

Seminar gezonde gebouwen

Een toekomstbestendig, flexibel en gezond schoolgebouw

Jacco Paauw, Associate, Team Leader Building Physics, Msc
Amsterdam, 20 september 2018

ARUP

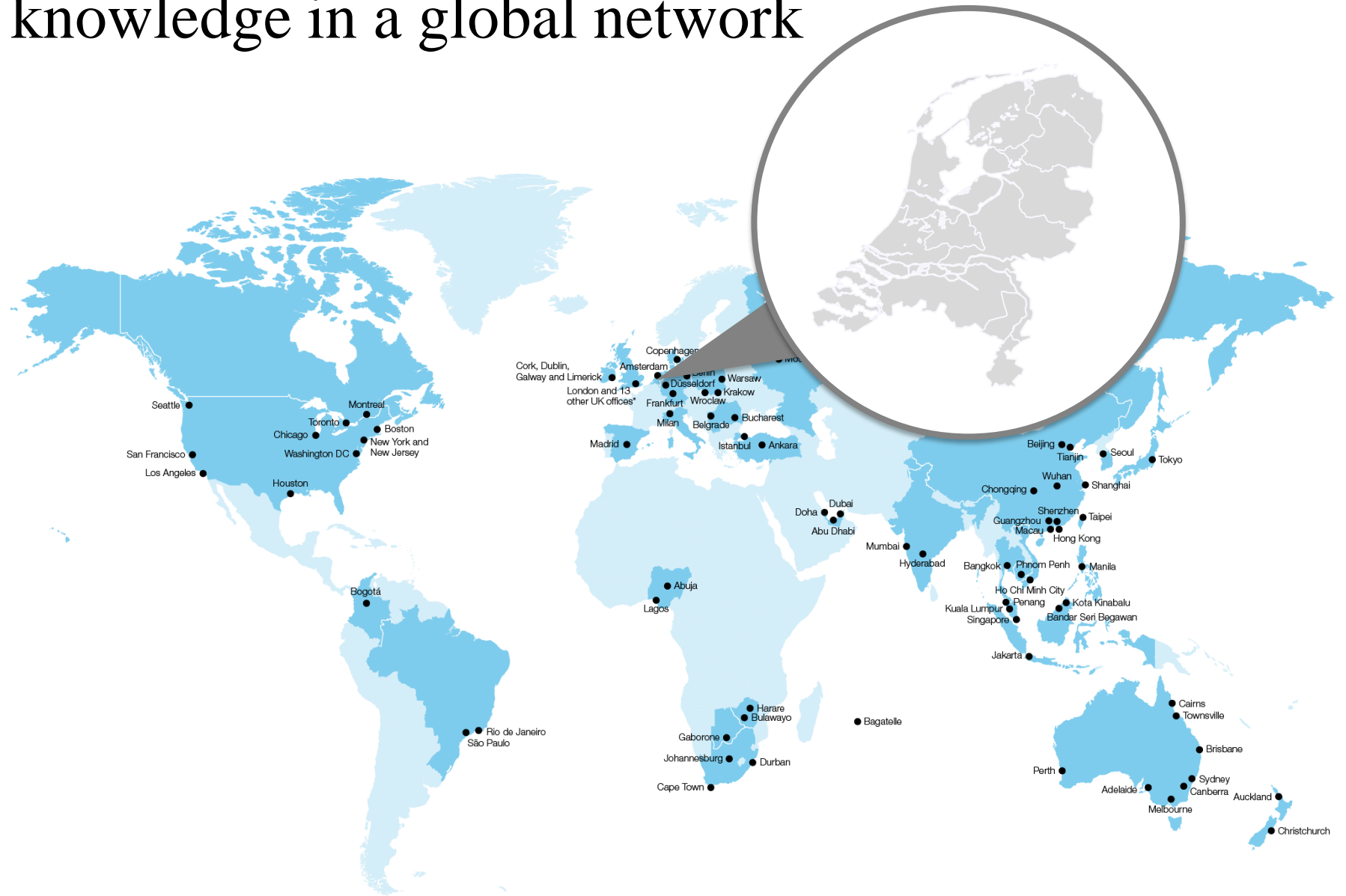
We are an independent firm of designers, planners, engineers, consultants and technical specialists offering a broad range of professional services.

Arup today: local knowledge in a global network

35
countries

85
offices

14,000
specialists





Our services in the Netherlands



**ELECTRICAL
ENGINEERING**



**MECHANICAL
ENGINEERING**



**PROJECT
MANAGEMENT**



MASTERPLANNING



SUSTAINABILITY



BUILDING PHYSICS



**SEISMIC
ENGINEERING**




INFRASTRUCTURE



**RESEARCH & FORESIGHT
& INNOVATION**



**ADDITIVE
MANUFACTURING**



**STRUCTURAL
ENGINEERING**



FAÇADES



**MANAGEMENT
CONSULTING**



ACOUSTICS



LIGHTING



**FIRE
SAFETY**




BIM



DIGITAL

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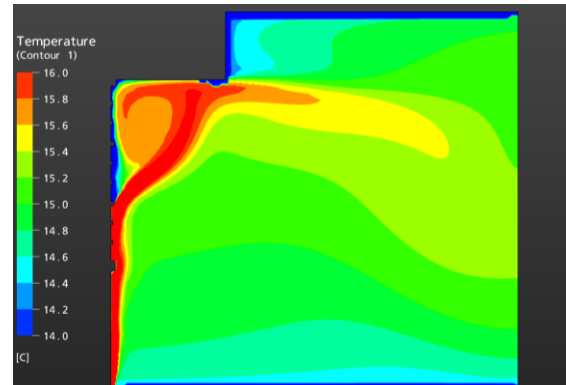
DIGITAL



Smart Building Envelope

Building Physics

Shading Analysis

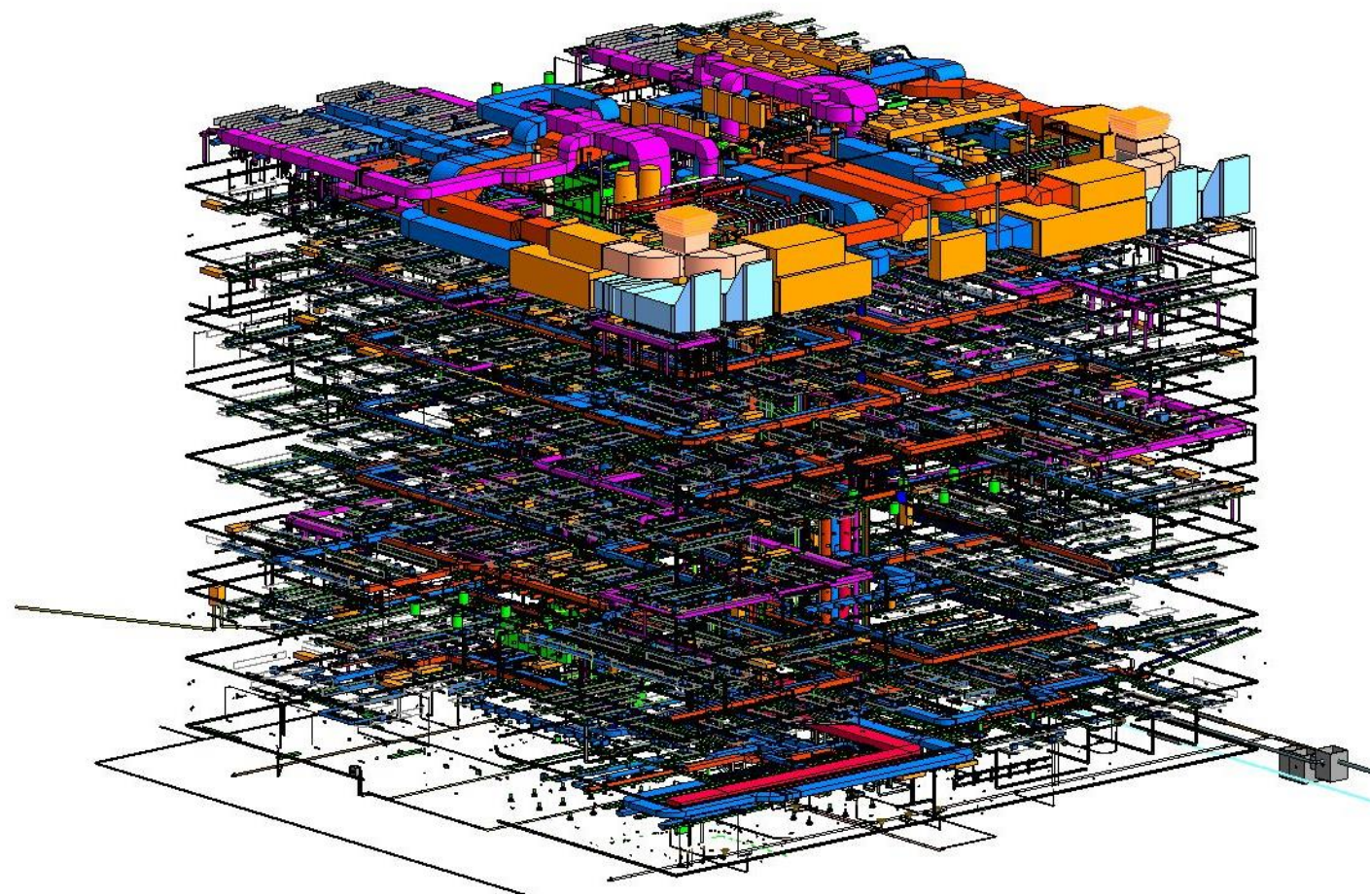


Building Certification

Building Refurbishment







// Introduction

// Hogeschool Saxion

// Future development

// Questions

Hogeschool Saxion

Duurzame samenwerking

Drie projecten

- Saxion Deventer - 2010
- Saxion Enschede - 2015
- Saxion Apeldoorn - 2016



Saxion

Duurzame samenwerking

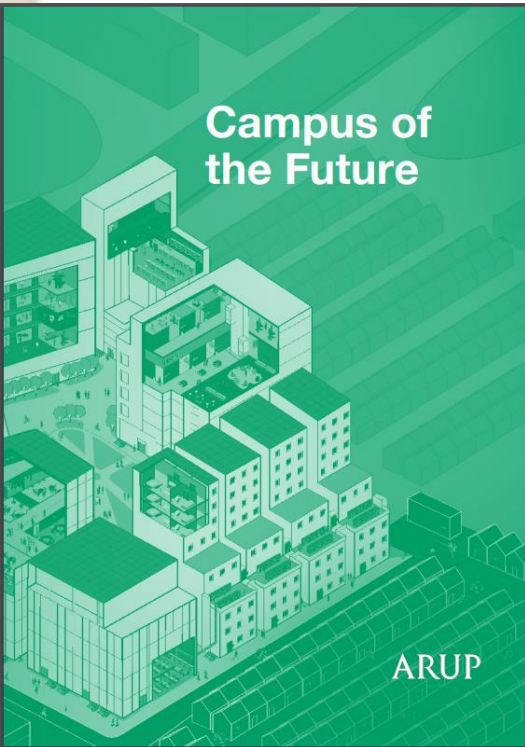
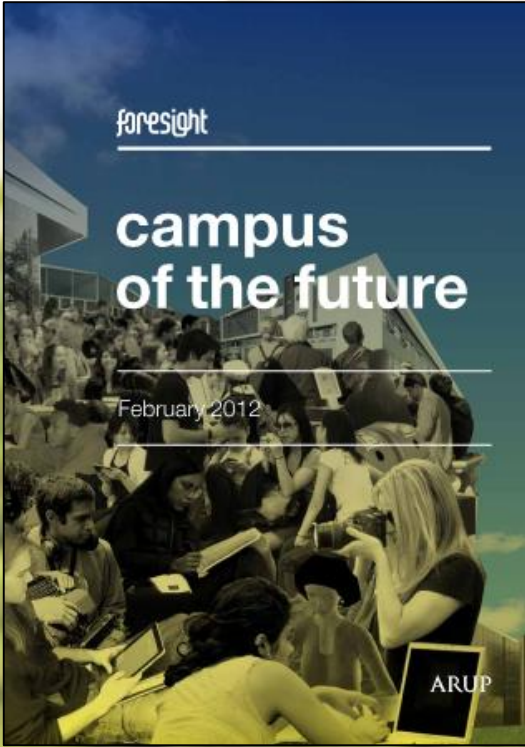
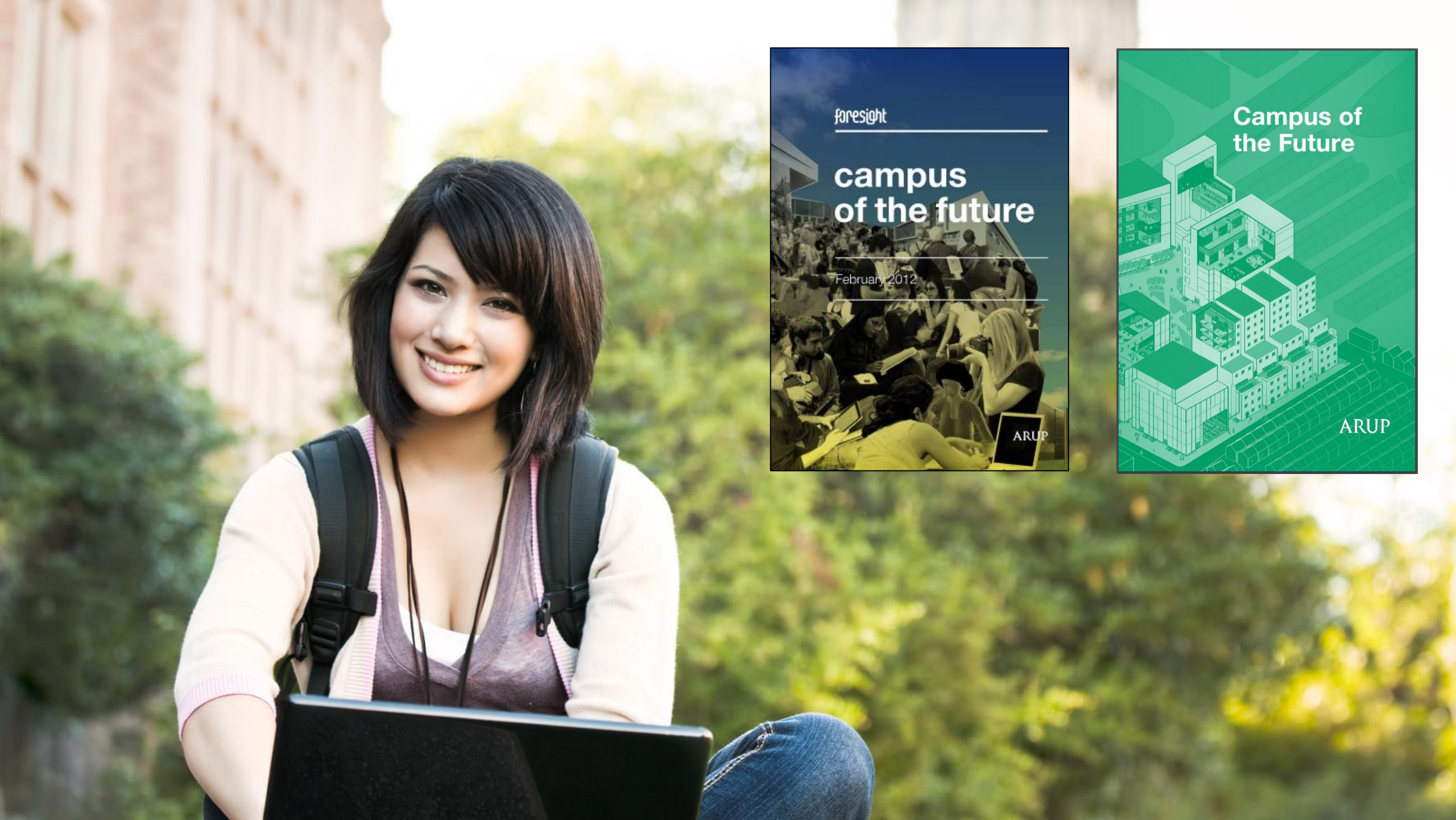
Meerjarige samenwerking met ontwerpteam om optimaal van de opgedane kennis te profiteren in al zijn vestigingen.

- IAA: Architect
- Arup: Adviseur Installaties, Electrotechnisch, Sanitair, Brand, Verlichting en Bouwfysica
- ABT: Constructeur, Akoestiek

IAA
Architecten

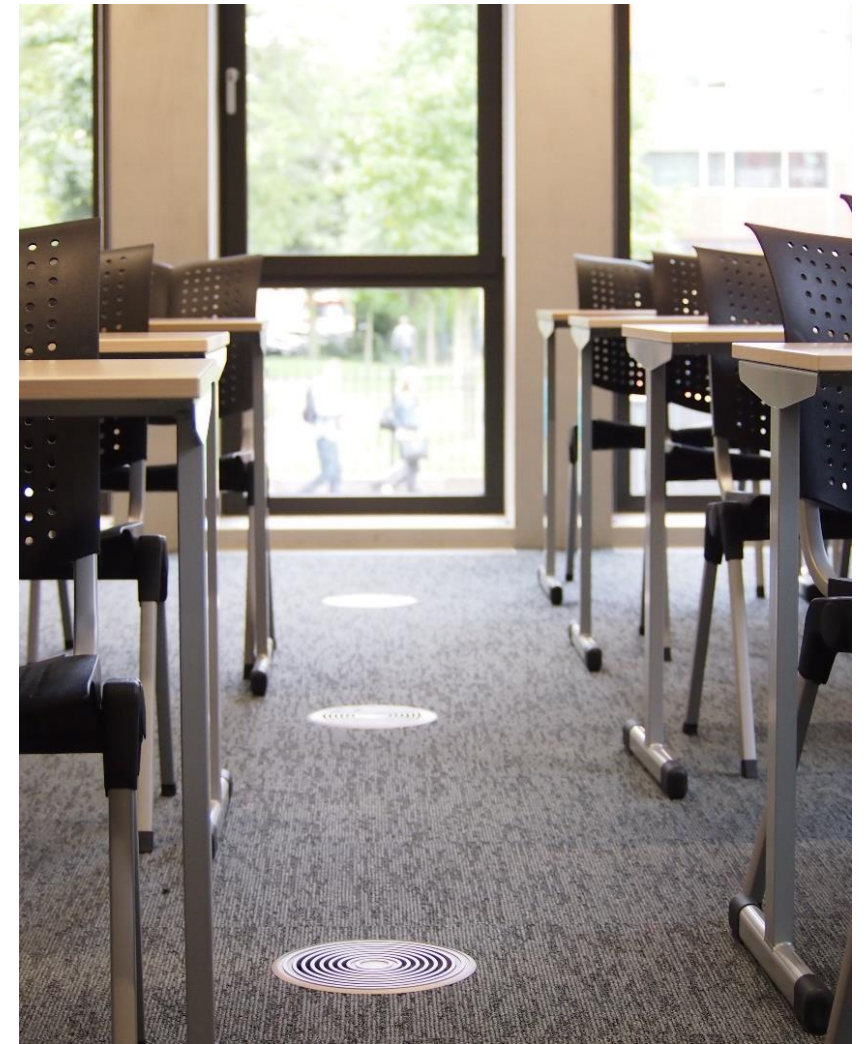
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abt





Flexibel in gebruik



Frisselucht

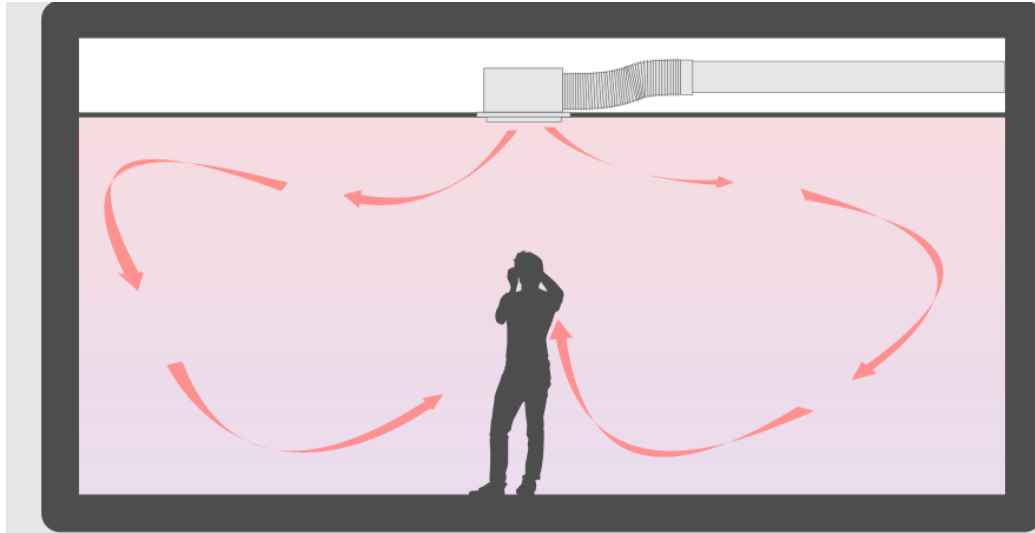


Input

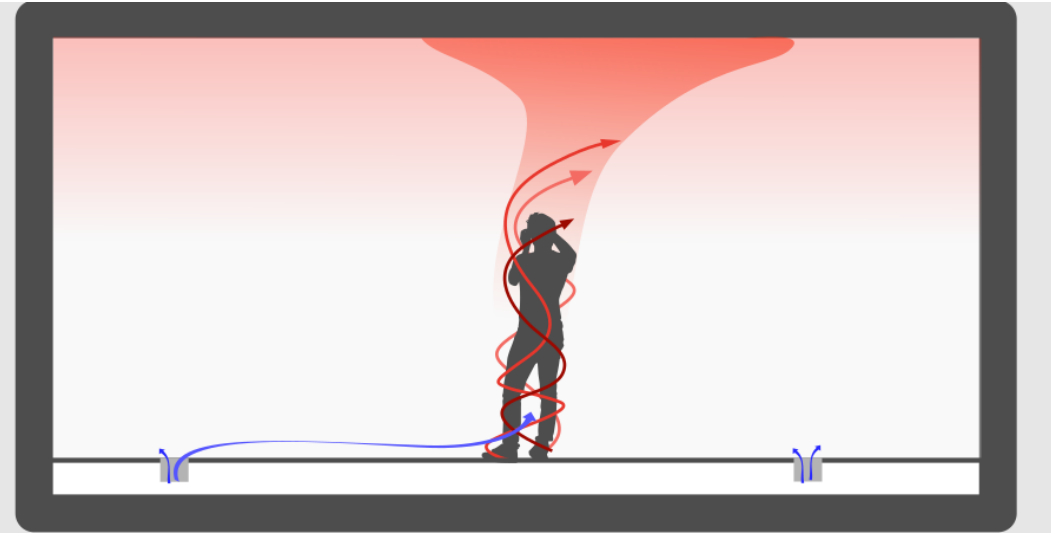
- Flexibiliteit in het gebruik op de dag
- Flexibiliteit op de lange termijn
- Aanpassingen zoveel mogelijk door eigen facilitaire team Saxion uit te voeren
- Gezondheid + comfort
- Hoge, esthetisch hoogwaardige ruimten zonder verlaagde plafonds

Type ventilatie

Mengventilatie

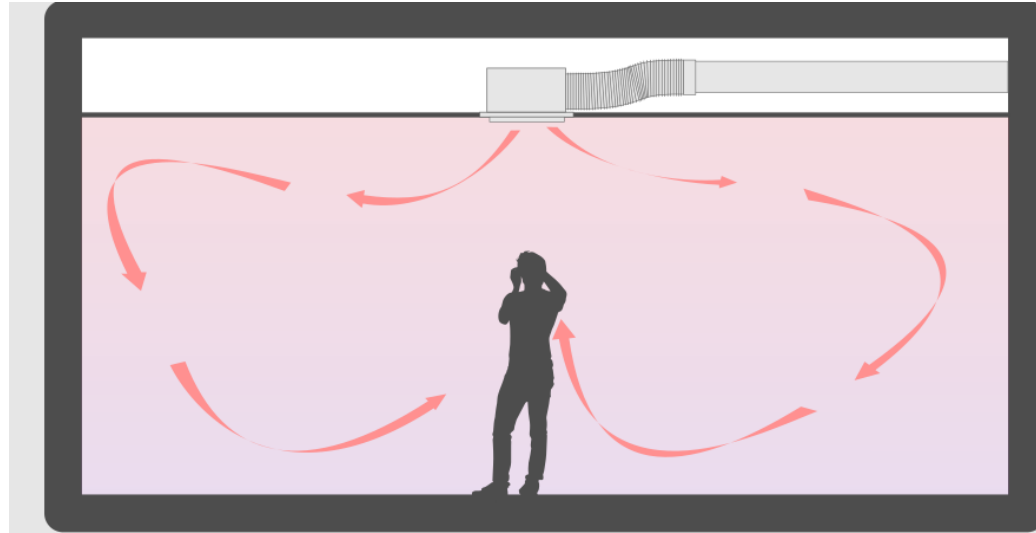


Verdringingsventilatie

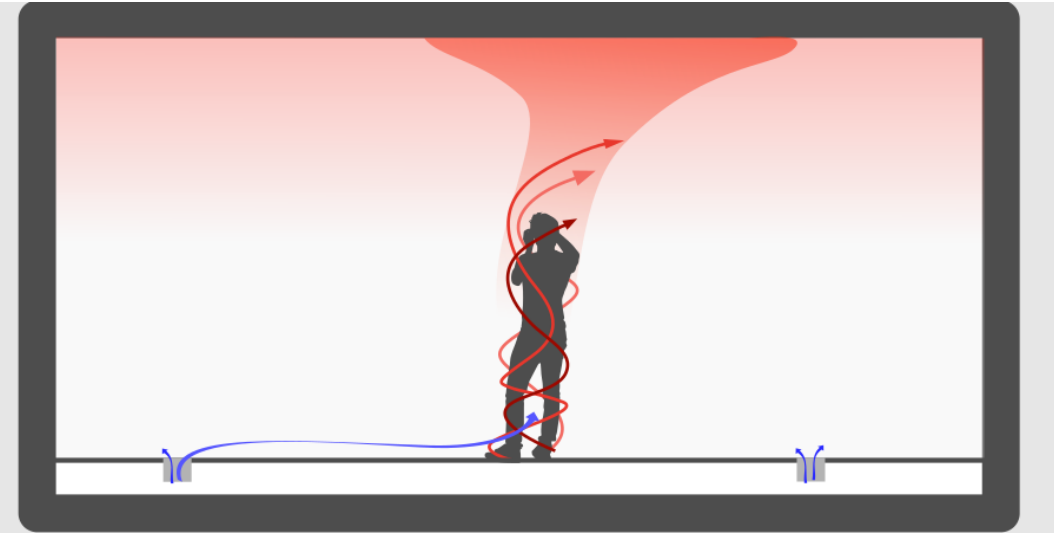


Type ventilatie

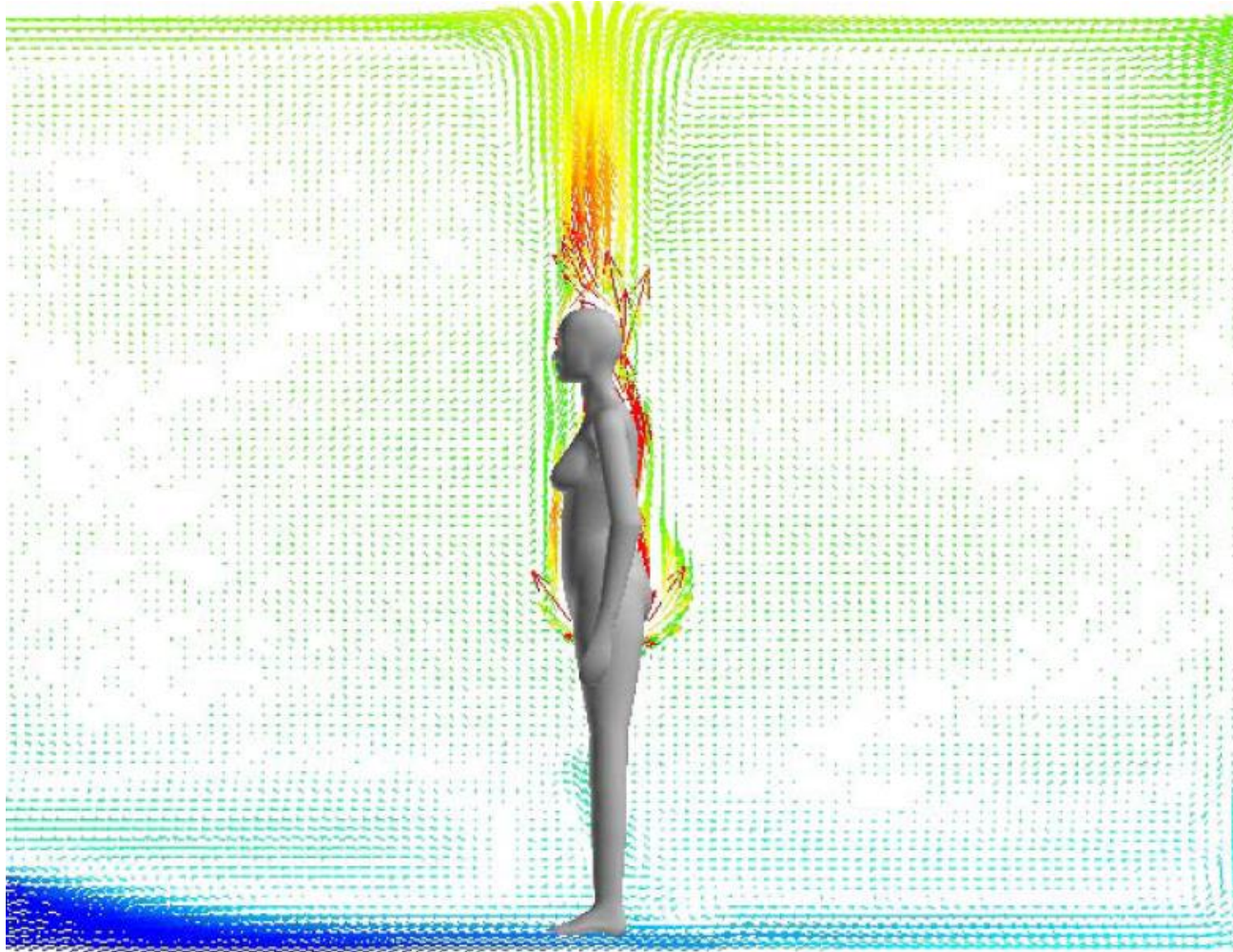
Mengventilatie



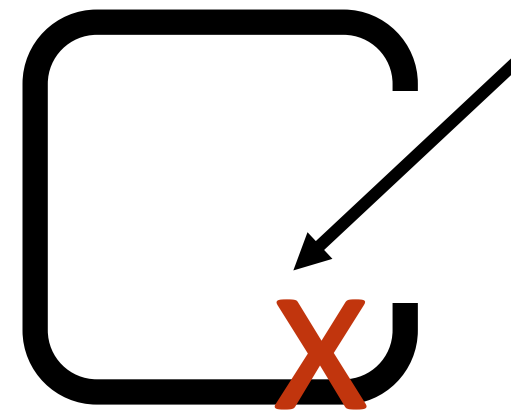
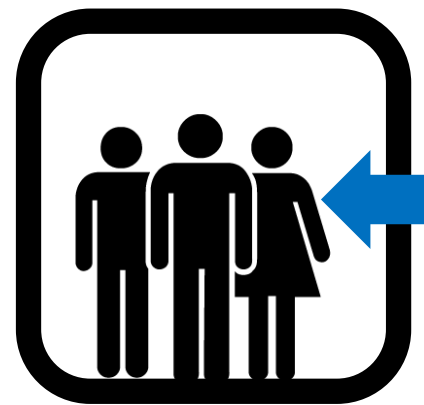
Verdringingsventilatie



Mens centraal



Wanneer verdringingsventilatie



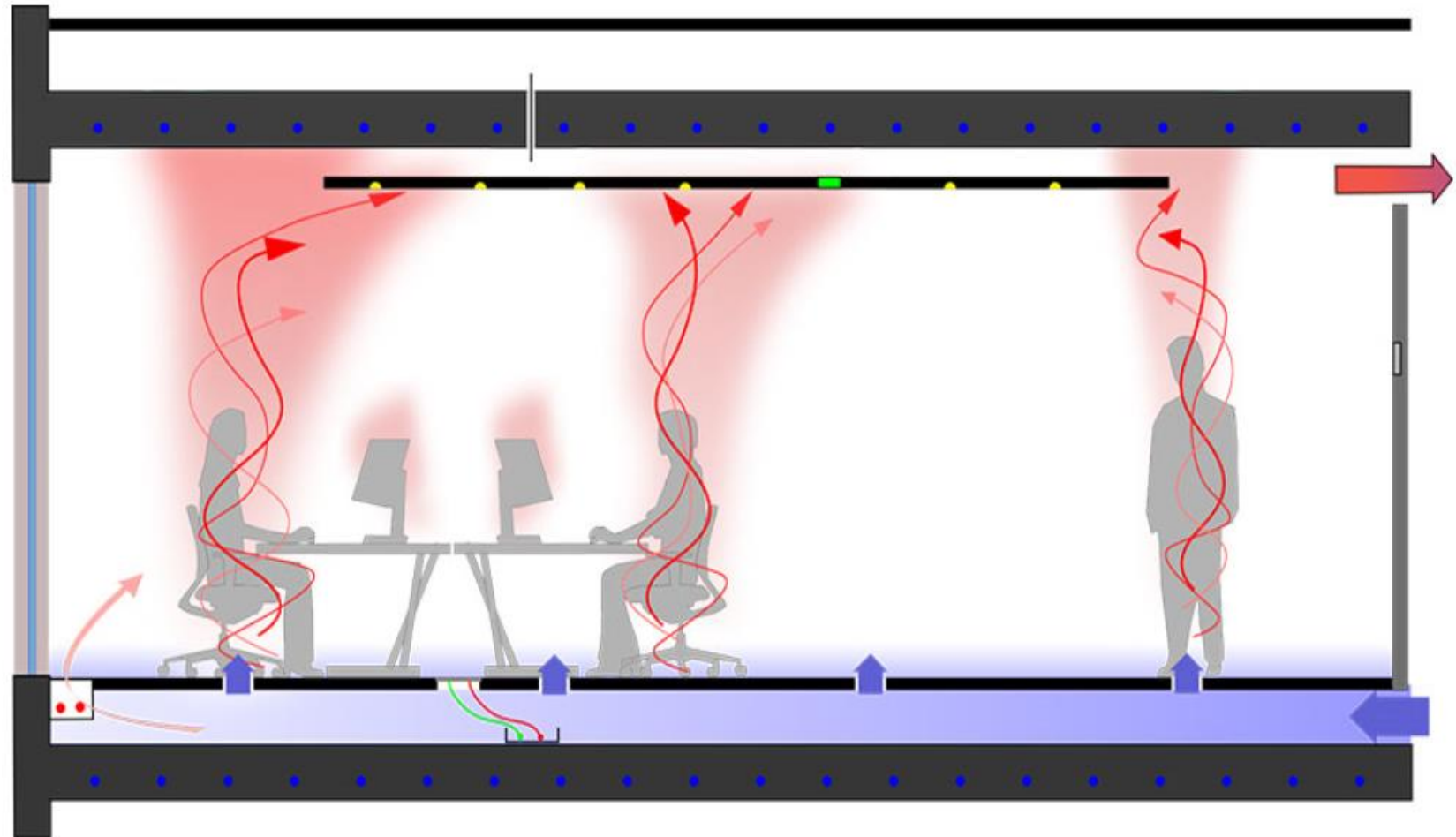
Klimaat concept

- Klimaatinstallatie concept

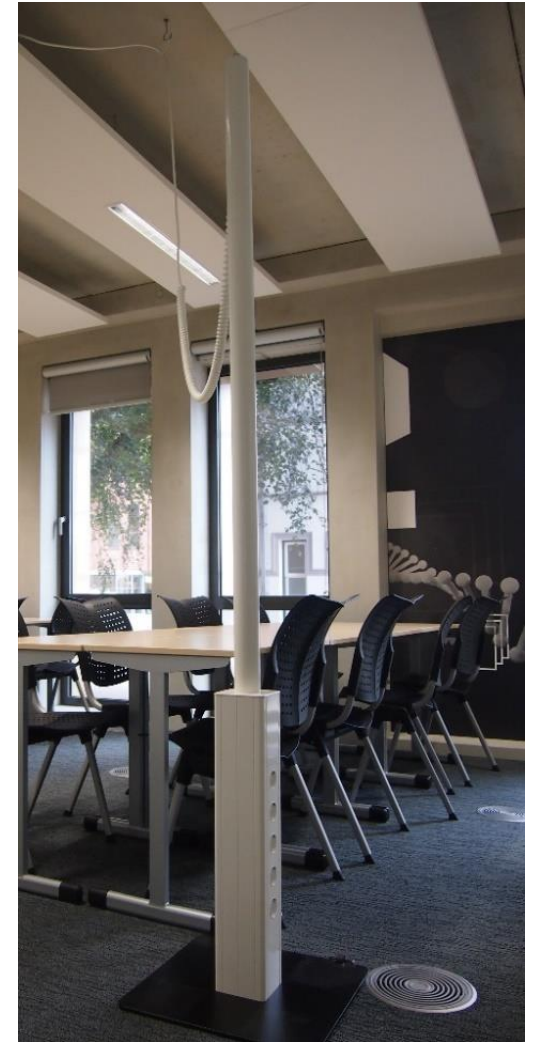
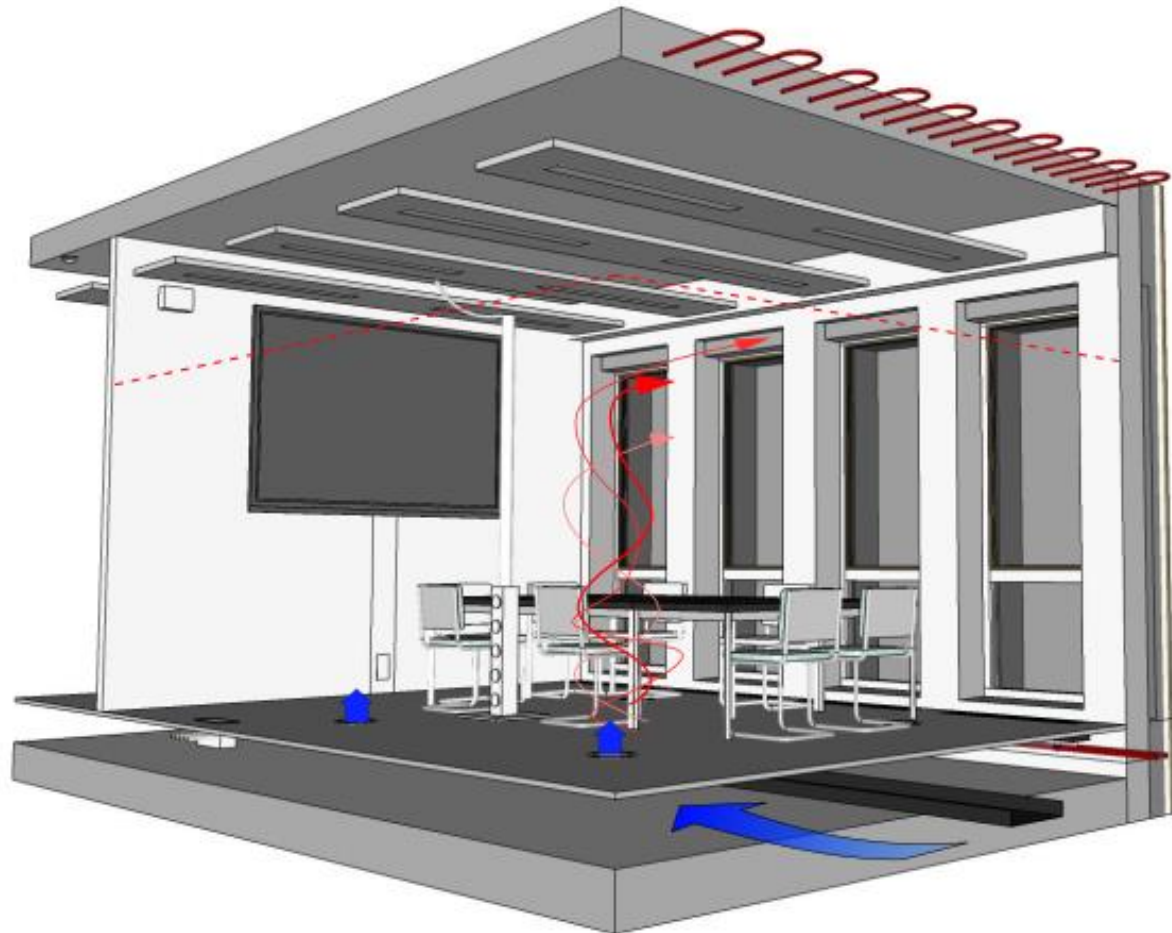
- Verdringingsventilatie
- Betonkernactivering

Voordelen:

1. lagere snelheden
2. minder luchtweerstand
3. lager energieverbruik
4. schonere lucht
5. effectievere koeling
6. maximaal flexibel

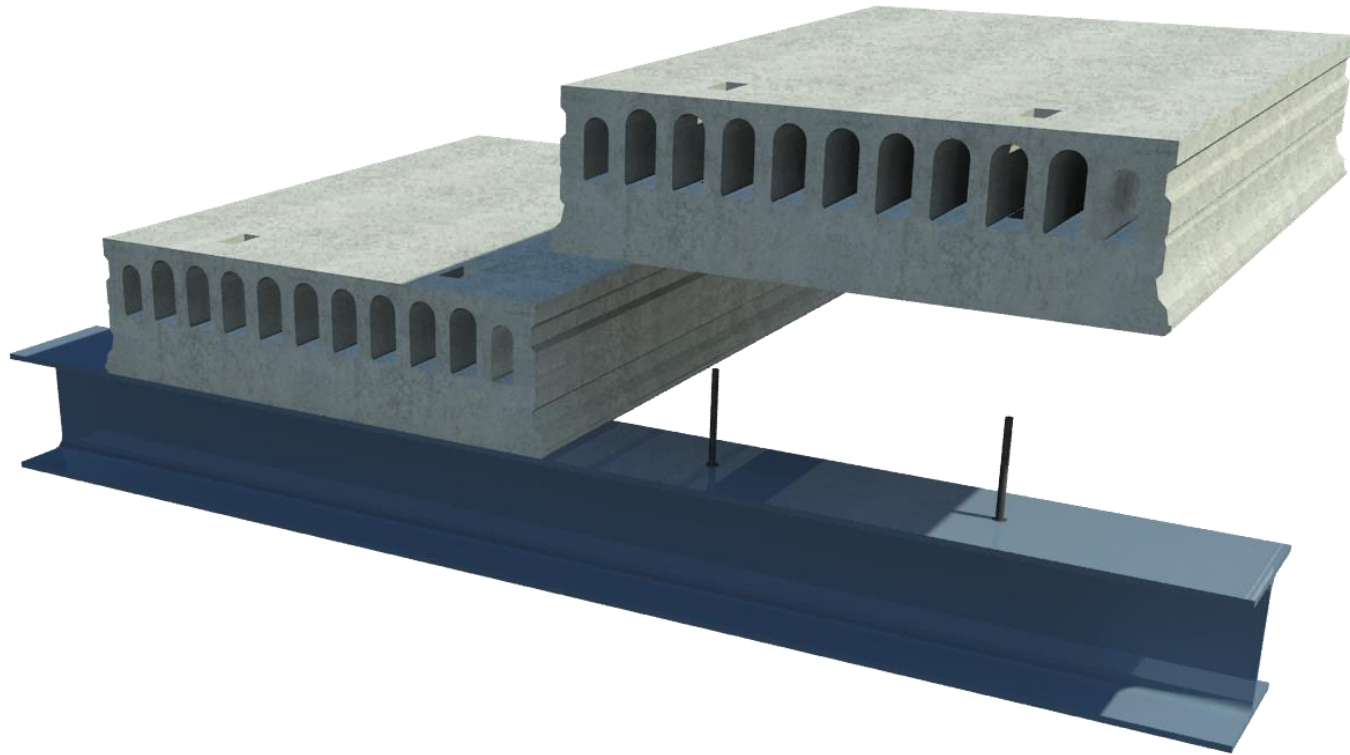


Flexibele indelingen en thermische massa



Droge bouw en betonkernactivering

Vloersysteem zonder druklaag, droge bouw



Klimaatvloer



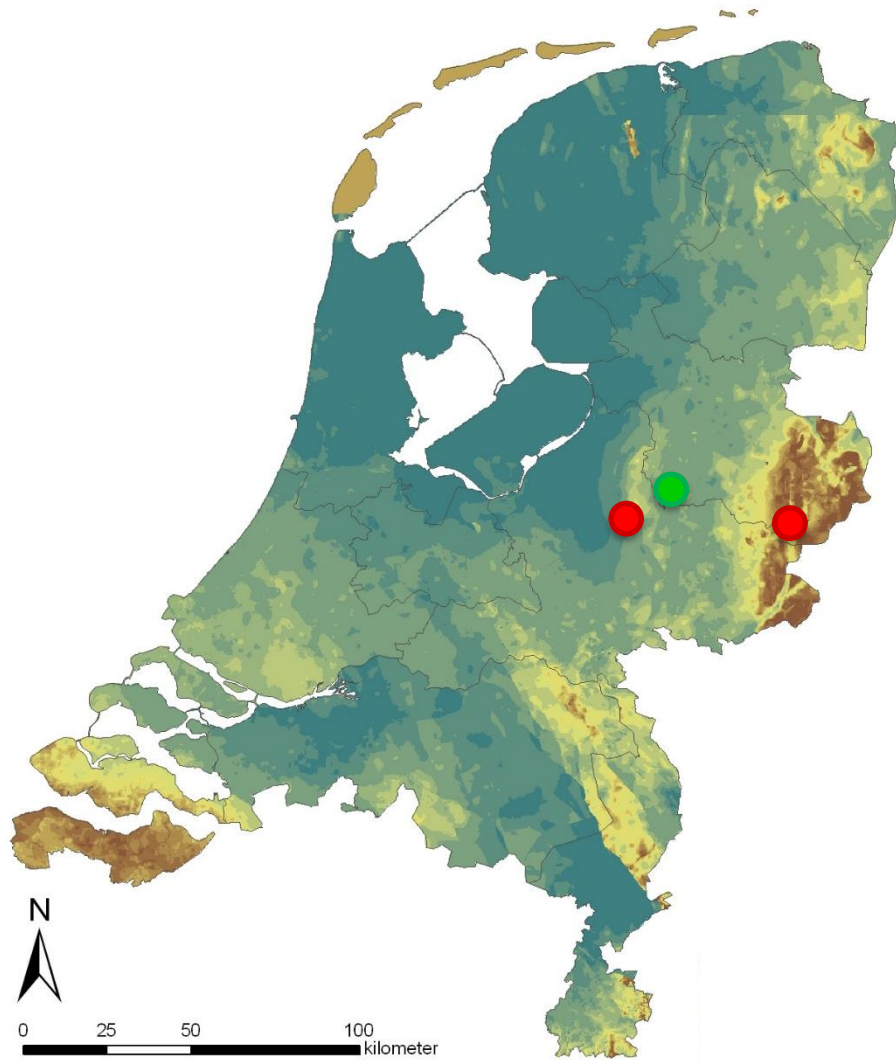
Warmtepomp

Interne gelijktijdige warmte- en koude vraag

- Buitenlucht
- Oppervlakte water
- Riool water
- Bodem



Warmte- en koude opslag (WKO)

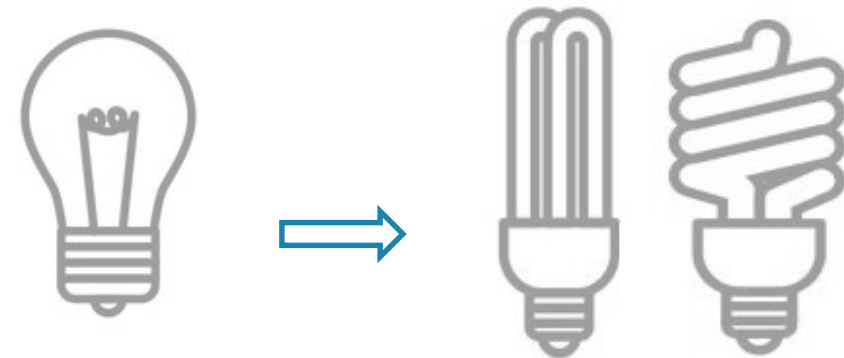
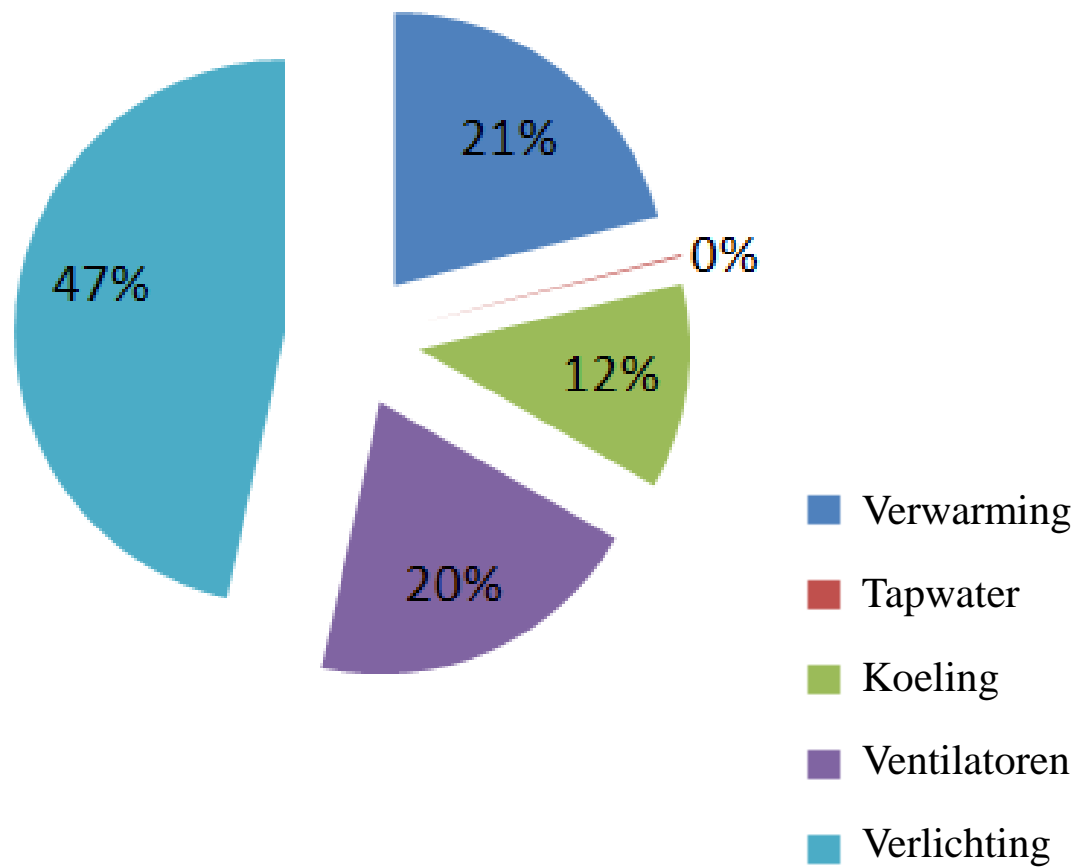


Legenda



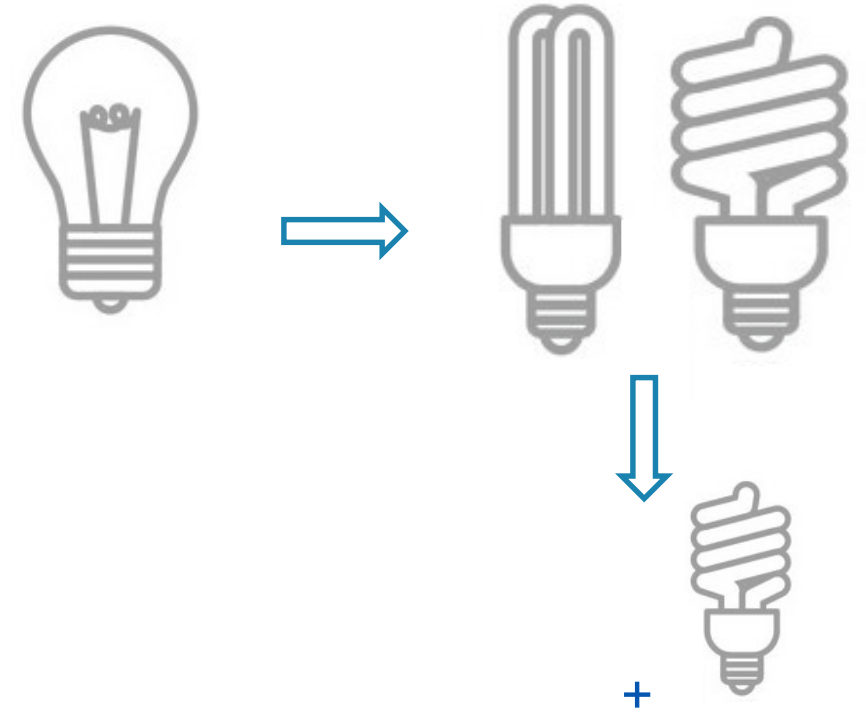
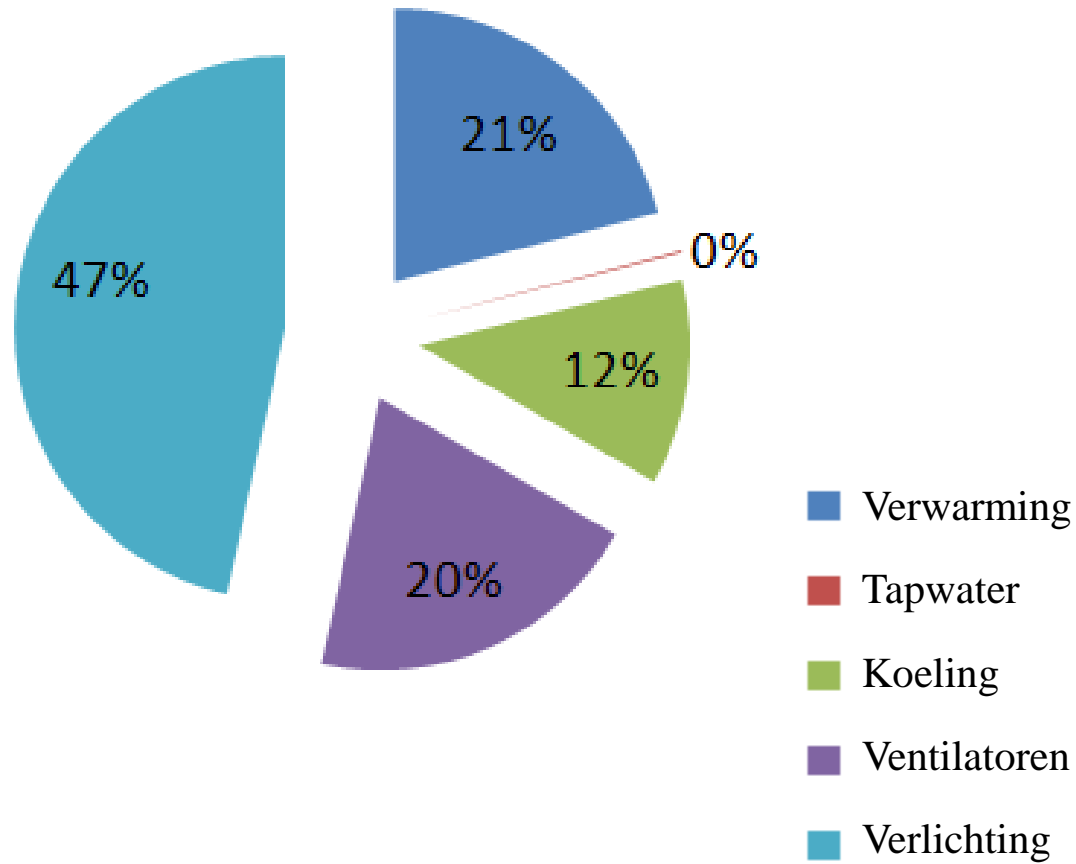
Energie behoefte

Sturen op daglicht



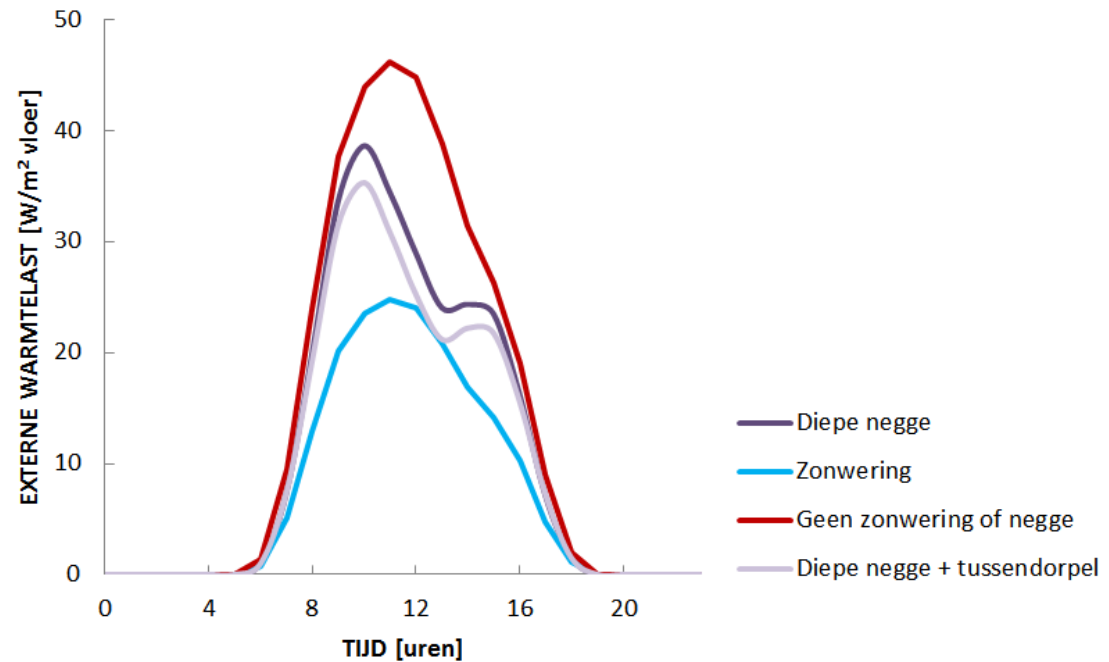
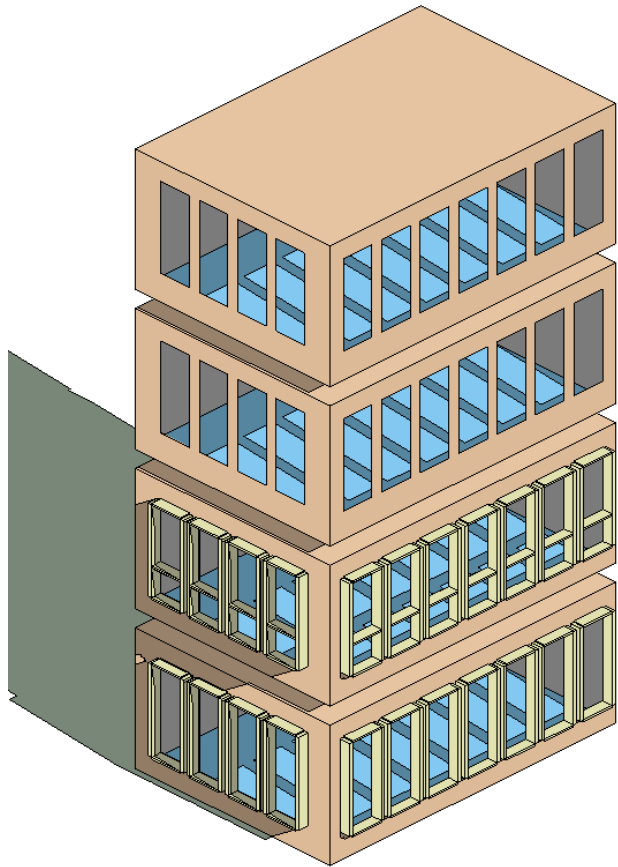
Energie behoefte

Sturen op daglicht



Saxion Enschede

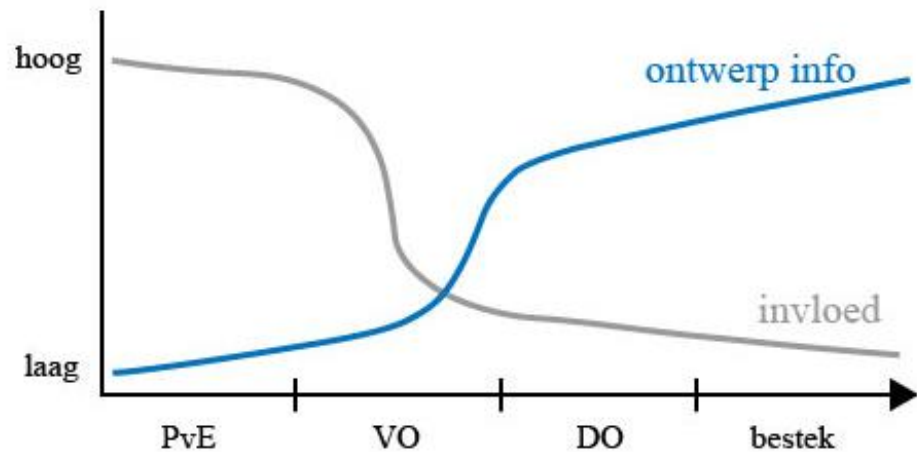
Daglicht vs zonnewarmte



Modelleren van massa's

Integraal ontwerpen

traditioneel proces



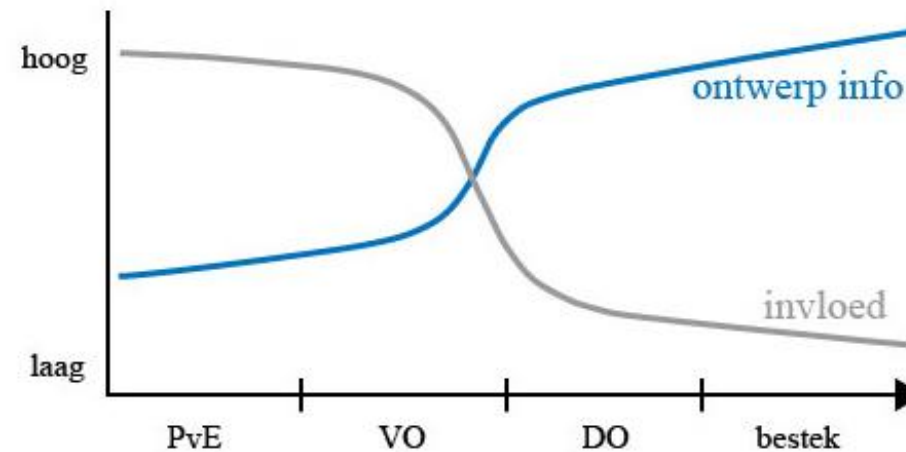
opdrachtgever

architect

constructeur

adviseurs

integraal proces



opdrachtgever

architect

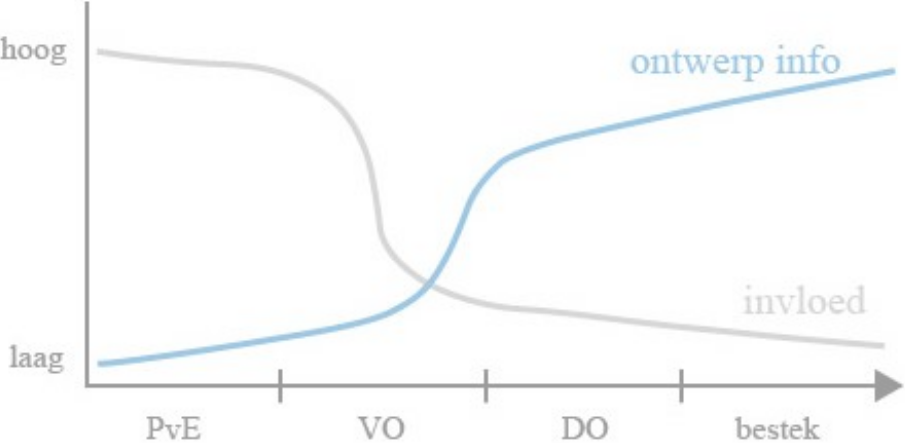
constructeur

adviseurs

Modelleren van massa's

Optimale gebouwvorm

traditioneel proces



opdrachtgever

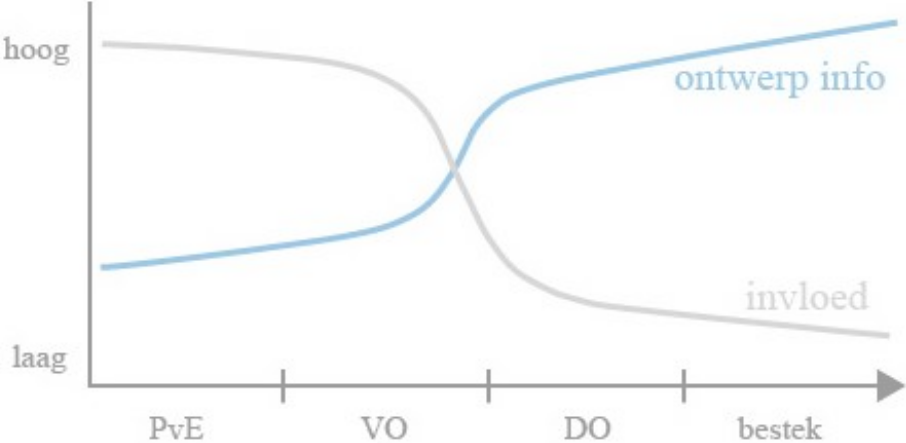
architect

constructeur

adviseurs

2010

integraal proces



opdrachtgever

architect

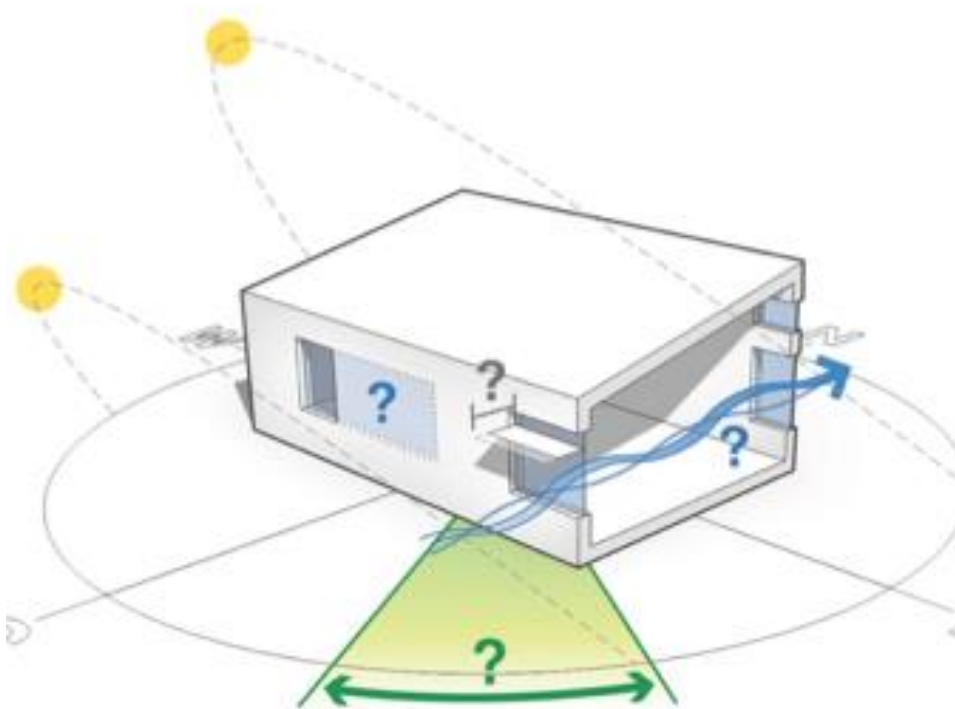
constructeur

adviseurs

2020

Performance Driven Design

Energie, daglicht, zontoetreding



Real time analysis

Risico op verblinding?

Atrium of serre?

Juiste gebouwworm?

HR⁺⁺ of triple glas?

Welk glaspercentage?

Optimale oriëntatie?

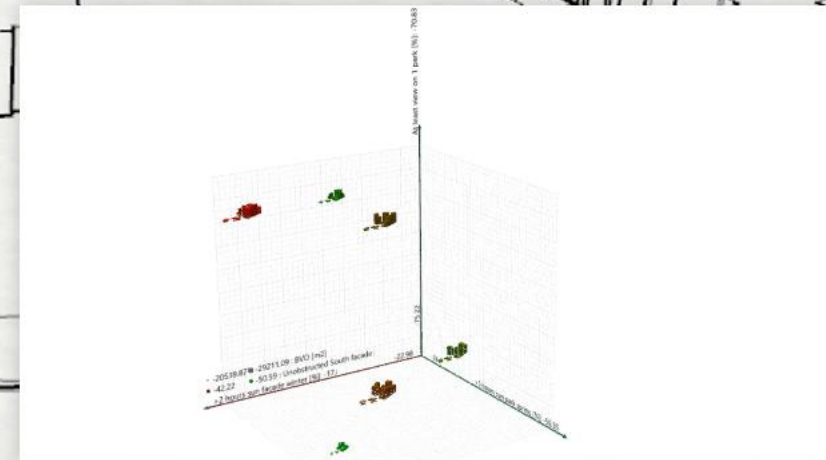
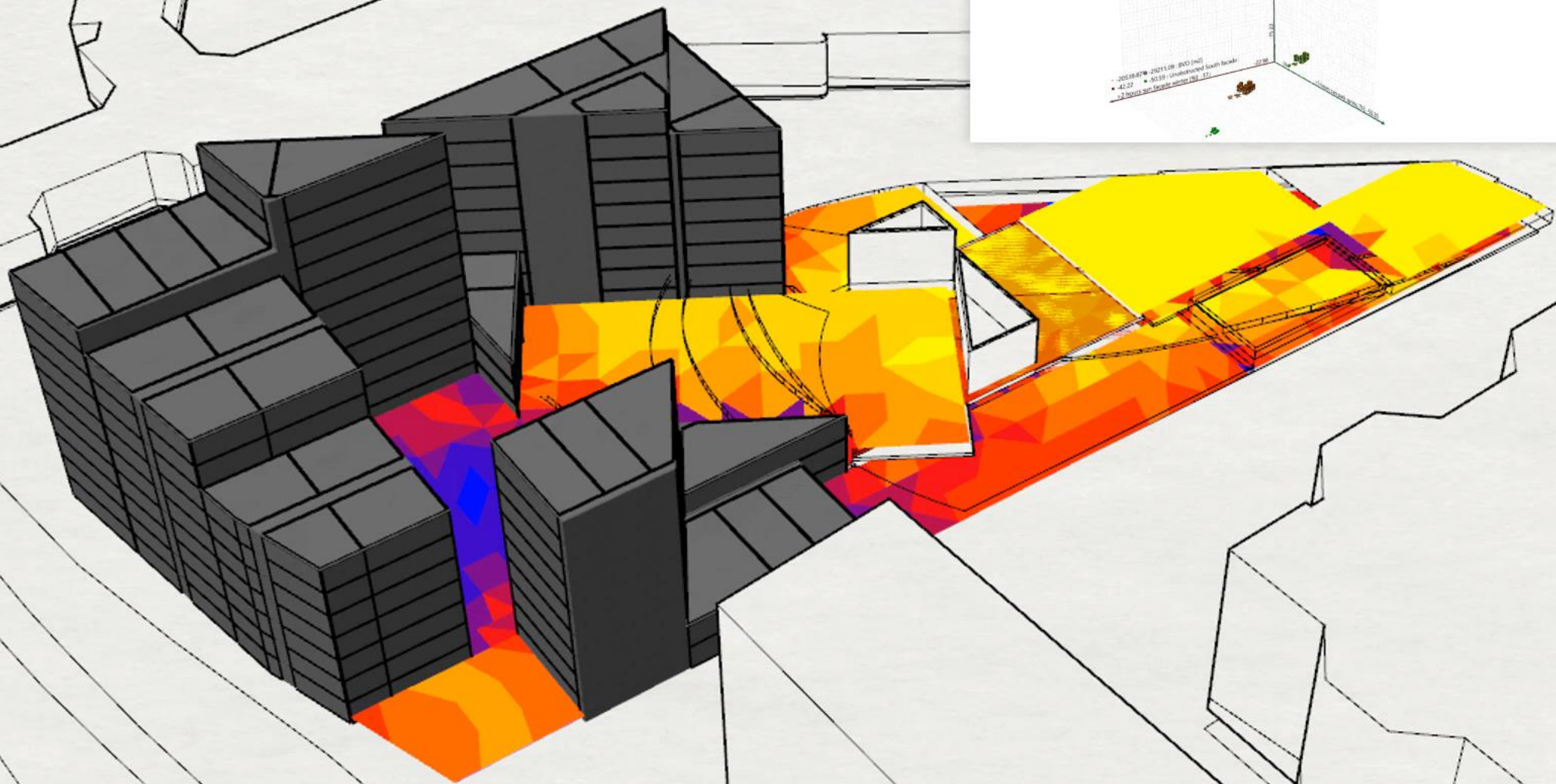
Genoeg daglicht?

Zonwerend glas of
buitenzonwering?

Isolatiegraad schil?

Smakkelaarspark

Parametrische optimalisatie



*“The art is to arrive at a good solution.
This is a creative activity, involving
imagination, intuition and deliberate choice.”*

Sir Ove Arup, entrepreneur, engineer, designer, and philosopher

Jacco Paauw

Associate | Team Lead Building Physics

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