BOYDENS ENGINEERING
PART OF SWECO

PROJECT GARE MARITIME
BRUSSELS, BELGIUM

14th IEA HEAT PUMP CONFERENCE

"HEAT PUMPS IN POSITIVE ENERGY DISTRICTS – OPPORTUNITIES, CHALLENGES AND PERSPECTIVES"

PROF IR WIM BOYDENS

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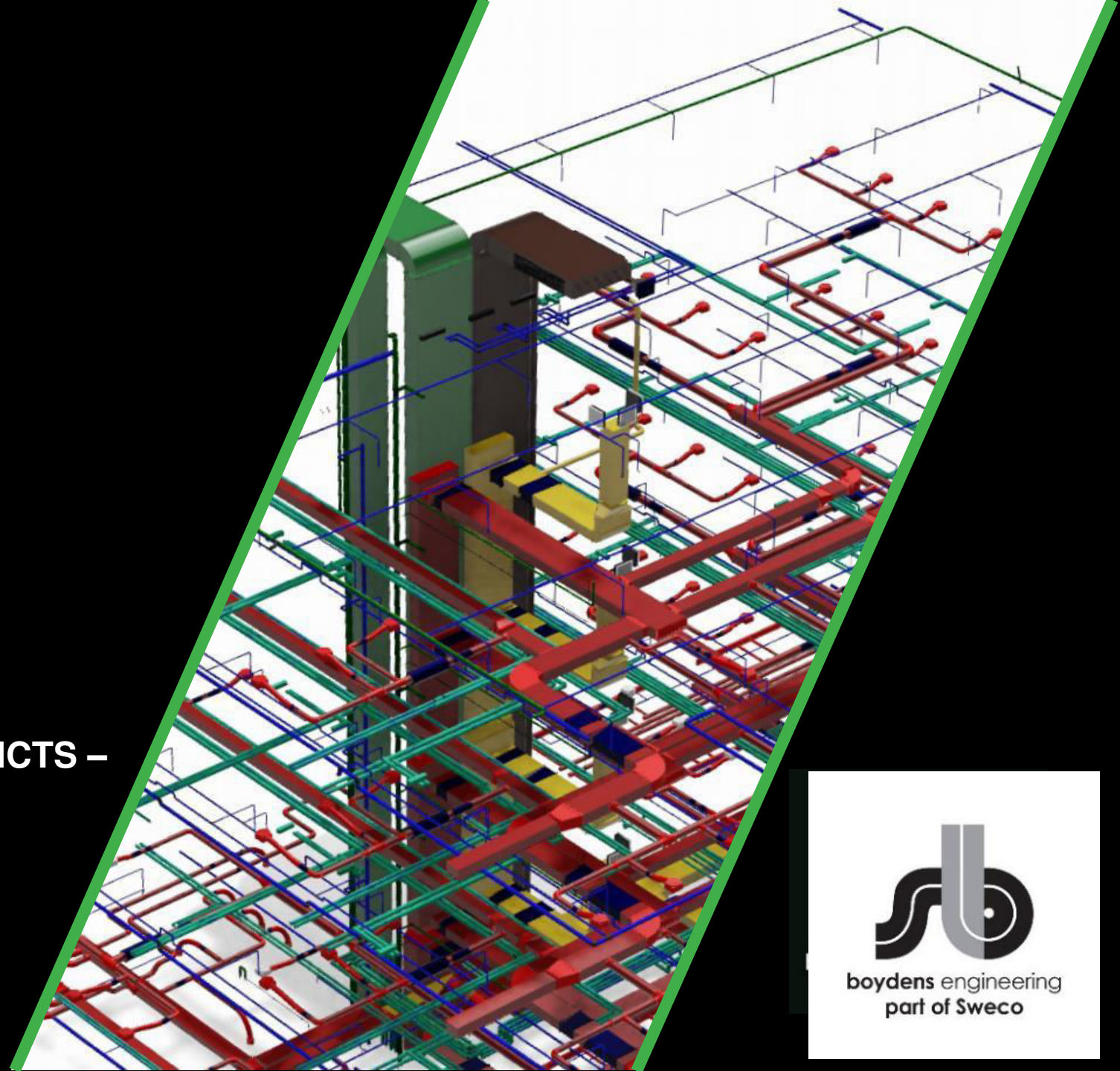
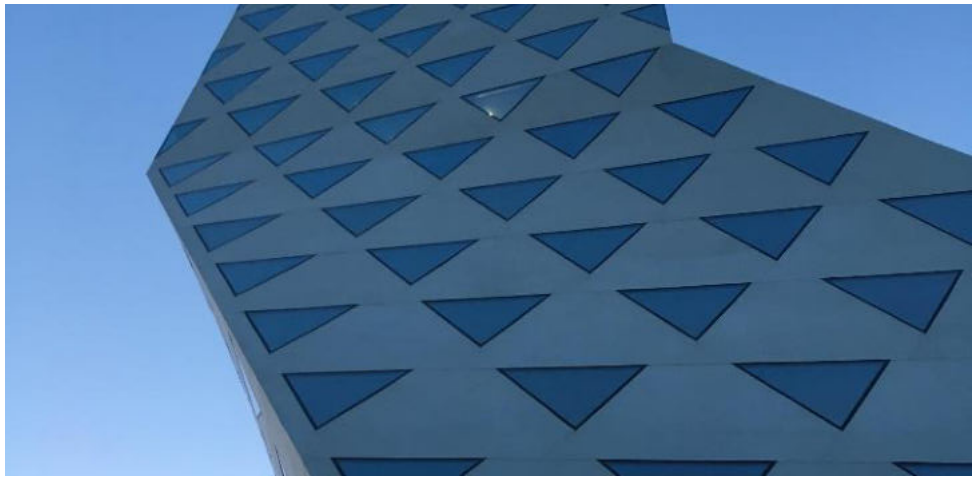
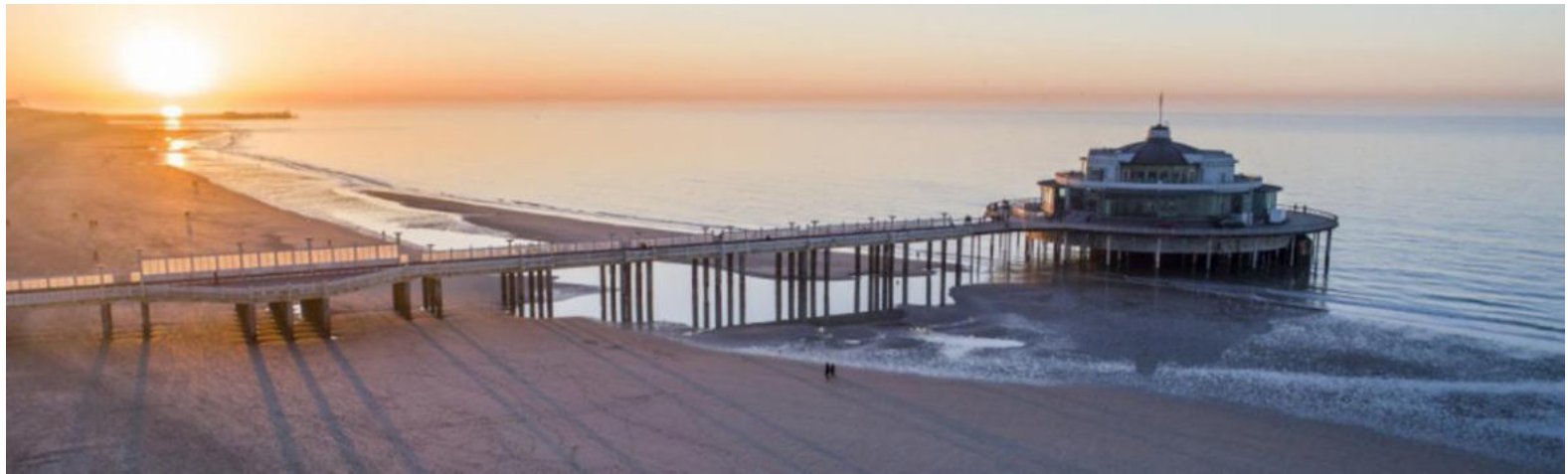
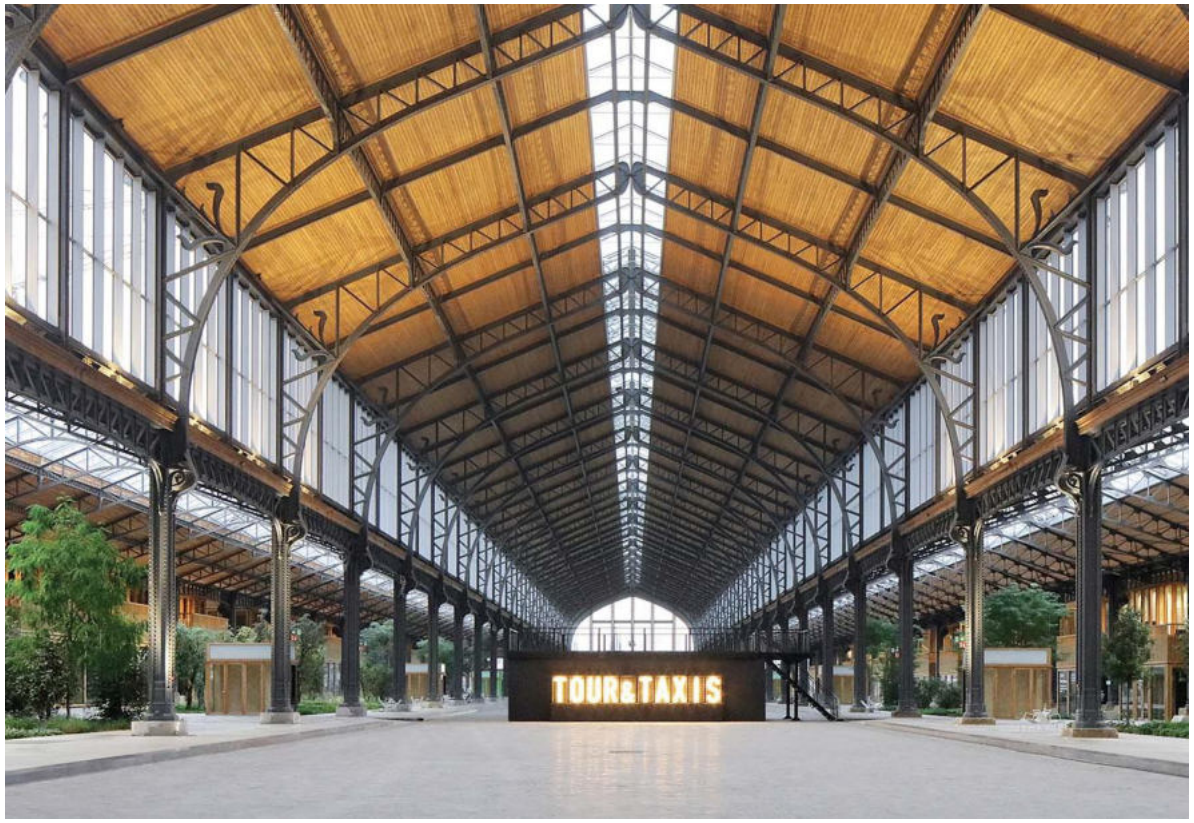


boydens engineering
part of Sweco

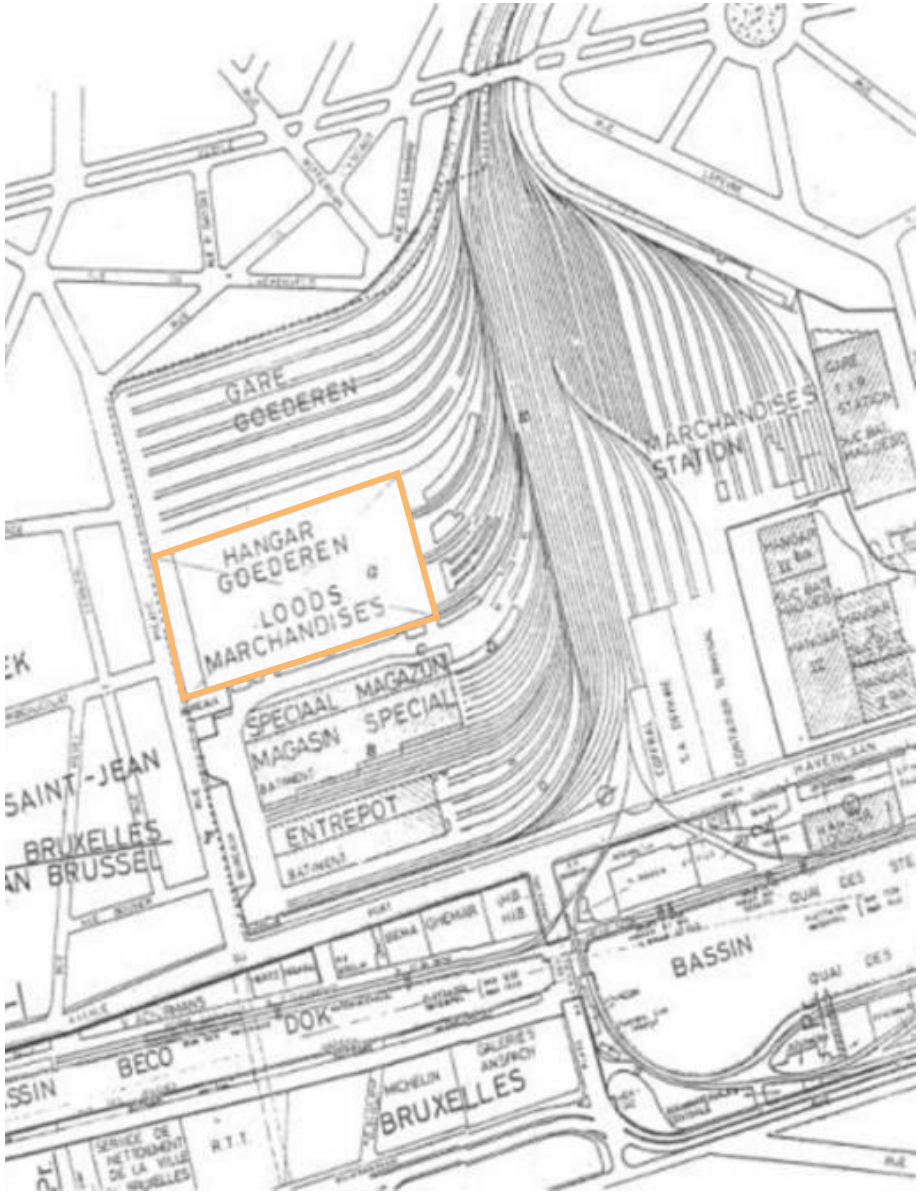
Designing of built environment
Sustainability-Quality & Innovation
People-Respect for Architecture

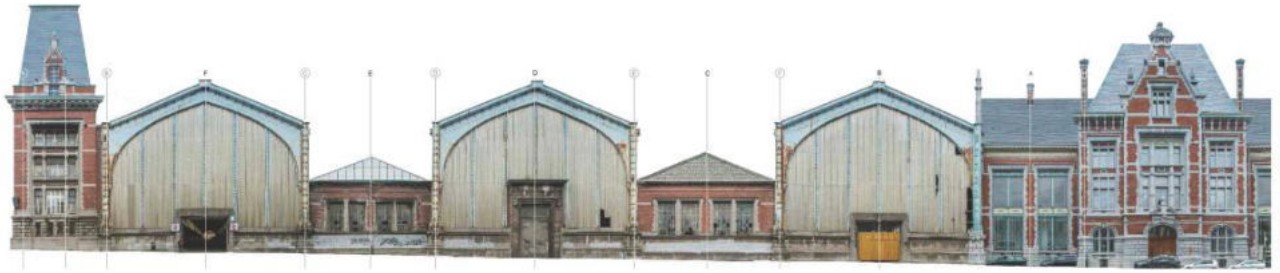


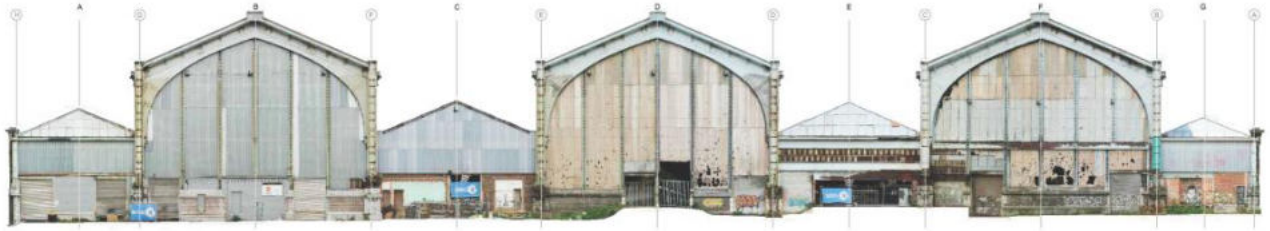




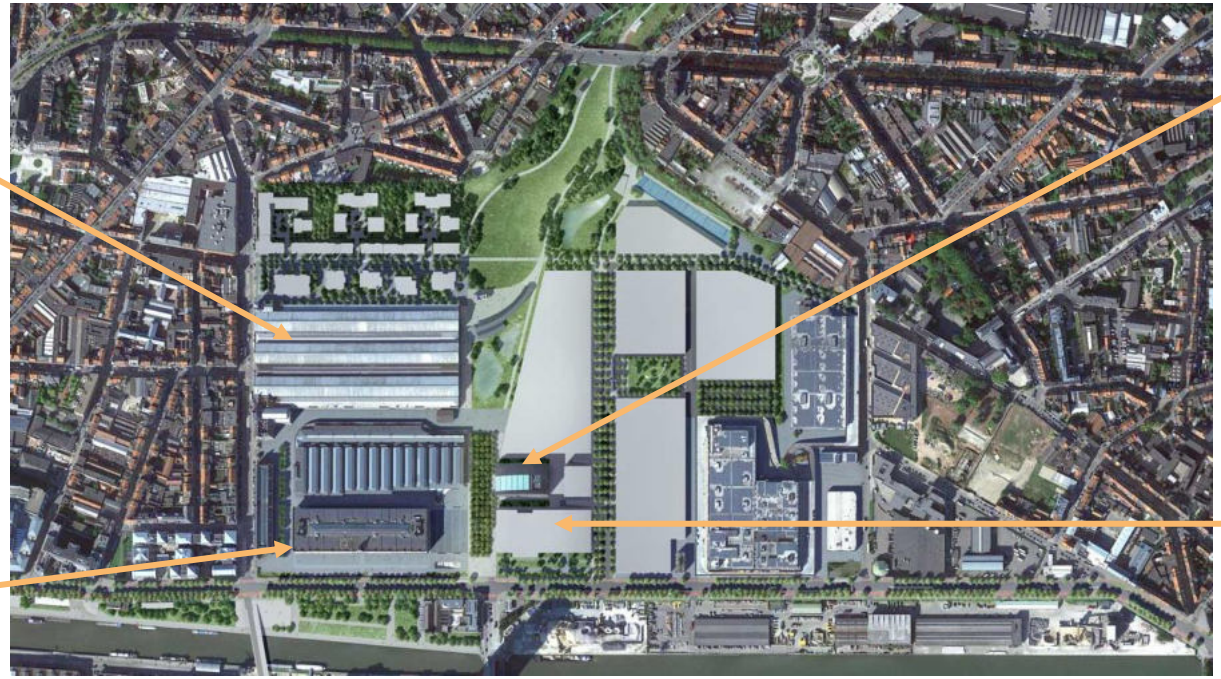
The Gare Maritime







Gare Maritime



Bruxelles Environnement

L'Entrepôt royal

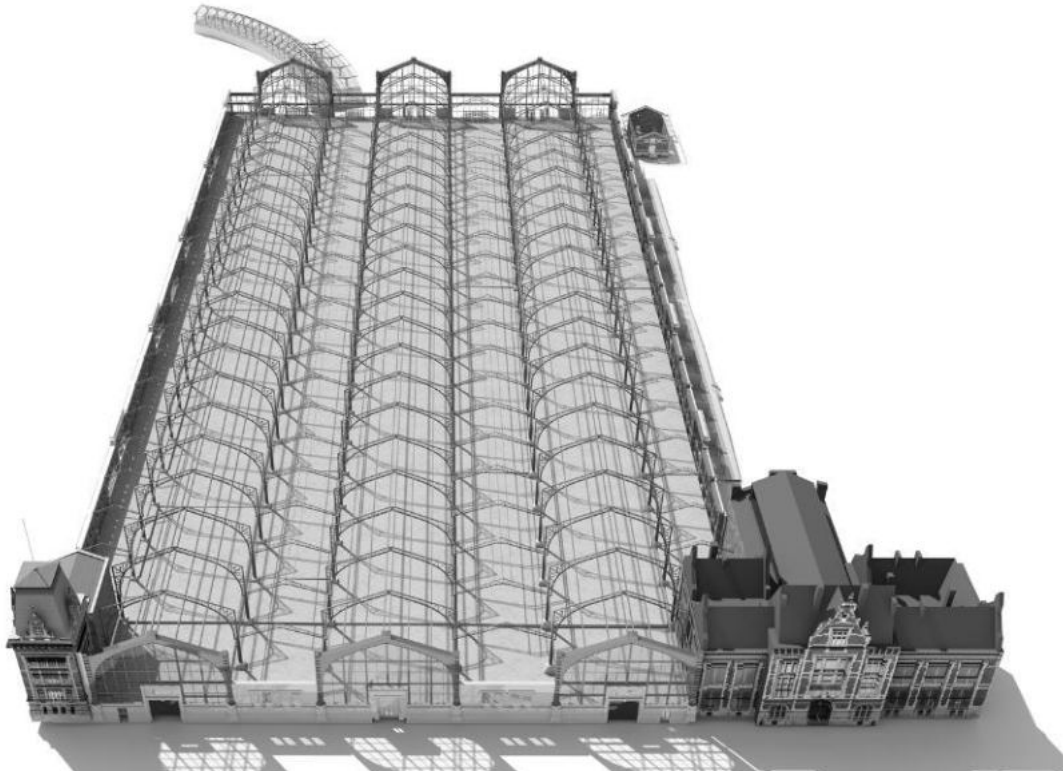
Flemish government building – Herman Teirlinck

40 000 m² footprint

24 m height

270 m length

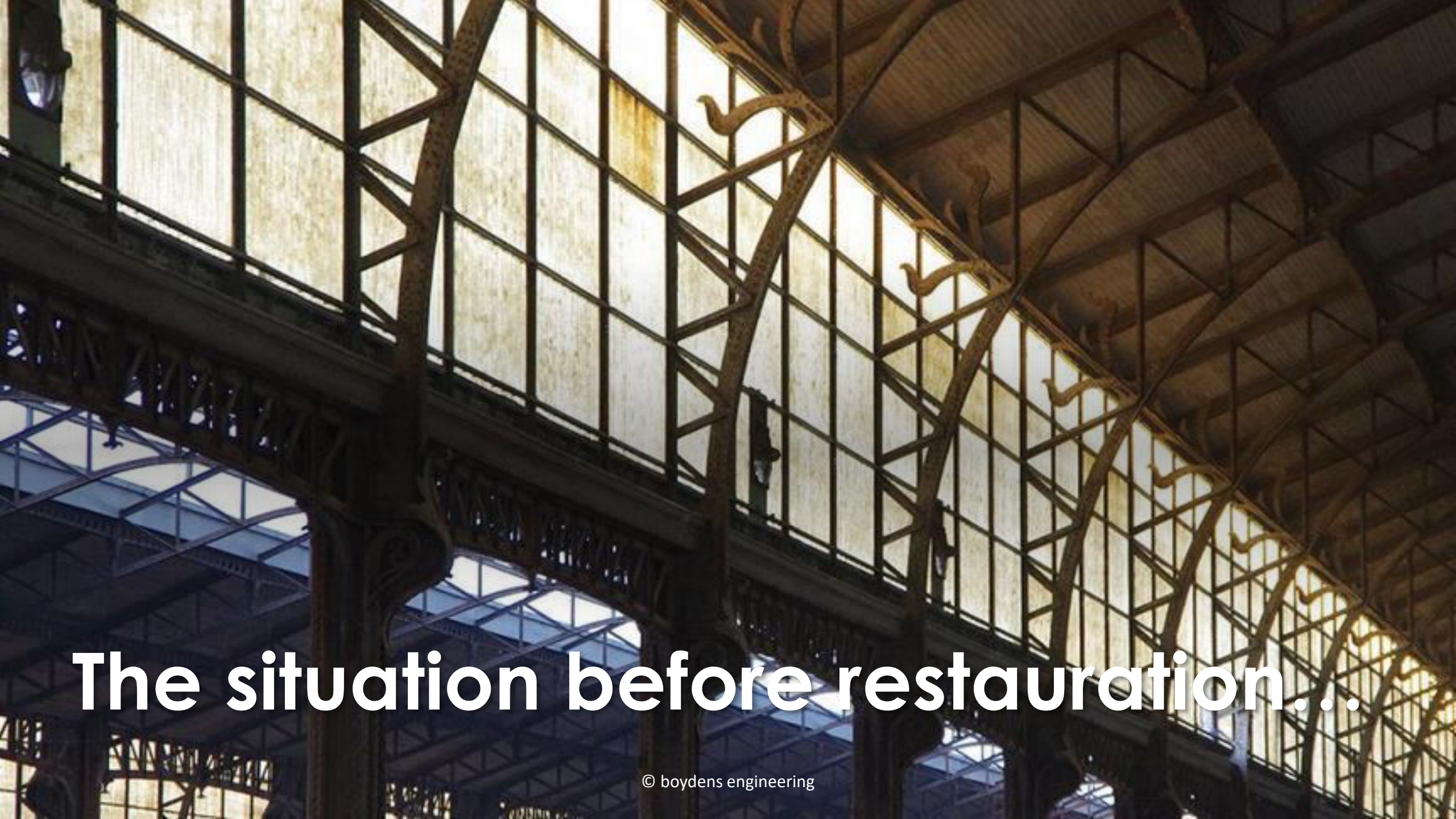
150 m width



Afbeelding. Bestaande toestand Parkgevel (fotogrammetrie ©Wouter Dreessen)

The situation before restauration…

…and after restauration



The situation before restauration…

...and after restauration

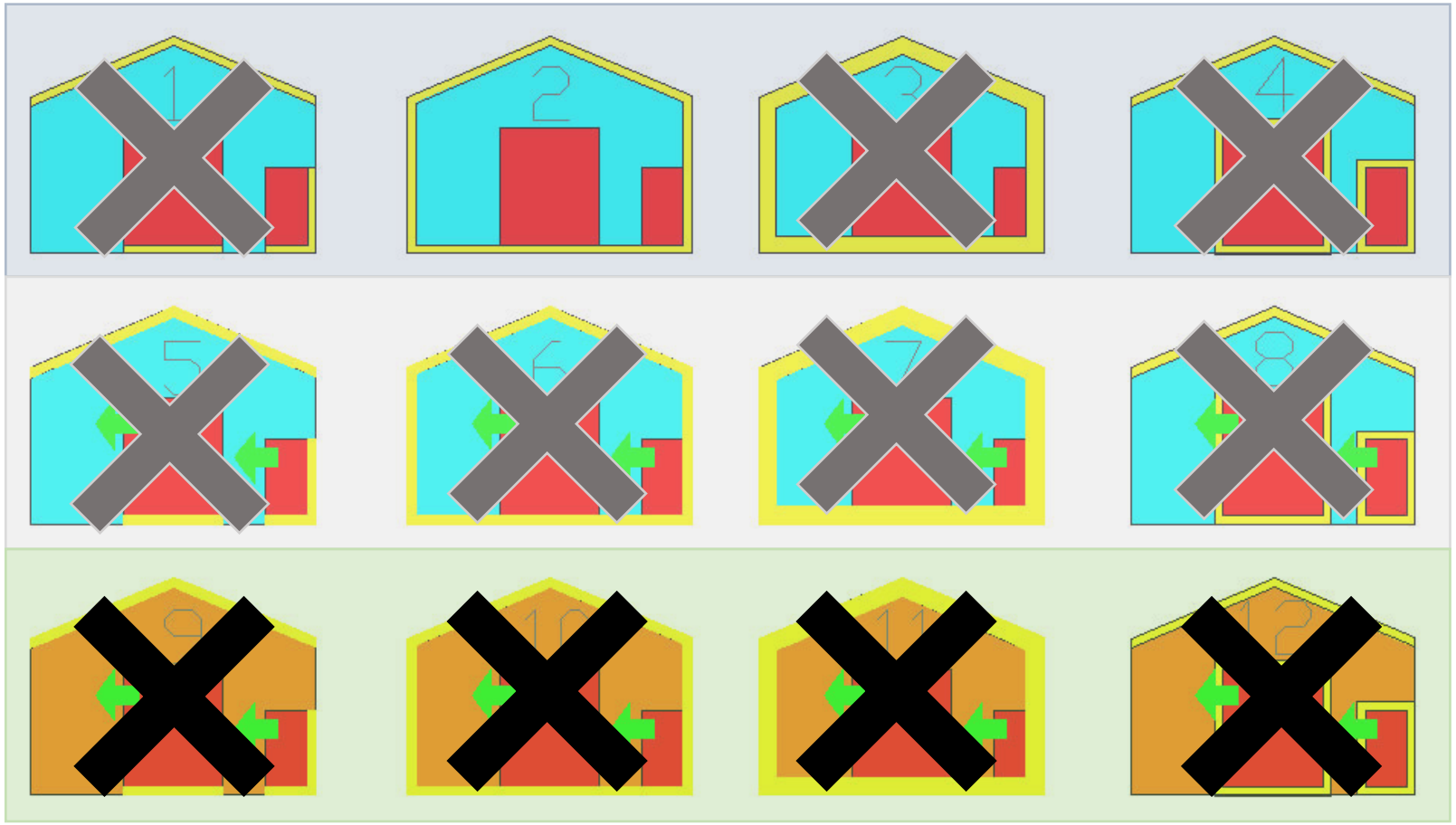
45.000m² energy neutral offices and retail

Use of best RES technologies

- Fossil free
- Geothermal energy
- 22 heat pumps
- Geothermal heating/cooling network
- 17.000m² PV on the roof
- 3.000m² BIPV in the South facade

Renovated with balanced EEF and circular approach
Heritage context
Passive design approach

Scenario studies for the building envelope
dynamic simulation based design



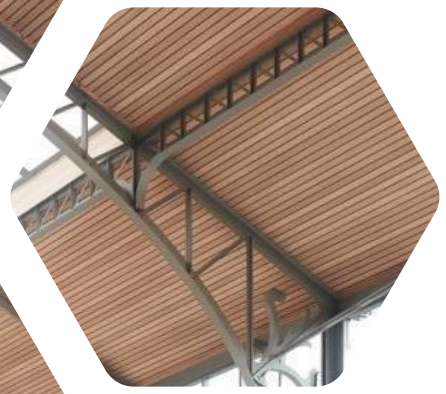
Heating the hall is too expensive

Thick insulation has no added value if hall is not heated

Option 4 and 8 increases the cooling demand and has little added value due to the damped temperatures of the hall

The channeling of air has such little impact on the gigantic volume of the hall

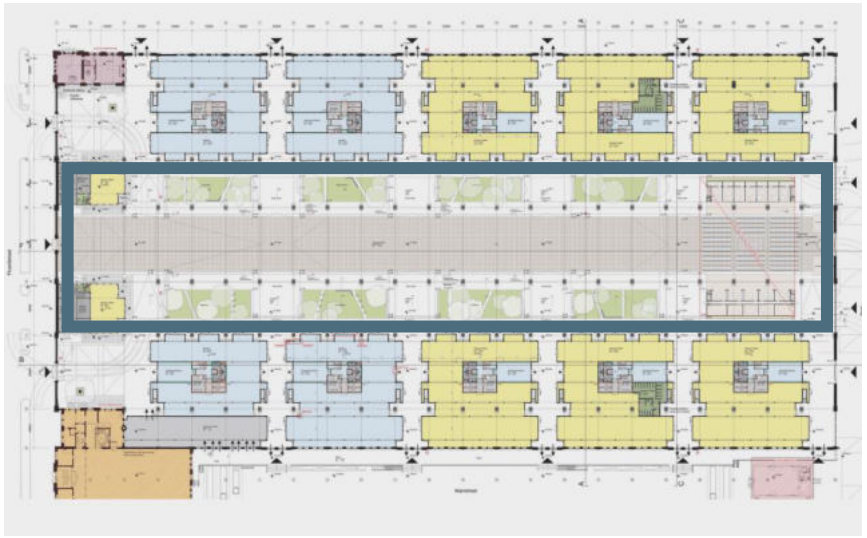
In reality, the aim will be adapt option 2, as much as possible since option 1 could not provide a degree of comfort during the winter months,

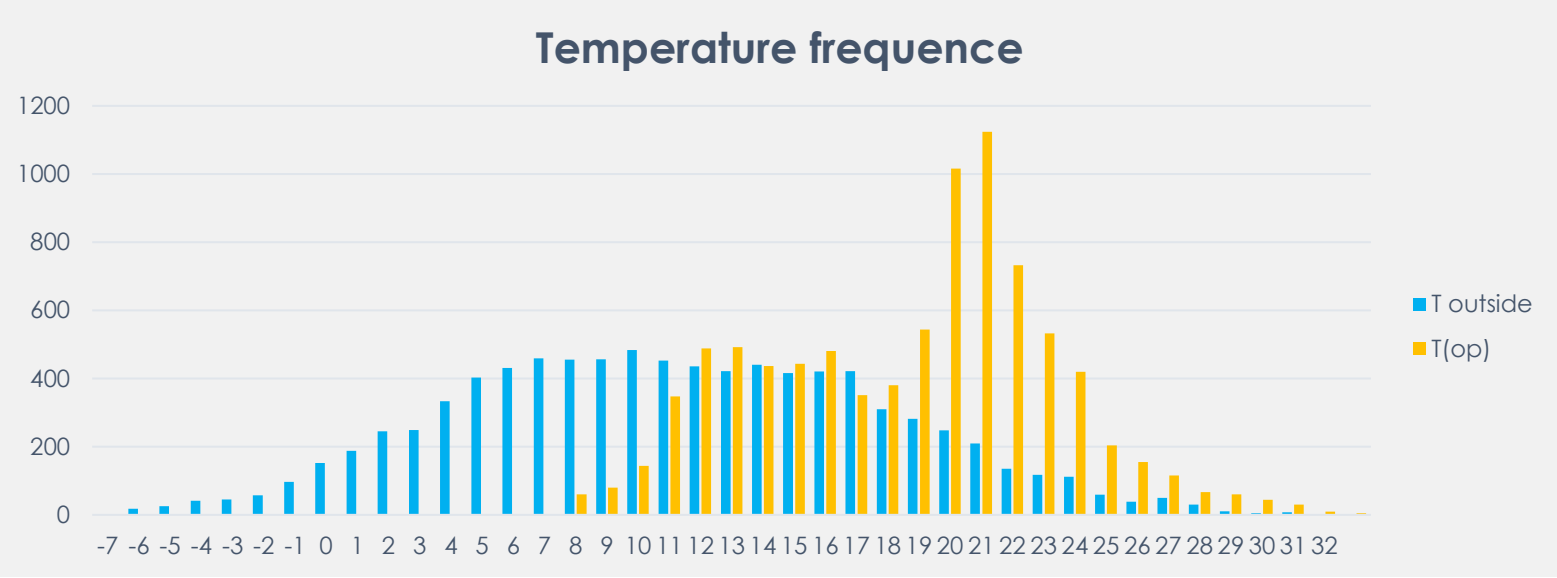


Daylight and natural ventilation

- The requested large elements of the roof can be opened and are also used in the event of a fire to extract smoke
- These ceiling panels ensure the climate in the hall, have safety features, and provide sufficient daylight for the built-in volumes

Design of In-Built Volumes





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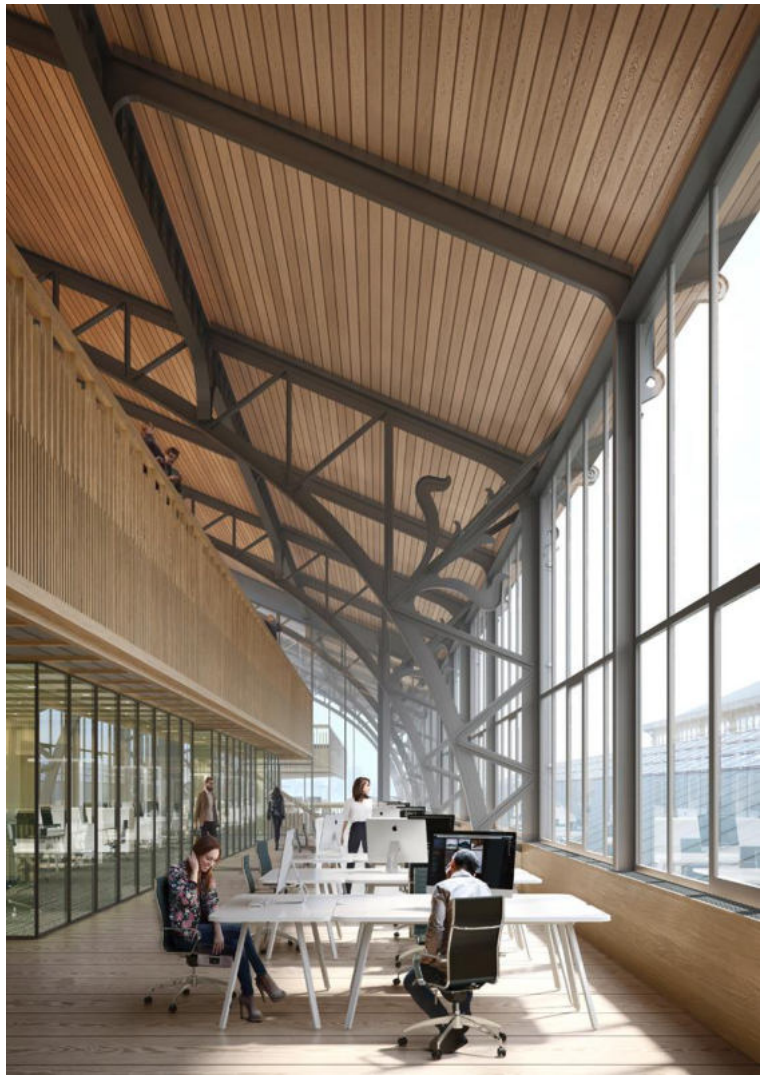
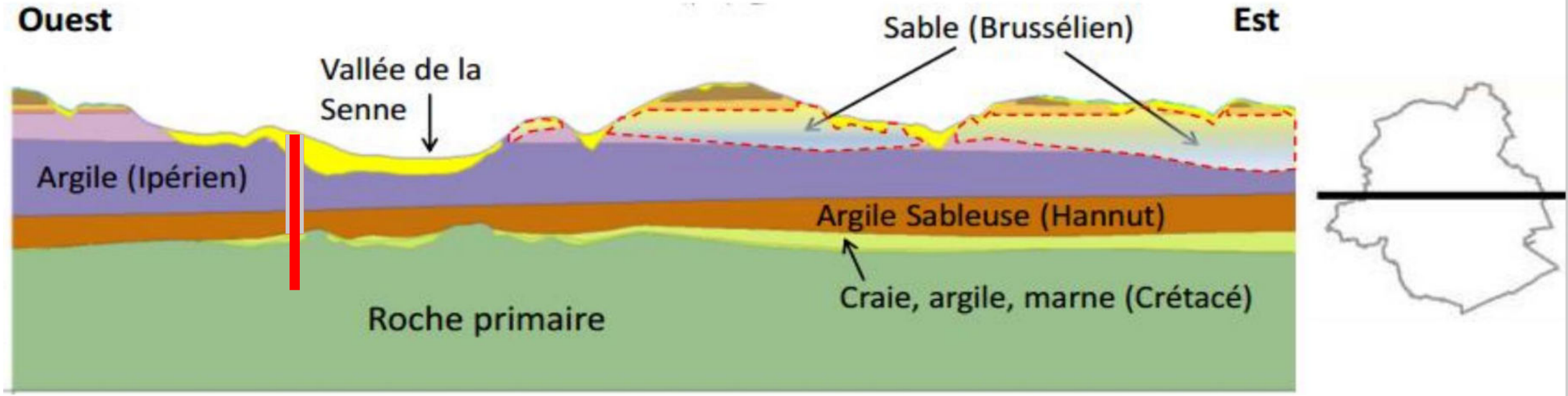


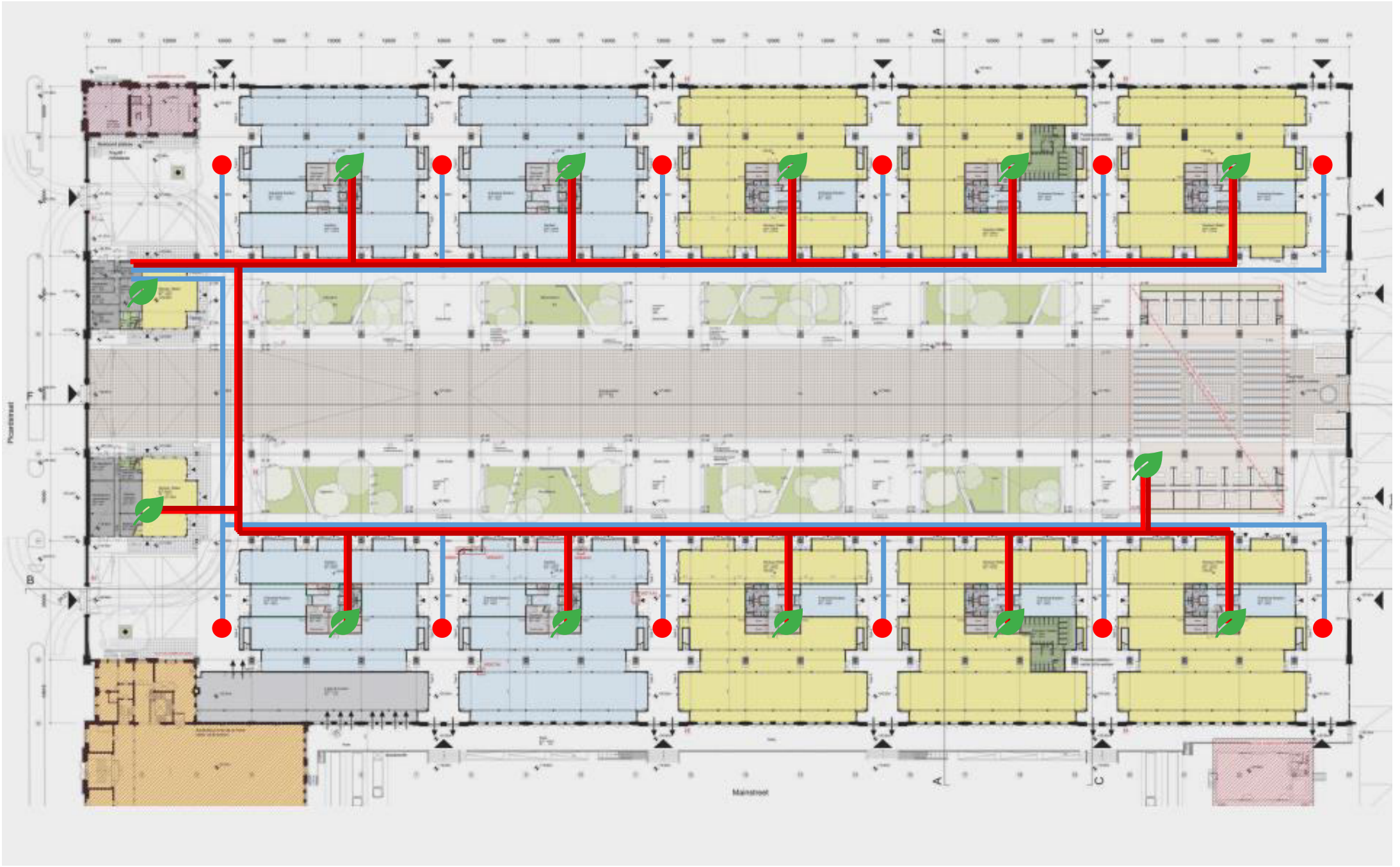
Geothermal ATES

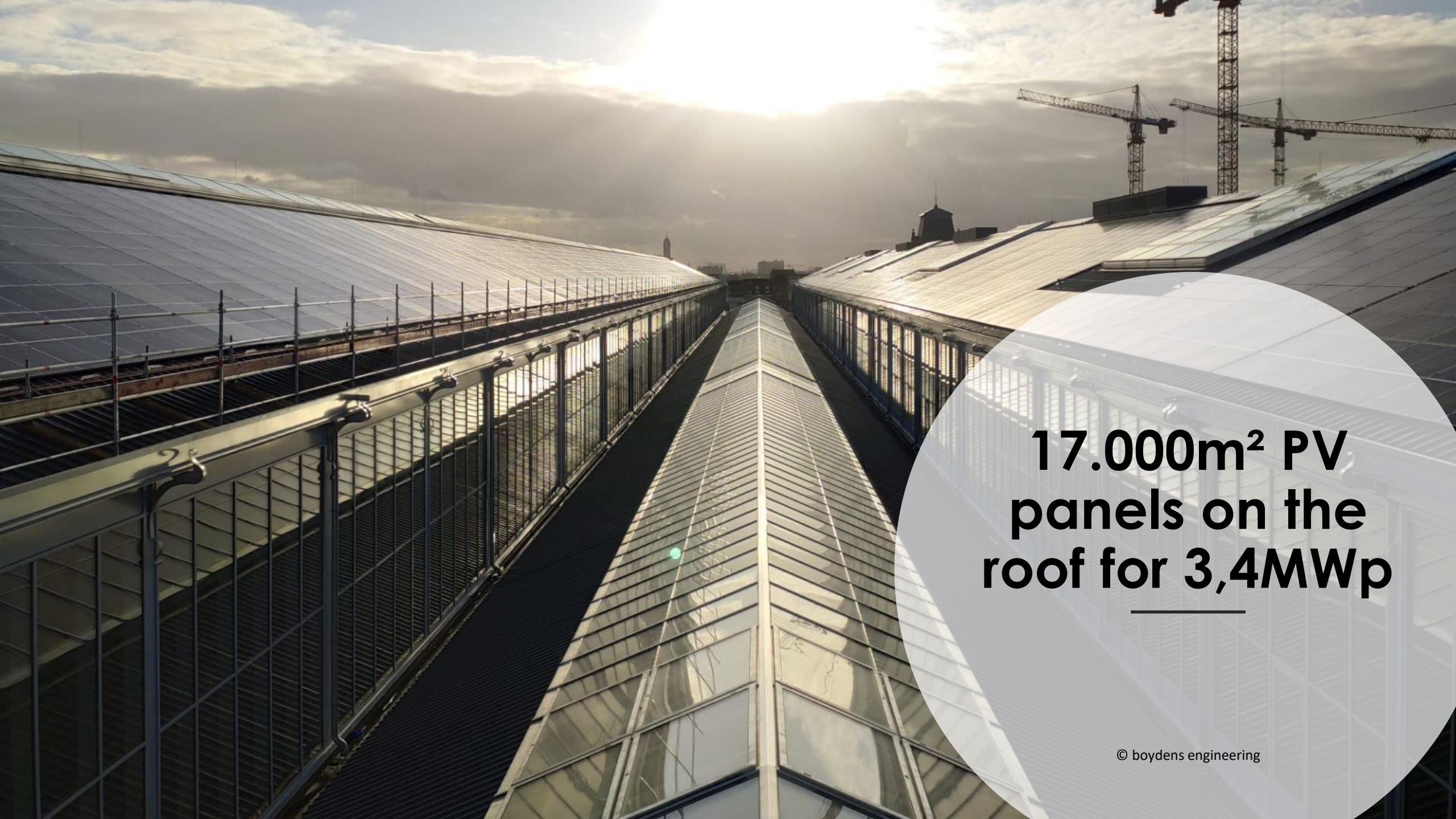


Bron: WTCB: Lysebetten, 2016

ATES in the rock (sokkel) is a first for Belgium and opens extra geothermal possibilities for geothermal heat pump energy in Brussels.

The capacity is up to 7 times higher than for a borehole in the Sand layers of Brussels.

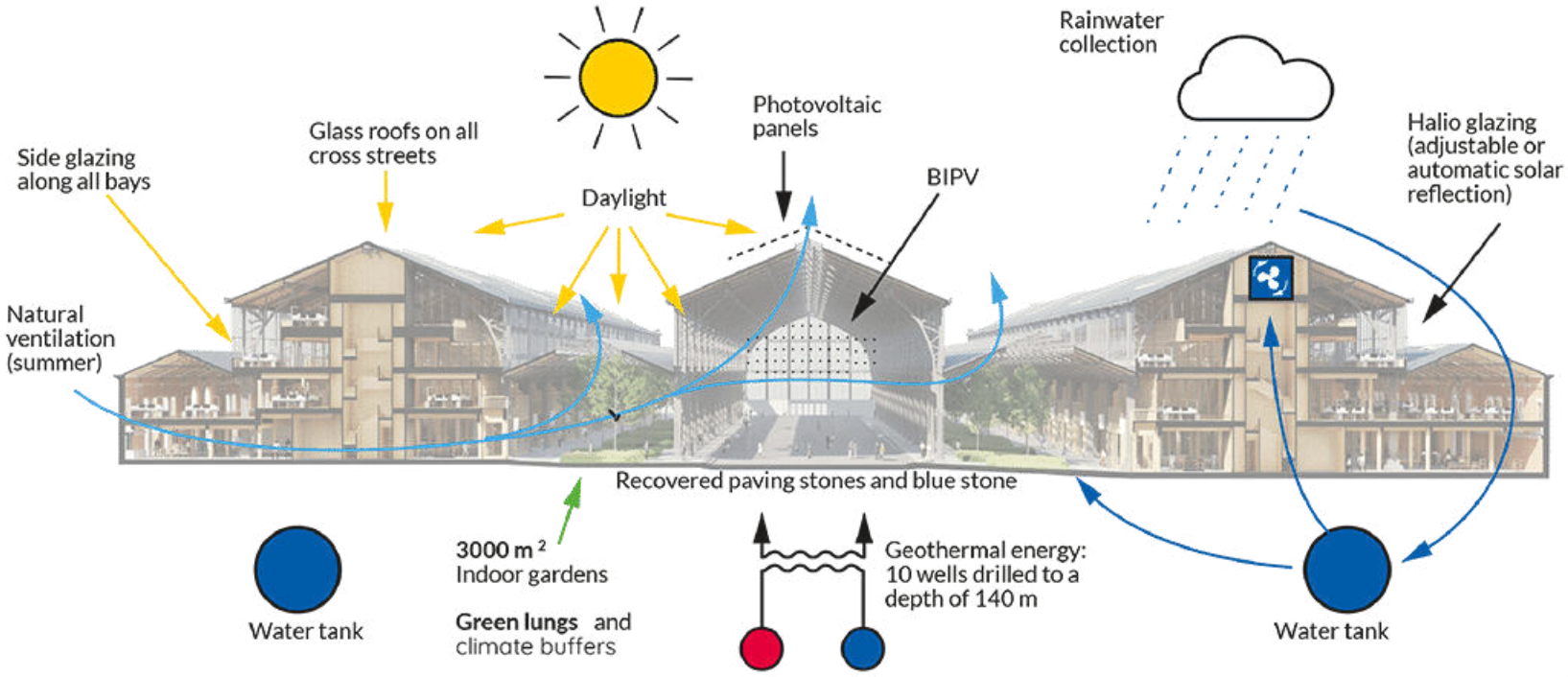




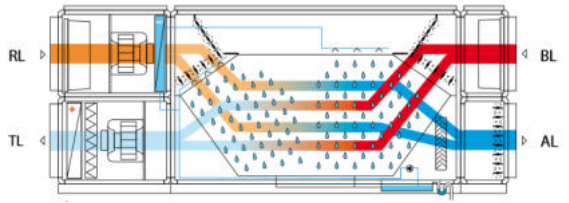
17.000m² PV panels on the roof for 3,4MWp

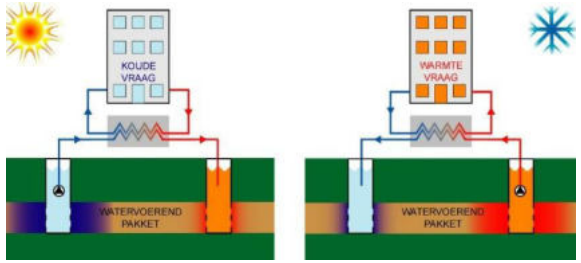
A city where it never rains

Overall Concept



Breeam Excellent





Transforming society together