Following the Sun

Low-energy, mixed-use, student housing redesign with a Climate Adaptive Facade
1. Context
- Fascination
- Problem Statement
- Urban scale analysis
- Program
- Thematic focus
- Research question

2. RESEARCH
- Climate adaptive facade
  - Thermal comfort / User comfort
  - Energy performance
  - Maintenance
  - C.A.F. principles
  - C.A.F. types
  - Conclusions

3. DESIGN PROPOSAL
- Design question
- Intentions
- Site analysis
- Building scale analysis

4. TECHNICAL DRAWINGS
- Plan + Side view drawings
- Facade fragment sections
- Details
- 3D view
1. Context
1. Context

1.1 Fascination

1.2 Problem Statement

1.3 Urban scale analysis

1.4 Program

1.5 Thematic Focus

1.6 Research question

Climate Adaptive Facade

M9-C project
1. Context

1.1 Fascination

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1.6 Research question

Climate Adaptive Facade

Basket apartments

M9-C project

Ipera 25
1. Context

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1.2 Problem Statement

1.3 Urban scale analysis

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1.6 Research question

Climate Adaptive Facade

M9-C project

Wilanowska Housing Complex

Basket apartments

Monash Uni. student housing

Ipera 25

Ipera 25
1. Context

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Climate Adaptive Facade

Monash Uni. student housing

Wilanowska Housing Complex

The Rock

Ipera 25

Basket apartments

Coca cola headquarters, Madrid

Golf’s Tower

M9-C project
1. Context

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1.6 Research question
Infrastructure

- train rail
- metro rail
- tram rail
- bus stop
Buildings height

- 2-4m
- 4-6m
- 6-8m
- 8-10m

infrastructure
- train rail
- metro rail
- tram rail
- bus stop
Building of choice

- belastingdienst

- infrastructure
  - train rail
  - metro rail
  - tram rail
  - bus stop
1. Context
1.1 Fascination
1.2 Problem Statement
1.3 Urban scale analysis

1.4 Program

1.5 Thematic Focus
1.6 Research question

Multi-functional

- diversification
- vitality
- density
- sense of community
- safety

Student housing

- communal areas
- cafeteria
- green zones
- study rooms
- workshops
- market
- restaurant
1. Context

1.1 Fascination

1.2 Problem Statement

1.3 Urban scale analysis

1.4 Program

1.5 **Thematic Focus**

1.6 Research question

Low-energy, climate responsive redesign
1.6 Research question

How can a climate adaptive façade that houses a mixed-use program of student housing, interact smartly between indoor and outdoor climate while generating, distributing and saving energy in an efficient way?
2. RESEARCH
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions
2. Research

2.1 Climate adaptive facade

2.2 **Thermal comfort/User comfort**

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

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2.4 Maintenance

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2.6 C.A.F. types

2.7 Conclusions
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

natural daylight

GouweZone CO2 Free Offices

Utrecht Library

Ipera 25
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

ventilation
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

**sound insulation**
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

**post & beam facade**
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

curtain wall facade
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

double-skin facade
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions
2. Research

2.1 Climate adaptive facade

2.2 Thermal comfort/User comfort

2.3 Energy performance

2.4 Maintenance

2.5 C.A.F. principles

2.6 C.A.F. types

2.7 Conclusions

Low-energy, climate responsive re-design
3. DESIGN PROPOSAL
3. Design Proposal

3.1 Design question

How can a redesign of an existing vacant office in Sloterdijk station area, Amsterdam, reduce the energy demands and save energy, with the combination of a student housing program and a climate adaptive façade?
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

FOLLOW THE SUN
3. Design Proposal

3.1 Design question

**3.2 Intentions**

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

Nature _

landscape of site
green walls
winter gardens
green roofs
green balconies
green panels
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

Nature
- landscape of site
- green walls
- winter gardens
- green roofs
- green balconies
- green panels

Sun shading devices

M9.C project 5

Kolding Campus, University of Southern Denmark

Social Housing Tower In Europa Square
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

Nature
- landscape of site
- green walls
- winter gardens
- green roofs
- green balconies
- green panels

Sun shading devices

Communal areas
- study
- relax
- meeting point

The Student Hotel, Amsterdam
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

Nature
- landscape of site
- green walls
- winter gardens
- green roofs
- green balconies
- green panels

Sun shading devices

Communal areas
- study
- relax
- meeting point

Solar chimneys
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

**multi-facade design**
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

existing situation
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

*proposed idea*
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea
3. Design Proposal

3.1 Design question

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3.3 Site analysis

3.4 Building scale analysis

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3. Design Proposal

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3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea
sun & shade

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3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea
_min. daylight
_low wind velocity
_lowest temperature

_max. daylight
_high wind velocity
_highest temperature
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

program

- 1 bedroom apartment
- 2 bedroom apartments
- 3 bedroom apartments
- communal areas
- student housing
- gathering lounges
- game/TV rooms
- music rooms
- group study rooms
- workrooms
- café
- restaurant
- bar
- gym
- sports fields
3. Design Proposal

3.1 Design question

3.2 Intentions

3.3 Site analysis

3.4 Building scale analysis

3.5 Design idea

floorplan & facades
floorplan & facades

East/south/west/north facade
floorplan & facades

East/south/west/north facade

private/public

glass facade

solid facade

public

public
floorplan & facades

East/south/west/north facade

vertical services core
solar chimney

existing voids

new voids

existing voids
floorplan & facades

East/south/west/north facade
floorplan & facades

East/south/west/north facade
floorplan & facades

South - east facade
floorplan & facades

South - east facade

_long & narrow apartments
long & narrow apartments
addition of a double facade
vertical, perforated, metal, colored panels

floorplan & facades

South - east facade
floorplan & facades

South - east facade

-long & narrow apartments
-addition of a double facade
-vertical, perforated, metal, colored panels
floorplan & facades

Double facade / structure
floorplan & facades

Double facade / panels
floorplan & facades

South - west facade
floorplan & facades

South - west facade

_short & wide apartments
floorplan & facades

South - west facade

_short & wide apartments _
_addition of a double facade with green balconies
floorplan & facades

South - west facade

_short & wide apartments
_addition of a double facade with green balconies
floorplan & facades

South - west facade

Front view

Plan view
Scale 1:100
floorplan & facades

South - west facade

_short & wide apartments
_addition of a double facade
_with green balconies
_communal area
south - west facade

plan view
scale 1:100
floorplan & facades

North - east facade
North – west facade
floorplan & facades

North - west facade

_short & wide apartments on the sides
_communal area in the middle
floorplan & facades

North - west facade

- short & wide apartments on the sides
- communal area in the middle
- addition of double facade
- vertical metal colored panels & spider glass facade
floorplan & facades

North - west facade

Detail
floorplan & facades

North - west facade
floorplan & facades

North - east facade
floorplan & facades

North - east facade

_long collective housing
_apartment
_communal area in the middle
_curtain wall facade
floorplan & facades

North - east facade

Front view

Detail

Section
floorplan & facades

apartment types

Type A: 1 person
double facade
perforated panels

Floor area: 20m²
Scale 1:100
floorplan & facades

apartment types

Type A: 1 person
double facade
perforated panels

Floor area: 20m²
Scale 1:100

Type Ba: 1 person
double facade
green balcony

Floor area: 24m²
Scale 1:100
floorplan & facades

apartment types

Type A: 1 person
double facade
perforated panels

Type Ba: 1 person
double facade
green balcony

Type Ba: 1 person
double facade
perforated panels

Floor area: 20m²
Scale 1:100

Floor area: 24m²
Scale 1:100

Floor area: 24m²
Scale 1:100
floorplan & facades

apartment types

Type Ca: 2 person
double facade
green balcony

Floor area: 44.25m²
Scale 1:100
floorplan & facades

apartment types

Type Ca: 2 person
double facade
green balcony

Floor area: 44.25m²
Scale 1:100

Type Ca: 2 person
double facade
perforated panels

Floor area: 44.25m²
Scale 1:100
floorplan & facades

apartment types

Type D: 6 person
- curtain wall facade
- green balcony
- private communal area

Floor area: 255.70m² (6 x 20m²)
floorplan & facades

communal areas
communal areas

- SW wing
- NW wing
- Type D apartment

- provide light to the corridor
- change position at each floor
- small gatherings and relaxation
communal areas

-provides daylight to the communal area of apartment type D at the back
-same position in all floors
-divided in 4 thematic parts
-formations of large interior voids connected with spiral staircases
communal areas

- provides daylight to the communal area of apartment type D at the back
- same position in all floors
- divided in 4 thematic parts
- formations of large interior voids connected with spiral staircases
communal areas

_provides daylight to the communal area of apartment type D at the back same position in all floors divided in 4 thematic parts formations of large interior voids connected with spiral staircases
communal areas

(private communal area of the residence of apartment type D -sliding windows on one side & rotating glass panels on the other)
public & private
3. Design
3.1 Design question
3.2 Intentions
3.3 Urban scale analysis

3.4 Building scale analysis

nature integration
Green walls

- Reduce solar heat gain
- Mitigate noise transfer
- Reduce building energy costs
Winter gardens

Winter garden

- provides daylight to the surrounding area
- protect from direct sunlight
- draws in fresh air, preconditions before it enters the rooms
- creates a pleasant environment to escape to
Green balconies

placed where is most favorable for the plants to grow
placed in front of apartments so students can take care of it
provide a pleasant view to the exterior
Green panels

- placed inside the horizontal panel apartment balconies
- moveable in order to provide additional shading where is needed
- purifies the cavity air
- provides a pleasant view to the exterior
4. TECHNICAL DRAWINGS
THANK YOU!