About the Range of Responsive Facades

Rudi Scheuermann
Global Building Envelope
Design Leader

Cost Meeting in Delft/NL 16/17 Sept 2015

Arup Fellow

About the Range of Responsive Facades

….with common sense

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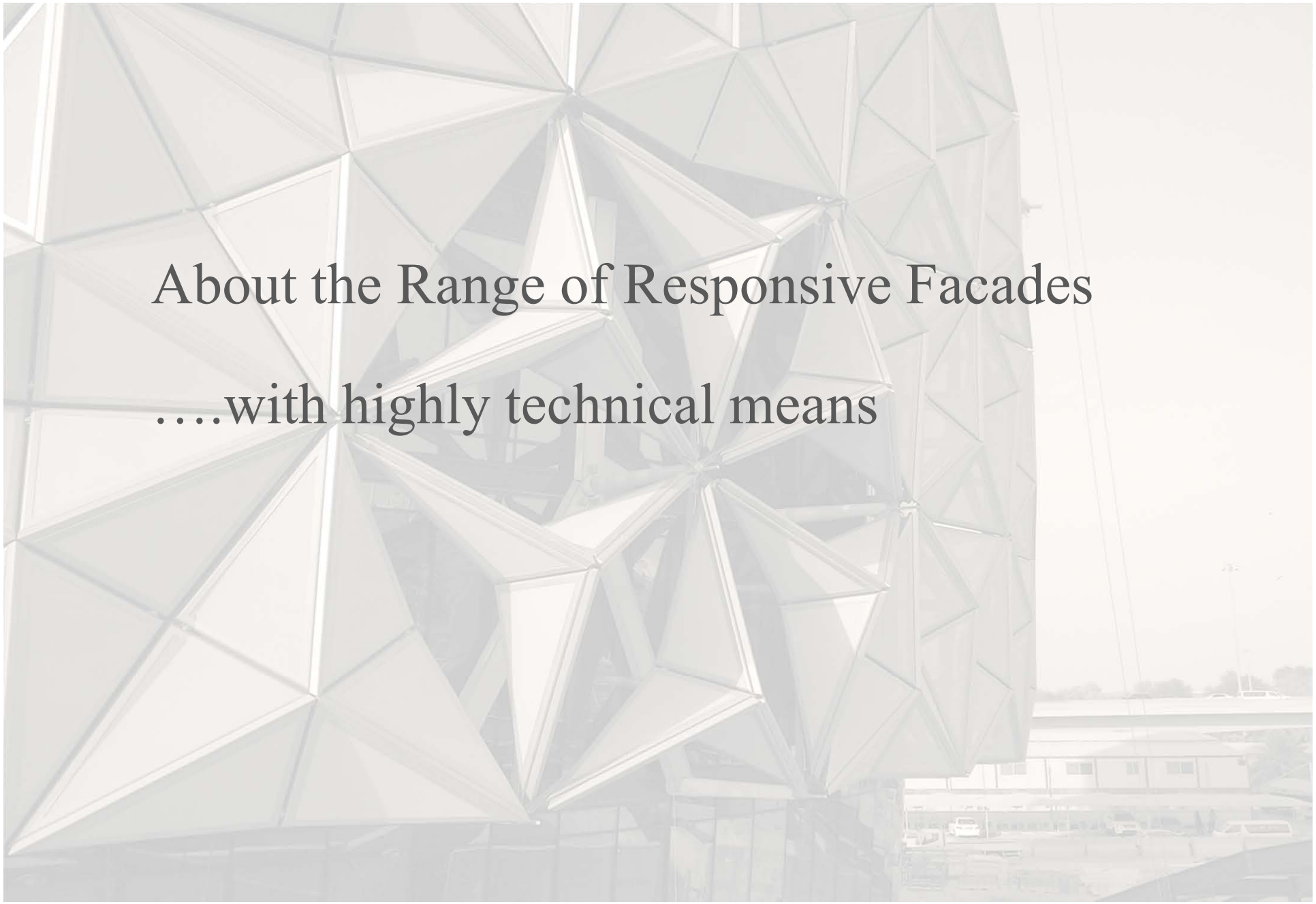

About the Range of Responsive Facades

….with highly technical means

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About the Range of Responsive Facades

….with intelligent natural support

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Envelope BMS for existing buildings

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Reacting to extreme conditions

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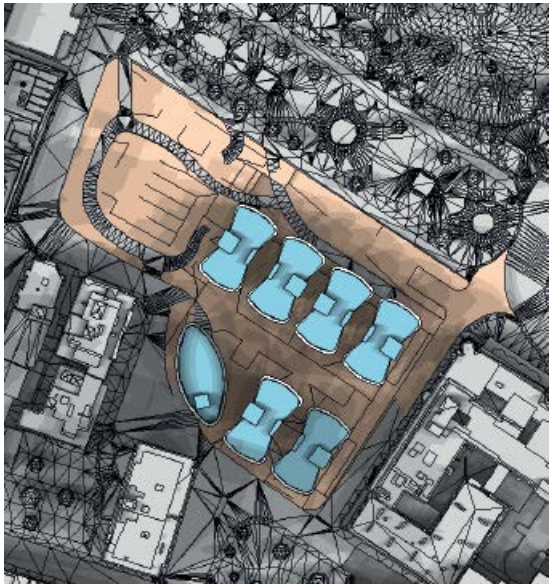

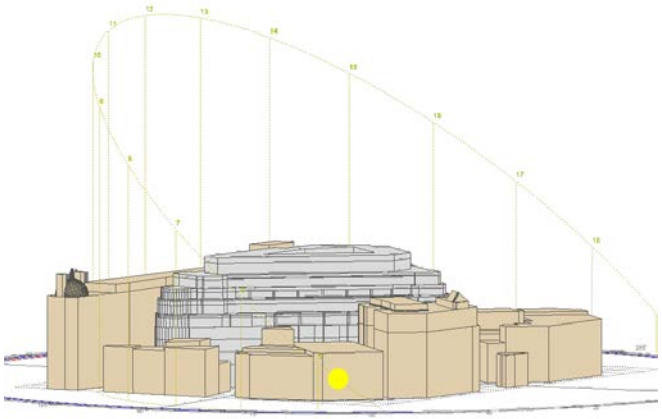

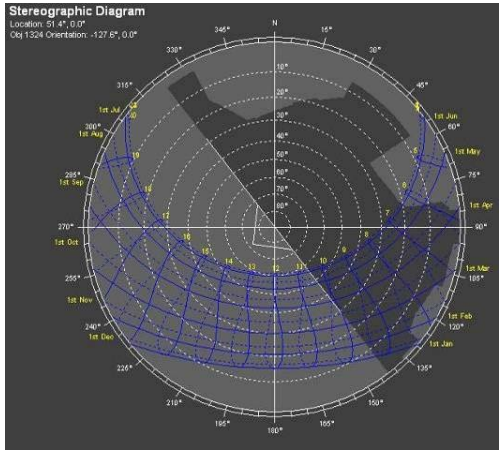

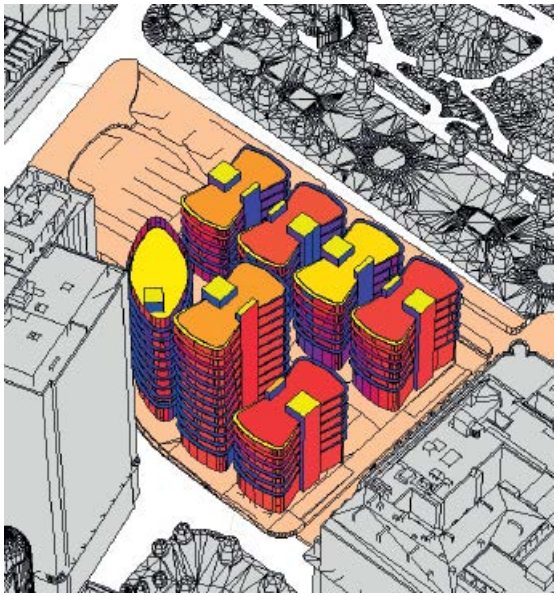

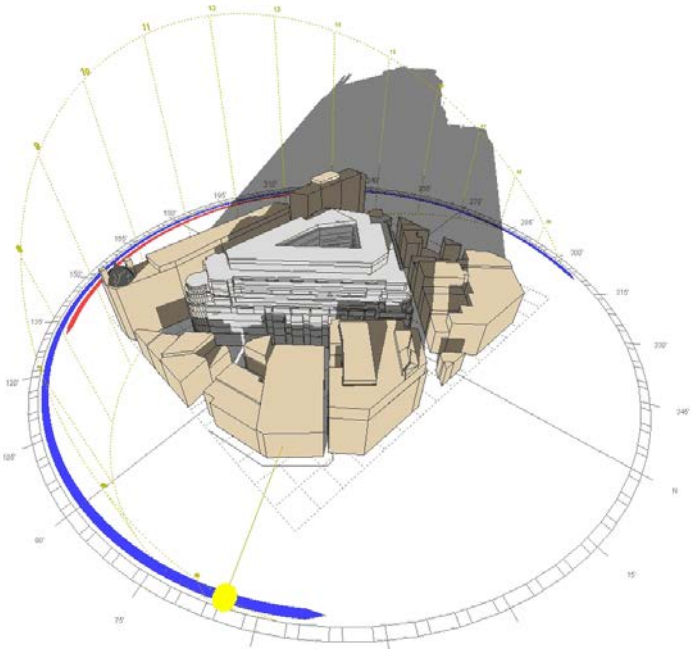

Glazed systems
- **WIS 3.10 (TNO)**
- **Window and Optics (LBNL)**

Solar, Shading, Daylighting
- **Ecotect**
- **Radiance**

Dynamic Thermal Modelling
- **Energy Plus**
- **IDA ICE 4.0**
- **IES**
- **TAS**
- **NatFac (Arup in-house tool)**

Detailed thermal modelling
- **Bisco, Trisco, Voltra (Physibel)**
- **Therm (LBNL**

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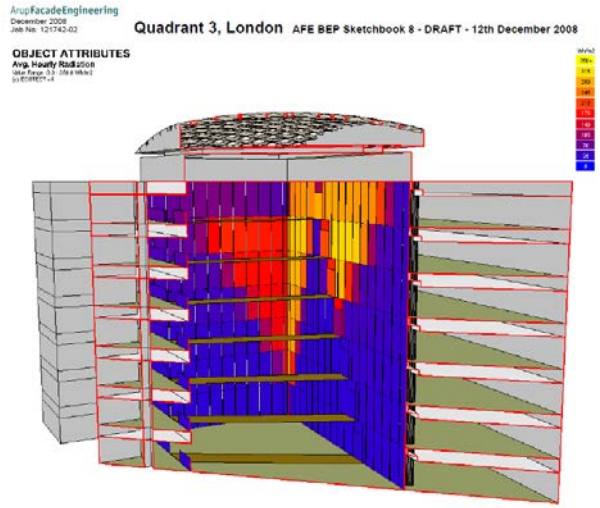

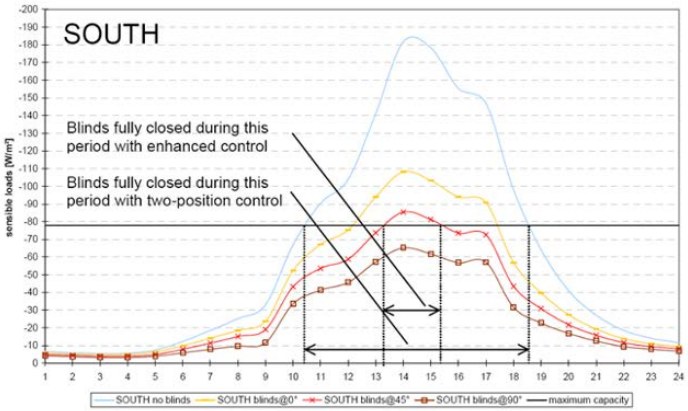

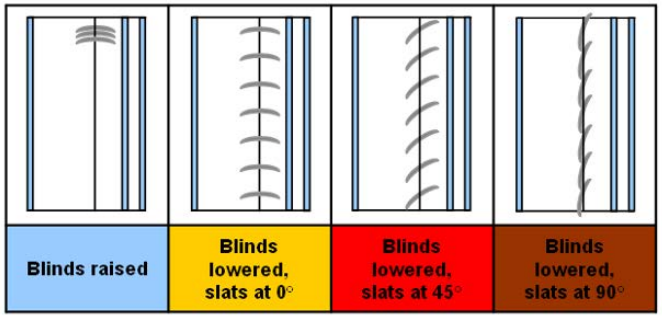

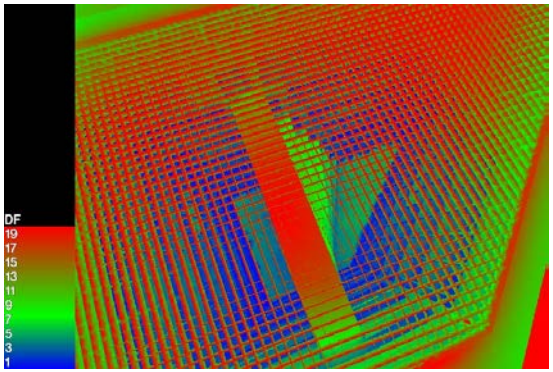

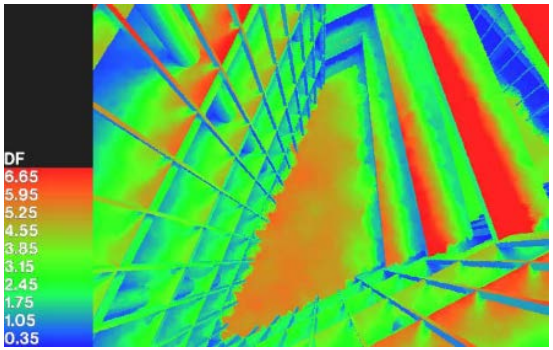

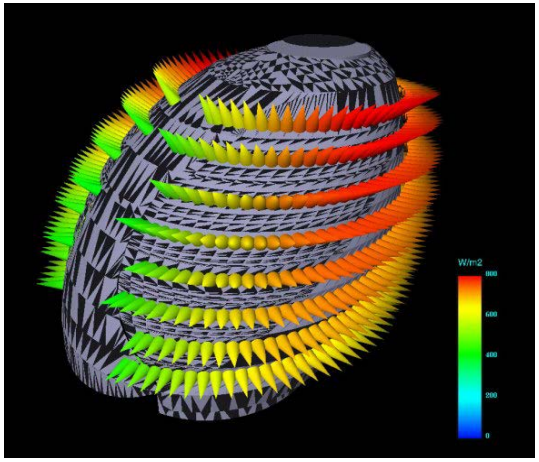

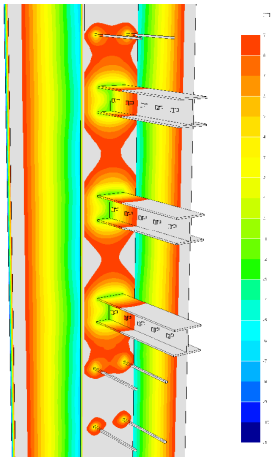

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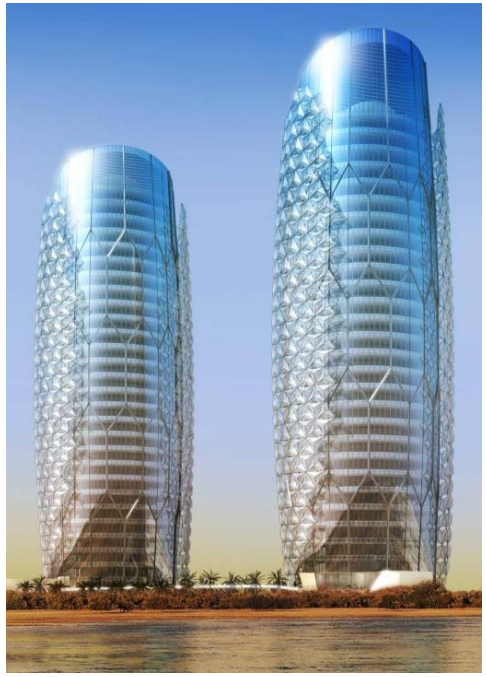

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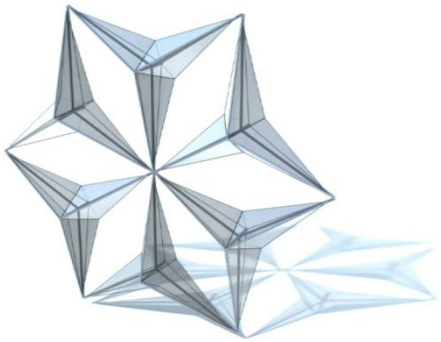

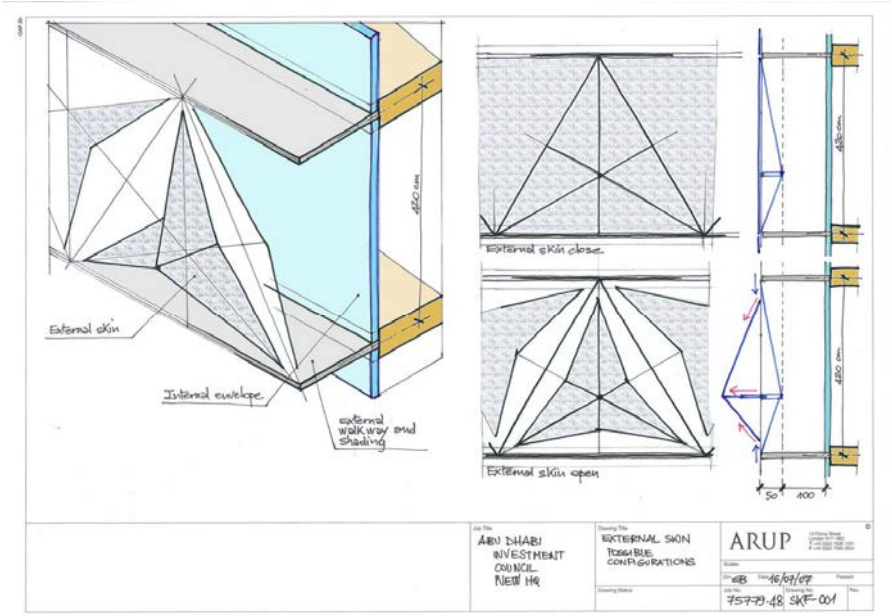

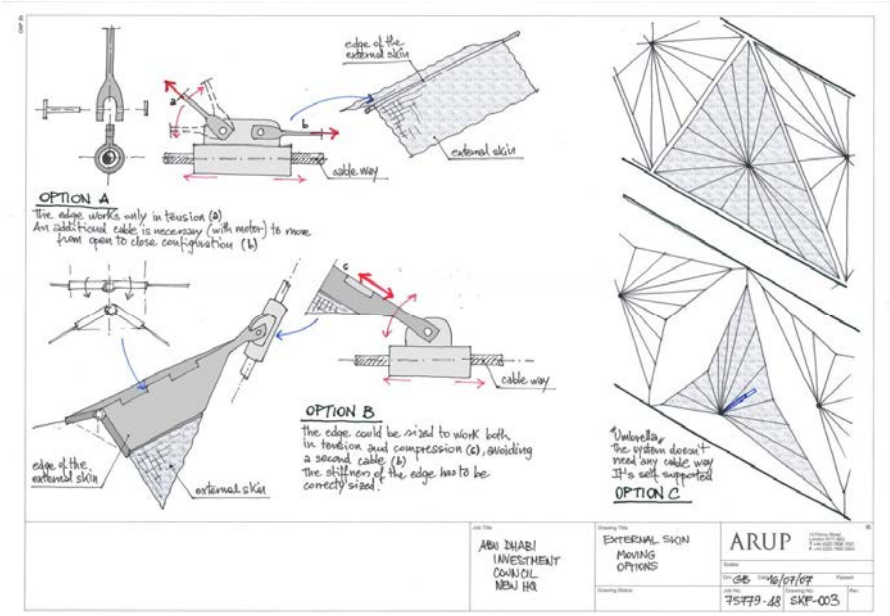

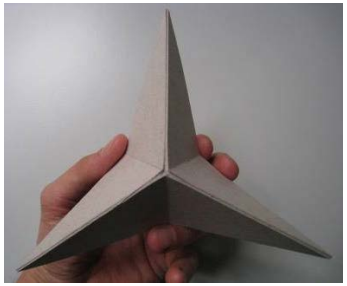

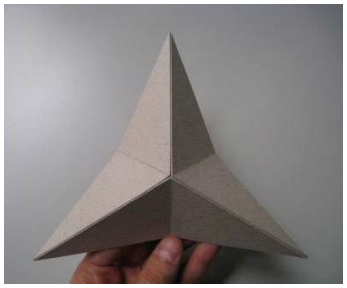

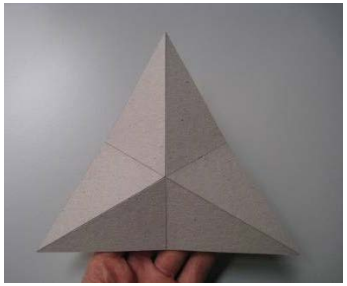

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BEP – without Mashrabiya

Façade – tower details

Façade – Wind tunnel test

Mashrabiya – Wind tunnel test

Mashrabiya – Durability test

August 2010
- Phase 1 – 20.000 cycles at aver.temp of 22°C
- Phase 2 – 10.000 cycles at aver.temp of 60°C

- Sand / Dust / Water mix applied regulary to all the joints and movable elements

Test Chamber

Sand, Dust ans Sea water from Abu Dhabi

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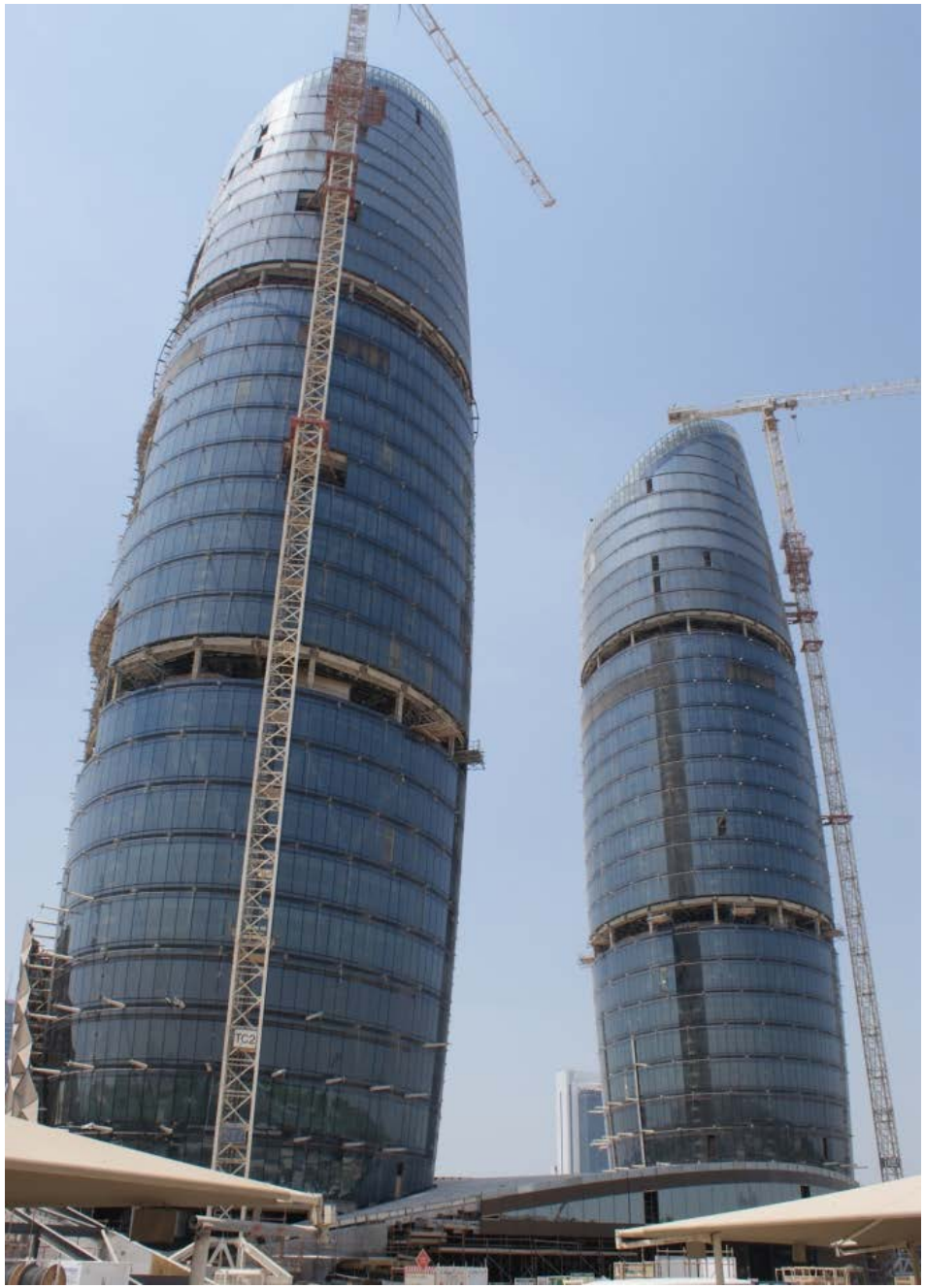

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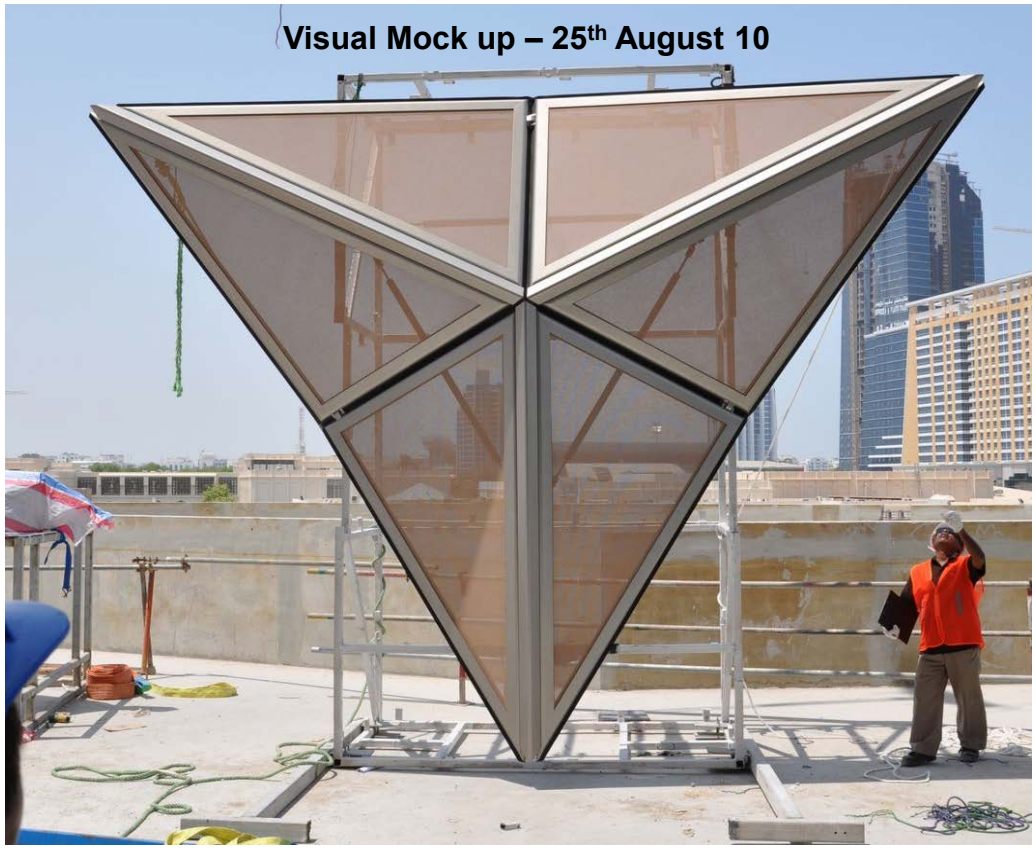

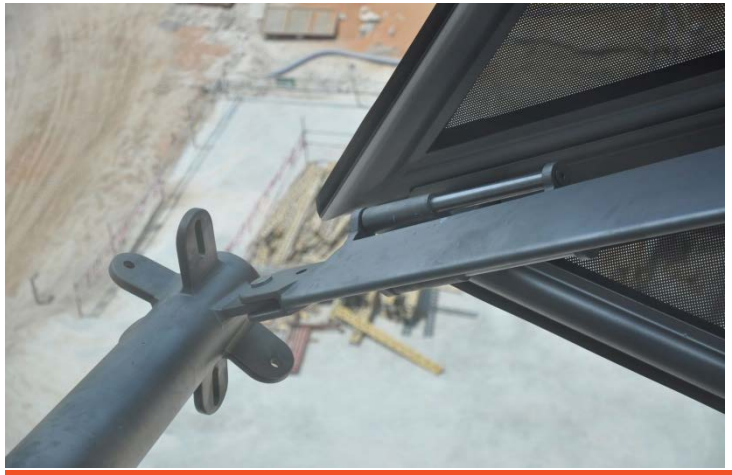

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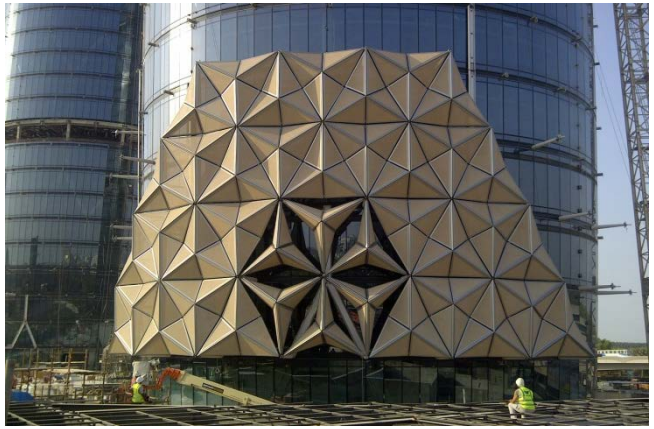

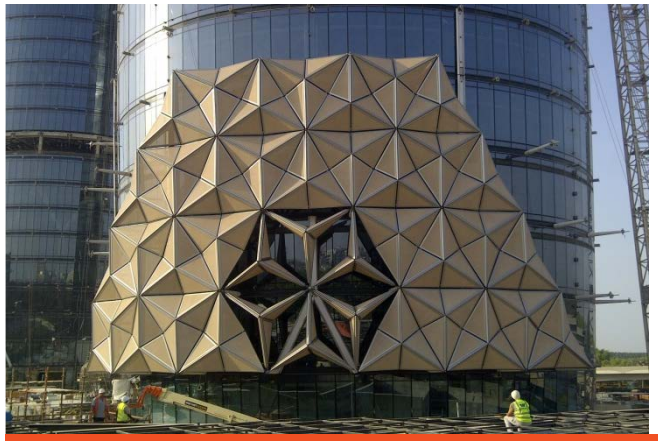

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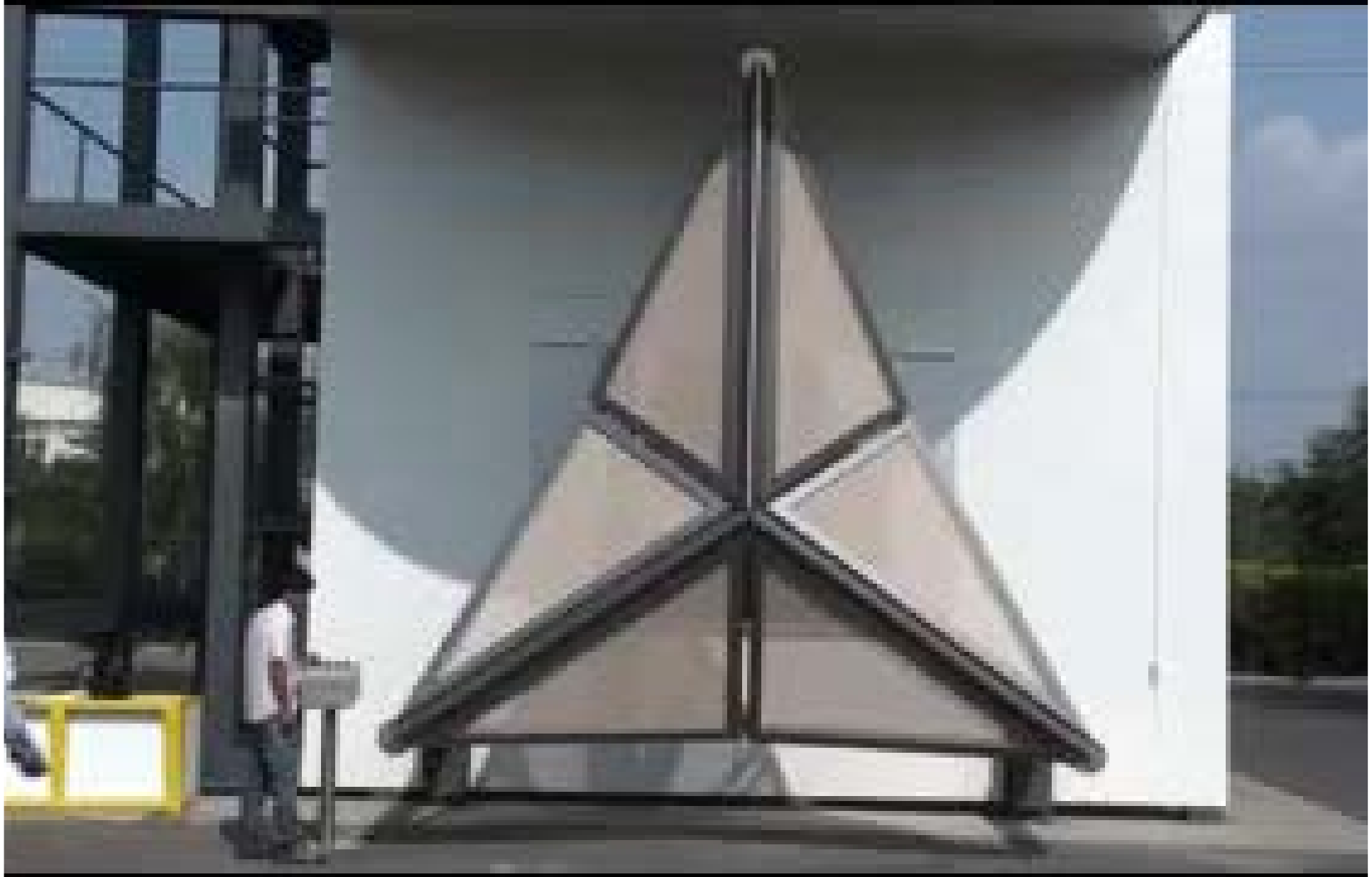

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Cost Meeting Delft 16/17Sept 2015 Global Building Envelope Design Leader

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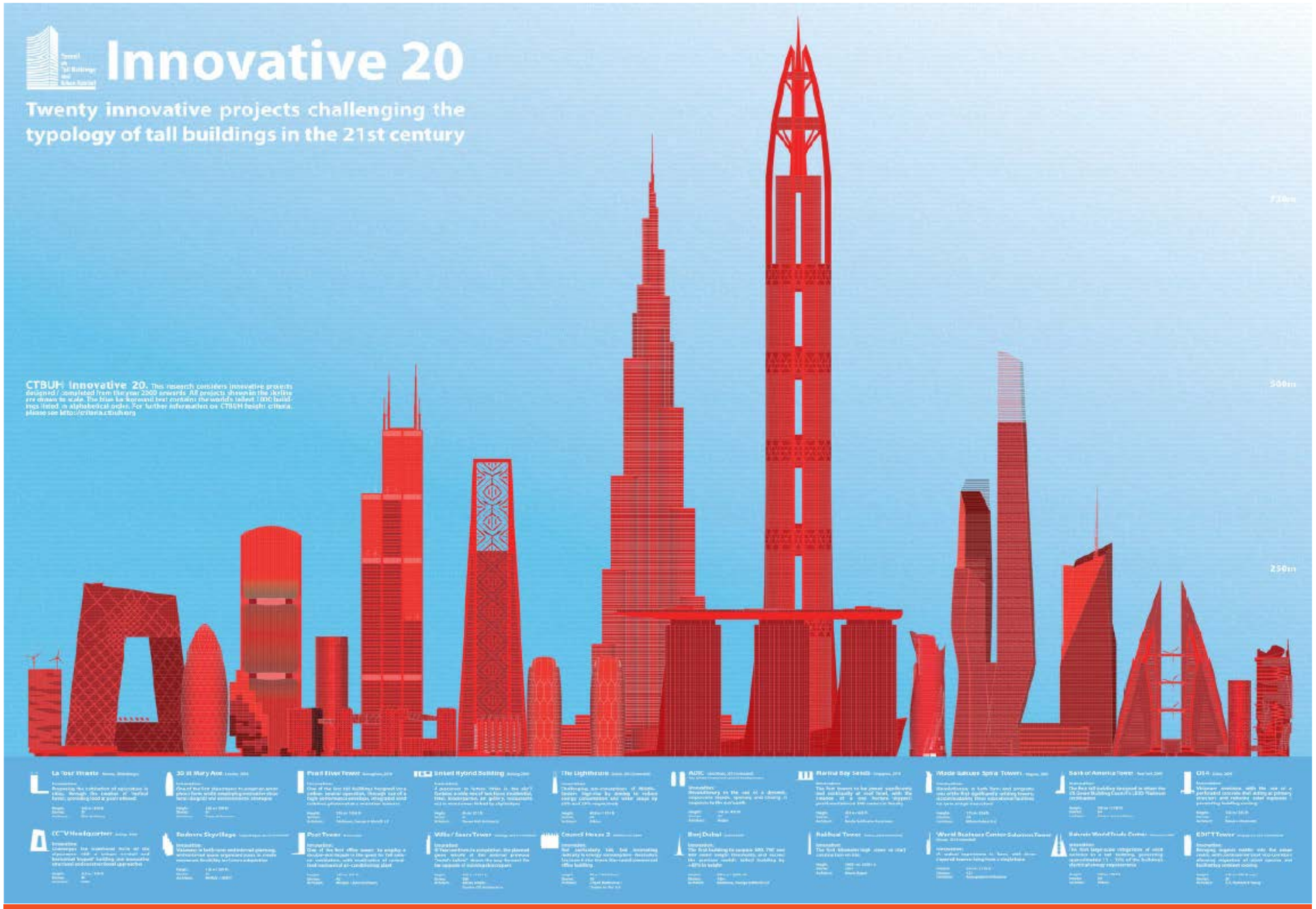

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Making use of biological behaviour

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Energy delivery by shading components

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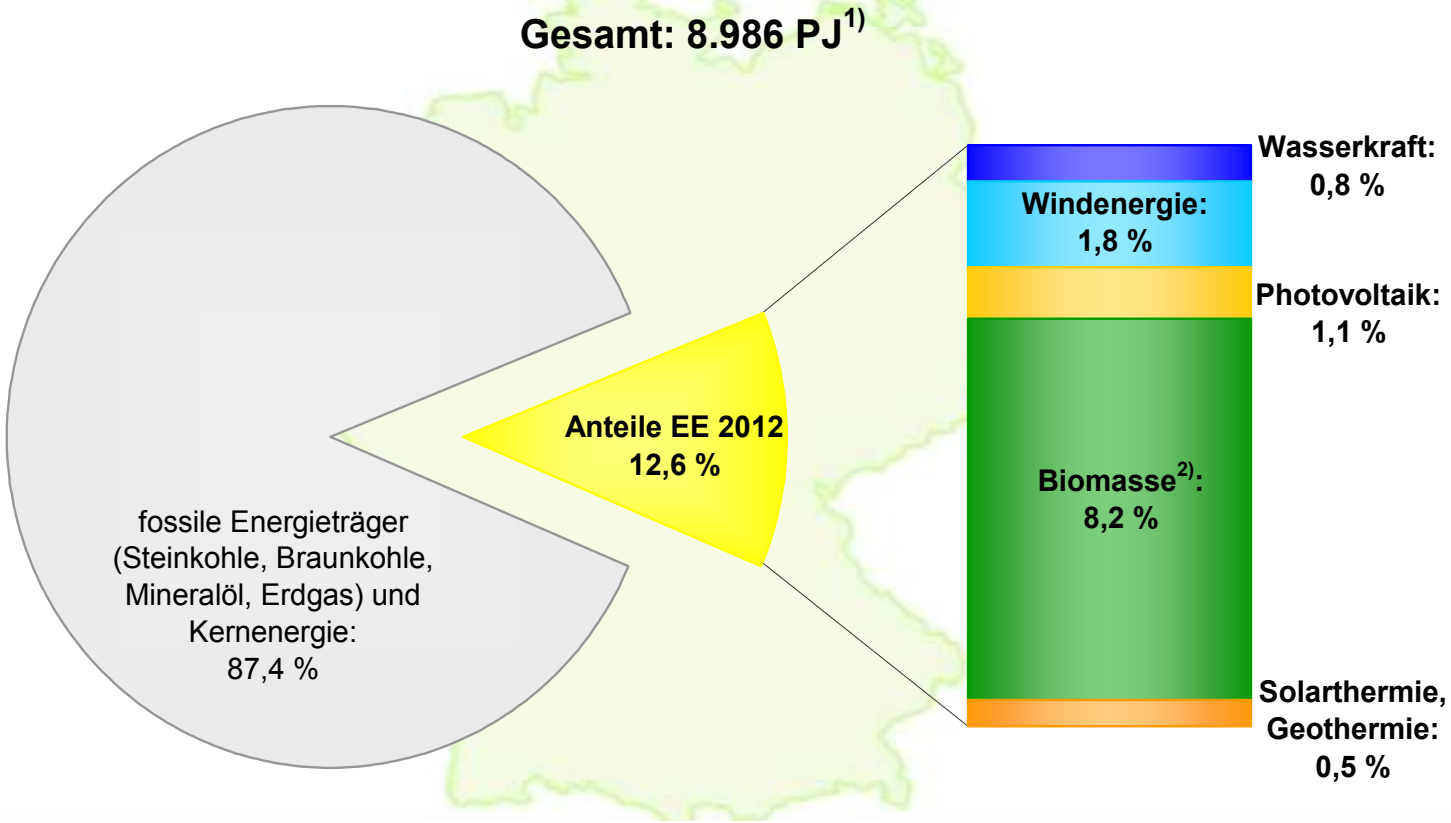

Renewables in Energy Consumption

Share of Renewables in end energy consumption in Germany 2012

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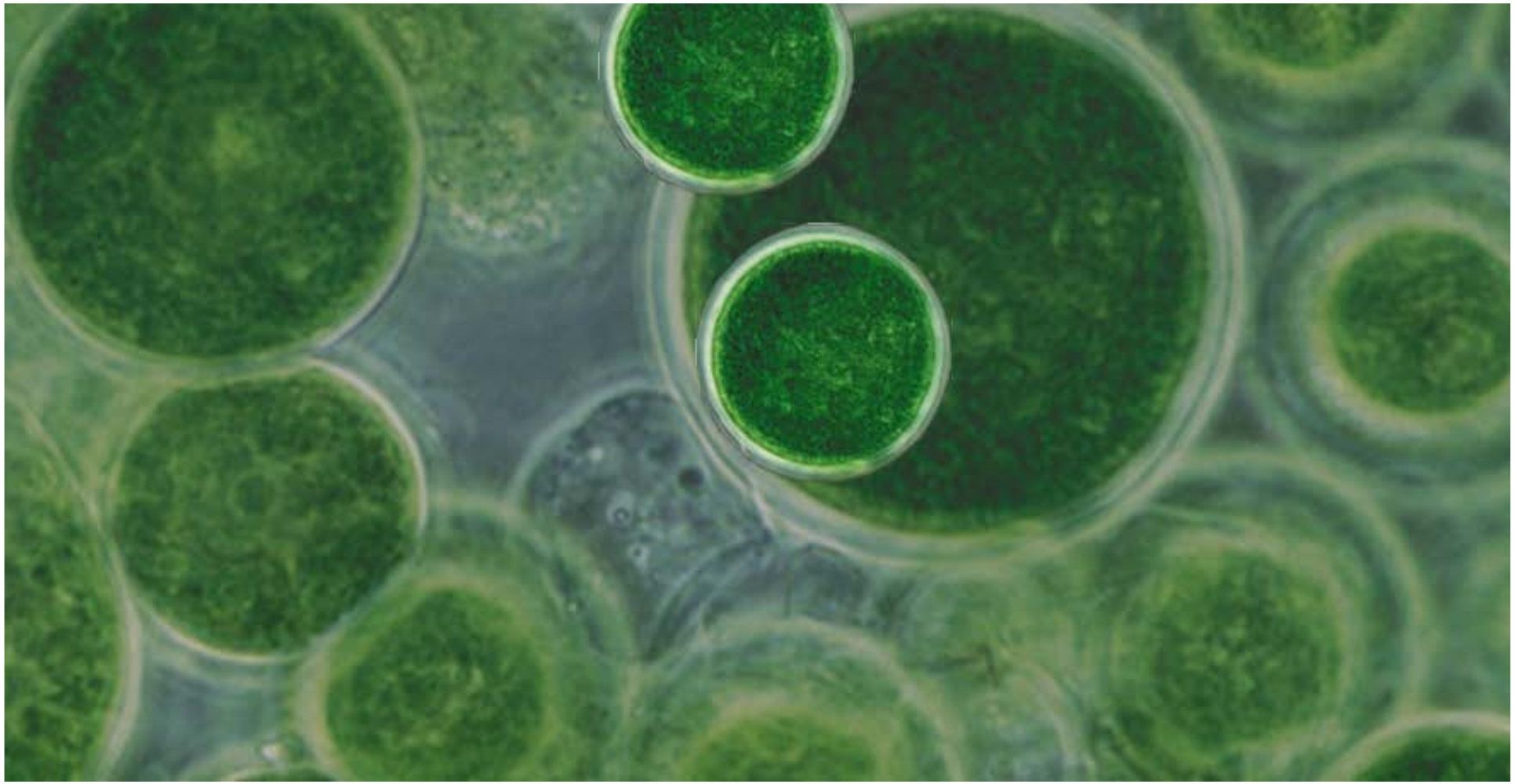

Micro algae

…grow very fast

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Green Urban Infrastructure

Peter Head

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Tube Collector

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Geo-Engineering

Institution of mechanical engineers

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2009

International Architectur Competition
Smart Material Houses IBA 2013

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The Smart Treefrog

International Building Exhibition Hamburg
Smart Material Houses (IBA 2013)

Architecture: SPLITTERWERK, Graz

Material Consulting / Facades/ MEP/ Building Physics: Arup, Berlin

Structural Engineering: Bollinger und Grohmann, Frankfurt

PBR Technology: SSC, Hamburg

Team 2009

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TERM Pilotprojekt Hamburg

Flat Panel Collector Technology,

By SSC (1st generation for field use)

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Glass Lamella for Shading,

Shadowglass by Colt

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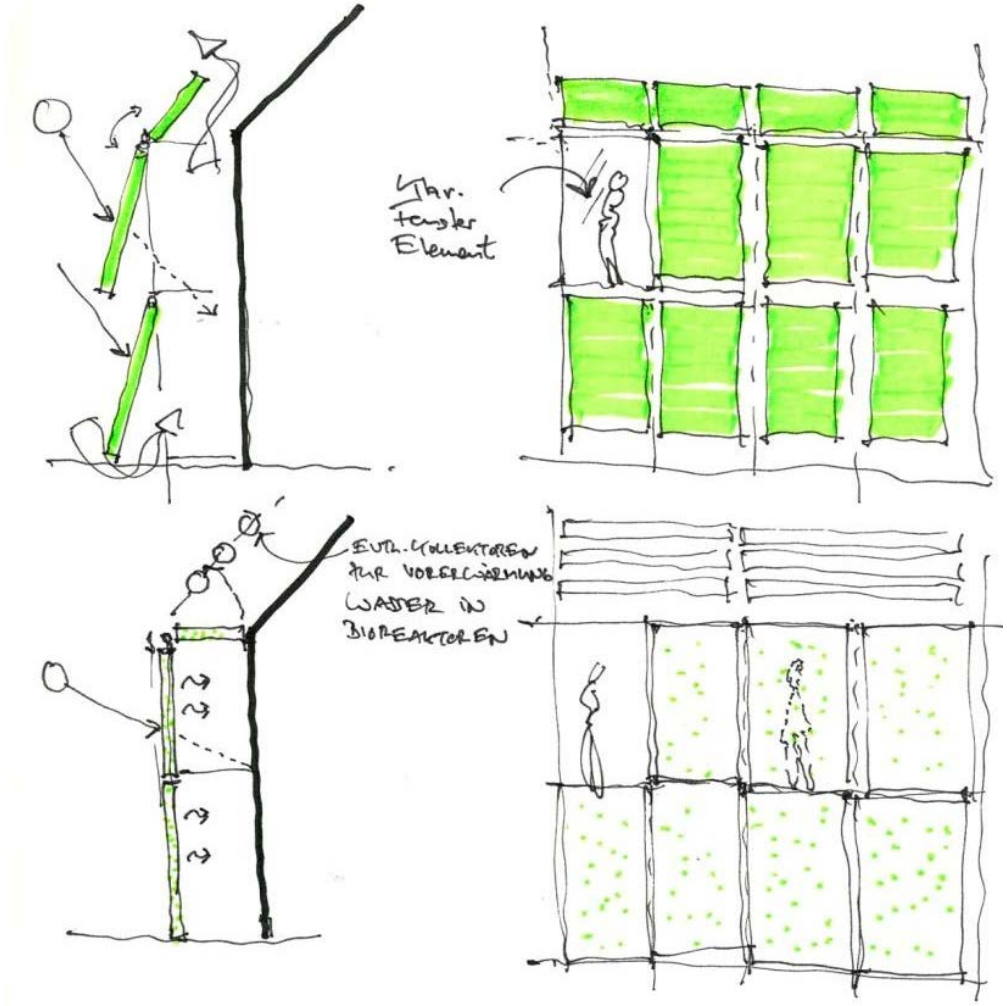

Concept

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(C) SPLITTERWERK

Competition Design 2010

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2010

Product Development Colt, Arup, SSC

Funded by ZukunftBau

FORSCHUNGSINITIATIVE ZukunftBAU

Team 2010

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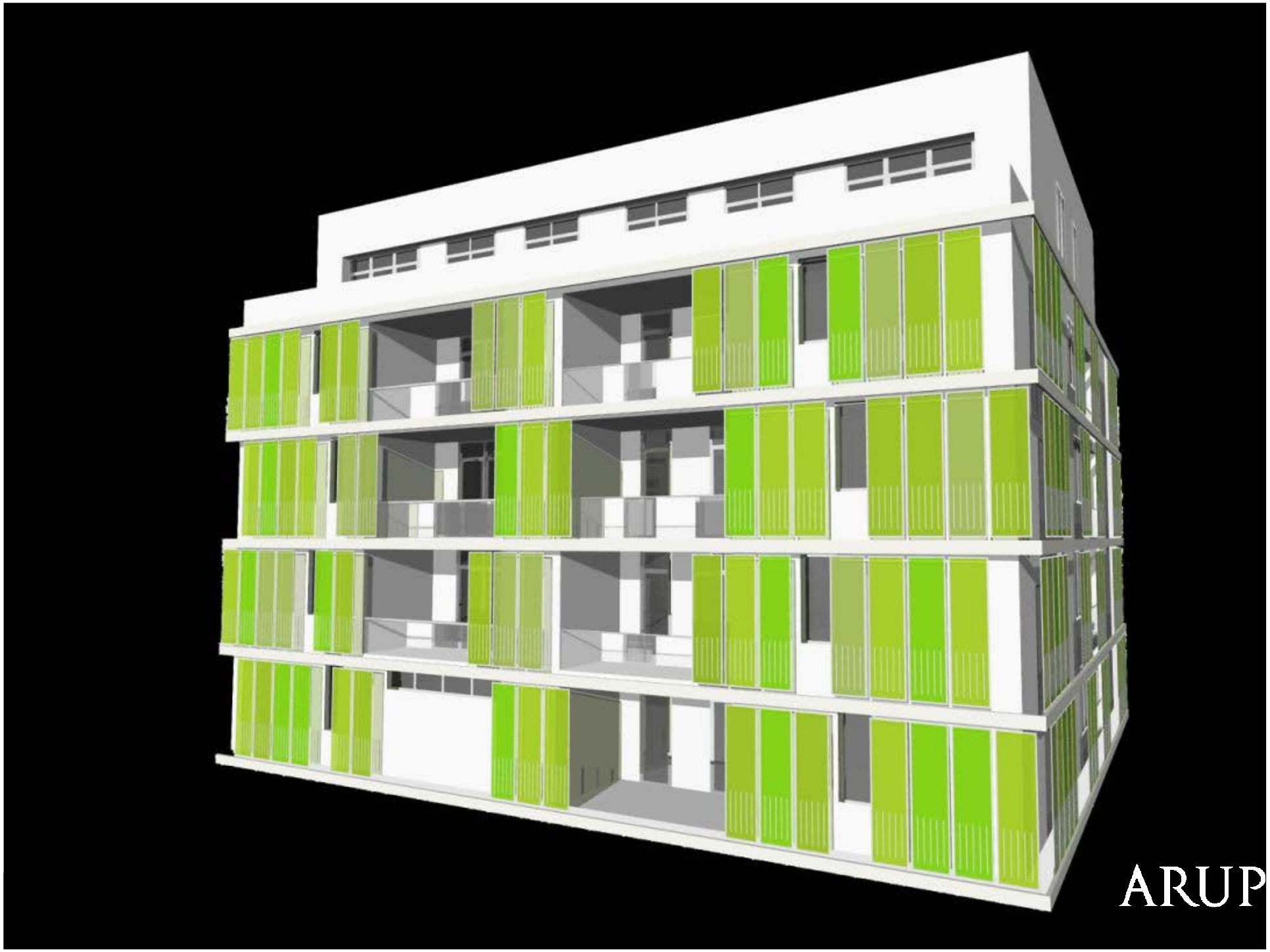
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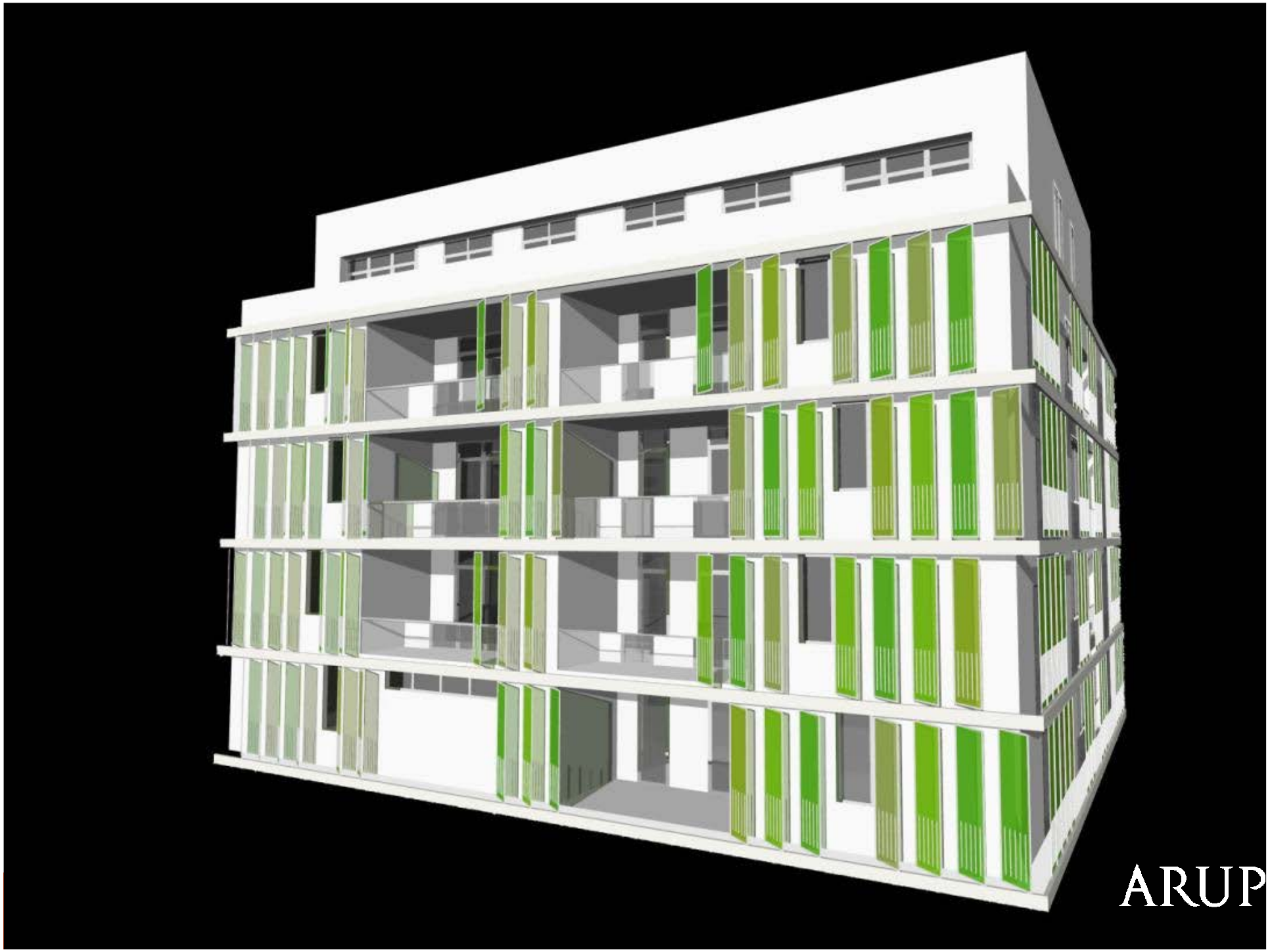
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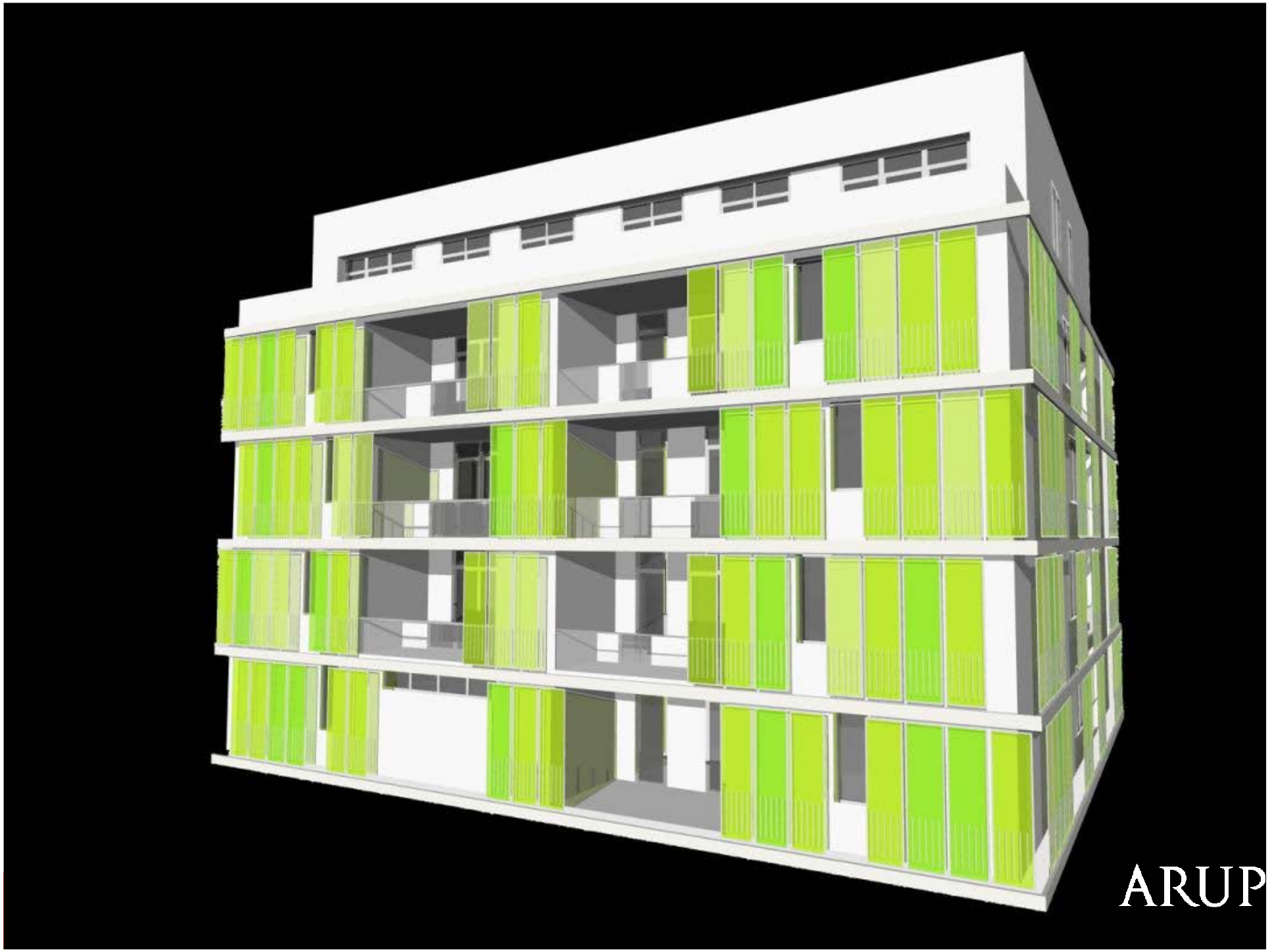
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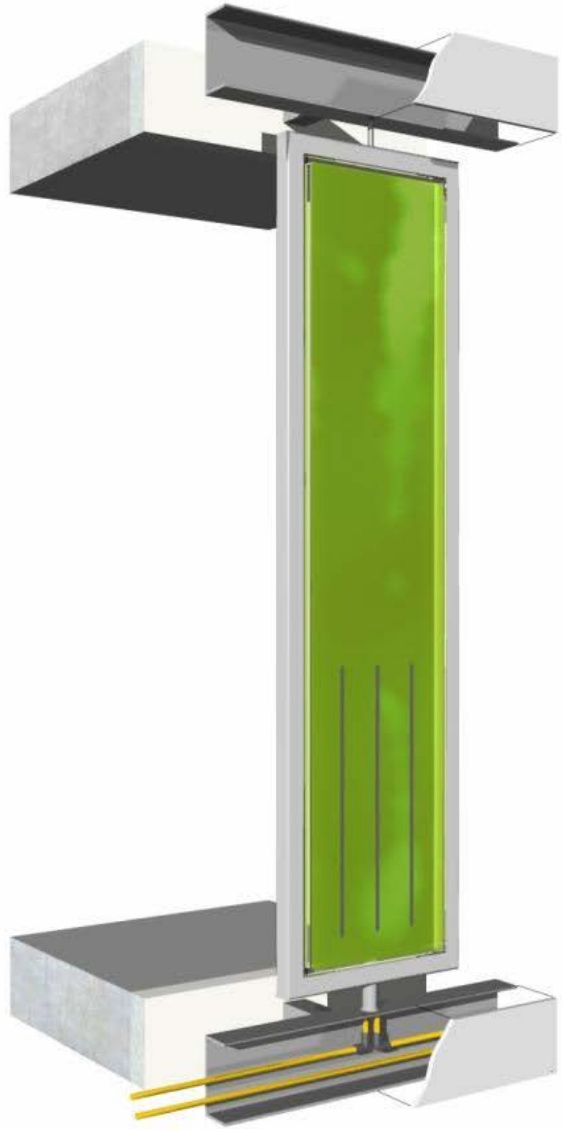
Dimensions:

- Hight: ~ 2,6m
- Width: ~ 0,7m
- Volume: ~ 24 l
- Weight filled: ~ 200 kg

Functionalities:

- Photobioreaktor
- Solar thermal collector
- Dynamic shading



SolarLeaf

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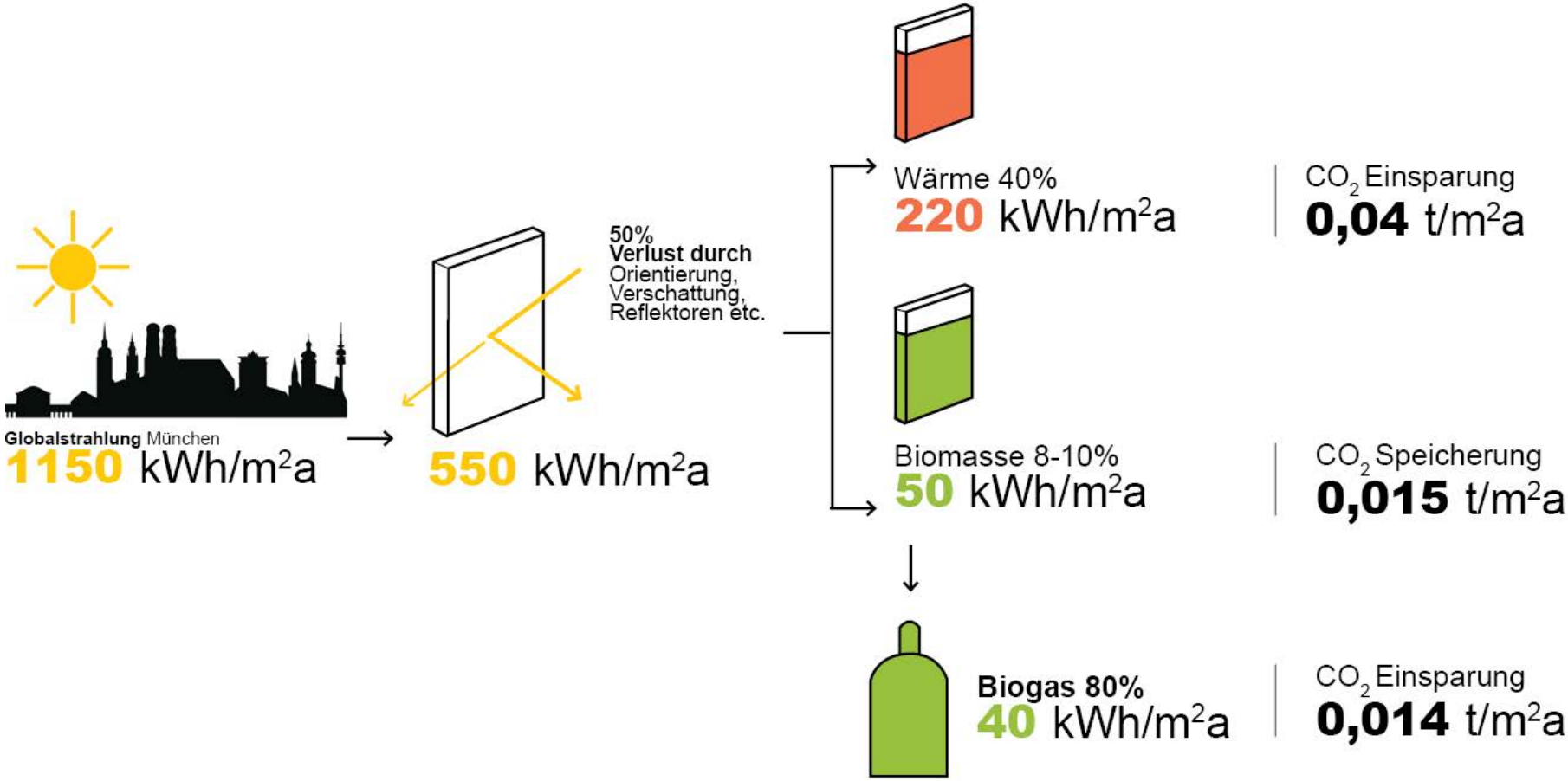

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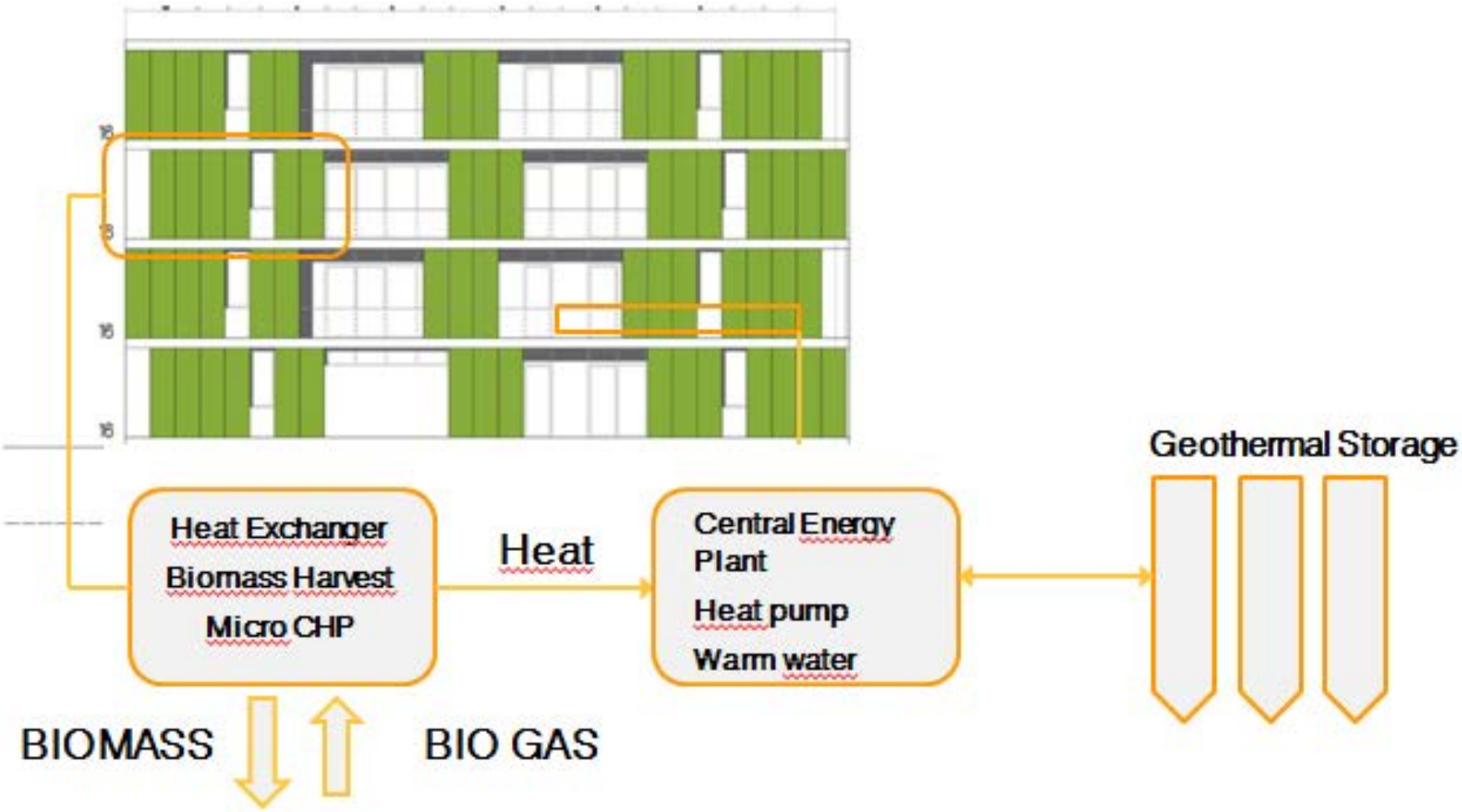

Building Integration

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‘the bioreative façade is alive’

Pilotproject BIQ, IBA Hamburg. 25. April 2013

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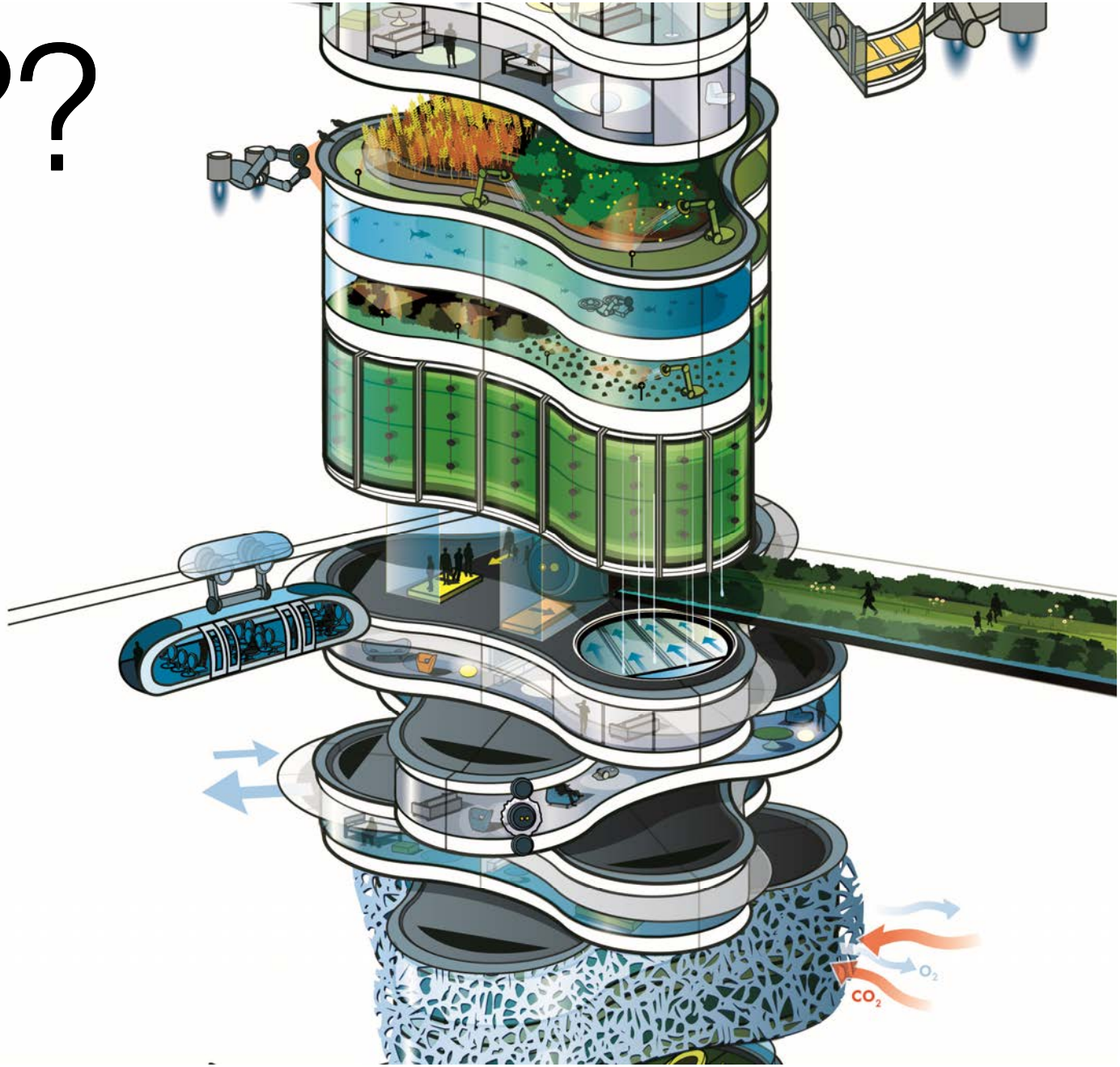
20??



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About the Range of Responsive Facades

….due to nature

→Green Building Envelope Forum 2015

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Global Building Envelope Design Leader

When did you last
get really excited
about a project?

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Global Building Envelope Design Leader

Thank you…

Rudi Scheuermann
Arup Fellow