

FUTURE-PROOF EDUCATIONAL AND RESEARCH BUILDINGS

October 5, 2023 12:00 – 19:30 Co-Creation Centre The Green Village (TU Delft) The Netherlands





Welcome by Thomas Jaißle, Drees & Sommer

Keynote speech by Hubert Linssen, TU Delft

TOPIC 1: SUSTAINABILITY

Impulse speech by Jaap-Willem Kleijwegt, UNStudio Panel discussion

Introduction The Green Village by Lidewij van Trigt, The Green Village

Guided inspiration tour

TOPIC 2: INNOVATION

Pitches Madaster, BlueBlocks. Paviljoen III, Biosphere Solar Panel discussion

COFFEE BREAK

TOPIC 3: CAMPUS DEVELOPMENT

Impulse speech by Richard Murray, AA Projects Panel discussions

WRAP-UP, DRINKS AND BITES

AGENDA



KEYNOTE SPEECH

HUBERT LINSSEN

PROGRAM MANAGER SUSTAINABLE REAL ESTATE TU DELFT



"Challenges and opportunities for TU Delft tackling sustainability"

Janabiti

COLUMN THE OWNER

The Green Village, 5th of October

Msc. Hubert Linssen Program manager Sustainable campus



TU Delft position on Climate Action

The Climate Action mission of TU Delft

There is no doubt that the anthropogenic emissions of greenhouse gases are changing our living environment through their impact on the global climate system. TU Delft will harness its innovative powers to support the world-wide transition to non-fossil energy, and adaptation of the living environment to the consequences of global warming.

Challenges & opportunities campus in tackling sustainability







Practice what you teach

Apollo 13 mission

Campus as a living lab



Campus Real Estate & Facility Management

The Campus Real Estate & Facility Management (CREFM) department develops and manages the real estate and outdoor areas of TU Delft and develops and provides facility services on campus. In this way we contribute to a healthy, safe and pleasant educational, research and working environment.





Focus CREFM coming years

Modernize the Campus



As a world-class university, we need a campus that matches that. That is why we are modernizing the campus in the coming years.

Sustainable ambition: CO₂-neutral & circular campus in 2030



We make a significant, sustainable and socially responsible contribution to our environment. Excelling in service, effectiveness and efficiency



The user is central to us. Our services meet at least the agreed performance and are effective and efficient.



TU Delft Campus in 2030

CO₂-neutraal

voor alle activiteiten op en vanaf de campus

Circulair

betrekking hebbend op alle grondstoffen- en afvalstromen op de campus

Klimaatadaptief

omgaan met hitte, droogte, regen, overstromingen, extreem weer

- Draagt bij aan de leefkwaliteit gericht op biodiversiteit, veiligheid, gezondheid, inclusiviteit, geluk
- Maakt impact met onderzoek op de campus

living labs en innovatie een plek geven en demonstreren





Challenges & opportunities campus in tackling sustainability





Transforming real estate





From energy neutral towards energy positive



Circular parking hubs





Remountable education building





Include biodiversity & climate adapation



TUDelft

Sustainable district heating with geothermal energy





Facility management services





Challenges & opportunities campus in tackling sustainability





Scarcity breeds creativity....





Rethink sustainability in our way of living





CO₂ rationing



TUDelft

Rethink our financial appreciation system

Total Cost of Ownership (TCO)

- CO₂ price /ton
- Depreciation for circular buildings





Challenges & opportunities for the campus in tackling sustainability







Practice what you teach

Apollo 13 mission

Campus as a living lab



Campus as a living lab: The Green Village





Energy efficiency: Co Creation Centre





Local and CO₂- free energy system



Scaling up innovations





Innovation funnel on campus





System innovation



ŤUDelft

Digital Twin Infrastructure















Thank you. Any questions?



ŤUDelft

DREES & SOMMER

SUSTAINABILITY

DREES & SOMMER

IMPULSE SPEECH

JAAP-WILLEM KLEIJWEGT

SENIOR ARCHITECT/ASSOCIATE UNSTUDIO

...a building designed from a human centric and future proof perspective promoting health, sustainability and flexibility

ECHO TUDelft

The new Energy-Generating interfaculty Teaching facility







Extension of public space



Attractoren in de publieke ruimte



Attractoren definiëren de posities van de hoofd auditoria


















Flexibility to maximizes efficient use of the building





























Large Spans for Future Flexibility





















Net-Zero Positive Energy Performance: 1200 solar panels, a smart building skin, and a heat and cold storage system, make ECHO produce more energy than it consumes











Fresh Air



Luchttoevoer van boven





Luchttoevoer van onder



Plug and play installations



Ventilatieroosters

Elektra + data







ECHO is circular at its core: demountable structure, biobased bamboo, recycled PET acoustic panels, 90% of furniture upcycled







...a building that teaches us how to learn, to live healthy, and how to create a better future for generations to come!

ALE





DISCUSSION ON SUSTAINABILITY



JAAP-WILLEM KLEIJWEGT – UNSTUDIO



HUBERT LINSSEN – TU DELFT



HEIN VAN TUIJL – EPEA BENELUX



RICHARD MURRAY – AA PROJECTS

MODERATOR: MARCO VILLARES – DREES & SOMMER





LIDEWIJ VAN TRIGT

DLAB

BIF

SENIOR PROJECT MANAGER ENERGY TRANSITION THE GREEN VILLAGE



THE GREEN

FIELD LAB FOR SUSTAINABLE INNOVATION


Lidewij van Trigt – Project manager Energy transition 5 October | Introduction to The Green Village

THE

GRE3N

VILLAGE

The 'hop' to large scale application

THE GREIN VILLAGE



2020 - 2025

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THE GREIN VILLAGE

Space for experiments





Display & connect

Learning community



A unique place to innovate



1 event centre 8 homes 13 residents 25+ employees

Staatsblad van het Koninkrijk der Nederlanden

275

Art 1612 2217

Bestuait wan 1.5 juani 20.17 tot erigziging en aanvulling van hee Bestuait uits oering. Sriaa-en hentstevet Bestuit uitsoering Criais-en hentstevet vijftemde transhe

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Publicly accessible

Around 12k visitors a year





State-of-the-art infrastructure & data platform

The key to successful acceleration



THE GREIN VILLAGE

Learning Community Exchange of working, learning, experimenting and inspiring



Future energy system Test facility 24/7 Energy Hub





- Energy hub
- Collaboration various parties
- Matching supply and demand
- Storage surplus energy
- Hydrogen for winter

Future energy system Test facility Hydrogen Grid





- Collaboration Alliander, Enexis and Stedin
- Practical research
- Real-life environment third parties



Lidewij van Trigt www.thegreenvillage.org

Scan the QR-code and sign up to our newsletter



THE GREIN VILLAGE





INNOVATION JEROEN BROERSMA

MANAGING DIRECTOR MADASTER NETHERLANDS



Madaster introduction

Create sustainable value by taking full material responsibility









Driven by vision

Facilitate circular economy



The global online register for materials and products

.madaster

90

For real estate and infrastructure



madaster



.madaster

... to connect and link (your) data

93

We need to build a circular ecosystem

madaster

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Madaster Leverage data

PRODUCTS

Material Passport Circularity Embodied Carbon Financial Valuation

- 9/

Impact

INPUT







Madaster Manage digital twins

Aligemeines Performance 30 Dossier Meese Zirkwantöt umwait Finanziell Benutzer Uplaad-Einstellungen



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madaster

Madaster Performance dashboards



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Madaster Area/ Portfolio Register



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Madaster Digital Building Logbooks





madaster

Track & trace products

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.madaster 10

Reuse & monetise

madaster

101

Assess risks

STATISTICS.

madaster 102

A COMPANY

1116

Analyse, compare & report

madaster







EPEA

Triodos & Bank

heymans ING

TORM

🚬 ТВІ

🚺 Ballast Nedam

A Rabobank



DREES & SOMMER

Are you ready to take full material responsibility?



www.madaster.com



Innovation

LINDE DE JONGE

PAVILJOEN III





INSTALLATIONS





SOLARPANELS



HEATPUMPS



GREENROOF


INSTALLATIONS





COMBINATION





COMBINATION













BENEFITS



Vegetation coverage: Dry weight:

Saturated weight:

Height: Dimensions: No. trays / m2: Price / m2: 95% 9 kg/tray 55 kg/m2 12 kg/tray 75 kg/m2 10 cm 40 x 40 cm 6,25 < €85,-



THE TECHNICAL DETAILS

THE USP'S OF OUR SYSTEM





Energy transition for existing buildings Modulair & upgradeable

Free combinations of

systems







WHAT'S NEXT

555

WHAT'S NEXT

555







DREES & SOMMER

Innovation PÉRINE FLEURY

CO-FOUNDER BIOSPHERE-SOLAR





Innovation MARJANNE CUYPERS

Sea

Timber

FOUNDER BLUEBLOCKS



Sea Wcod MATERIALS

Timber from the ocean forests

Marjanne Cuypers

BlueBlocks B.V.

If we can create systems with waste, we can also re-design them without

Challenge

THE BUILDING SECTOR FACES A TRIPLE CHALLENGE

The high demand for new and renovated buildings, while facing increasing material shortage and high environmental & financial costs



WHAT IF..?

We build with abundantly available natural resources and clean processes



Low energy, non-toxic processing



Green chemistry

No glue, no binders





Sea Wcod MATERIALS



100% bio-circular & recyclable



Healthy indoor climate



Rigid but lightweight



Ease of use standard machinery

Same process, variety of products

Naturally healthy wall tiles

Lightweight ceiling panels





The exploded view beyond building



World Design Embassies

Acoustic interior panels

副作



AN IN CASE DON



WE SEA A FUTURE THAT IS BRIGHT BLUE





www.blueblocks.nl



O SeaWood_Materials

DREES & SOMMER

DISCUSSION ON INNOVATION



JEROEN BROERSMA - MADASTER



LINDE DE JONGE – PAVILJOEN III



MARJANNE CUYPERS – BLUEBLOCKS



PERINE FLEURY – BIOSPHERE SOLAR

MODERATOR: ESTHER AKKERMAN – DREES & SOMMER





DREES & SOMMER

CAMPUS DEVELOPMENT.

DREES & SOMMER

IMPULSE SPEECH

RICHARD MURRAY

DIRECTOR ENERGY & SYSTAINABILITY DIVISION AA PROJECTS (PART OF DREES & SOMMER) Introduction

AA PROJECTS

University of Oxford some facts and figures

There are more than 26,000 students

Oxford is the oldest university in the English-speaking world

The highest volume of world-leading research in \ K Contributes around £15.7 billion to the UK econom Supports more than 28,000 full time jobs Aix to be carbon neutral by no later than 2035

The University of Oxford - Science Area Heat Decarbonisation Plan

Presented By Richard Murray, Director, AA Projects







Introduction

University of Oxford some facts and figures

- / Oxford is the oldest university in the English-speaking world
- / There are more than **26,000** students
- / The highest volume of world-leading research in UK
- / Contributes around **£15.7 billion** to the UK economy
- / Supports more than **28,000** full time jobs
- / Aims to be carbon neutral by no later than **2035**



Science Area





- / Total electricity consumption is50.7 MWh pa
- / Equivalent to 10.65K tCO2 /pa
- / Total Gas Consumption 39.3MWh pa
- / Equivalent to 7.068K tCO2 /pa








Developing the Solution

With space as premium, identifying heat sources was essential. The heat sources identified are the:

- River Cherwell using Water Source Heat Pumps (WSHP)
- 2. Ground Source Heat Pumps (GSHP) in the University Park
- 3. Centralised Air Source Heat Pumps (ASHP)
- 4. Waste heat ejected as part of the building cooling chillers (free heat)



All work best at lower temperatures.



Ambient networks operate at temperatures of around 20-12°C on the warm side and 7-5°C on the chilled side.

The buildings have design temperatures of 82/71 degrees.

To reach this temperature (or lower as appropriate for the building) a step-up water source will be used.





Typical Heat Pumps Cascade Arrangement

AA PROJECTS

October 2023

AA PROJECTS

PART OF DREES &

SOMMER

Analysis of the cooling load from three buildings as this was all that was available indicated:

Cooling is more constant than is commonly seen on offices

This will aid simultaneous heating and cooling

[WW] Sat 12/10/24 Sun 13/10/24 Mon 14/10/24 Tue 15/10/24 Fri 18/10/24 Wed 16/10/24 Thu 17/10/24 Sat 19/10/2 heat and cool HP ASHP Heat consumption Sat 12/10/24 Sun 13/10/24 Mon 14/10/24 Tue 15/10/24 Wed 16/10/24 Thu 17/10/24 Fri 18/10/24 Sat 19/10/2 heat and cool HP Elec chiller — Cooling demand

The modelling has indicated a need for thermal storage



The recommendation is therefore using waste heat a ground loop and Air Source Heat Pump.





Key Risks

- / Listed Building Consent for working in the park
- / Ground source heat pumps (ground conditions unknown)
- / Thermal stores (including ground loop)
- / Uncertainty around actual cooling loads to a number of buildings
- / Service congestion along pipe route
- / Design is conceptual





Conclusion

- / The use of ejected cooling loads has dramatically reduced the amount of heat generating equipment required 44 mW to 12 mW
- / The solution provides flexibility for the various building types
- / Running cost are kept to a minimum
- / Space required is minimised
- / Buildings can be upgraded, and flow temperatures reduced independently of timeline for ambient loop and heat network





DISCUSSION ON CAMPUS DEVELOPMENT



RICHARD MURRAY – AA PROJECTS



MARZIA TRAVERSO – UNIVERSITY OF AACHEN



KRISTINA KNAUF – LAND SRL



JACQUELINE LEMM – TFI AACHEN

MODERATOR: THOMAS KÖHLER – DREES & SOMMER







THANK YOU FOR YOUR ATTENTION

UNITING **OPPOSITES TO CREATE** A WORLD WE WANT TO LIVE IN

> DREES & SOMMER