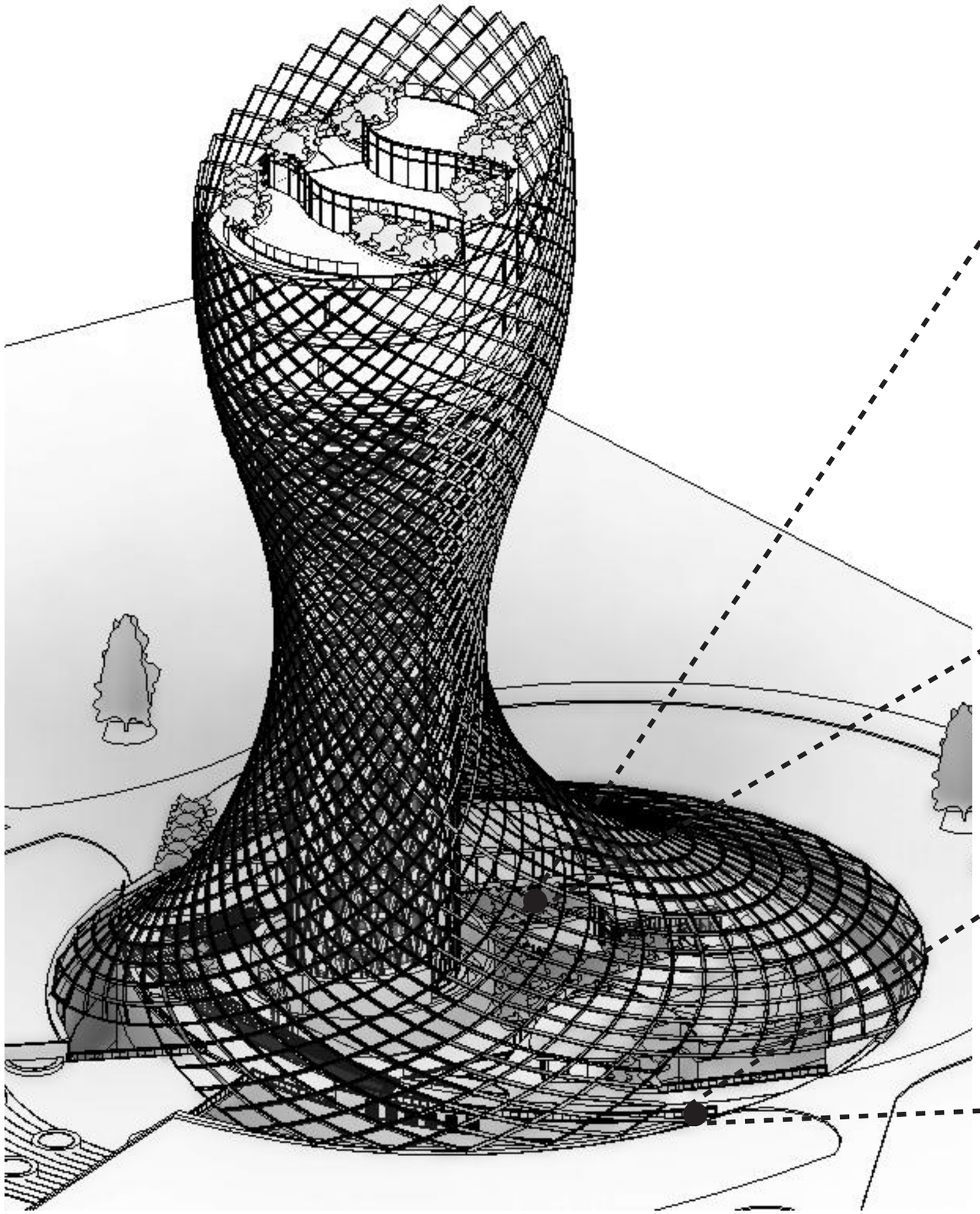
substantial embodied energy impact

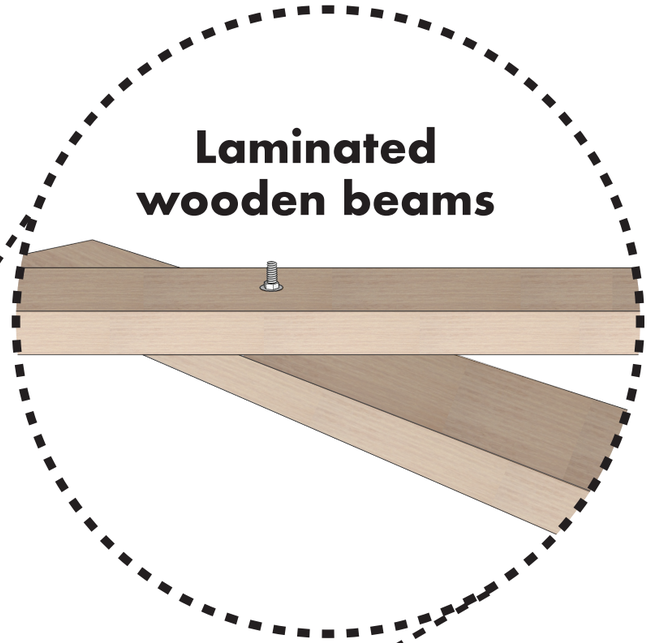
Highest wooden structure in the Netherlands

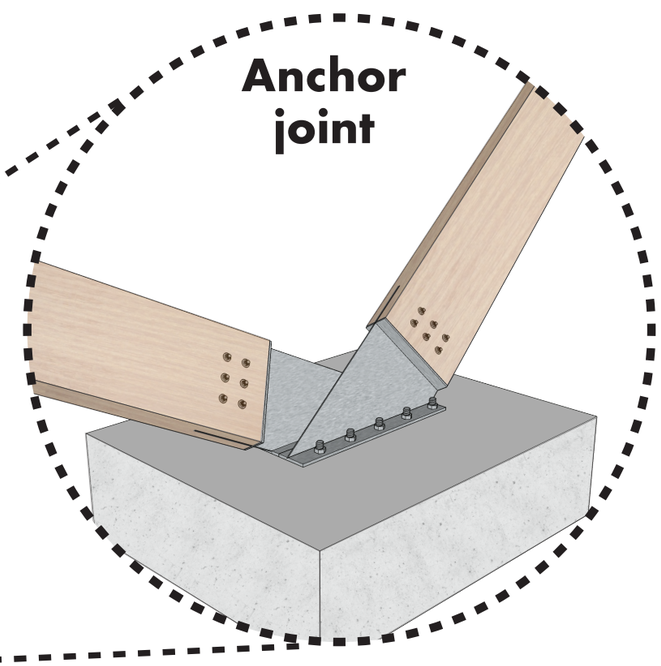


Sustainable bussiness opportunities

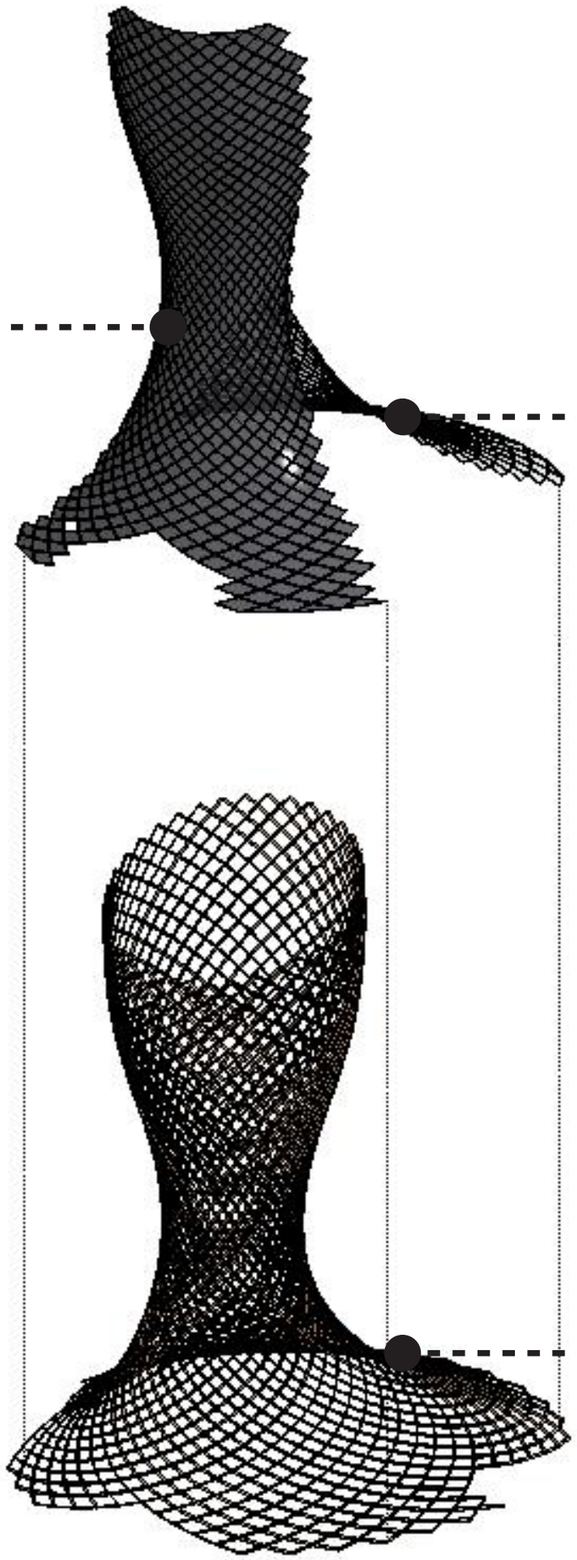
Demountable




Laminated
wooden beams

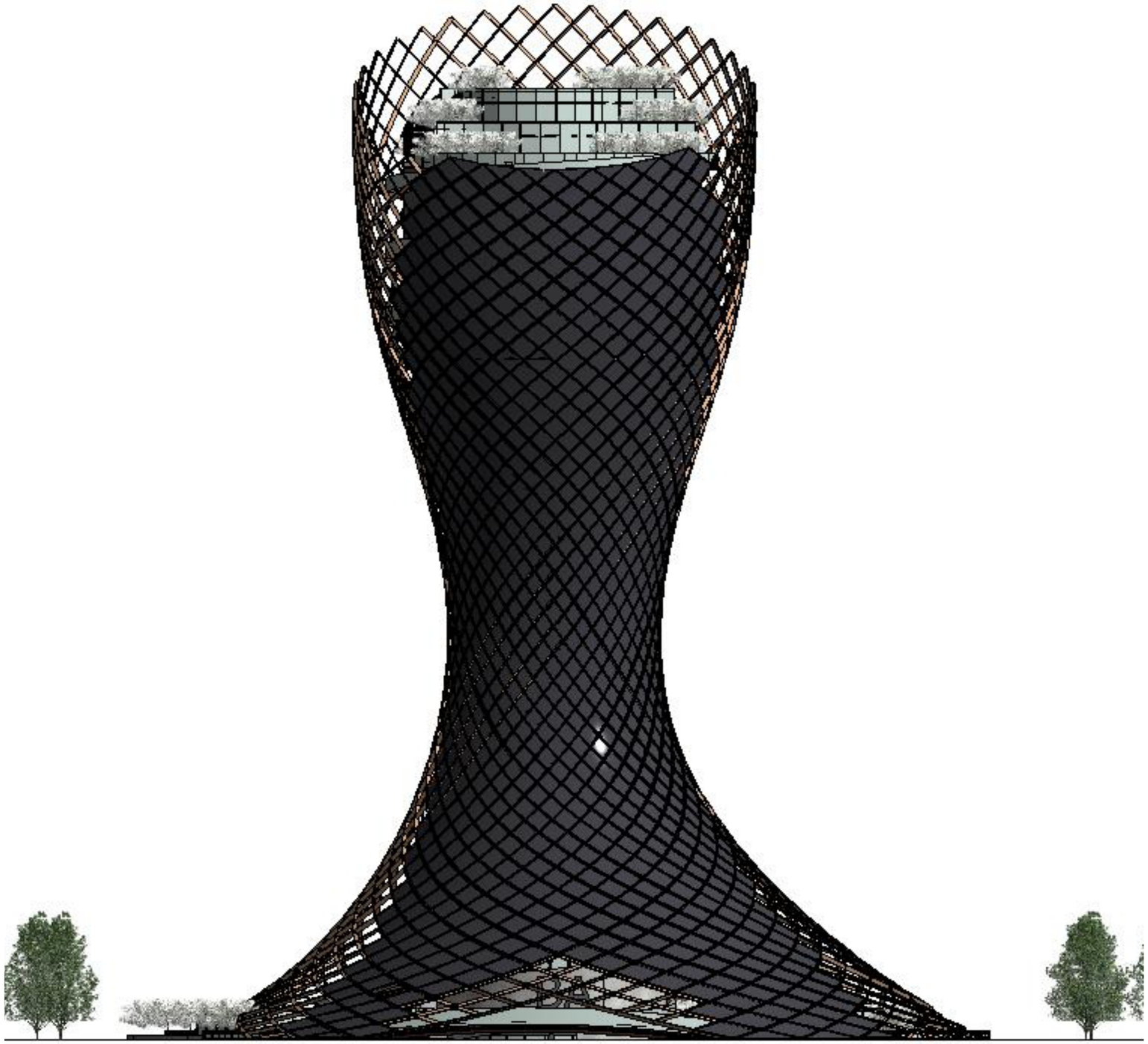

Anchor
joint

Solar panels and solar glass facade



Glass facade Creating an open atrium

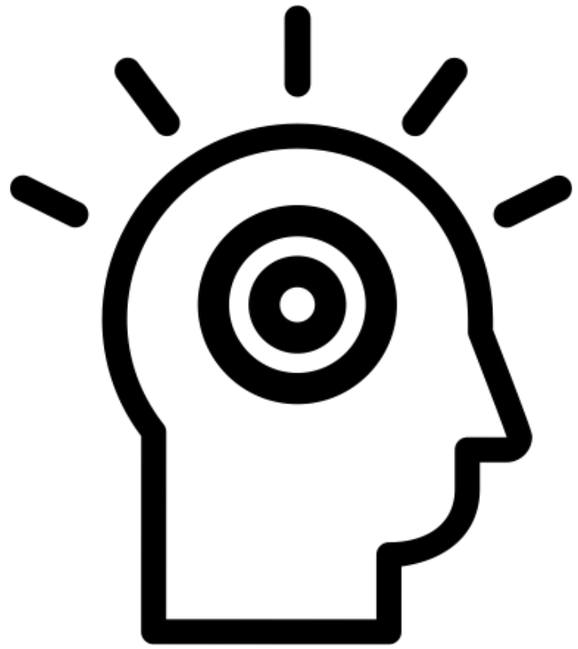
Wooden Outercore structure

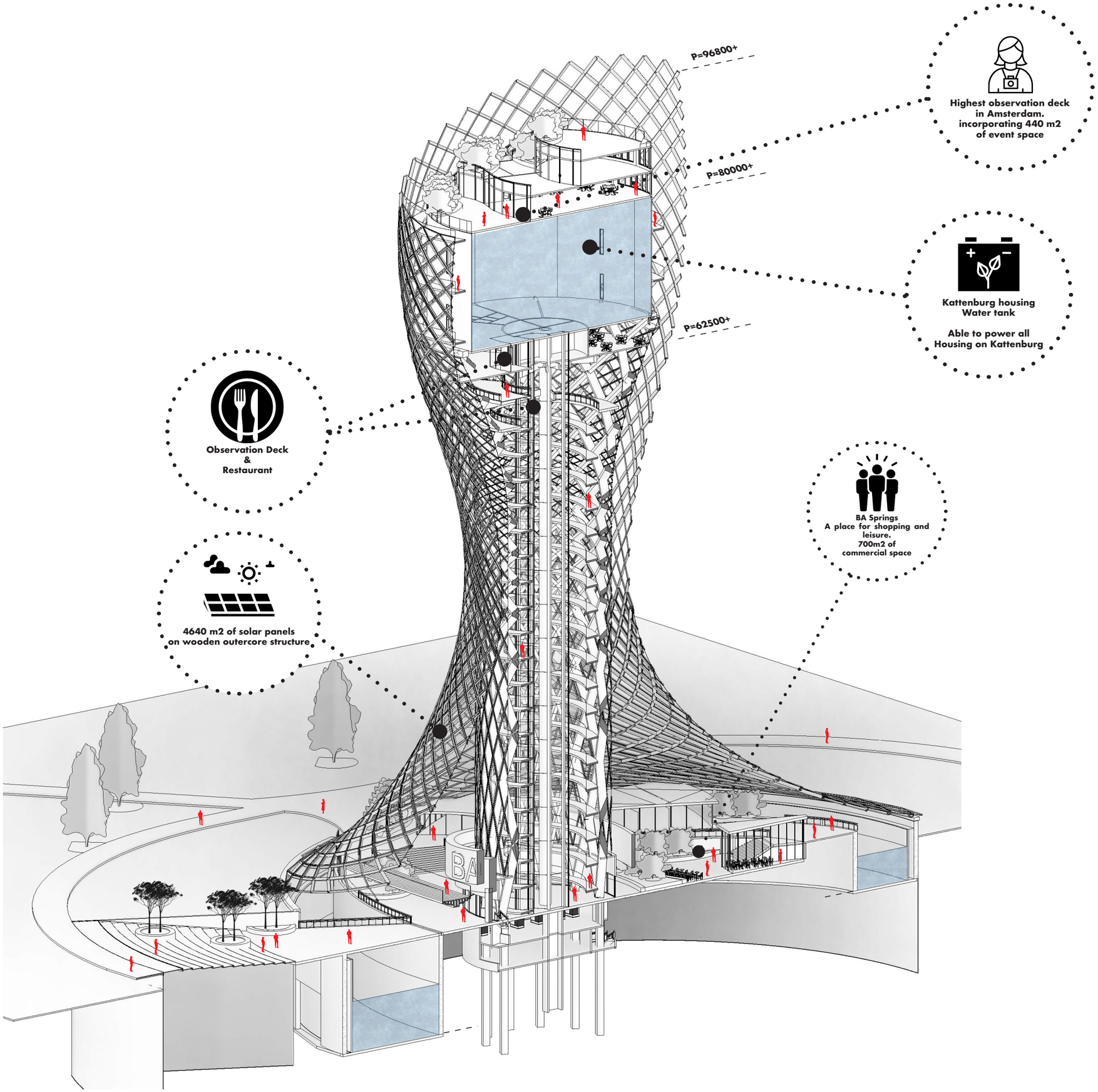


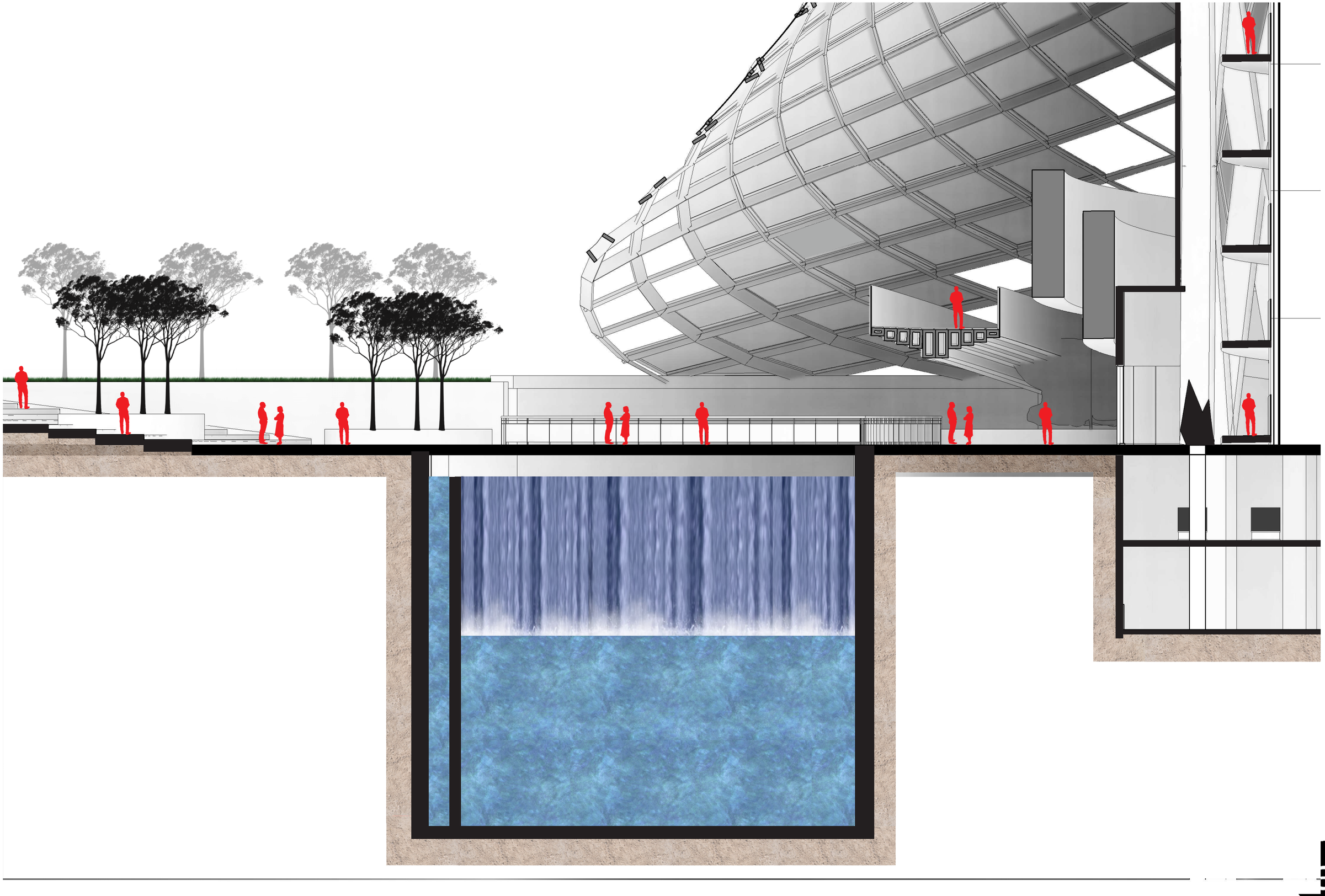
Outercore structure creates a surface space of 12715 m2.

Creating a surface space for 4464 m2 of solar panels

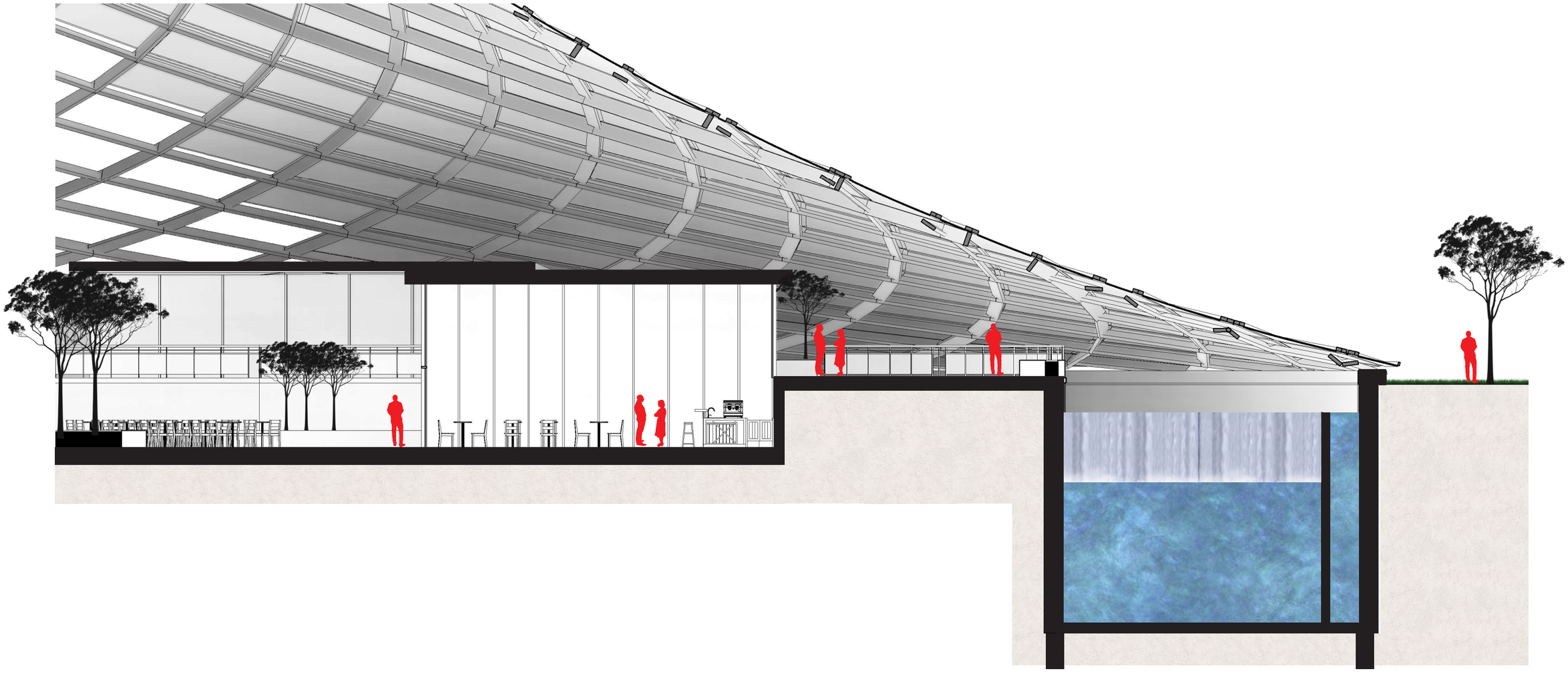
Experience

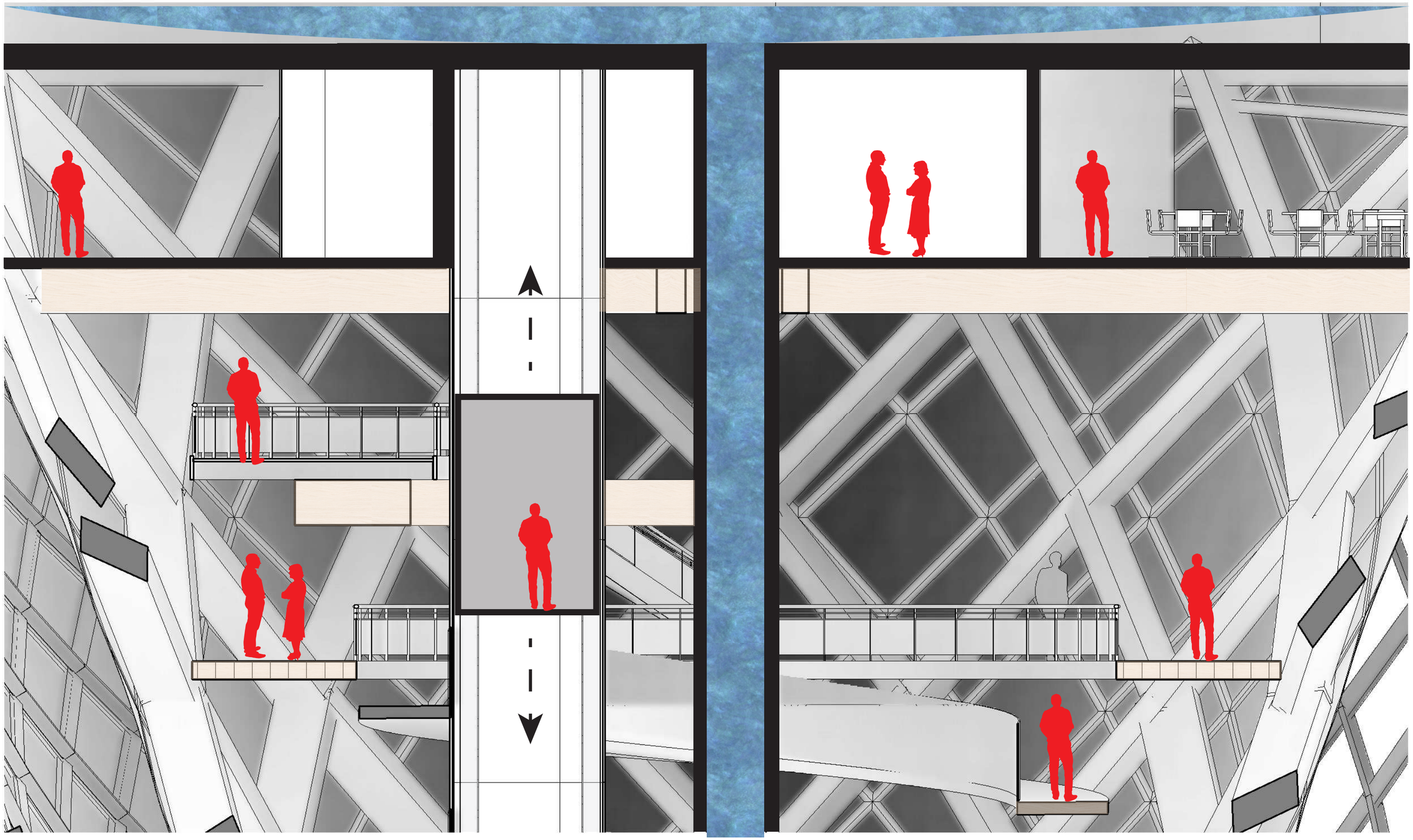


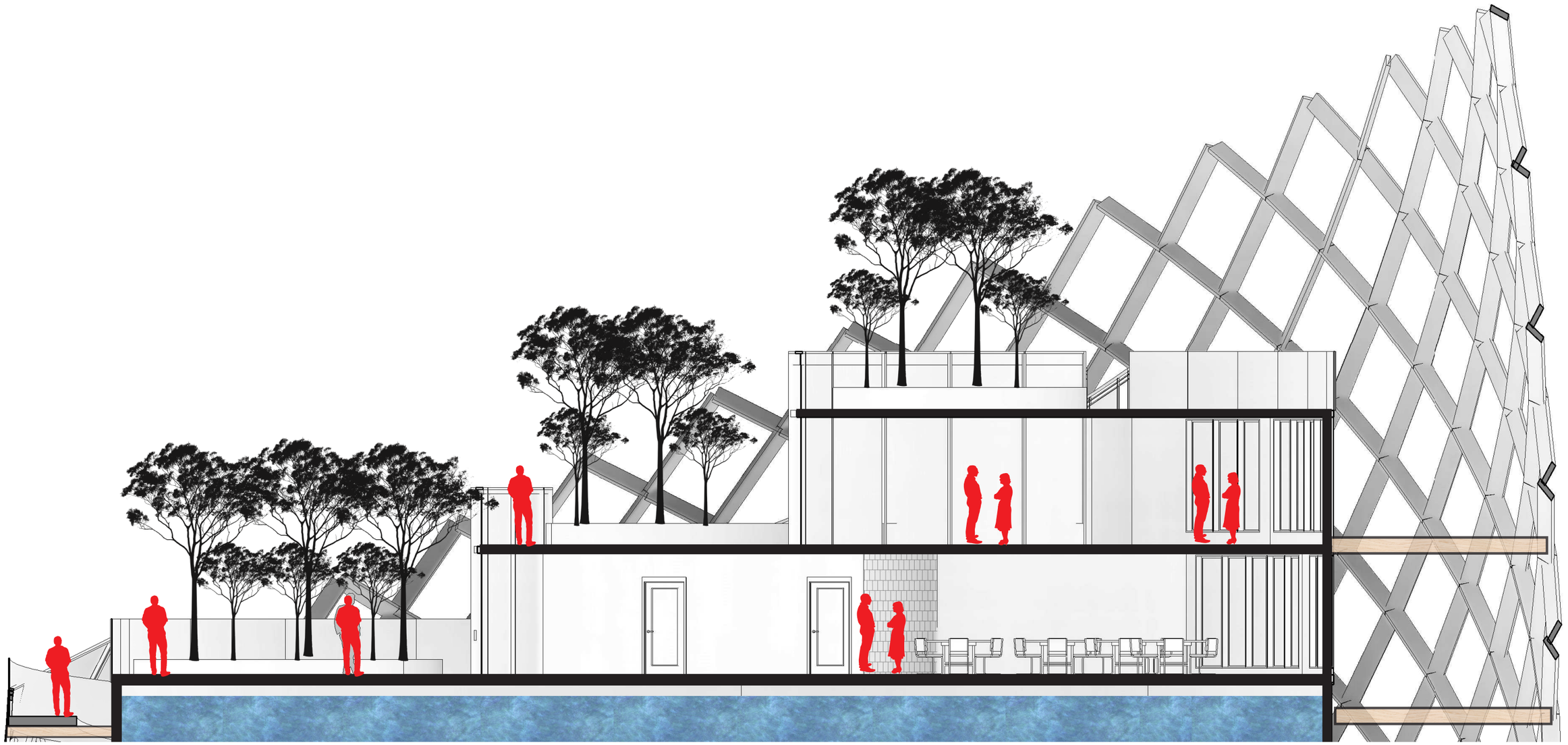

P=96800+
P=80000+
P=62500+
Highest observation deck
in Amsterdam.
incorporating 440 m2
of event space
Kattenburg housing
Water tank
Able to power all
Housing on Kattenburg
Observation Deck
&
Restaurant
BA Springs
A place for shopping and
leisure.
700m2 of
commercial space
4640 m2 of solar panels
on wooden outercore structure



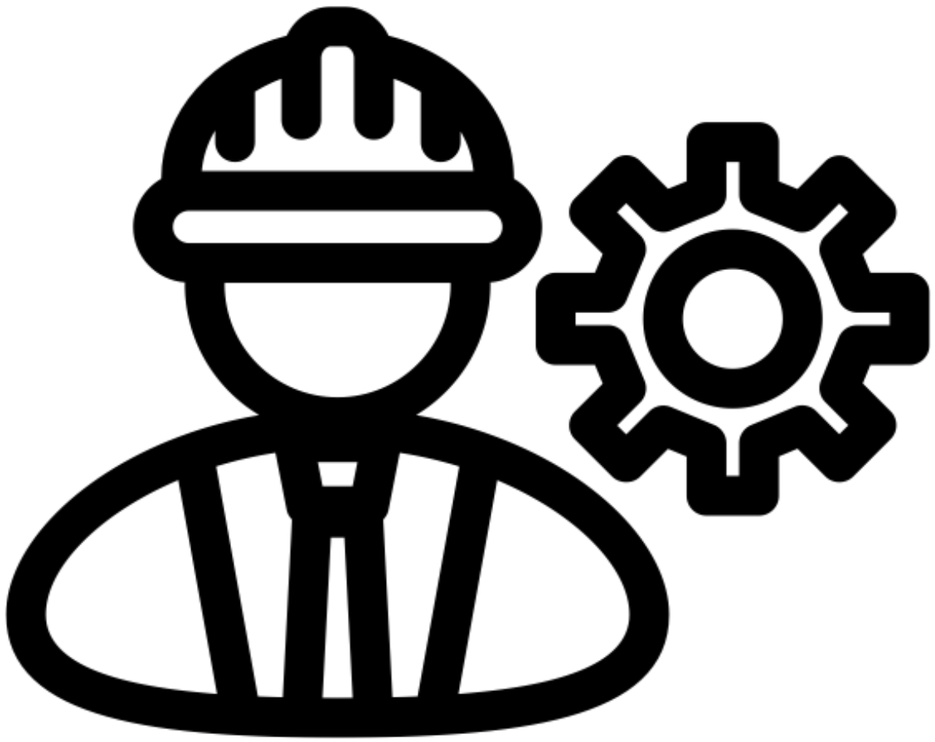
BA Springs
A place for shopping and leisure.
700m2 of commercial space







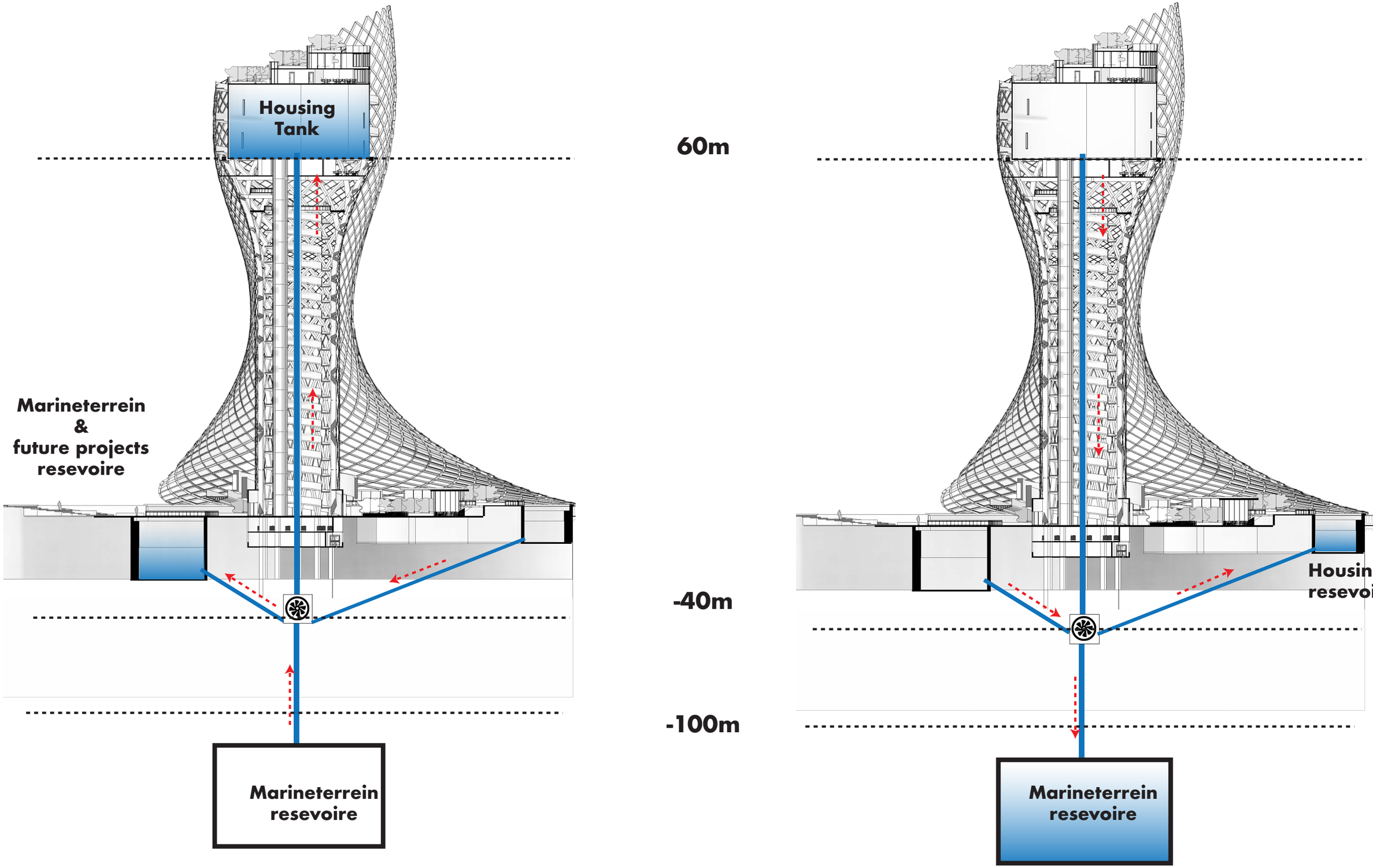
BA's performance

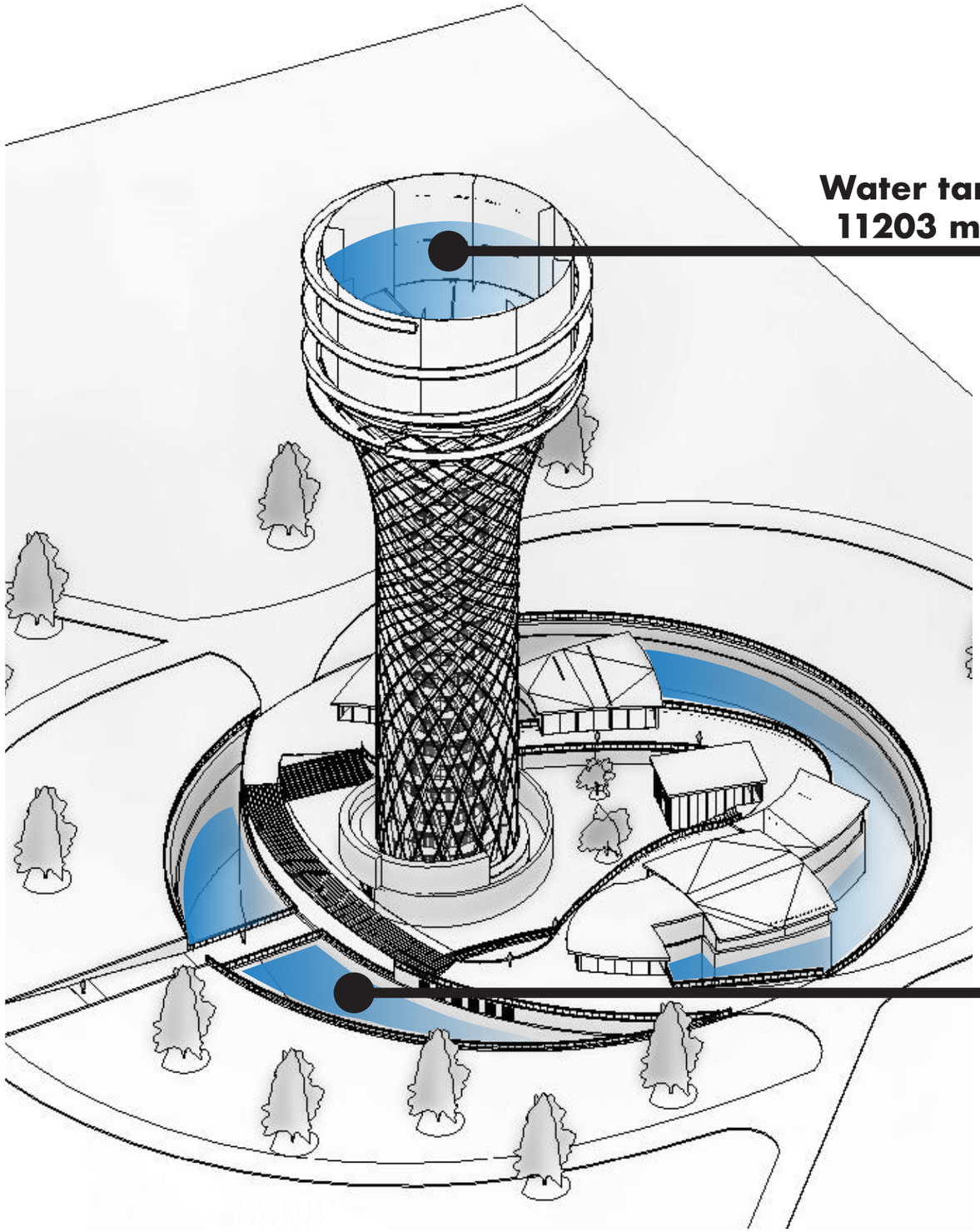


BA's Battery

Storing energy

producing energy





Water tank
11203 m3

Enough for houses on kattenburg

Able to produce 229 Kwh per day, Able to power the houses on Kattenburg for 12 hours straight.

With an efficiency rate of 80% it takes about 15 hours to charge

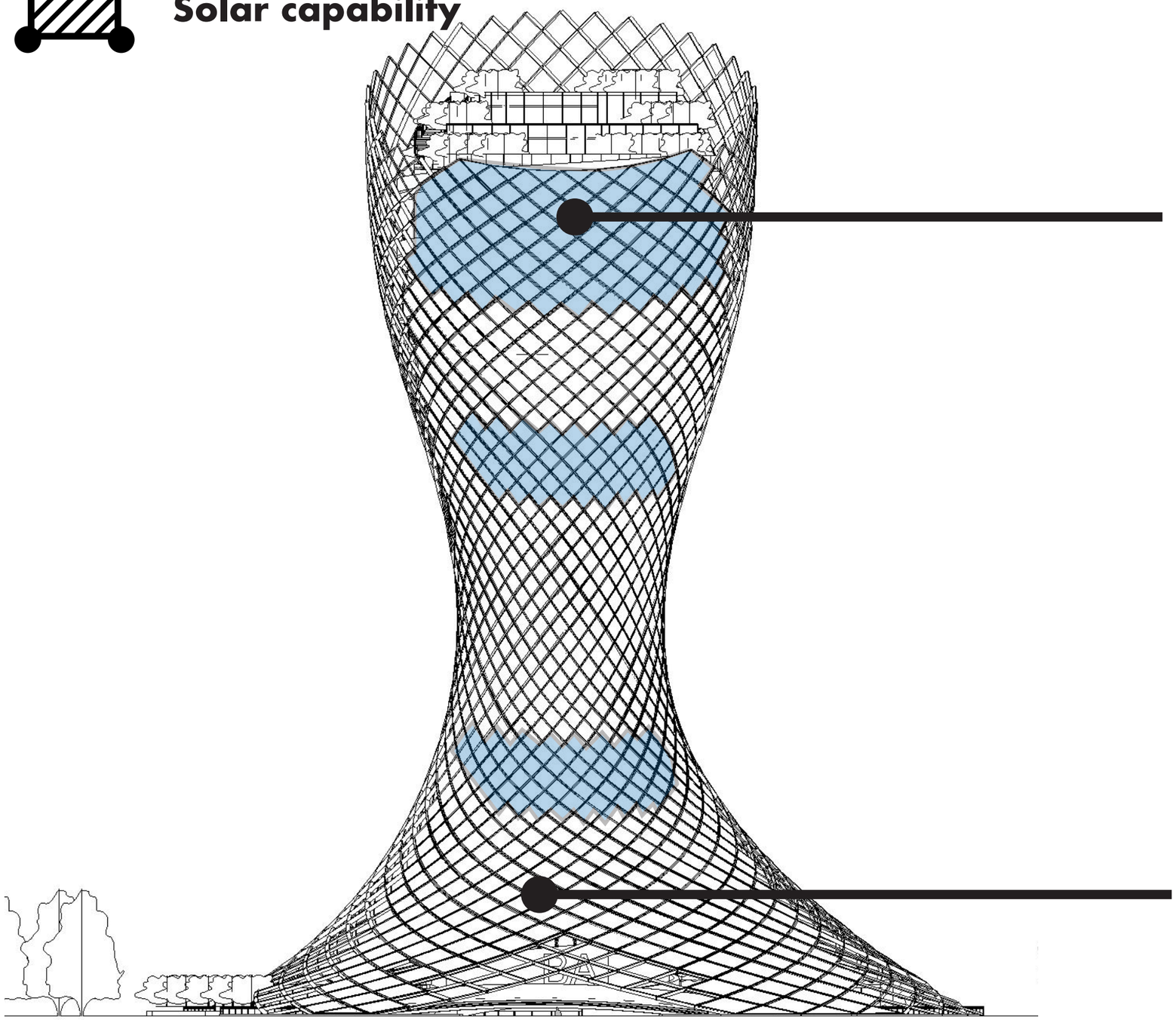
Water tank
22406 m3

Enough for the remaining buildings on kattenburg.

producing 458 Kwh per day.

BA's energy production

4640 m2 of Solar capability



Solar glass (seethrough)

Capable of producing 100 to 140 kwh per m2 depending on the level of opacity.

Solar panels

Capable of producing 163 Kwh per m2

Solar production

BA's solar power potential

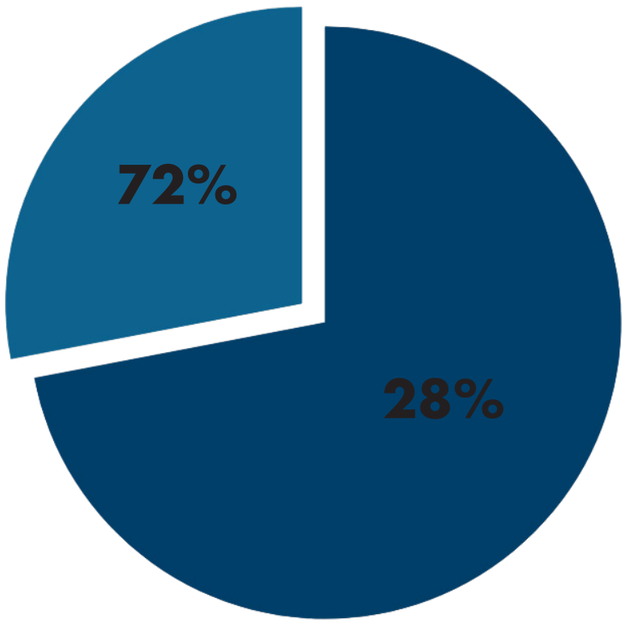
756,320 Kwh yearly

80% efficiency rate

605.056 Kwh yearly

yearly Kwh production

Summer and winter



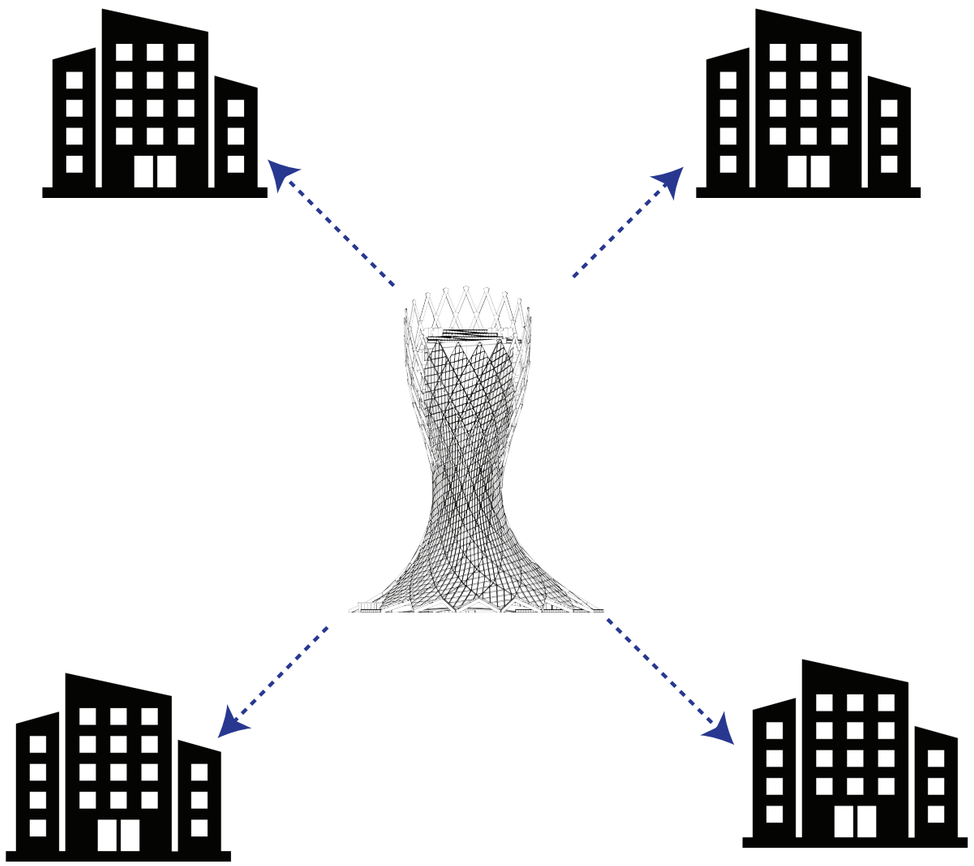
Winter
169,415

Summer
435,640

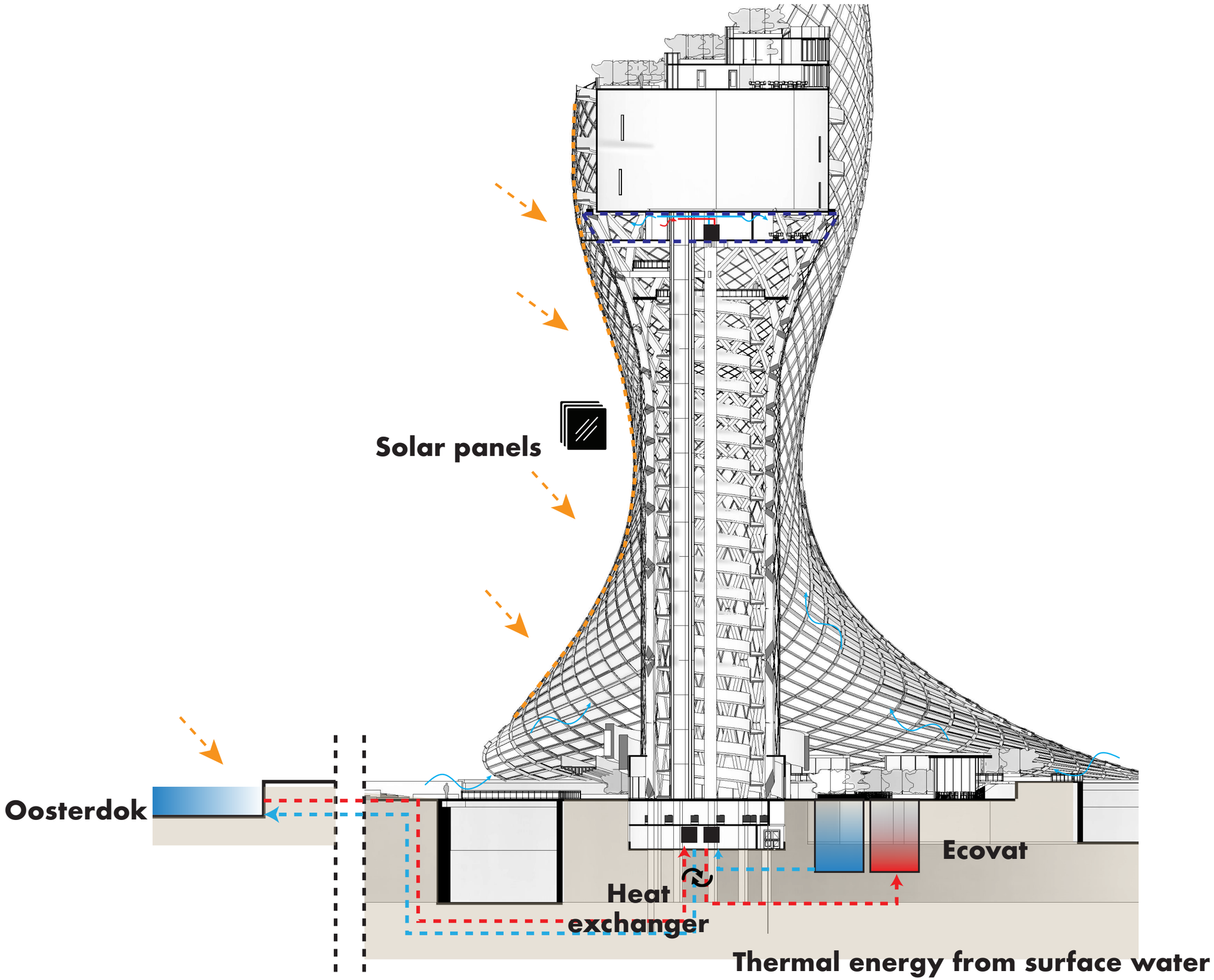
Enough for 150 Dutch houses

Thermal energy from surface water

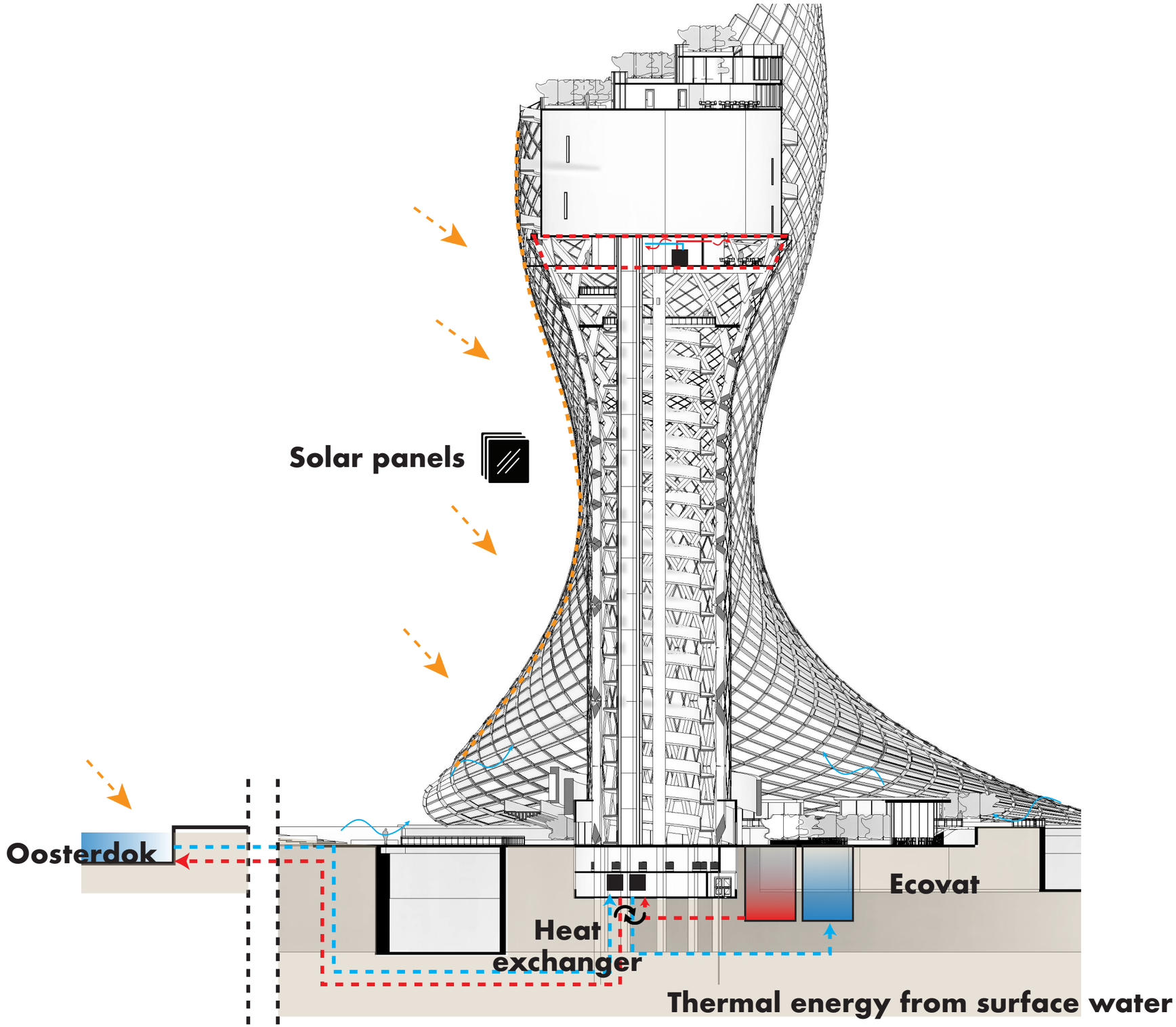
The BA will use the nearby surface water to store heat in the summer and cold in the winter. Creating a sustainable way lowering our cold and heat production.



Summer climate scheme

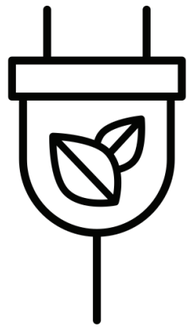


Winter climate scheme



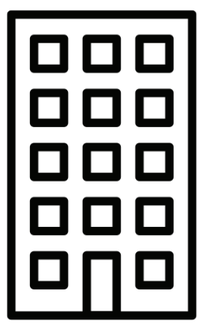
BA's impact

A net Zero kattenburg



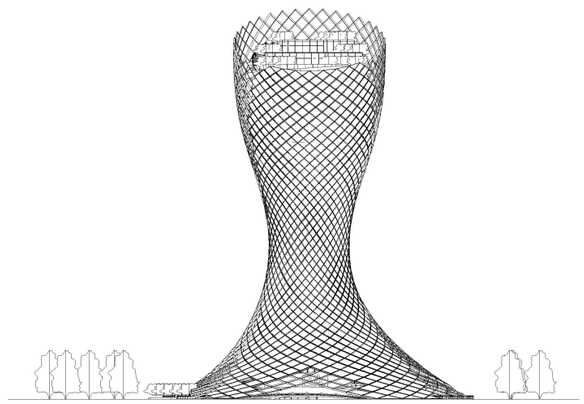
A sustaianble kattenburg

Sustainable Treshold



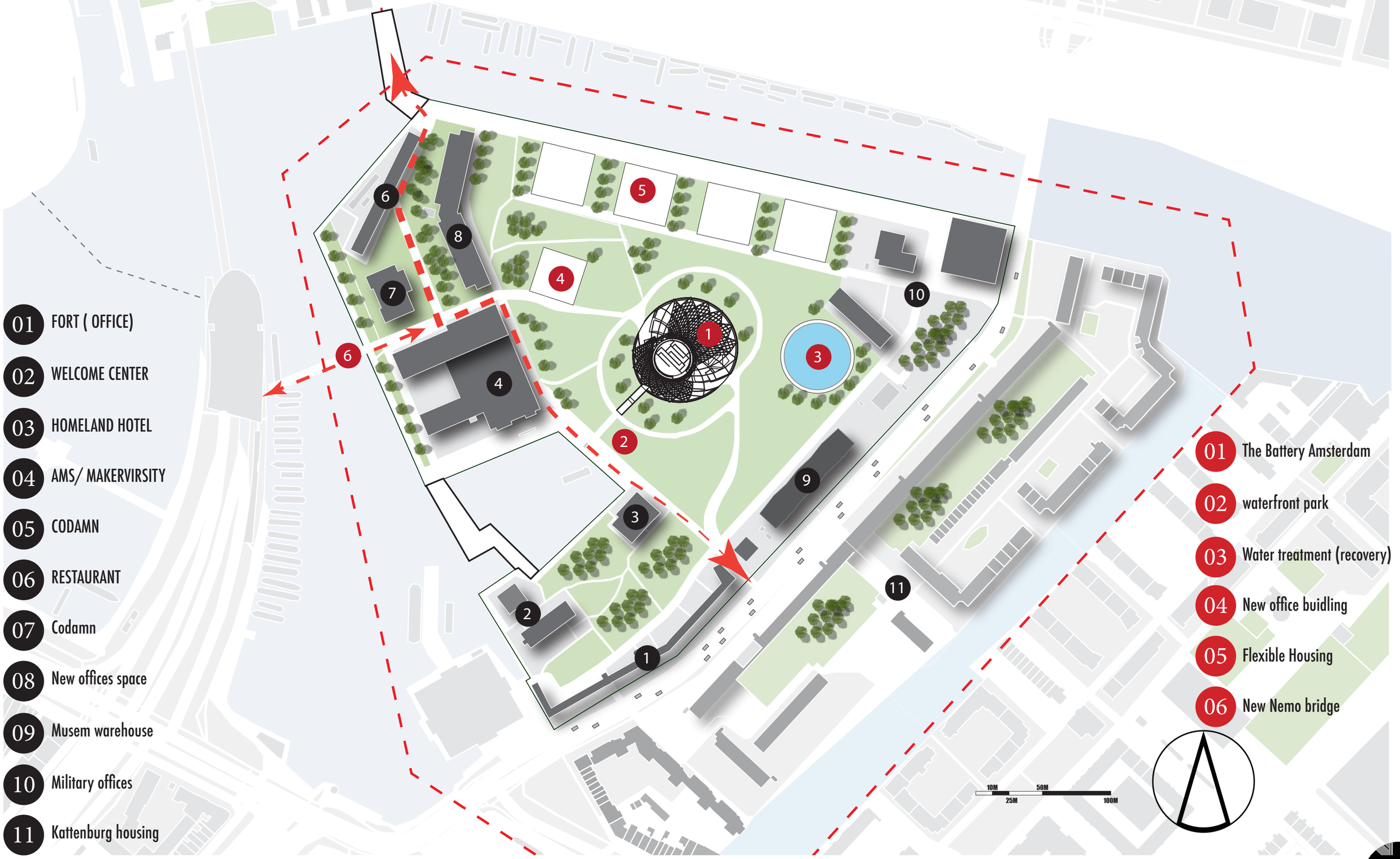
Old buidlings
With solar panels

Sustainable
interventions



THE BA
battery,production & district utility

Masterplan


01 FORT (OFFICE)
02 WELCOME CENTER
03 HOMELAND HOTEL
04 AMS/ MAKERVIRSITY
05 CODAMN
06 RESTAURANT
07 Codamn
08 New offices space
09 Musem warehouse
10 Military offices
11 Kattenburg housing
01 The Battery Amsterdam
02 waterfront park
03 Water treatment (recovery)
04 New office buidling
05 Flexible Housing
06 New Nemo bridge
10M
25M
50M
100M

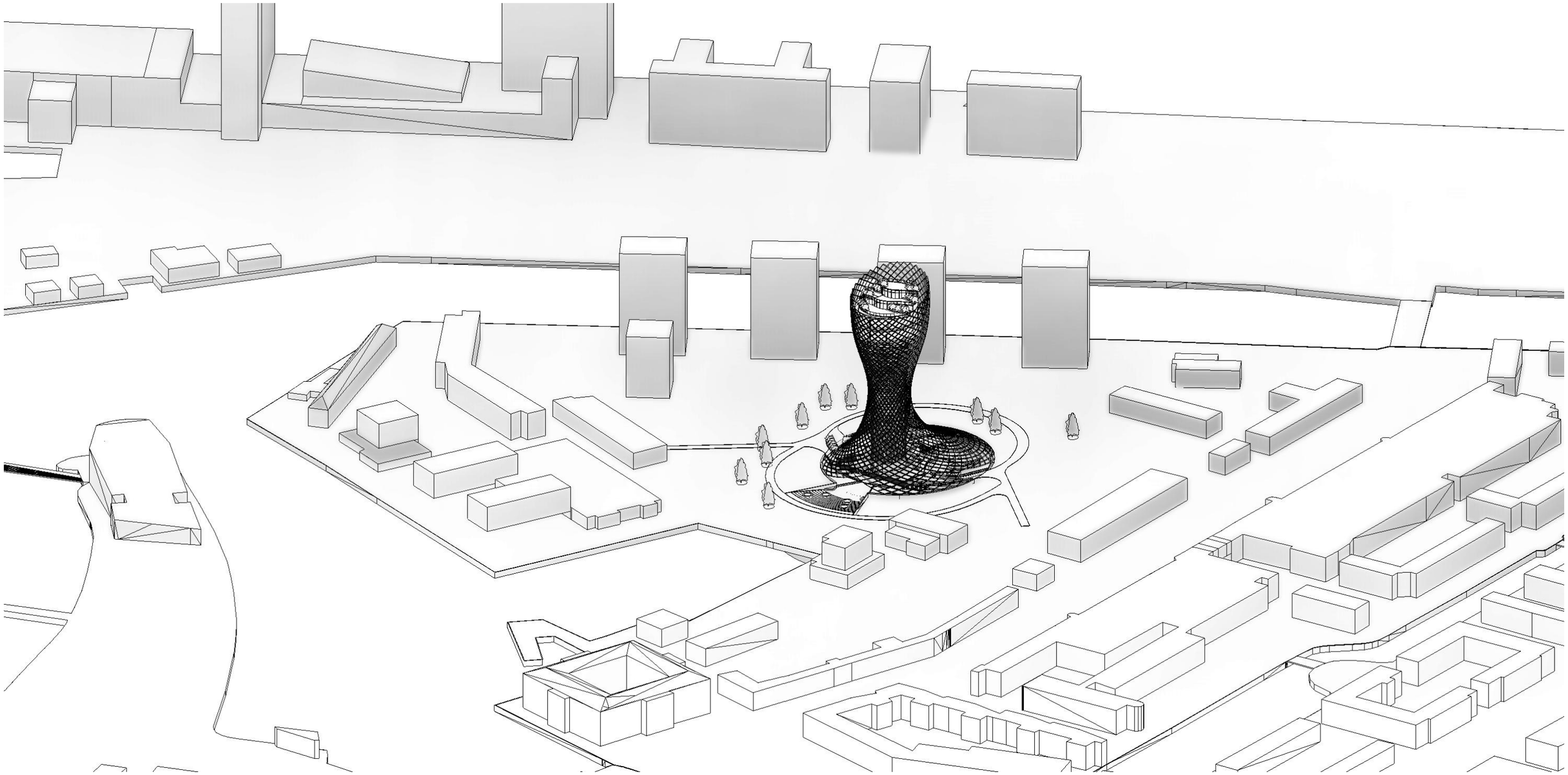
Flexible housing

Innovatin zone
Offices

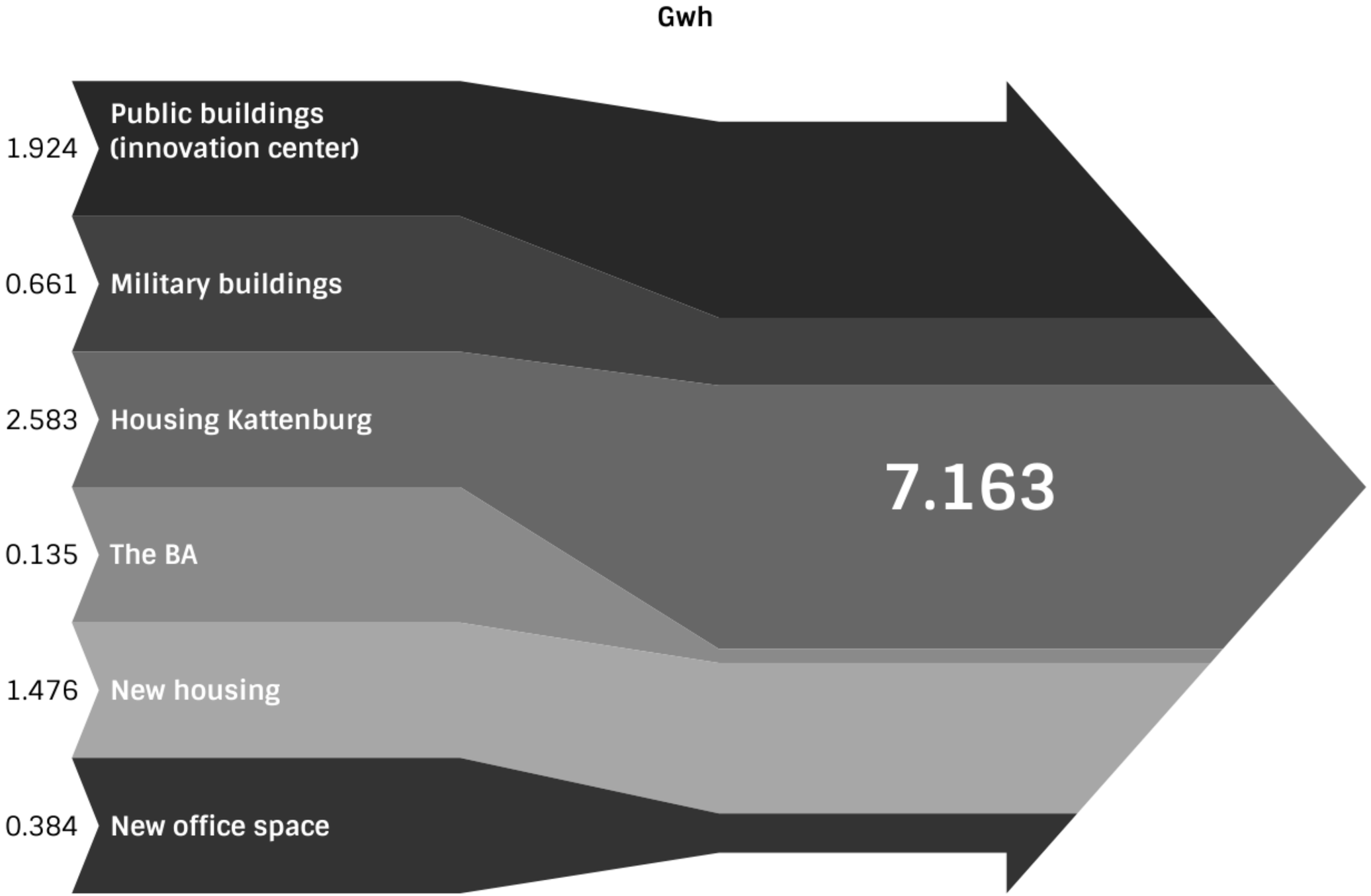
extended
park

10M 25M 50M 100M

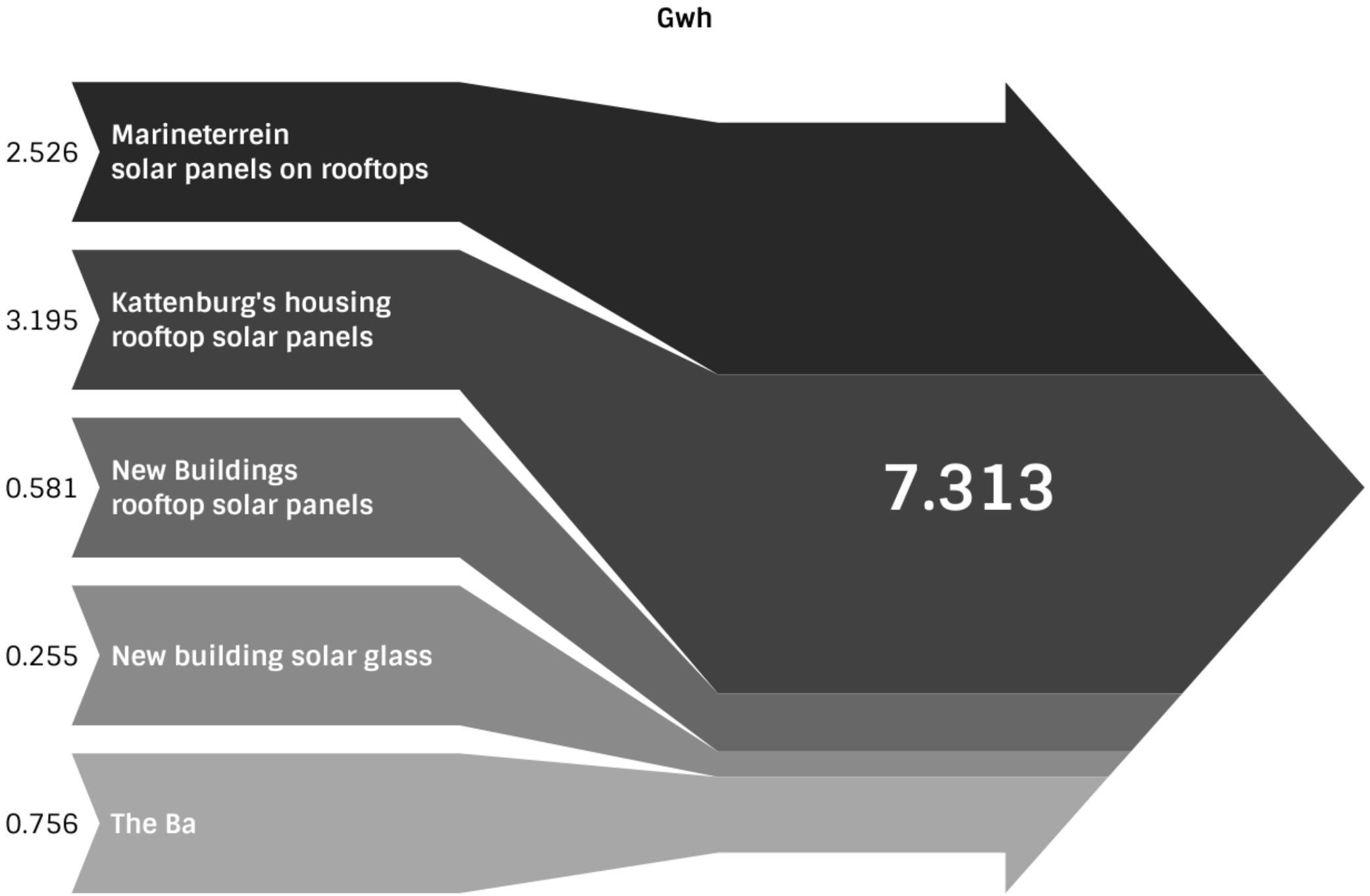
Masterplan section cut



Kattenburg's consumption

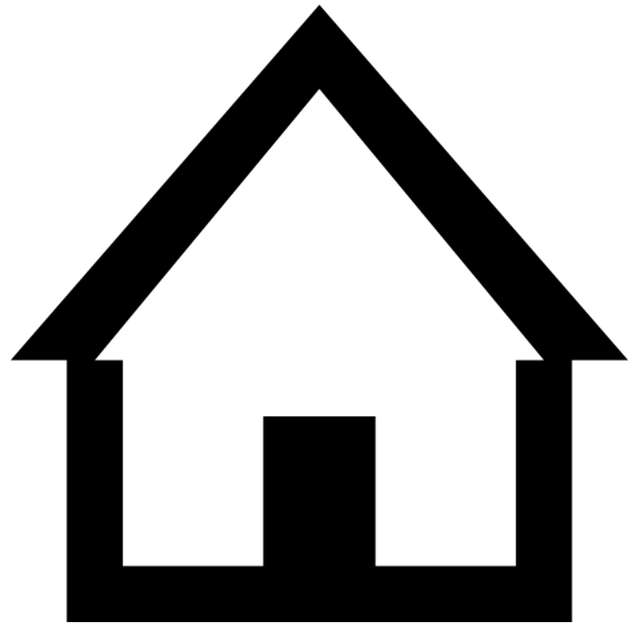


Kattenburg’s production



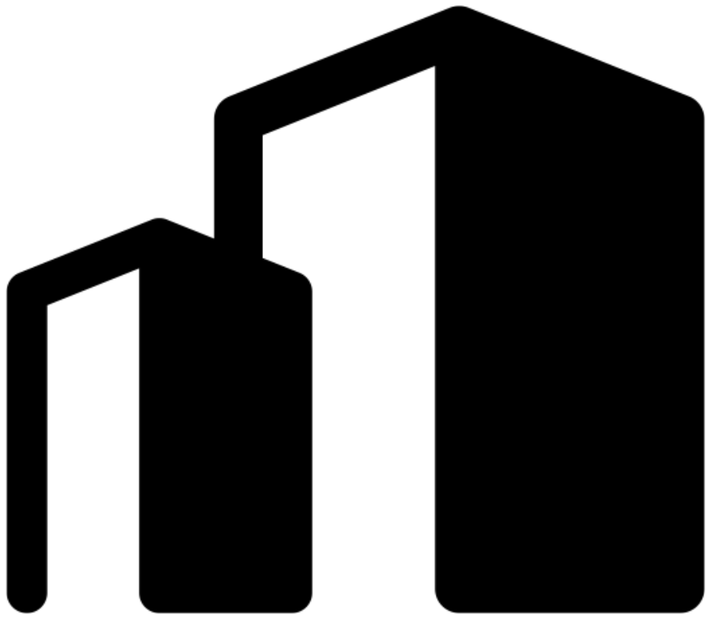
new space

room for
6400m2 of office space



room for
36000m2 of
flexible housing

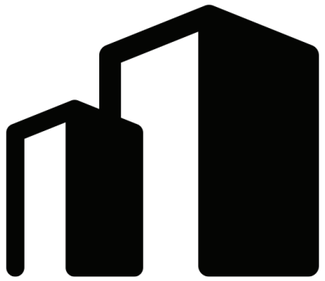
Changing the perspective

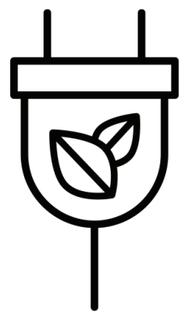


The common Powerplants will seize to exist creating a new paradigm of power plants. As buildings switch from a consumer standpoint to a producer standpoint, this Creates a power transition within our build environment.

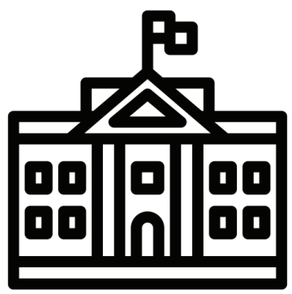
New players

Plus energy buildings





Energy companies



The goverment

private investors

The
new normal.

The shift towards a
renewable future

Thank you