GreenTech Solutions Summit

Boostez votre transformation et votre entreprise

Interreg

Cofinancé par
l'Union Européenne

Kofinanziert von
der Europäischen Union

Grande Région | Großregion

GREEN BUSINESS EVENTS.

GREATER GREEN

Modérateur

Charles-Albert Florentin

Luxinnovation

Interreg

Grande Région | Großregion

Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union

GREATER GREEN

Construction
Bioéconomie

Philippe Jordan
Build &Connect - Fibres-Energivie

Philippe Courtoy
WoodShapers/CFE

Interreg
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN
Grande Région | Großregion

BUILD& CONNECT

INNOVATION FOR BUILDINGS & TERRITORIES

Examples in France of innovation projects for construction with bio-based materials

Philippe JORDAN, Directeur Général Adjoint

Build&Connect, THE ONLY FRENCH COMPETITIVENESS CLUSTER ENTIRELY DEDICATED TO THE BUILDING SECTOR....

A KEY PLAYER IN INNOVATION AND REINDUSTRIALISATION

les pôles de compétitivité
Innovation Collaborative, Croissance Collective
RÉPUBLIQUE FRANÇAISE

Since 2005, the 55 clusters and their 18,000 cluster members have been unique players in the service of industrial and economic innovation

Competitiveness clusters support the environmental, energy and digital transformations of companies while having a strong impact on the health of companies

"Being part of a cluster brings a 36% gain in turnover, a 114% increase in public aid and a 64% increase in R&D spending"

Today, competitiveness clusters are at the heart of France's re-industrialization strategy

"The clusters create growth and jobs by acting on the lever of innovation"

* Lecture: Sur la période 2013-2019, une entreprise aurait un gain supplémentaire de chiffre d'affaires d'environ 36% du fait de son adhésion à un pôle entre 2013 et 2016 comparé à la situation contrefactuelle de non-adhésion – source : étude DGE

The 4 generic missions of the competitiveness cluster

BUILD& CONNECT
INNOVATION FOR BUILDINGS & TERRITORIES

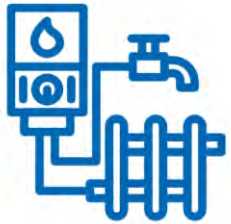
The 6 strategic programs

BUILD& CONNECT
INNOVATION FOR BUILDINGS & TERRITORIES

Decarbonisation of territories

A carbon-free building stock

Digital and competitiveness



Energy system efficiency

Sustainable materials and the circular economy

Jobs & Skills

Our expertise

Innovation Engineering

Network animation

Intellectual property

Support for companies

BIM and digital transformation

Circular Economy

Business Development

Training Engineering

Communication and marketing

Business Models

Corporate Finance

Events

A TEAM SPECIALIZED IN SUPPORTING CONSTRUCTION COMPANIES

GENERAL MANAGEMENT

Ismail Tahtaci
Directeur Général

Philippe Jordan
Directeur Général adjoint

Déborah Haegel
Assistante de direction

INNOVATION PROJECTS & SUPPORT

Quentin Barbe
Chef de projets

Cyril Momplot
Chef de projets Europe

Fréderic Neubauer
Chef de projets

MEMBER EXPERIENCE and COMMUNICATION

Colline Kolb
Responsable communication

Eric Adjagbenon
Chargé de communication et d'animation

Ines Kom-Mojieyie
Chargée de communication junior

Rodica Suteu
Cheffe de projets numériques

Philippe Jacglin
Responsable de projets numériques

Loïc Ledermann
Chargé de projets EC

DEVELOPPEMENT

Patrick Filizian
Responsable développement

Jérome Kormann
Chargé de développement

Cyprien Villemain
Chargé de mission SGGE

Agapé Ambs
Chargée de mission
Advenir Formations Grand Est

Our expertise

Innovation Engineering

Network animation

Intellectual property

Support for companies

BIM and digital transformation

Circular economy

Business Development

Training Engineering

Communication and marketing

Business Models

Corporate Finance

Events

The cluster is supported by

les pôles de compétitivité
Innovation Collaborative, Croissance Collective
RÉPUBLIQUE FRANÇAISE

La Région Grand Est

Strasbourg.eu
eurometropole

The cluster participates in/is a member of:

conseil national de l'industrie

AFPC

SBA
SMART BUILDINGS ALLIANCE FOR SMART CITIES

ECTP
INNOVATIVE BUILT ENVIRONMENT

CSF « Industries pour la Construction »

Examples in France of innovation projects for construction with bio-based materials

Evolving regulatory environment

- Energy Transition for Green Growth Act (LTECV) of 17/08/2015
  - Divide GHG emissions by 4 by 2050
  - Halving energy consumption by 2050
- Decree No. 2019-771 for the reduction of energy in existing buildings for tertiary use
  - **Reduce final energy consumption by 40% by 2030**
  - **Reduce final energy consumption by 60% by 2050**
- Decree No. 2021-1004 (RE2020) - new buildings
  - New GHG emissions cap
  - Taking into account sound insulation, thermal comfort (summer/winter) and the environmental impact of materials (LCA)

The decarbonisation of the building sector is one of the major challenge of the coming years. Insulation, a pillar of the energy transition, is at the heart of current concerns.

Project Pavagrowth

Project objective	Increase in the production capacity of rigid and semi-rigid wood insulation panels
Key elements	■ Total cost: €74 millions supported by pavatex France. ■ Aid: 22 M€ AAP Systèmes Construction Bois ■ Duration: 30 months ■ Localisation: Epinal (88)
Solutions	■ Solutions developed within the framework of the project: Installation of a shredder at the current site for the industrialization of the production of semi-rigid wood insulation panels and creation of a new production site for rigid wood insulation panels. ■ Products marketed at the end of the project: 28,000 tonnes of semi-rigid wood panels 60,000 tonnes of rigid wood panels 7,000 tonnes of bulk fibres (bales)

Projet labellisé par BUILD& CONNECT INNOVATION FOR BUILDINGS & TERRITORIES

les pôles de compétitivité

RÉPUBLIQUE FRANÇAISE

Structuring, industrialization and securing of the wood fiber insulation sector, enhancement of the characteristics of wood and implementation of an eco-efficient industrial process in a logic of sustainable development

Strengthening and structuring the French timber industry

Scale up of the French industrial offer of bio-based insulation:
+ 95,000 tons/year

Valorisation of wood that is not used much (hardwoods, bark beetles) while strengthening short circuits (Vosges wood)

Strong commitment to minimising the ecological footprint across the entire value chain

Project innovations

Process/product innovations

- Product R&D: bio-based, tests for mixing binders and additives, finer defibration
- Use of bark beetle and twisted wood
- Use of hardwoods: up to 1/3 (rigid panels) and up to 100% (semi-rigid panels)

Triple production capacity

- Rigid panels: double production
- Semi-rigid panels: new production
- Bulk / baled fibres: new commercialisation

Project ACLIBIO

Adapting to CLImatic changes with BIOsourced insulation

Objective: To characterize the evolution over time of the hygrothermal performance of several types of bio-based insulation and to evaluate their impact on the summer and winter comfort of buildings by 2050

Budget: 700 k€ (Fund 300 k€ ADEME – "Towards responsible buildings")

Completed project

Projet labellisé par BUILD& CONNECT INNOVATION FOR BUILDINGS & TERRITORIES les pôles de compétitivité RÉPUBLIQUE FRANÇAISE

Issues

- Durability of the properties of bio-based insulation:

Limited field returns

Some laboratory studies on certain materials

- Performance of bio-based buildings by 2050:

No studies taking into account a possible evolution of hygrothermal properties

"Determine the evolution of the hygrothermal properties of several types of insulation and evaluate their impact on the summer and winter comfort of buildings by 2050".

The main works consisted of:

- Modeling of hygrothermal transfers
- Measurement of the hygrothermal properties of materials
- Accelerated and natural aging of insulation
- Socio-economic analysis and feedback from the field
- Operational recommendations

Projet ADEME ACLIBIO : Etude du vieillissement d'isolants biosourcés dans une perspective de changement climatique

Lucile Soudani, Géraldine Garnier, Matthieu Cosnier, Nicolas Place, Etienne Gourlay

Project PHYTAGORE

Hydrothermal Performance: Global Analysis and Regulatory Compliance

Objective of the project :To provide the scientific and technical elements for taking into account the hygrothermal performance of vegetable concretes to the public authorities and design offices

- Total cost: 2 M€
- Public funding 1,5 M€ France 2030
- Duration: 48 months
- Project location: France (80, 67, 77, 17,35)

Projet labellisé par BUILD& CONNECT INNOVATION FOR BUILDINGS & TERRITORIES les pôles de compétitivité RÉPUBLIQUE FRANÇAISE

The literature has shown that taking into account only the thermal properties of this material induces too high a gap between calculations and reality.

Summer comfort is clearly visible on the REX of instrumented buildings but little taken into account in the calculations by the technical engineering consultants

Dynamic simulations taking into account hydrothermal coupling, kinetics or option hysteresis show a better fidelity to measurements taken in the field.

Partners: CODEM, CEREMA, CSTB, TIPEE University of Rennes

Demonstrating the hygrothermal performance of hempcrete

Starting at:

- The complete characterization of hempcrete at the material scale (λ, Cp, μ, MBV, sorption, U at the wall scale in dynamics, etc.)
- Evaluation of material performance through tests up to scale 1
- Evaluation of the material's performance by instrumentation and numerical modeling
- Assessing the comfort perceived by the occupants
- The valorization of the results in regulations

Project VERDIGRIS

Optimization of the wood aggregate concrete production process

€500,000 with €200,000 ADEME PERFECTO funding

Lesage Développement, in collaboration with Ecocem and the LMDC laboratory in Toulouse

Projet labellisé par BUILD& CONNECT INNOVATION FOR BUILDINGS & TERRITORIES les pôles de compétitivité RÉPUBLIQUE FRANÇAISE

To optimize the production process of wood aggregate concrete

- Type and shape of aggregates
- Pre-treatment of aggregates with respect to binder
- Use of low-carbon binder
- Implementation methodology.

Optimization:

- The cost of production,
- The environmental footprint (CO_2, water, etc.)
- Application for prefabricated products

Project RIZFLEX

Recovery of local agricultural waste into bio-based semi-rigid insulation panels.

Rice straws or alternative straws

16M€ with 3M€ funding France 2030

To offer a bio-based alternative to the reference solution (mineral wool insulation): creation of a versatile manufacturing line, designed to produce semi-rigid insulation panels from rice straw with openness to other bio-based materials (alternative straws, wadding, cotton, textile).

15,000 tonnes of semi-rigid insulation panels (mainly from rice straw)

Projet labellisé par BUILD& CONNECT INNOVATION FOR BUILDINGS & TERRITORIES les pôles de compétitivité RÉPUBLIQUE FRANÇAISE

- Fibrous waste product composed of cellulose, lignin, organic proteins and lipids
- Few possible uses: difficult to compost, poorly digested by animals, very poor fuel, low quality bedding but qualities in thermal insulation, acoustics
- 50,000 tons of rice straw cut each year in the Camargue, including: 80% burned, 20% left on the field

Burning leads to an ecological and health disaster
Around Arles, 70% of fine particles came from agriculture (326 t) in 2019 compared to 8% in the Southern Region (1.2 kt).

Enhancement of the characteristics of rice straw and implementation of an efficient industrial process in a sustainable development logic.

Structuring and premiumization of the upstream rice straw sector.

Structuring, industrialization, securing the bio-based insulation sector.

R&D work on bio-based fibres (rice straw and alternative straws) and material mix trials

+15,000 tonnes/year of bio-based insulation =

10,000 homes/year insulated

Improving the environmental performance of the rice sector in the Camargue while strengthening short supply chains

LABELLING OF INNOVATION PROJECTS

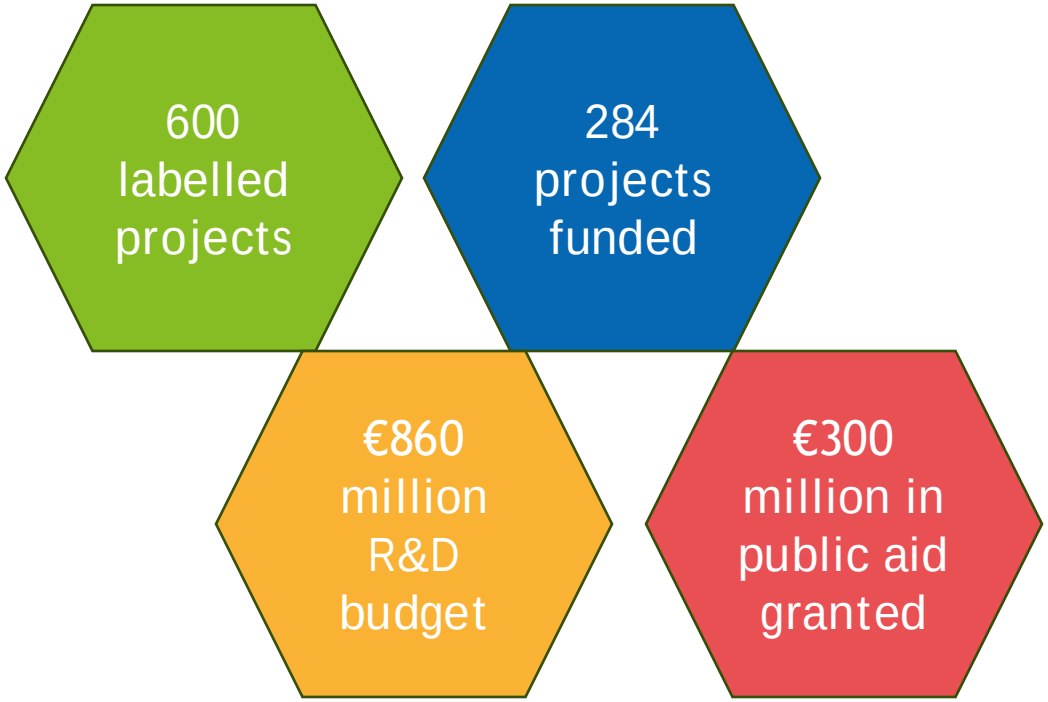
The labeling of an R&D project is the official recognition of the support of the Competitiveness Cluster Build&Connect.

It allows you to benefit from the Cluster's expertise to:

- Improve the quality of your project and the robustness of your application
- Access complementary skills available in the cluster's network
- Strengthen the visibility of your project throughout its duration

- Obtain a quality label and put all the chances on your side to access public funding and Succeed in your innovation projects -

A FACTORY FOR EFFICIENT INNOVATION PROJECTS



In addition to obtaining the Competitiveness Cluster label issued by the Cluster, the committee of experts challenged the project on specific points that allowed us to arrive perfectly prepared in front of the funders.

Clément Benassy - Managing Director Néolithe

For a construction manufacturer like Burger, a cluster such as Build&Connect makes it possible to find the right interlocutors to research, test, and improve existing standards in the face of the innovations of the time.

Bertrand Burger - CEO Burger et Cie

Thank you for your attention!

Pôle Build & Connect
contact@buildandconnect.eu
https://buildandconnect.eu
+33 (0)7 87 72 85 28

Our locations :

210 rue Geiler de Kaysersberg
F-67400 Illkirch-Graffenstaden
Strasbourg

5 rue Jacques Villermaux
F-54000 Nancy

CIRTES
F-88100 Saint-Dié-des-Vosges

Low Carbon Building with biobased materials

CFE / Woodshapers

Philippe Courtoy

LUXEMBOURG TRADE & INVEST

Green Tech Solutions Summit

26 Sept 2024

Bettembourg (LU)


cfe
CHANGING
FOR GOOD
SUSTAINALYTICS
ESG
2024
INDUSTRY
TOP RATED
top
EMPLOYER
BELGIË
BELGIQUE
BELGIUM
2024
CERTIFIED EXCELLENCE IN EMPLOYEE CONDITIONS

Who we are

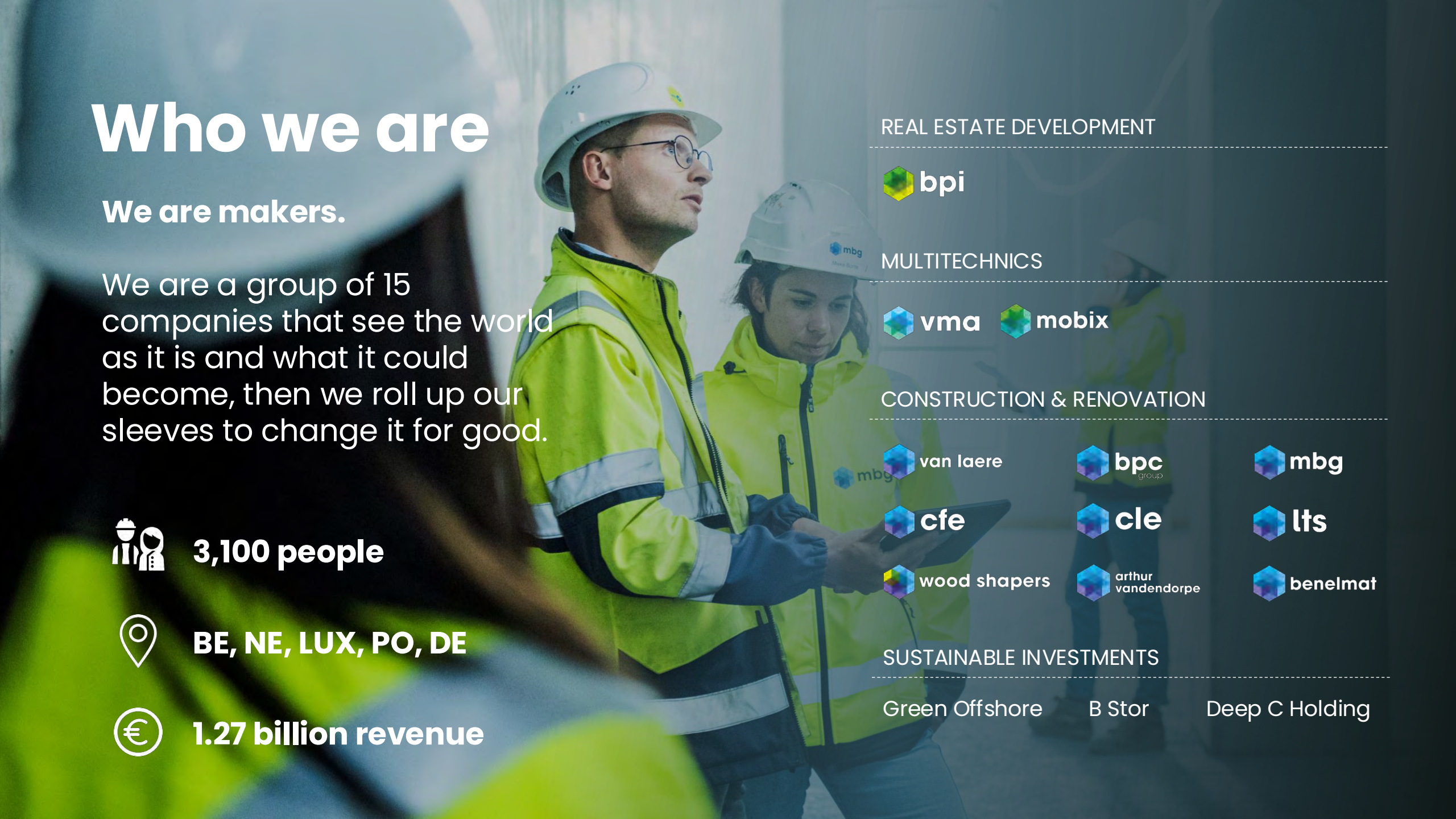
We are makers.

We are a group of 15 companies that see the world as it is and what it could become, then we roll up our sleeves to change it for good.

3,100 people

BE, NE, LUX, PO, DE

1.27 billion revenue



REAL ESTATE DEVELOPMENT

bpi

MULTITECHNICS

vma mobix

CONSTRUCTION & RENOVATION

van laere bpc group mbg

cfe cle lts

wood shapers arthur vandendorpe benelmat

SUSTAINABLE INVESTMENTS

Green Offshore B Stor Deep C Holding

What we do

We are active in 3 markets that are essential for the **net-zero transition.** Basically, we are changing for good how people live, move, work, produce & power the world.

Sustainable buildings

Smart industries

Energy & mobility infrastructure

WOOD HUB
Brussels
6.922 m2 offices

Hybrid wood-concrete CREE structure

79% below the *Nearly Zero Energy Building* standard

Fossil fuel free

WELL PRECERTIFIED

Certification level BREEAM OUTSTANDING

vmanager. inside

bpi

bpc group

wood shapers

vma

TOUR & TAXIS

GARE MARITIME

GARE MARITIME
Brussels
75.000 m2 office & retail

Complete restauration of historic building

50.000 m2 floor

35.000 m2 roof

304.000 m3 air proofing

12 wooden boxes-in-a-box with 10.000 m2 prefab FSC-certified wood

vmanager. inside

mbg vma

WOODEN

WOODEN
Luxembourg
10.078 m2 office
6.600 m2 parking

Largest wooden office building in Luxembourg

Wooden framework with V-modules

New headquarters of Baloise Insurances

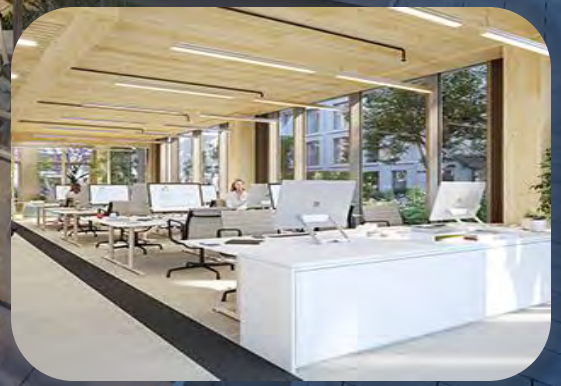
BREEAM® EXCELLENT

WELL™ GOLD

bpi cle

wood shapers

ROOTS
BELVAL



Roots
Luxembourg
19.250 m2 mixed use

Located on the wastelands of a former steel plant

Hybrid wood-concrete structure

Taxonomy aligned

Pilot project for the new LCBI label

LOW CARBON BUILDING LCB INITIATIVE PILOT PROJECT 2023

BREEAM® EXCELLENT

WELL™ GOLD

bpi cle

KRONOS

KRONOS
Luxembourg
55.658 m2 mixed use
at least

Reconstruction in a circular approach

Preservation of existing basements

Taxonomy aligned

Including new headquarters of KPMG Luxembourg

DGNB

BREEAM® EXCELLENT

WELL™ GOLD

bpi

cle

ZIN

ZIN IN Noord
Brussels
110.000 m2 mixed use

ZEBRA mixed use philosophy

65% of existing building was kept

30.000 tonnes of concrete re-used

95% of new materials C2C certified

vmanager. inside

van laere

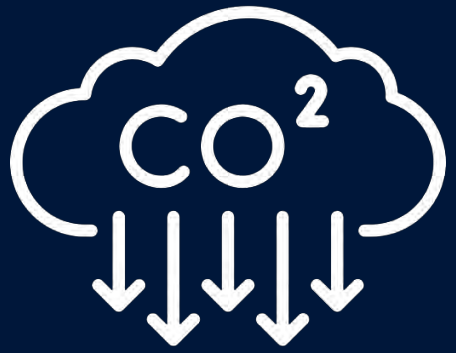
bpc group

vma

EU Taxonomy aligned turnover

20,03%

+48% vs 2023



Direct CO2 emissions (1 + 2)

-35%

since 2022

Waste reduction

-17%

since 2021

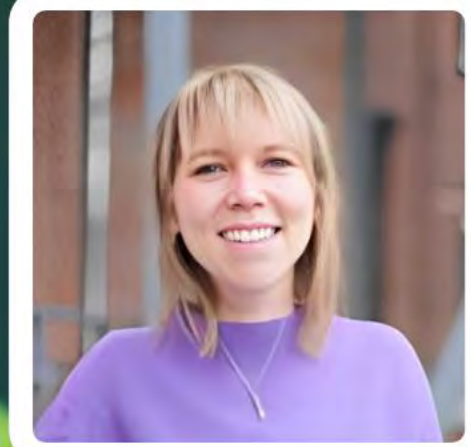
cfe | CHANGING FOR GOOD

SUSTAINALYTICS ESG 2024 INDUSTRY TOP RATED

top EMPLOYER BELGIË BELGIQUE BELGIUM 2024
CERTIFIED EXCELLENCE IN EMPLOYEE CONDITIONS

Construction
Eco-quartiers

Yves Biwer
Agora sàrl. et Cie



Margaux Monforti
District Cleantech

Interreg
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN
Grande Région | Großregion

AGORA
SUSTAINABLE URBANITY

Quartier METZESCHMELZ
From steel- to urban factory

Sustainable, circular urban development of a former industrial site

INTRODUCTION

Location

INTRODUCTION

AGORA

Location

INTRODUCTION

Location

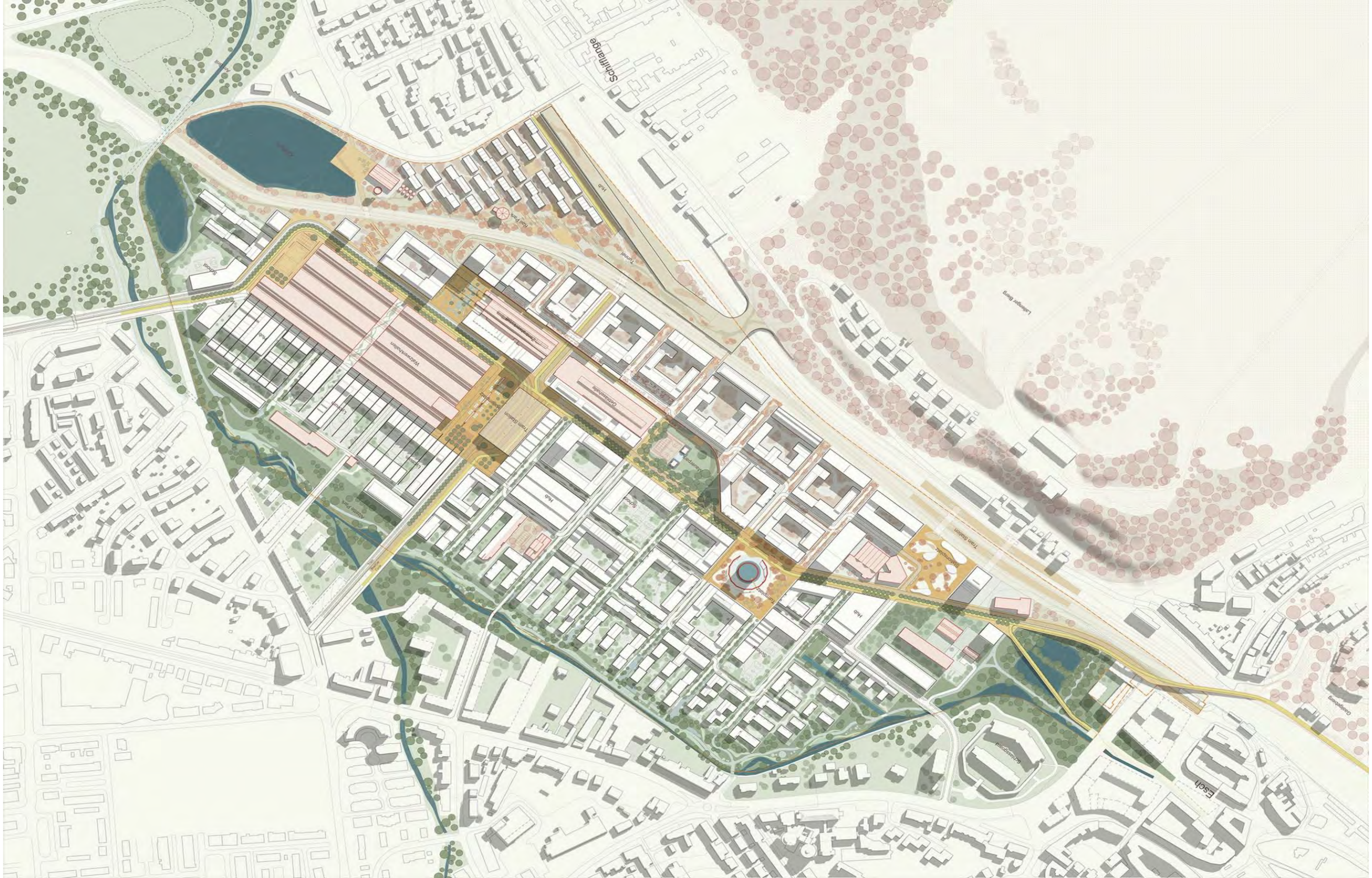
The Esch-Schifflange site is located on the territory of 2 municipalities

ESCH
91 %

Administration Communale de Schifflange
9 %

Total surface area: 62,9 ha

INTRODUCTION



Schifflange
Esch

URBAN VISION / STRATEGIES

AGORA

A green city framed by nature

A liveable city giving new life to industrial heritage

A dense city founded on sustainable innovation

URBAN VISION / STRATEGIES

AGORA

A frame of urban nature and a network of habitats

A strong identity by giving existing structures new life

A walkable network of healthy spaces

Interconnected mobility for car-free streets

Dense mix of buildings and functions, adapted to context

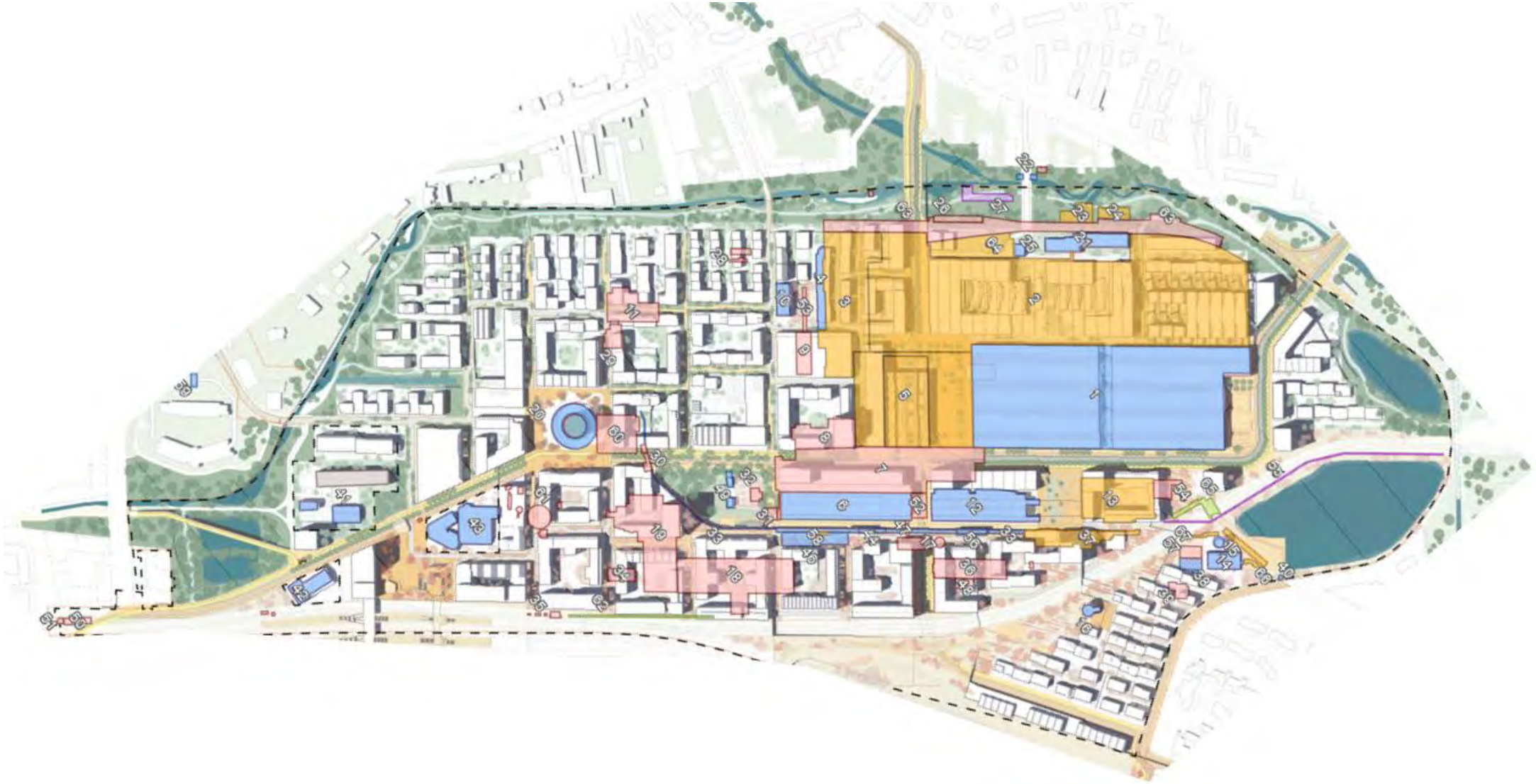
Supporting circularity and symbiotic flows

A strong identity by giving existing structures new life

AGORA

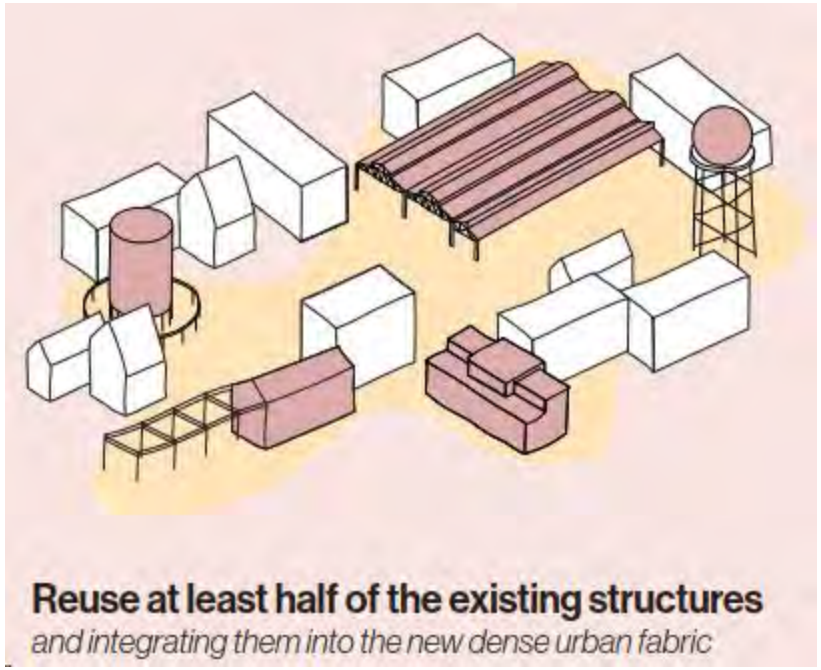
A strong identity by giving existing structures new life

AGORA



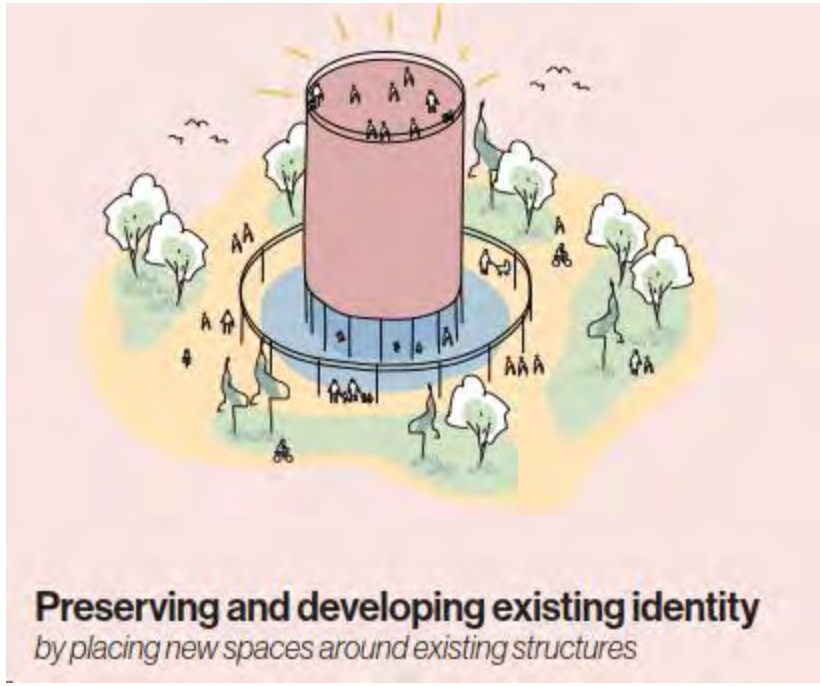
A strong identity by giving existing structures new life

AGORA



Reuse at least half of the existing structures
and integrating them into the new dense urban fabric

Giving existing buildings new life
with new functions

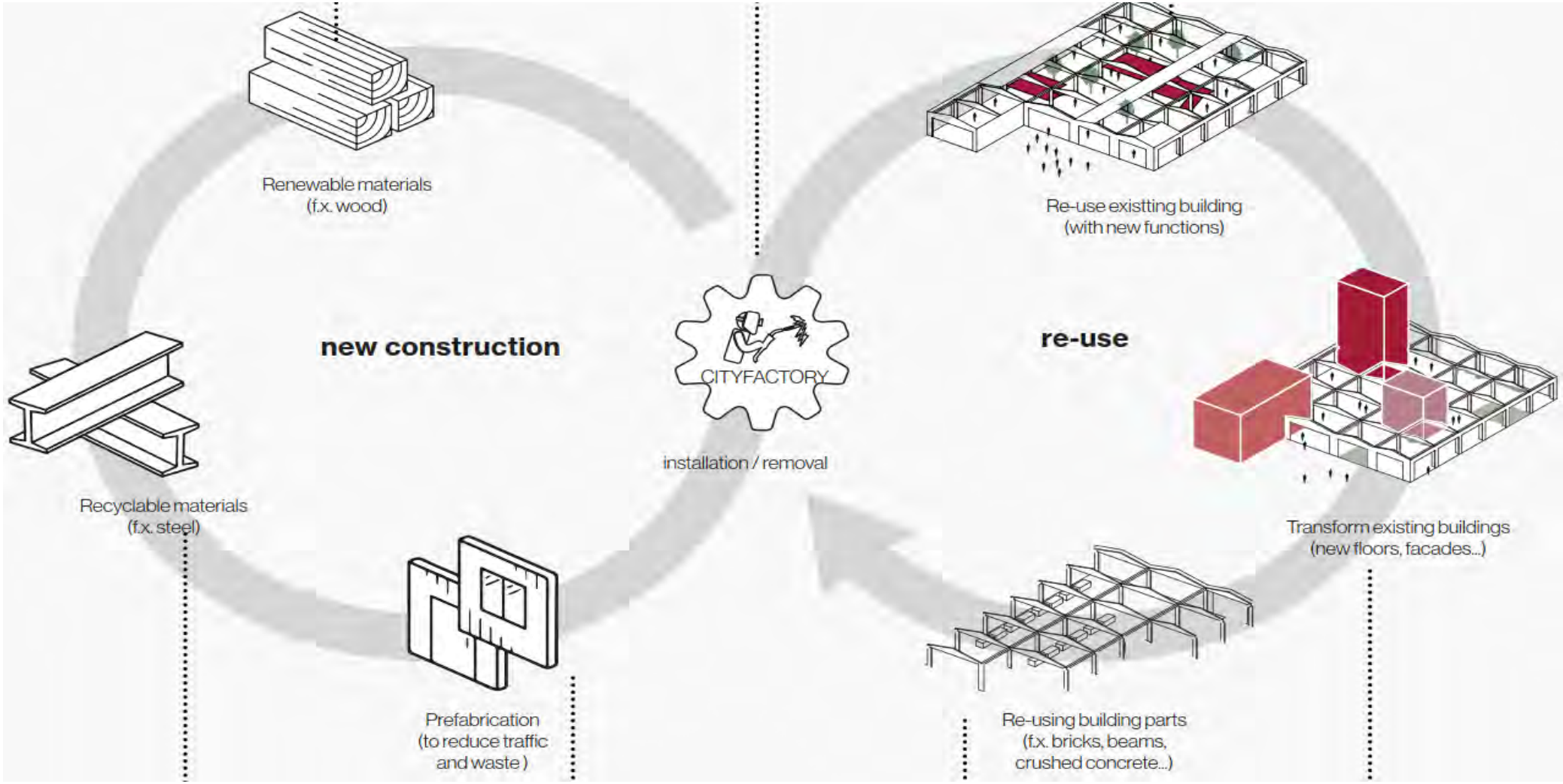


Preserving and developing existing identity
by placing new spaces around existing structures

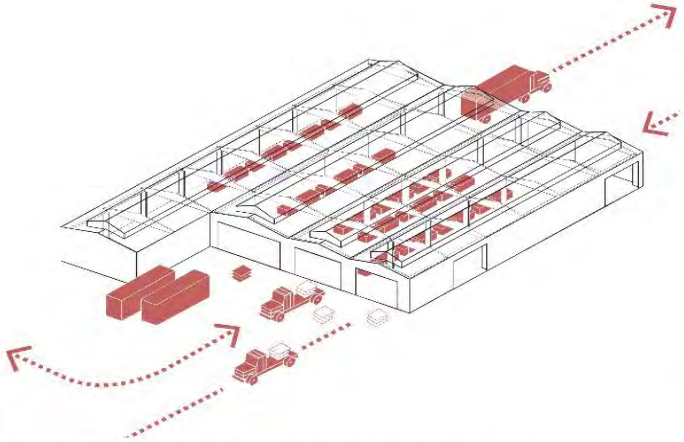
A strong identity by giving existing structures new life

AGORA

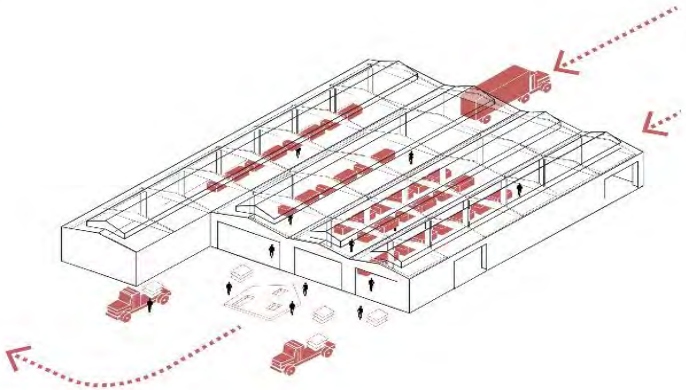
A strong identity by giving existing structures new life



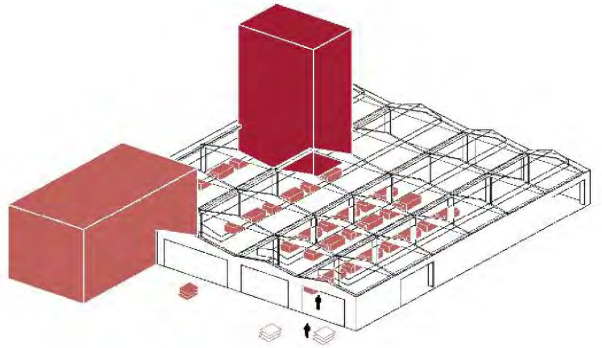
A strong identity by giving existing structures new life



Logistical use f.x. for urban mining



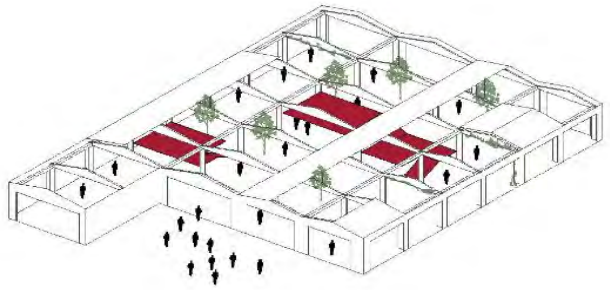
Prefab on site, f.x. CLT

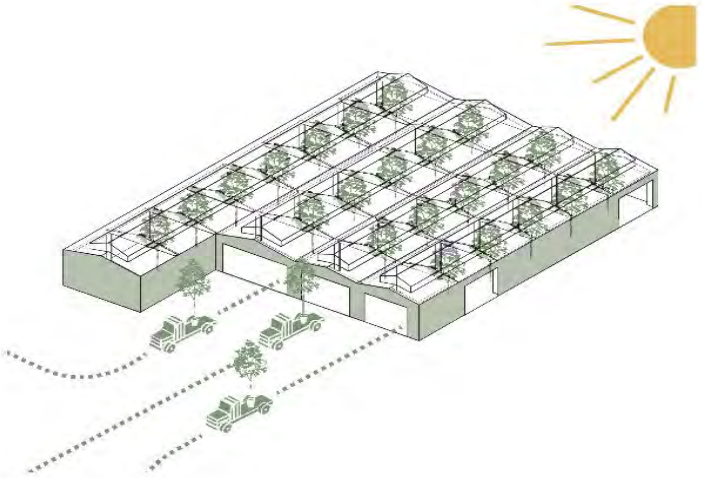


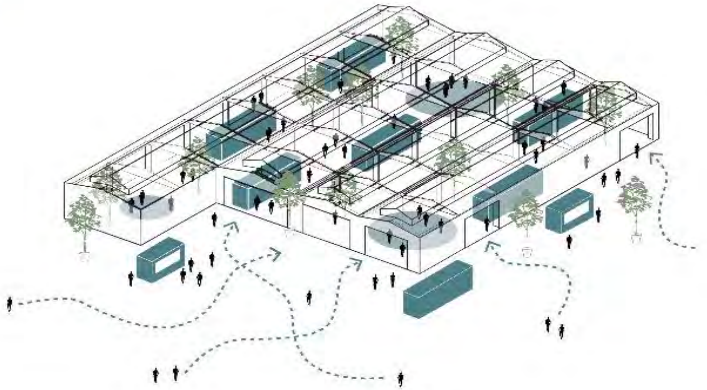
Future crafts and production

A strong identity by giving existing structures new life

AGORA







Temporary use

Tree nursery

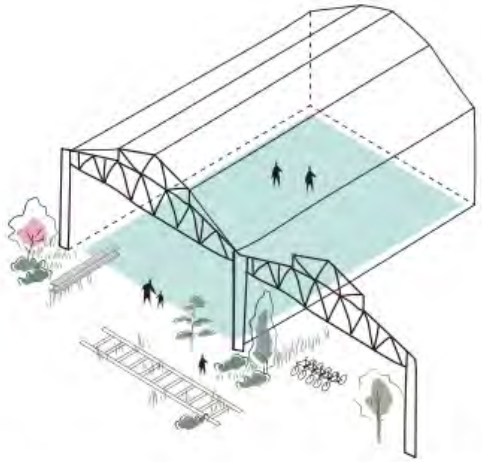
Innovative office

A strong identity by giving existing structures new life

AGORA

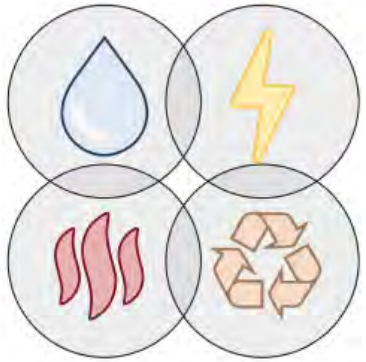
Supporting circularity and symbiotic flows

Supporting circularity and symbiotic flows



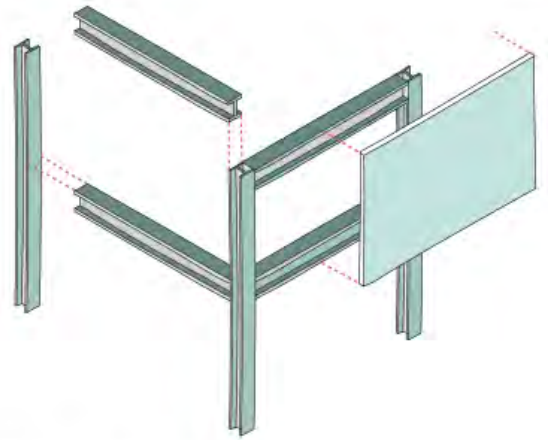
Reuse of existing buildings and materials

- *new functions for old buildings*
- *identity through existing elements*
- *urban mining*



Resource flows

- *the "Symbiosis" project is looking closer at resource flows*
- *facility hubs can become a crucial node in these flows, from recycling stations to the placement of batteries, transformers and water storage tanks*
- *within buildings: from photovoltaic to water saving toilets*
- *within gardens: from rain water re-use to compost*



Ensure future circularity

- *build for dissasembly*
- *modularity*
- *prioritize recycleable materials*

Supporting circularity and symbiotic flows

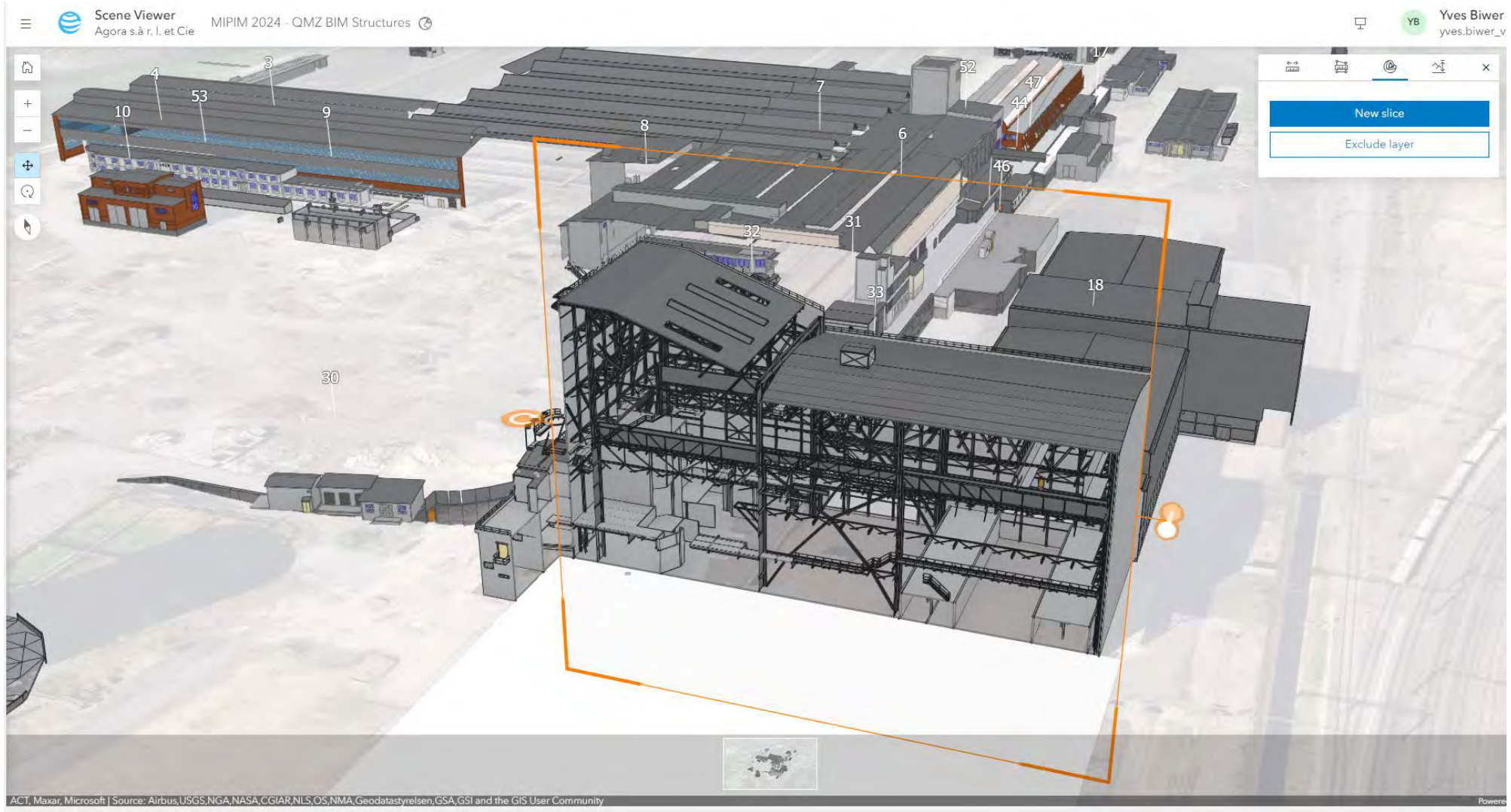
Deconstruction studies for buildings and underground structures

AGORA

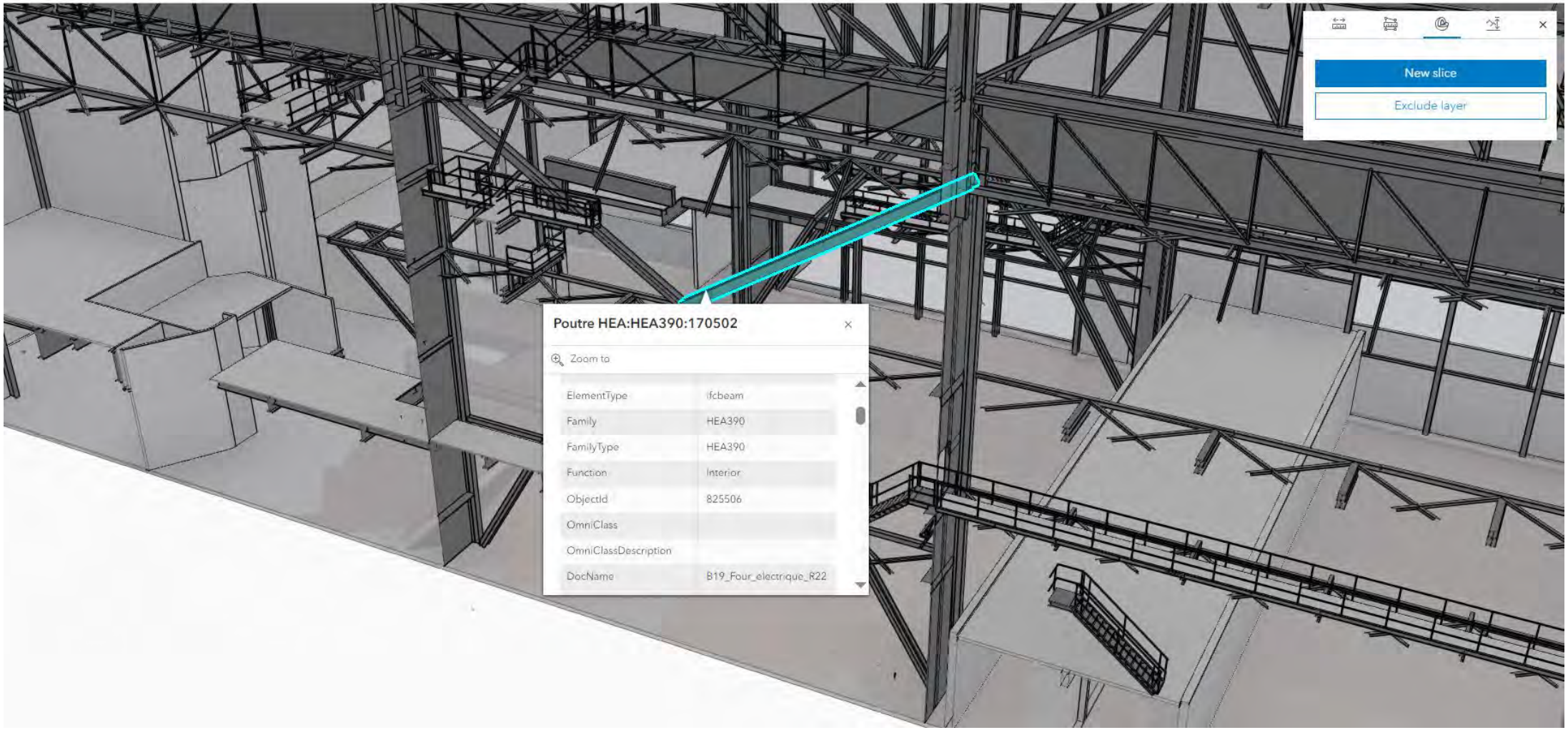
Objectives

- Inventory of deconstruction materials with a view to their re-use
- Reduce waste and revaluation of resources
- Precise evaluation of the volume of reusable, recyclable or disposable materials

Digital Twin / Database of reusable materials



Digital Twin / Database of reusable materials



UrbaFlow / Projet Interreg

Creation of a cross-border sustainable city demonstrator

Objectifs

- Create inclusive jobs in the field of the circular economy and services;
- Develop the reuse of resources from construction, deconstruction and renovation;
- Improve the recovery of remaining waste;
- Reduce the carbon cost of building sites by pooling logistics;
- Create a global, citizen-based dynamic in favour of the circular economy;
- Improve the well-being of local stakeholders and their access to local goods and services;
- Create a cross-border initiative factory, mobilizing the region's driving forces to develop joint projects;
- Improve citizen participation in the construction of these projects.

UrbaFlow / Projet Interreg

Creation of a cross-border sustainable city demonstrator

AGORA

Achievements

1. **The creation of a cross-border circular economy demonstrator**
   - Implementation of a circular economy platform, partly in Thil and partly in Metzeschmelz;
   - Creation of a joint materials recycling center, with physical locations and an online platform, to improve the use of second-hand resources;
   - Raising awareness among citizens to develop circular economy projects.
2. **Creating a cross-border demonstrator of social innovation and well-being**
   - Creation of a cross-border initiative factory bringing together the region's driving forces around Franco-Luxembourg projects;
   - Mobilization of local stakeholders to participate in thematic groups to meet unmet needs;
   - Creation of a "Maison des projets" in Metzeschmelz, hosting local project leaders and providing a place for activities and socializing;
   - Deployment of a concierge service on both sides of the border, for employees and residents.

3D – Vision of the future district

THANK YOU FOR YOUR ATTENTION

District Cleantech

Margaux Monforti

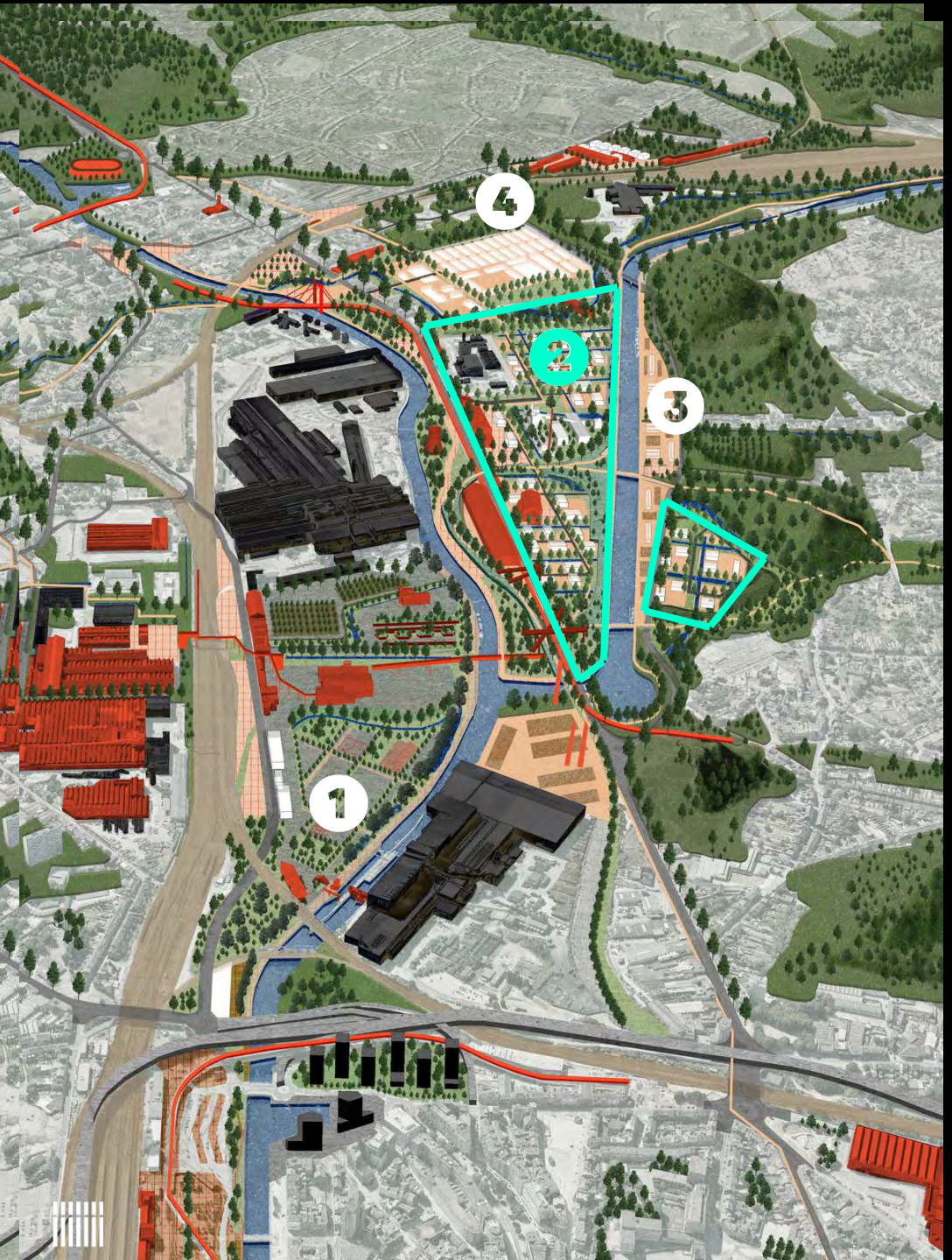
Greentech Solutions Summit - 26 September 2024

Climate change moves faster than our actions


We need to go faster and stronger

DISTRICT CLEANTECH

It all began with a former Cockerill steelworks site…



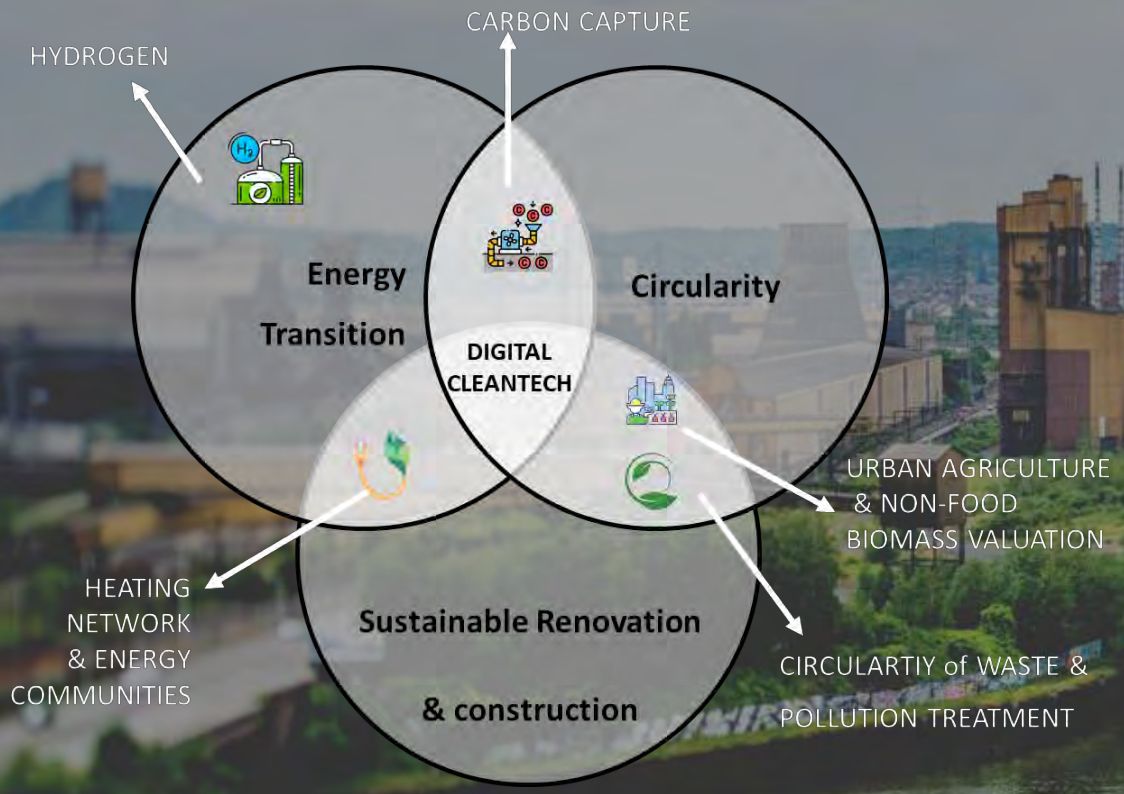
...a brownfield whose redevelopment master plan was approved by the Walloon government in 2022.

1. The 'Phare Ouest', metropolitan park
2. The District Cleantech ecosystem
3. The Urban Port
4. A new military base : “Le Quartier du Future”
5. A system of public spaces, culture, and landscapes"

DISTRICT CLEANTECH

Objectives of the District Cleantech

Three Major Themes



Four Upscaling Labs

1. **H2 national testing & innovative platform**

   VKHylab | .be — von KARMAN INSTITUTE FOR FLUID DYNAMICS

2. **Innovative platform dedicated to industrialization of building renovation**

   Renolab

   sirris — Buildwise

3. **Urban Agriculture innovative platform**

   GreenHouse Lab

   LIÈGE université Gembloux Agro-Bio Tech

4. **Innovation platform dedicated to soil remediation solutions and circularity**

   DepolluLab

   MATERIA NOVA — CTP — CRM GROUP

District Cleantech's main infrastructures

01 | Les Vestiaires, the brain of the ecosystem

2027

Center of expertise and innovation, incubation space, offices, collaborative areas, center for coordination of projects and digital activities.

02 | La Centrale, beating heart of the ecosystem

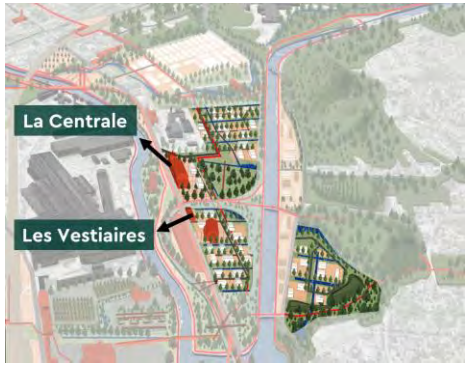
2029

Incubation space, "plug & run" industrial workshops, shared test infrastructures (Renolab and GreenHouse Lab)

03 | A 40 ha innovative business park part aligned with the ambition of a 'positive' energy site

2027

Reindustrialization of the site, hosting of SMEs, cleantech industrial projects and pilots



80 founding members

MEMBRES PLATINUM

CARMEUSE · IVA · Industeel ArcelorMittal · sirris · CRM GROUP · PÔLE MECATECH · Cenaero · H2[hub] wallonia · TWEED · Belgian Hydrogen Council · WANTY · AGC · aperam · Buildwise · CTP · MATERIA NOVA Materials R&D Center · GREEN WIN · KPMG · von KARMAN INSTITUTE FOR FLUID DYNAMICS · ROOSENS BÉTONS

MEMBRES PREMIUM

Ecoterres · BEBLUE · 5 ELEMENTS Energy · RESOLIA thermal networks engineering · KARNO ENERGY · bpost · LOGISTICS IN WALLONIA connectmoveshare · Duferco Wallonie · Duferco GROUP · BELGARENA · IFAPME · forem · EIFFAGE · destore · RAYSUN · Skywin Aerospace cluster of Wallonia · wagralim APPETITE FOR INNOVATION · Ocetic Your Connection to ICT Research · proximus · bxventures

MEMBRES REGULAR

iba · etex · CAP CONSTRUCTION ensemble, construisons durable · groupecomet · bsolutions · retrival · LIXON · CHARLEROI · PERMAFUNGI Eat Grow Learn · Wallonie port Charleroi · H2WIN · BESIX · BUILD · Matgenix · eloy · remagin · RESERVOIR A · EQUANS · enerdeal by edp · Citronics Circular electronics · POLY-TECH ENGINEERING · Ecowez L'habitat au naturel · sunsoak solar energy design architecture · Multitel INNOVATION CENTRE · mitis · SIRONA TECHNOLOGIES · Industrya · Capricorn CLEANTECH · ICONTECH OFFSITE BUILDING · ARK · LIÈGE université Gembloux Agro-Bio Tech · UCLouvain · UMONS Université de Mons · ULB UNIVERSITÉ LIBRE DE BRUXELLES · BSTOR BATTERIES AS A SERVICE · EnFgil · abr ARCHITECTURE URBANISME · ReNewind · CALYSTA · IMP Technologies

3 investors :

Sambrinvest · WE Wallonie Entreprendre · igretec

Startups
District Cleantech

- ✓ Business development: access to the Cleantech District network
- ✓ Innovation, fundraising: connecting with the right people (C-level, relevant individuals, etc.)
- ✓ Expansion strategy: desire to establish on the Cleantech District site
- ✓ National and international visibility: connecting with the international network of the Cleantech District and integration with the Cleantech Wallonia approach

ECOSYSTEM DISTRICT CLEANTECH = 30% STARTUPS

bxventures

Energy Transition: clean energy, hydrogen, carbon capture,….

RAYSUN · RESOLIA thermal networks engineering · Destore · Thermo Power Systems · BEBLUE · BSTOR Batteries as a Service · 5 ELEMENTS Energy · KARNO Energy · CTX · H2WIN Hydrogen Worldwide Integration · mitis · SIRONA TECHNOLOGIES · EnFgil · FeX ENERGY · IMP Technologies · ReNewind · WellDoneDrill · ARK

Sustainable renovation : Prefabrication,…

Ecowez L'habitat au naturel · ICONTECH OFFSITE BUILDING · BUILD · remagin

Circularity: Construction, electronics, materials, urban agriculture

Matgenix · Citronics Circular electronics · retrival · PERMAFUNGI Eat Grow Learn · SO WOOD KOMBUCHA

District Cleantech

La

Columbus

Urban Agri.
GreenHouseLab

H2 Testing
VKhylab | .be

Prefab&Circular
RenoLab Virtual + Physique

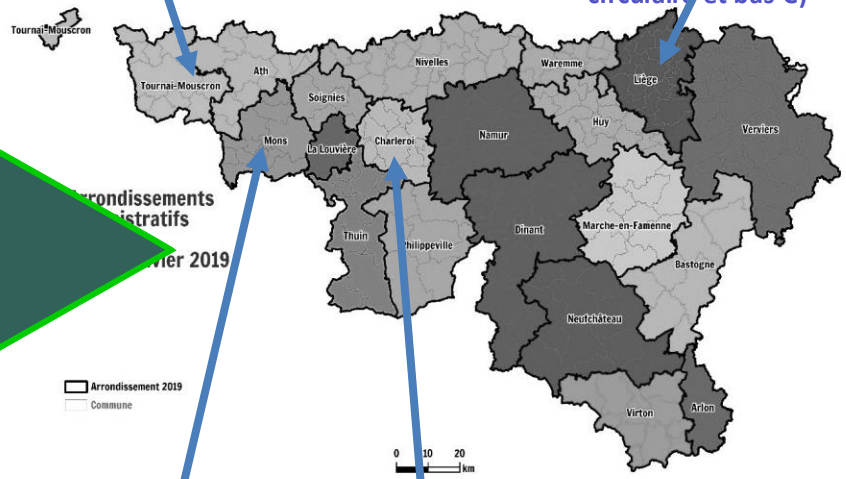
Dépollution
DepolluLab

Les Vestiaires

CLEANTECH WALLONIA

PHENIX
(Ecosystème construction circulaire et bas-C)

MC² MINERAL CIRCULAR CENTRE



HEART FOR CLEANTECH

District Cleantech

More than 30 projects identified

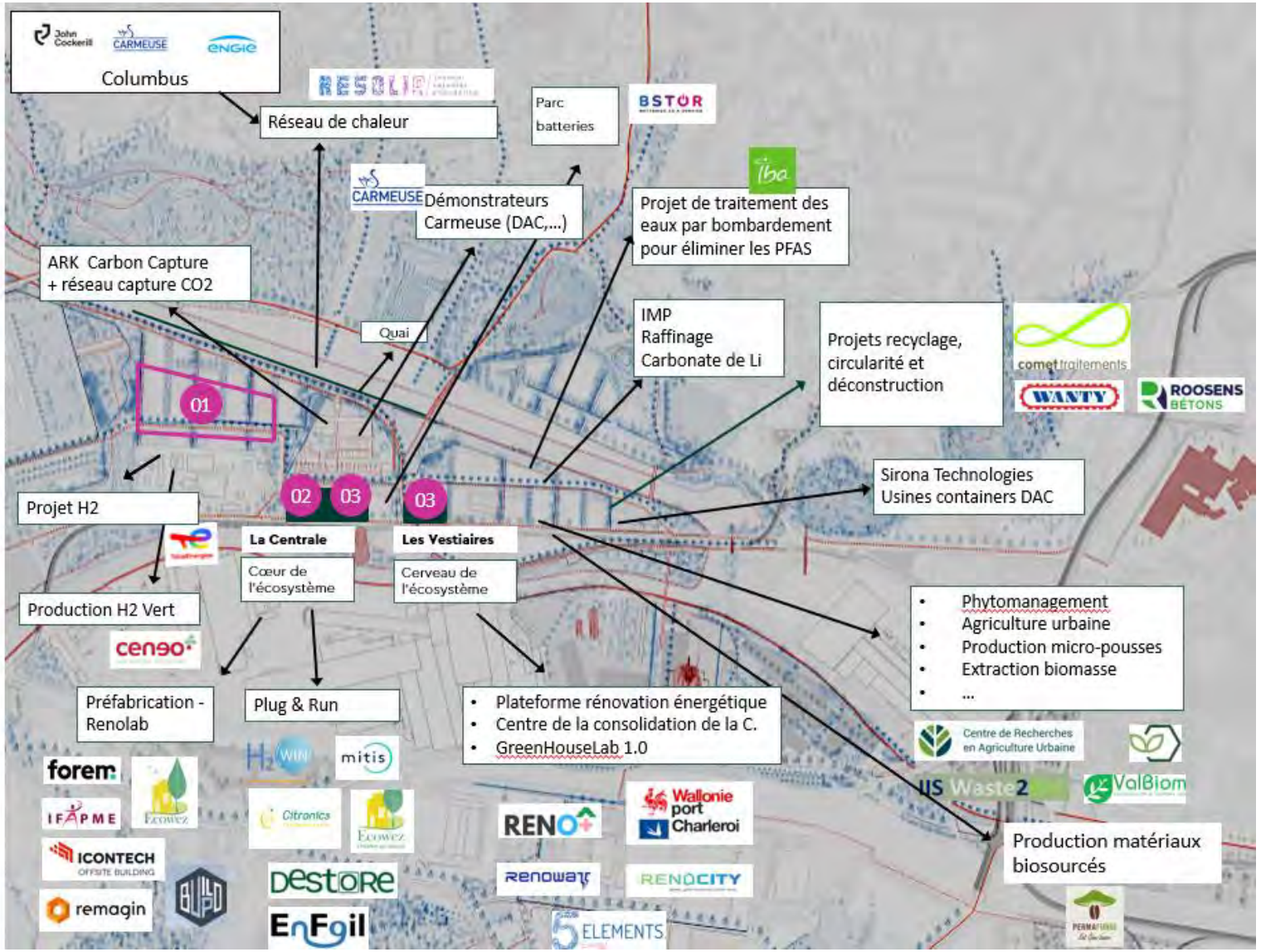
Les Upscaling Labs

01 VKHyLab
Plateforme fédérale de test H2

02 RenoLab
Industrialisation de la rénovation

03 Greenhouse Lab
Agriculture urbaine

04 DepolluLab
Dépollution des sols, des eaux et déconstruction



CURRENT FORECAST

Between **20 et 30** ha of lands occupied

30% of building Les Vestiaires occupied

15% of building La Centrale occupied

Satellite Ecosystem

Sustainable renovation & construction

Sustainable Renovation & Construction

5 Stakeholders engagement

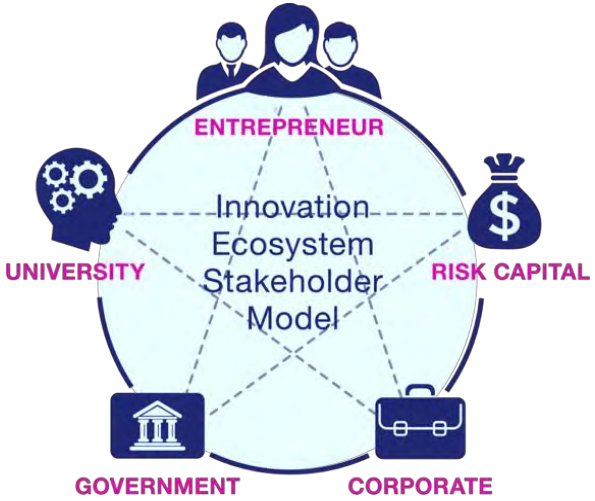
Retrival, Karno, Permafungi, Destore, Ecowez, Builp Up,

Icontech, Remagin, Renewind, SunSoak

Buildwise, Sirris,

CENAERO, REMIND, IIS

RENOW, IIS WIN4C



Sambrinvest, WE,

Industrya

GreenWin, Mecatech, RENO+,

RENOWATT, FOREM, IFAPME,

Port Autonome de Charleroi,

IGRETEC, Ville de Charleroi, LIW

Eiffage Duchene, BESIX, LIXON,

Wanty, COMET, AGC, IBA, Roosens

Bétons, Eloy, Groupe Comet, Etex,

Bpost, ReservoirA, BSSolutions,

ABR Architectes, Proximus

Sustainable renovation & Construction

OBJECTIVE

ACCELERATE, SCALE-UP AND INDUSTRIALIZE THE ENERGY RENOVATION

3 STRATEGIC PROJECTS

Renovation projects for the two iconic buildings of our Ecosystem : La Centrale (2029) et Les Vestiaires (2027)

Co-creation of an ambituous and innovative hub of projects around sustainable housing

PREFABRICATION	AUTOCONSTRUCTION
DECONSTRUCTION	CIRCULARITY
EDUCATION	DIGITAL

Support the development of the Upscaling Lab « ***Renolab*** » (Production, education, innovation)

Buildwise

sirris

Satellite ecosystem

Hydrogen & Energy

Hydrogen & Energy

5 Stakeholders Engagement

H2 : BEBLUE, Mitis, Haffner, H2Win
CC : Sirona technologies, ARK
Energies : Résolia, Destore, Karno, Raysun, BSTOR, IMP techno., Renewind, aug-e, WelldoneDrill, SunSoak, Enfoil

ULB, CRM, VKI, C3E2D, MateriaNova, UMons, Multitel, UCLouvain, CETIC, CENAERO

Sambrinvest, WE, Industrya, Capricorn

GreenWin, Mecatech, Skywin, LIW

IIS e-wallonHy, CENEO, FOREM , IFAPME, IIS CETWA, PAC, Charleroi

TWEED, (Belgium H2 Council)
AGC, CARMEUSE, (TE), Industeel, BESIX, Equans, Bsolutions, (Engie), Aperam, Riva, Proximus, Duferco Wallonie, Bpost, Enerdeal

Hydrogen & Energy

OBJECTIFS

ACCELERATION

OF TECHNOLOGICAL INNOVATIONS RELATED TO THE TRANSITION TOWARDS GREEN ENERGY AND DECARBONIZATION

OF THE ADOPTION AND USE OF THESE TECHNOLOGIES BY THE INDUSTRY

6 STRATEGIC PROJECTS

Development of an ambitious and innovative hub of projects H2/CCU/CCS on District Cleantech's site

Support the development of VKHyLab and its integration within Wallonia and Belgian strategy

Support the development of a positive energy business park

Support the project : Wallonia recognized as a EU H2 Valley by May 2025

Support the development of heat networks in Charleroi

Support the development of a research project around cybersecurity of energy networks

Satellite ecosystem

Urban Agriculture

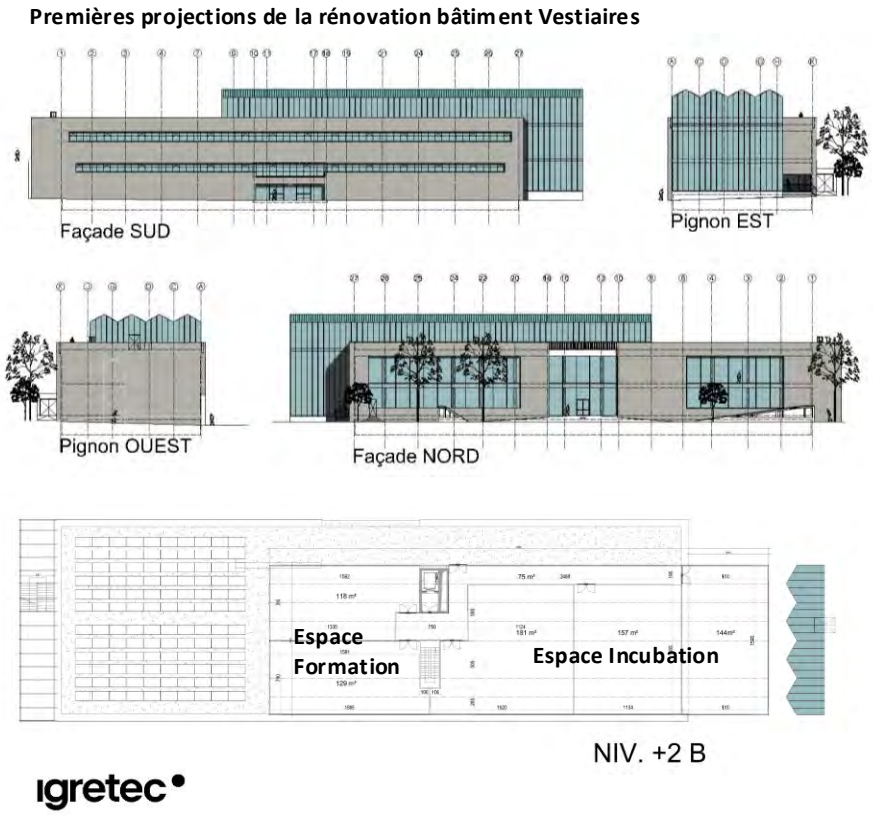
Urban Agriculture

5 Stakeholders engagement

1 STRATEGIC PROJECT

Development of the GreenhouseLabs project and structuration of a hub of projects around biomasse and Urban Agriculture

GreenHouseLab(s) within District Cleantech



Greenhouses on the roofs of our two buildings
Areas for « SCALE-UP », FORMATION ET PRODUCTION

Greenhouses in synergies with the buildings (energy, CO2, rainwater, heat network), and in synergy with the industrial environment

Showroom for innovative technologies supporting the development of the sector

Satellite Ecosystem:

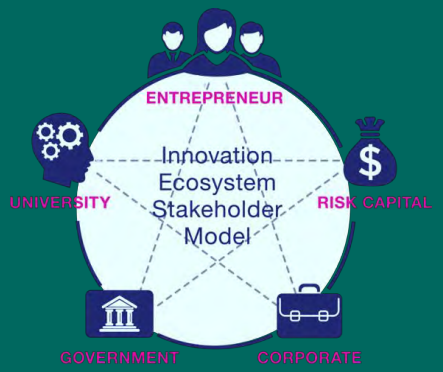
Depollution, deconstruction, water and soil remediation

Depollution, deconstruction, water and soil remediation

5 Stakeholders engagement

GreenFrix, (CEDEBEAU)

Remind, CTP, CRM, Win4C, IIS Waste2Bio Ulg,



Sambrinvest, WE, Besix

Spaque, FOREM, IFAPME, PAC, Charleroi, WE (aménagement des friches)

IBA, Duferco Wallonie, GreenWin, LIW, Eiffage, COMET, Wanty, Roosens Beton, Belgarena, Ecoterres, (JC),(Universoil), INDUFED,(Brownfield Academy),(DcEnvironnements)

2 STRATEGIC PROJECTS:

Structuration of a hub of projects around depollution, deconstruction, water and soil remediation (*Upscaling Lab DepolluLab)*

Support the development of an **industrial pilot e-Beam treatment** for environmental applications (PFAS, antibiotics, etc.) (IBA Technology)

DISTRICT CLEANTECH

By 2030

+100
Cleantech Companies

+ 1.000
Jobs created

24.000 m²
Former industrial buildings renovated

40 hectares
Economical and Innovation Hub in Cleantech

4 Upscaling Labs
Development of shared infrastructures

DISTRICT CLEANTECH

THANK YOU

Any question? Contact us…

Marc Van den Neste

Chief Ecosystem Officer

Marc.Vandenneste@districtcleantech.be

Margaux Monforti

Chief Operating Officer

Margaux.Monforti@districtcleantech.be

Construction
Technologies de recyclage et réemploi

Julia Scheidt
Dyckerhoff GmbH

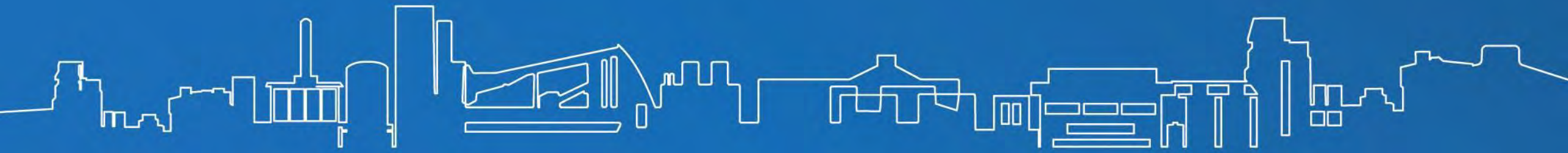
Eric Dziechciarek
Polygone

Interreg
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN
Grande Région | Großregion

Concrete recycling in practical application

Dr. Julia Scheidt; Dyckerhoff GmbH

Greentech Solution Summit, Luxembourg, 26.09.2024



Dyckerhoff

CONCRETE RECYCLING

Outset

Advantage of concrete compared to other construction materials: Concrete is fully recyclable

Closed loop and Producer Responsibility by concrete with recycled aggregates and cement with recycled fines is possible and standardized since 1998!

Intense research and studies
→ Revision of the German Standards in progress (Recycled Concrete now standardized in DIN 1045-2)

Obstacles and barriers in Germany were due to unfavorable boundary conditions (acceptance, availability of natural aggregates, costs) → Social perception and boundary conditions change now!

REGULATIONS

Rules for the production and application of concrete with recycled aggregates

Currently: dafstb

DAfStb-Richtlinie

Beton nach DIN EN 206-1 und D…
mit rezyklierten Gestei…
DIN EN 12620

From 2…

The regulatory framework ensures that the concrete is equivalent to concrete with natural aggregates in terms of strength, durability and design!

	DIN 1045-2	DIN
Tragwerke aus Beton, Stahlbeton und Spannbeton – Teil 2: Beton		

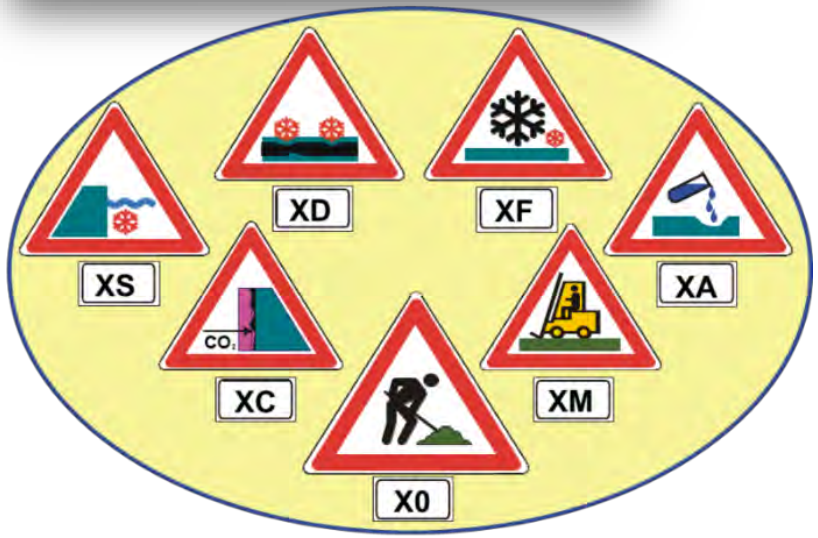
REQUIREMENTS

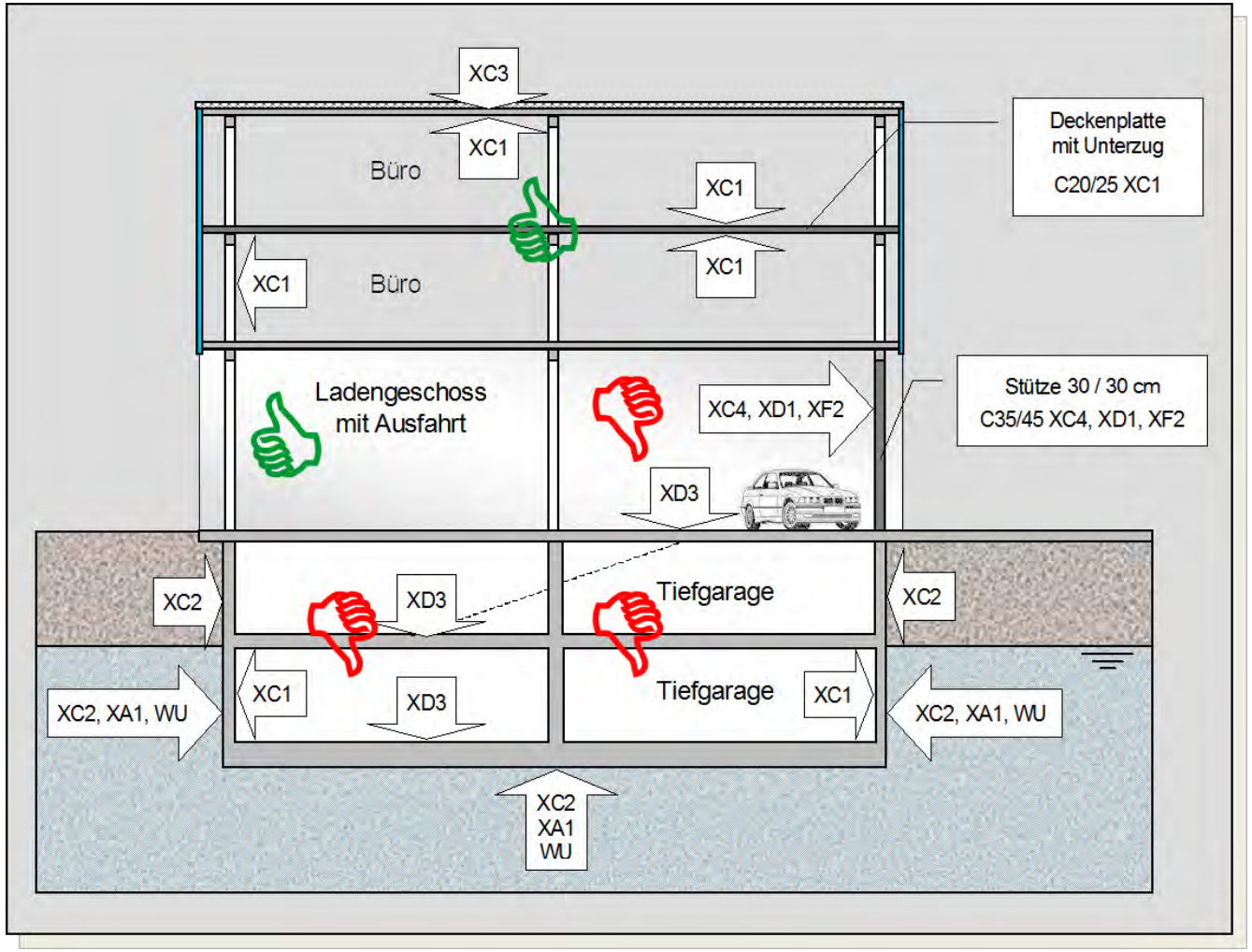
Typ 1: Concrete	Typ 2: Mixed recycled aggregates
min. 90 % b.w. concrete max. 10 % b.w. masonry	min. 70 % b.w. concrete max. 30 % b.w. masonry
	

REGULATORY LIMITS

Not allowed for exposure classes

XS1, XS2, XS3
XD1, XD2, XD3
XF2, XF4
XA2, XA3
XM1, XM2, XM3





REGULATORY LIMITS

Normal- und Schwerbeton

Normalfest

C8/10
C12/15
C16/20
C20/25
C25/30
C30/37

Tabelle 6:
Zulässige Anteile rezyklierter GK > 2 mm, bezogen auf die gesamte GK (Vol.-%)

DIN EN 206-1 und DIN 1045-2 (DAfStb-Alkalirichtlinie)		DIN EN 12620	
Betonkorrosion infolge AKR	Expositionsklasse	TYP 1	TYP 2
WO (trocken)	XC1 Carbonatisierung	≤ 45	≤ 35
WF[1] (feucht)	X0 kein Korrosionsrisiko		
	XC1 bis XC4 Carbonatisierung		
	XF1[1] und XF3[1] Frost ohne Taumittel	≤ 35	≤ 25
	Beton mit hohem Wassereindringwiderstand		
1) Zusätzliche Anforderungen nach Abschnitt 1, (3) und (4)	XA1 Chem. Widerstand	≤ 25	≤ 25

fines < 2 mm are not allowed to use in concrete!

maximum amount of 45 Vol.-% of recycled aggregates

DAfStb-guideline BREZ 2010:09

Dyckerhoff

NEW REGULATIONS IN 2025

BK-N

BK-E

C8/10
C12/15
C16/20
C20/25
C25/30
C30/37
C35/45
C40/50
C45/55
C50/60

Austauschmengen in Vol.-%, bezogen auf die gesamte Gesteinskörung

Anwendungsbereich		BK-N	BK-E	
Alkali-richtlinie	DIN EN 206-1 und DIN 1045-2	Typ 1 oder Typ 2	Typ 1	Typ 2
WO	XC1	≤ 25[1)]	≤ 45 [1)]	≤ 35
WF	X0	≤ 25[1)]		
	XC1 bis XC4 XF1 und XF3 Beton mit hohem Wassereindringwid		≤ 45	≤ 35
		≤ 25[1)]	≤ 25	≤ 25
	und XD2 XS1 und XS2 XF2 und XF4	-	≤ 30	≤ 20

1) Es dürfen feine rezyklierte Gesteinskörnungen Typ 1 verwendet werden, sofern sie aus der Produktion von grober rezyklierter Gesteinskörnung stammen, für die die Anforderungen an die stoffliche Zusammensetzung nach DIN EN 933-11 nachgewiesen wurde. Das Verhältnis von feiner und grober rezyklierter Gesteinskörnung muss sich dabei an dem entsprechenden Verhältnis von Sand zu grober Gesteinskörnung der Gesamtsieblinie orientieren.

2) Die Feuchtigkeitsklasse WA darf nur für rezyklierte Gesteinskörnungen mit nachgewiesener Alkaliempfindlichkeitsklasse E-I-S nach Alkalirichtlinie verwendet werden.

EVERY conrete with recycled aggregates ALWAYS contains primary material!

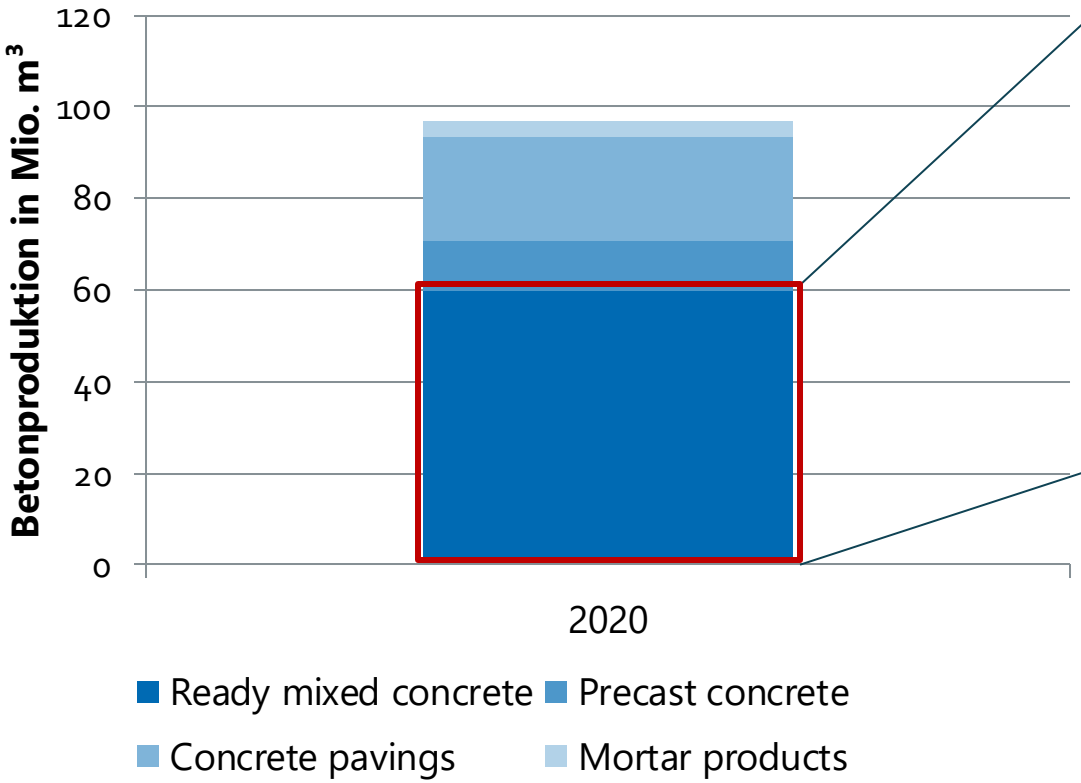
DIN **DIN 1045-2:2023**

- **…dm amount …5 Vol.-% of recycled aggregates**
- **Recycled concrete fines can be used**
- **more options for use in Strength classes till C50/60**

Dyckerhoff

POTENTIAL

Production of cement-based building materials in Germany by type of production and product



Druck-festigkeits-klasse	Anteil in % Deutschland 2020	Expositionsklasse
C8/10	0,6	---
C12/15	6,5	---
C16/20	1,6	---
C20/25	12,0	XC3
C25/30	40,4	XC4, XA1, XF1
C30/37	21,1	XC4, XA1, XF2
C35/45	12,4	XC4, XA 3, XD3, XF2/XF3
C40/50	0,7	---
C45/55	1,7	XC4, XA 2, XD2, XF2/XF4
C50/60	1,4	XC4, XA 3, XD3, XF2/XF3
andere	1,6	---

60% ✓

80% ✓

98% ✓

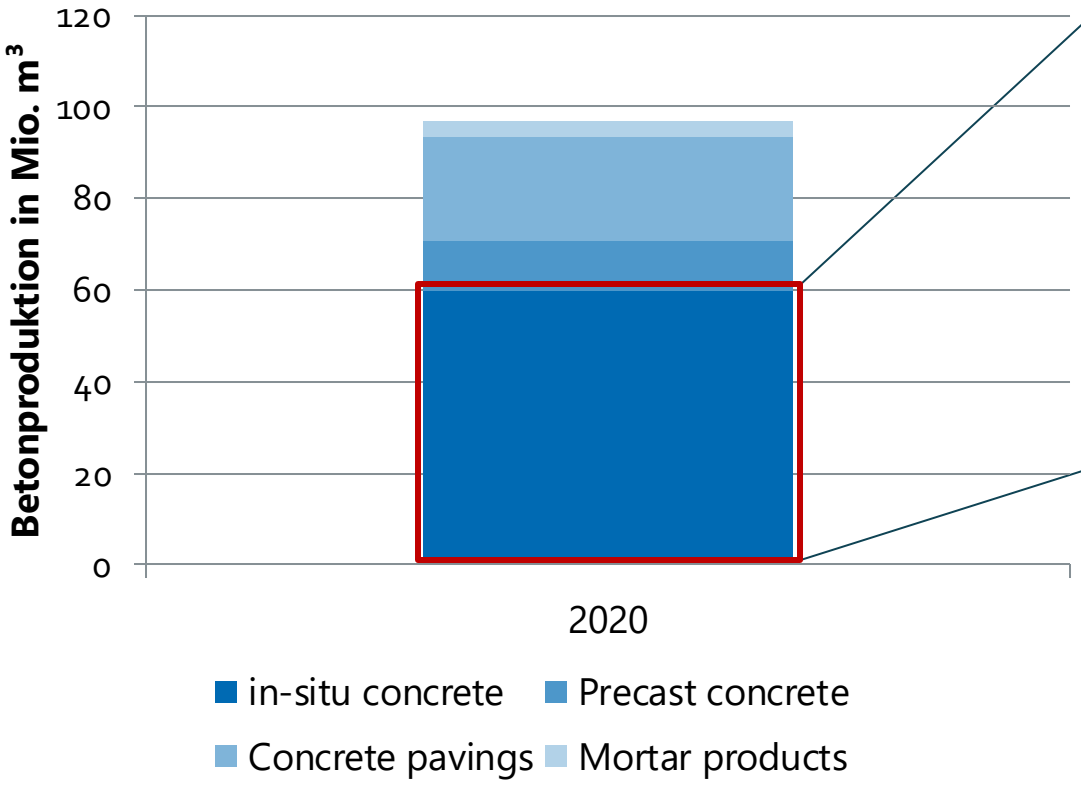
Davon Teilmengen (alles in Feuchtigkeits-klasse WF) mit NA-Zement möglich

Quelle: Anteile der Betondruckfestigkeitsklassen und Zuordung zu Expositionsklassen nach BTB/Haist 2021
--- : keine Angabe

Quelle: VDZ
Anmerkungen: ca. 92 Prozent des Ortbetons = Transportbeton; es fehlen Betonmengen aus dem Zementverbrauch in diversen Einsatzzwecken (z.B. Spritzbeton) – hierzu gibt es keine Statistiken

BOTTLENECK AVAILABILITY?

Production of cement-based building materials in Germany by type of production and product



Druck-festigkeits-klasse	Anteil in % Deutschland 2020	Expositionsklasse
C8/10	0,6	---
C12/15	6,5	---
C16/20	1,6	---
C20/25	12,0	XC3
C25/30	40,4	XC4, XA1, XF1
C30/37	21,1	XC4, XA1, XF2
C35/45	12,4	XC4, XA 3, XD3, XF2/XF3
C40/50	0,7	---
C45/55	1,7	XC4, XA 2, XD2, XF2/XF4
C50/60	1,4	XC4, XA 3, XD3, XF2/XF3
andere	1,6	---

Quelle: Anteile der Betondruckfestigkeitsklassen und Zuordung zu Expositionsklassen nach BTB/Haist 2021
--- : keine Angabe

60%

60% of 60 million m^3/a = **36 million m^3 RC-concrete**

approx. 700 l GK/m^3, of which at least 25% can be replaced; density recycled aggregates approx. 2350 kg/m^3

$0{,}7 m^3/m^3 * 36$ mio. $m^3 * 25\% * 2{,}35$ t/m^3 = **15 million t of recycled aggregates**

Source: VDZ
Notes: approx. 92% of in-situ concrete = ready-mixed concrete; concrete quantities from cement consumption in various applications (e.g. shotcrete) are missing – there are no statistics on this

Dyckerhoff

CONCLUSIONS

Concrete properties do not set any relevant limits for R-concrete.

Normative limits are being extended and simplified with the introduction of the new DIN 1045-2 (e.g. principle of concrete families), they only need to be applied

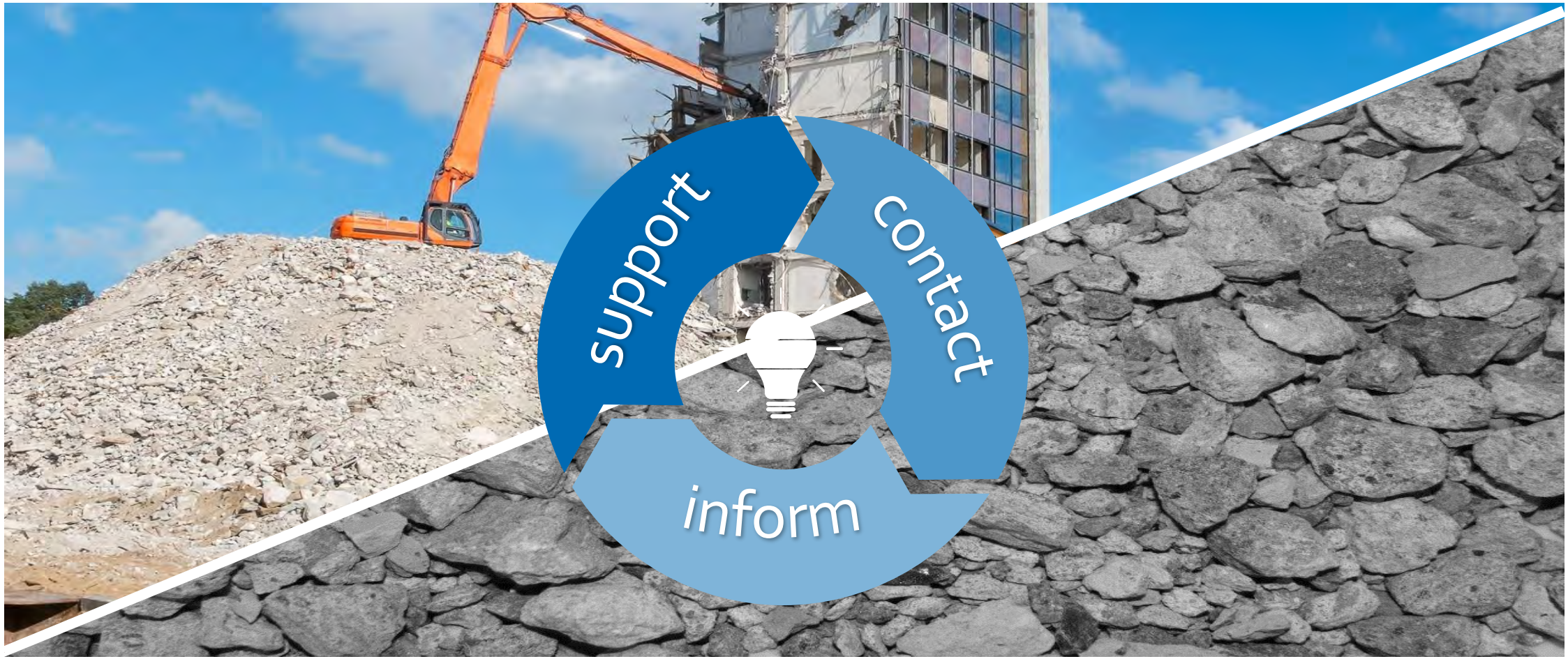
More is not always better - 100% recycled aggregates is not effective in terms of technical properties and material availability - use normative options!

Natural aggregate is ALWAYS necessary in every concrete with recycled aggrgates!
Regional availability of primary sand/gravel will still be required in the future

The boundary conditions for R-concrete have never been as good as they are today.

CALLENGE: Supply Chain

Where can we find certified suppliers ?



DEMAND

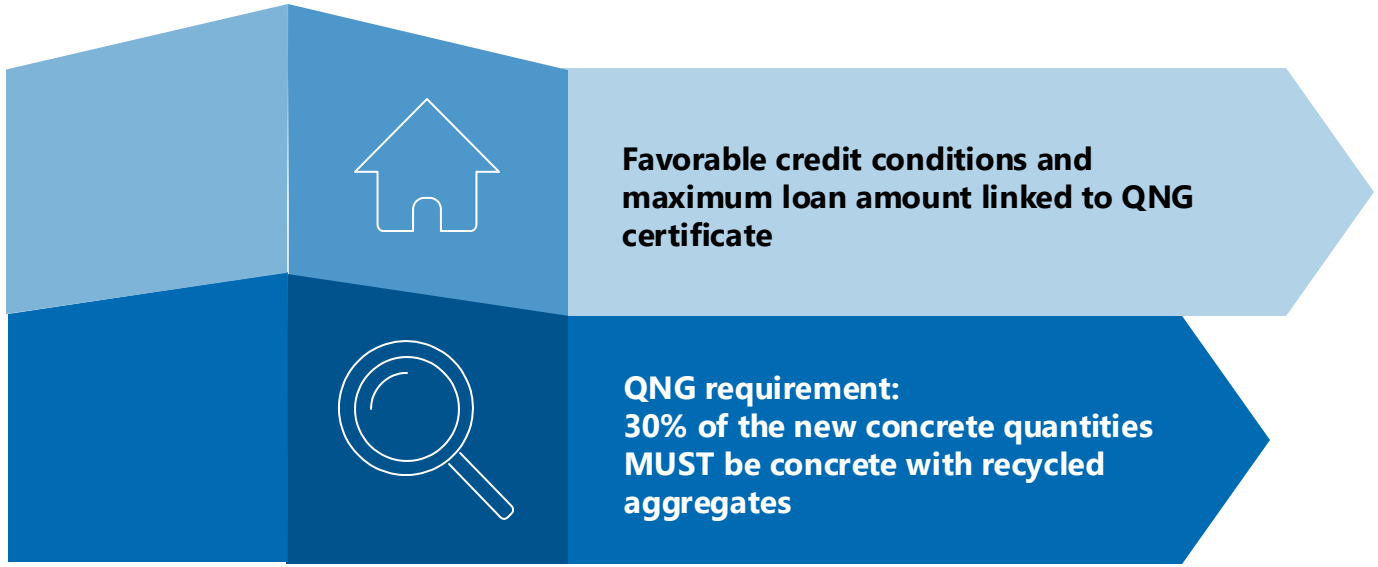
Increasing demand is noticeable …

- Increasing interest of (public) building owners in sustainability aspects
- New funding conditions in Germany for credits of the KfW: for climate-friendly non-residential buildings (schools, kindergartens, administrations...), concrete with recycled aggregates MUST be used

KFW
Bank aus Verantwortung

NACHHALTIGES GEBÄUDE

Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen



EXAMPLES

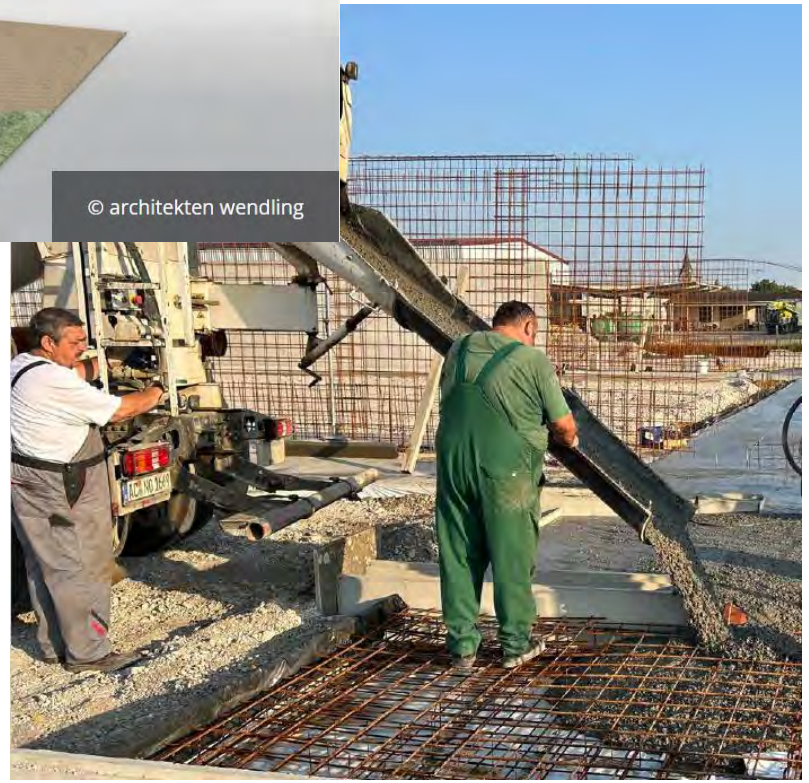
Since 2021 – Saarland: Dyckerhoff Beton GmbH & Co. KG, plant Dillingen

- Since August 2021, concrete with recycled aggregates as standard within the permissible regulatory limits
- Recycled aggregates come from the recycling plant nearby (no transport)

Dyckerhoff

EXAMPLES

2024 - Rheinland-Pfalz: Community center with Kindergarten Mörsdorf



- Public funding
- Wooden construction
- floor slab: concrete with recycled aggregates.
- Still under construction

VISION:

Concrete recycling becomes just the «new normal»

Pause café

Interreg

Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union

GREATER GREEN

Grande Région | Großregion

Construction
Eau

Emmanuelle Ciota
Neobuild GIE

Clara Jarnigon
Soprema

Interreg
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN
Grande Région | Großregion

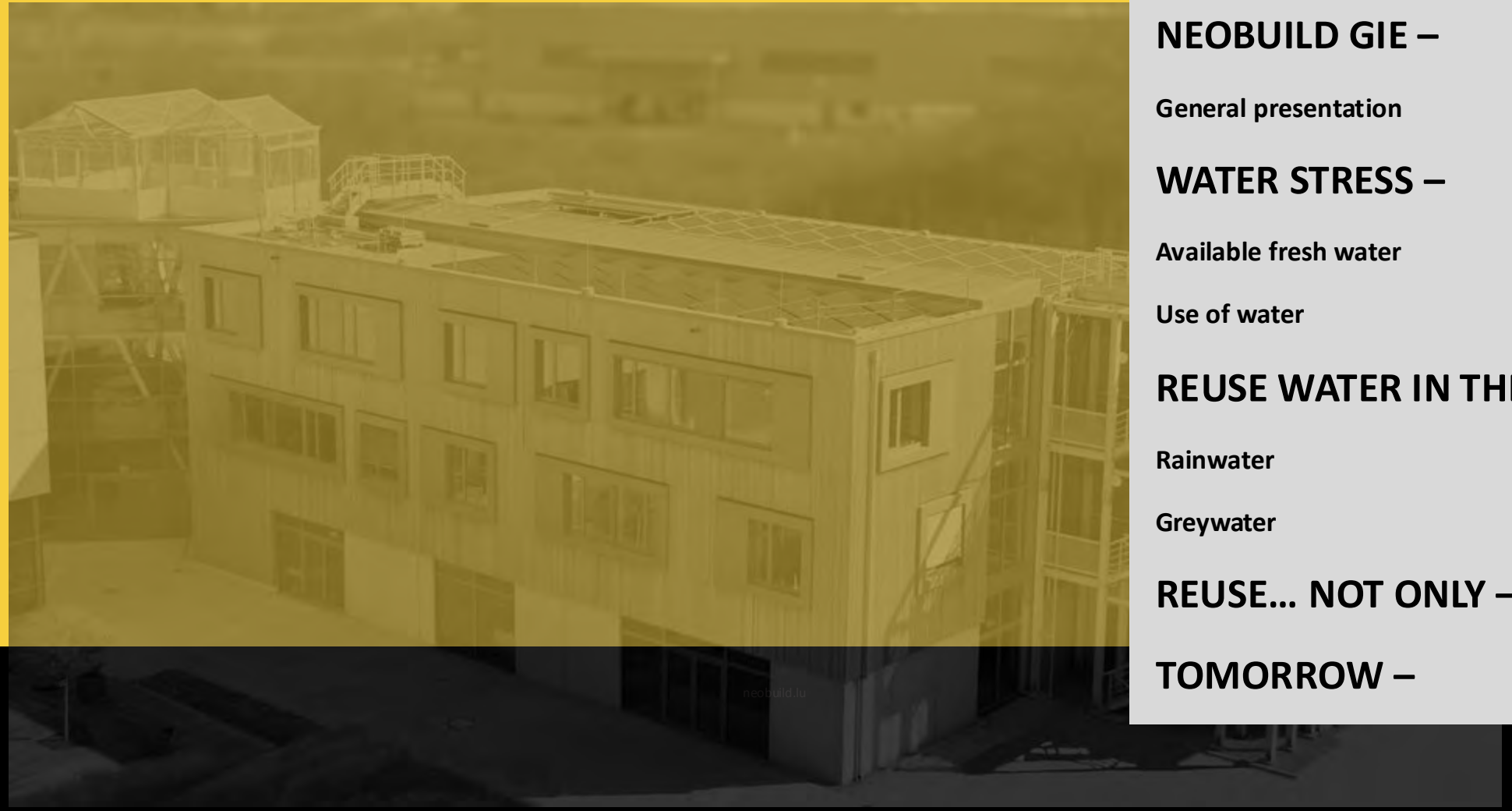
Presentation

Neobuild GIE

26.09.2024 -

neobuild

Summary.



NEOBUILD GIE –

General presentation

WATER STRESS –

Available fresh water

Use of water

REUSE WATER IN THE BUILDING –

Rainwater

Greywater

REUSE… NOT ONLY –

TOMORROW –

neobuild

GENERAL PRESENTATION

General presentation.
Ecosystem

Founding members:

Since 2022, the former limited company, created in 2012, has become an economic interest grouping (EIG).

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

cdec
Conseil pour le Développement
Economique de la Construction

Pôle d'innovation technologique de la construction durable

439, Zone d'Activités Economique Wolser F
L-3290 Bettembourg

TVA: LU 34261352
RCS : C176
Capital : 150 000 €
Matricule : 2022 8100 103

Neobuild,
is the
sustainable
innovation
Cluster for
construction in
Luxembourg.

neobuild

Our Tools.

Neobuild Innovation Living Lab - NILL

Neobuild has built a real laboratory incorporating over 100 different materials, products and systems. This building offers a wide range of possibilities for control and full-scale testing. The building is an additional tool enabling members to observe and analyse the behaviour of innovations in real conditions

(1er BIM project and Nzero in Luxemburg)

General presentation.
Themes covered

DEVELOPPMENT OF INNOVATIONS

TECHNOLOGY TRANSFER WATCH

EXPERTS AND PARTNERSHIP

PROMOTION AND DISSEMINATION

- **Construction 4.0 «construction process»**

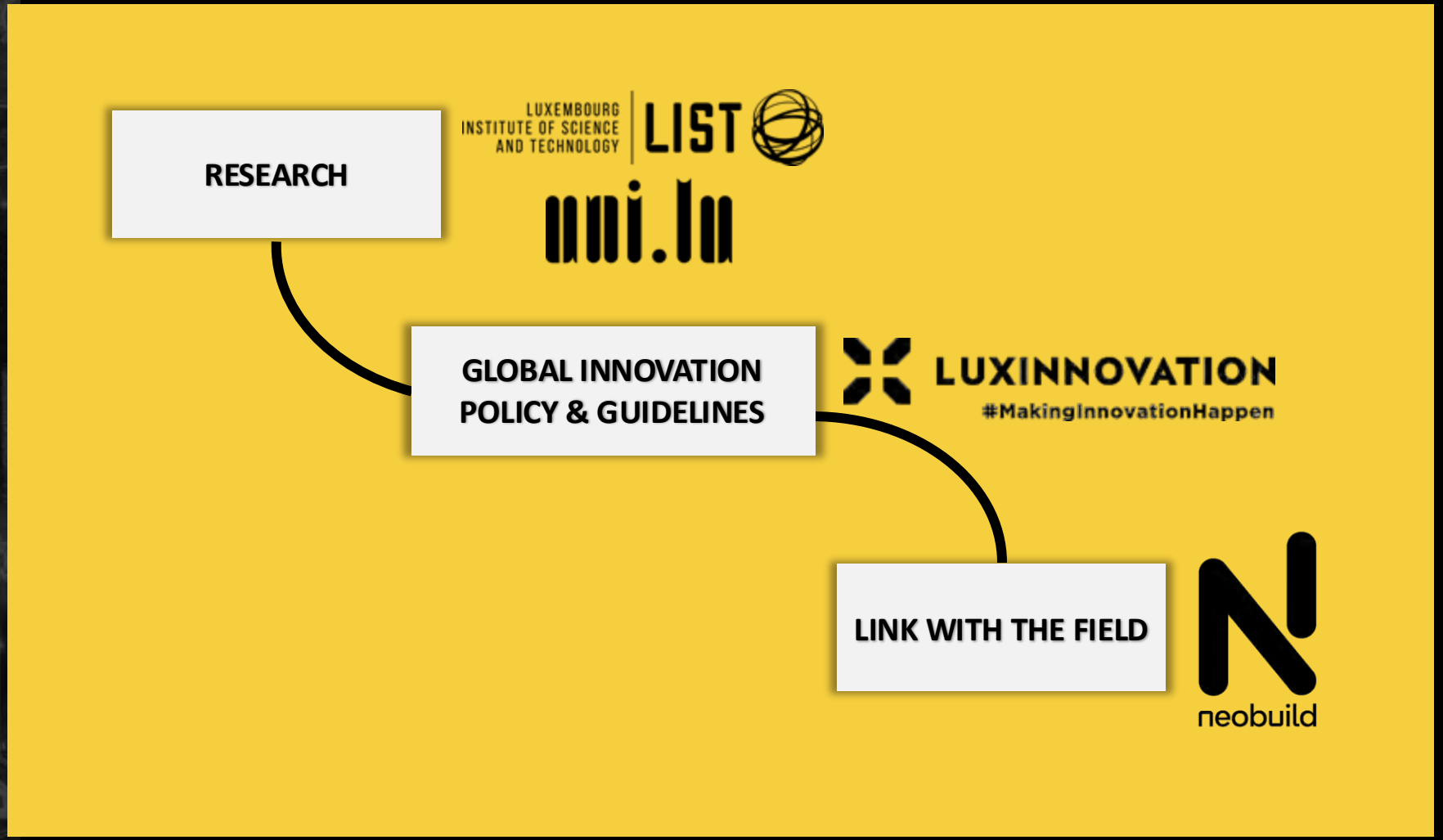
Digitalisation
Automatisation / Numerisation
Offsite

- **Sustainable construction « Building»**

Circularity
Biosourced materials
Healthy buildings
Sustainable techniques and technologies

Wo we serve? **The entire construction sector**

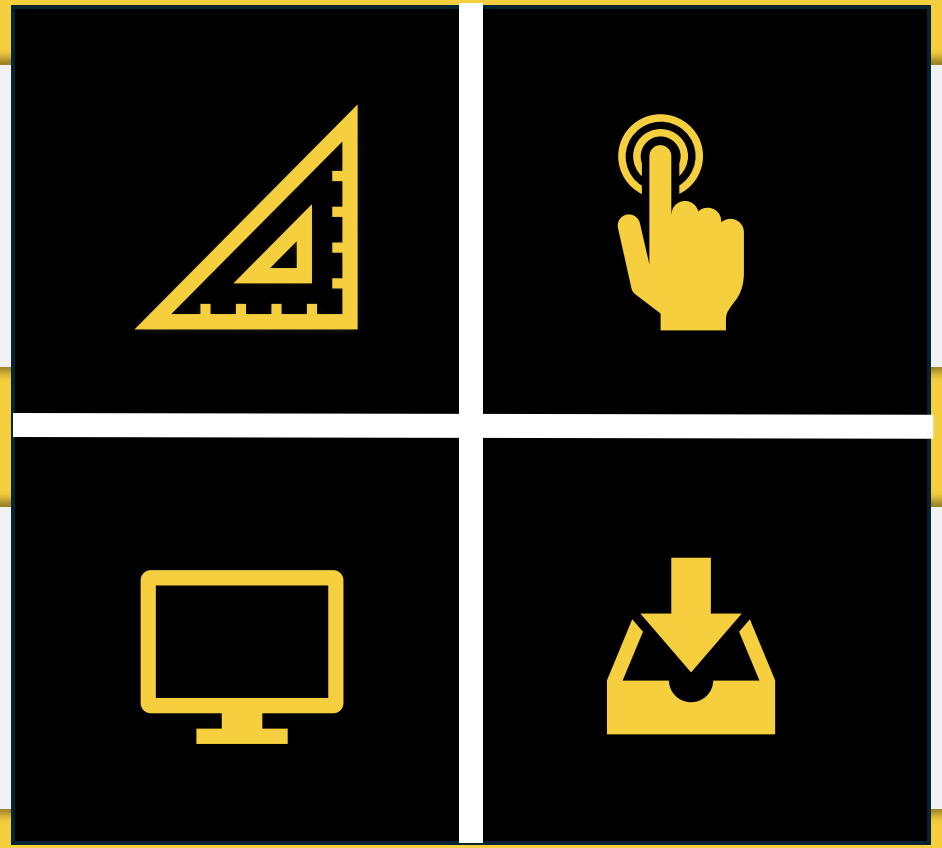
Strategy Positioning.



Multidisciplinary teams.

Internal skills

A broad application
for a global vision of sustainable construction and materials.



Coordinators
for the dissemination of skills.

Specialties
for specific skills related to water, IT/IoT processes and technology.

Experienced professionals
for a general overview specific to construction.

Multidisciplinairy Teams.
Affiliated roles

ADMINISTRATORS

Mme Laurence Tock (MECO)
M. Christian Tock (MECO)

LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

M. Max Didier (CDEC a.s.b.l.)

cdec

M. Gérard Thein (Neobuilding S.A.)

neobuilding

Luc MEYER
Ingénieur Tech
Director

Régis BIGOT
Architecte
Innovation Project Manager

Mickaël PASCUAL
Ingénieur
IT and Innovation Project Manager

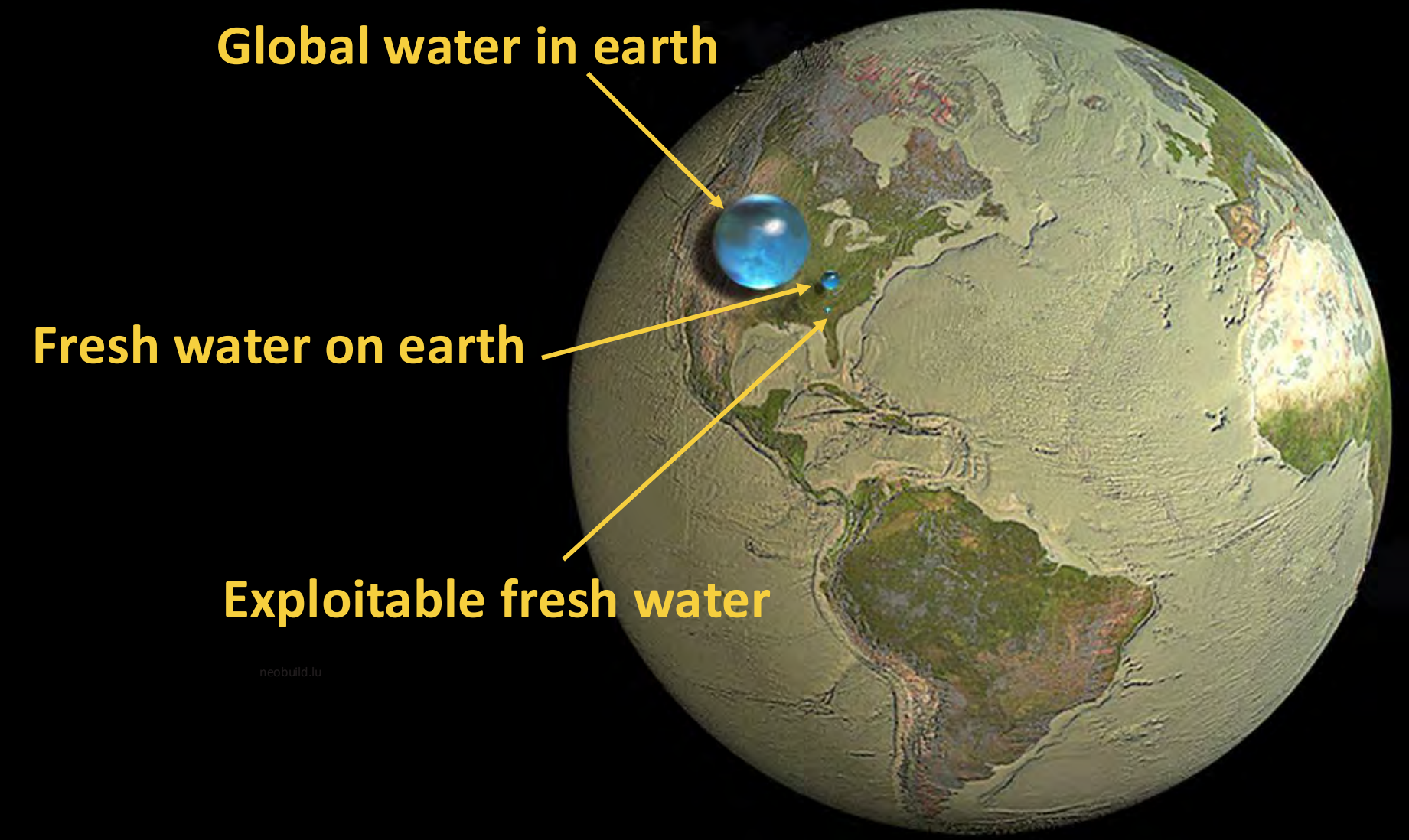
Emmanuelle CIOTA
Ingénieur
Innovation Project Manager

Sara VILLARD
Architecte d'intérieur
Administrative Assistant
Events Officer

WATER STRESS

neobuild

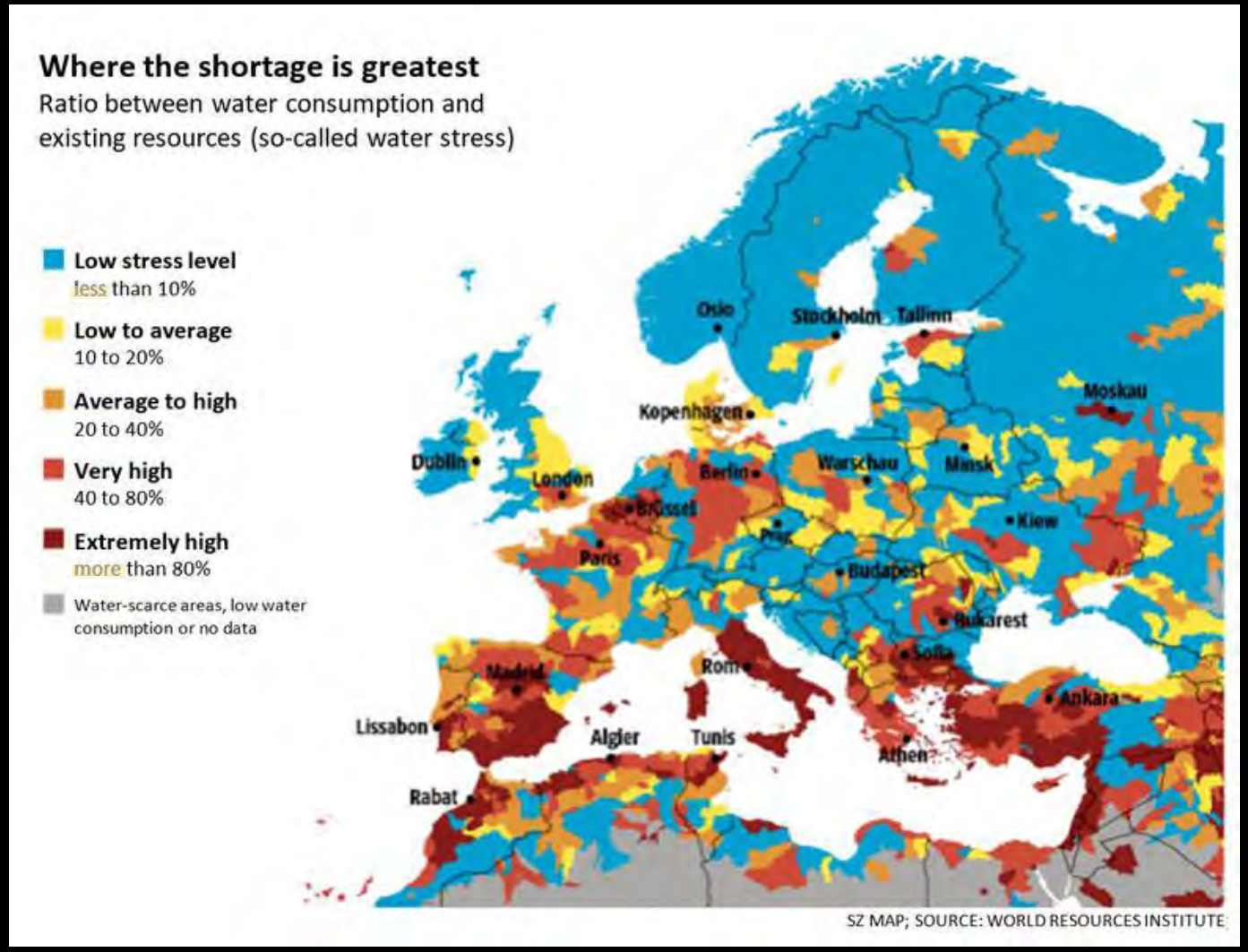
Water stress.
Available water
World.



Water stress.

Available fresh water

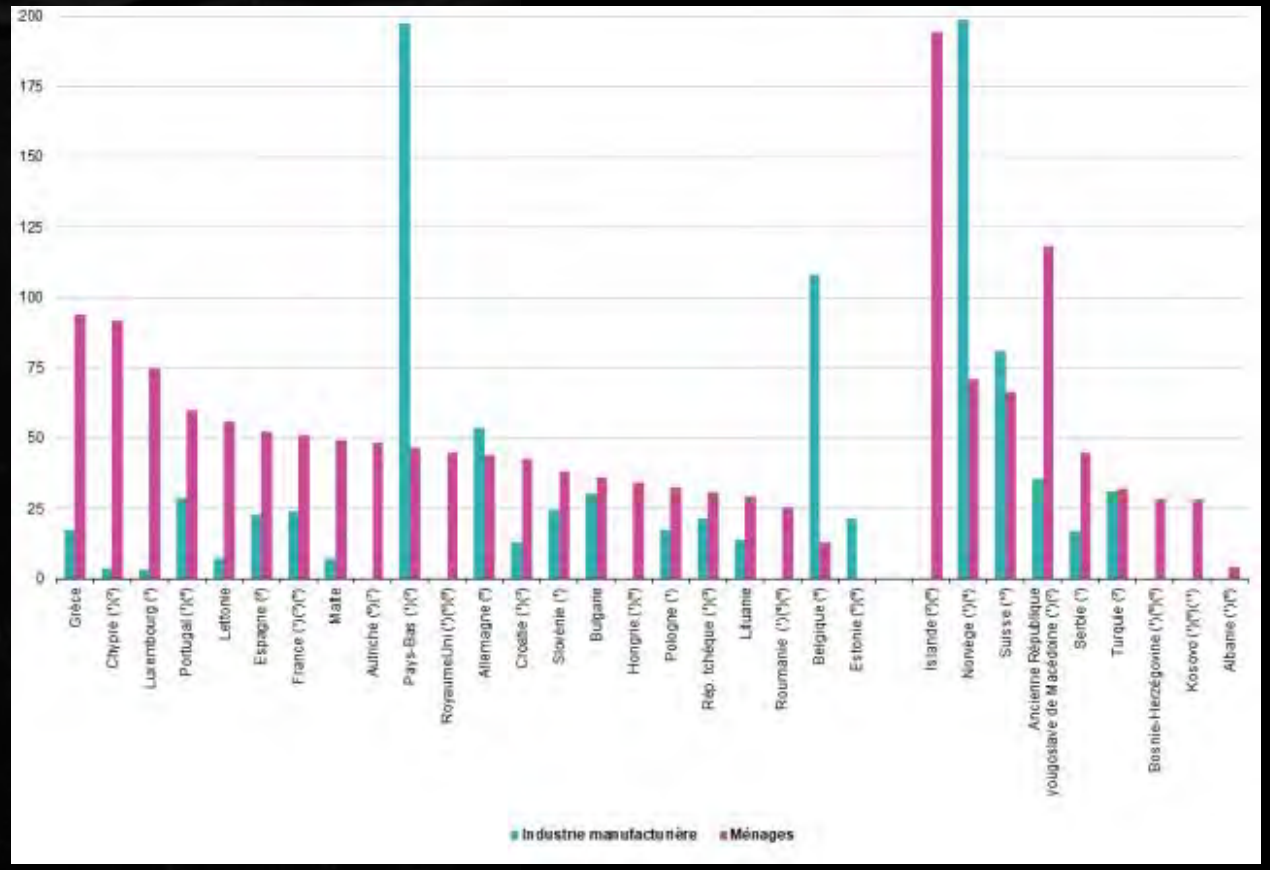
Europe.

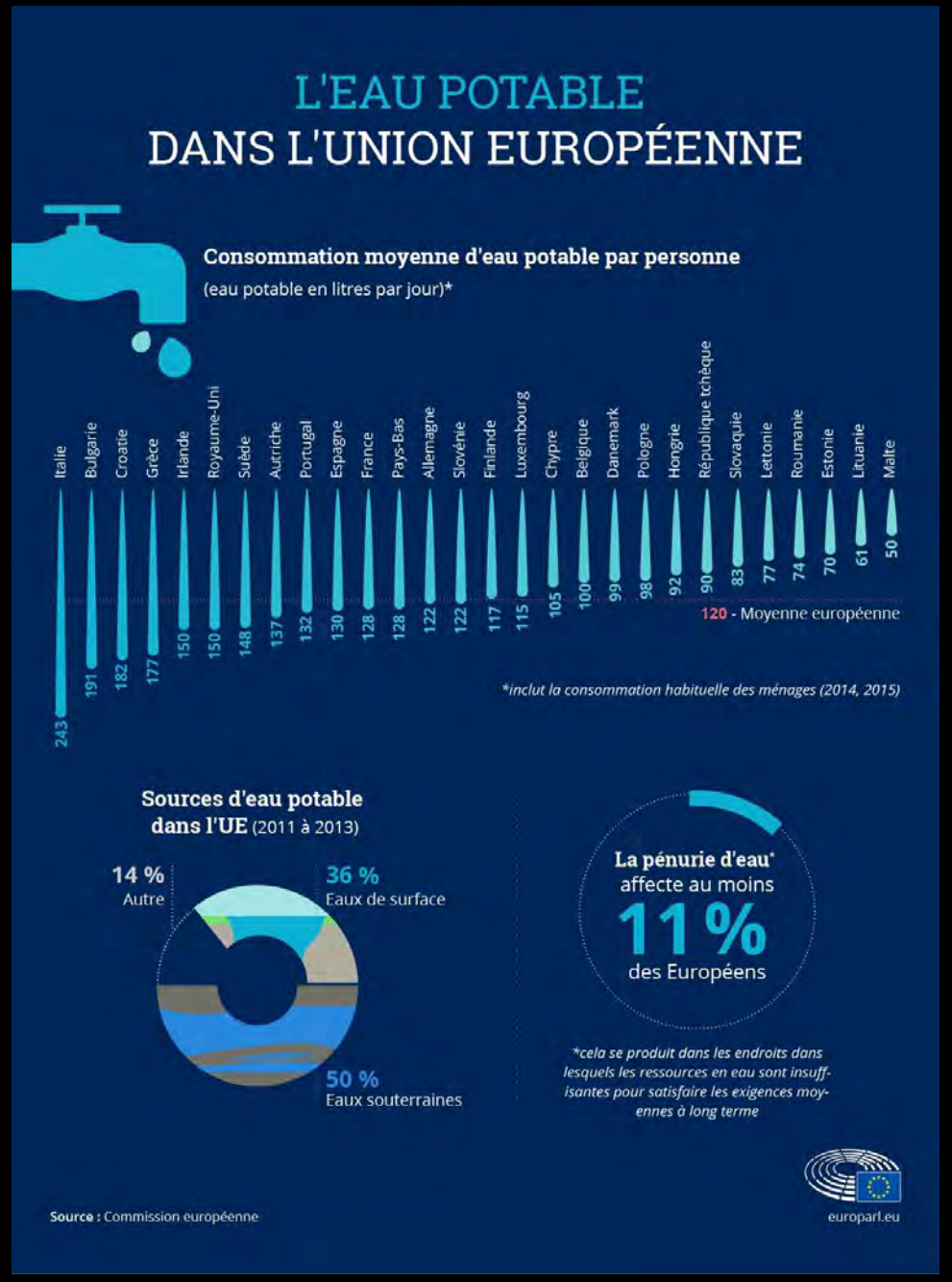


Water stress.

Use of water

Europe.





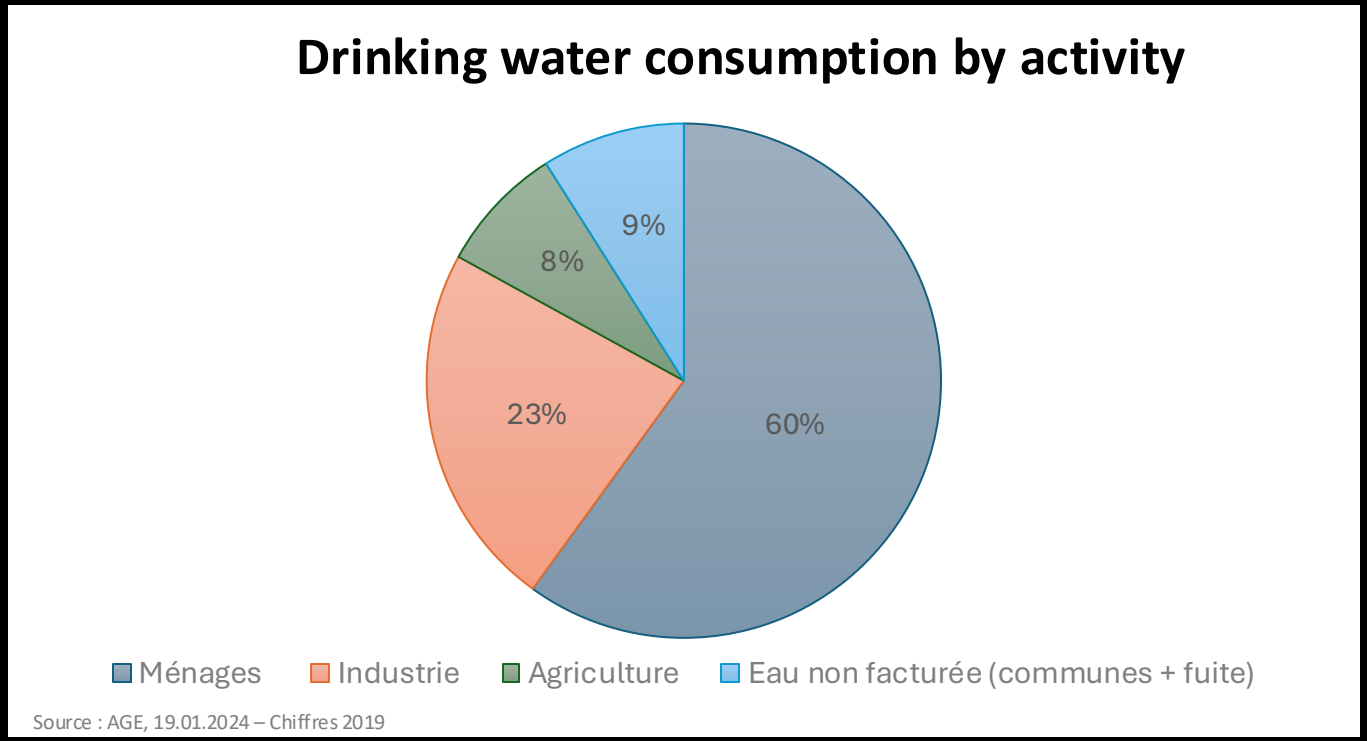
Water stress.

Available fresh water

Luxembourg.

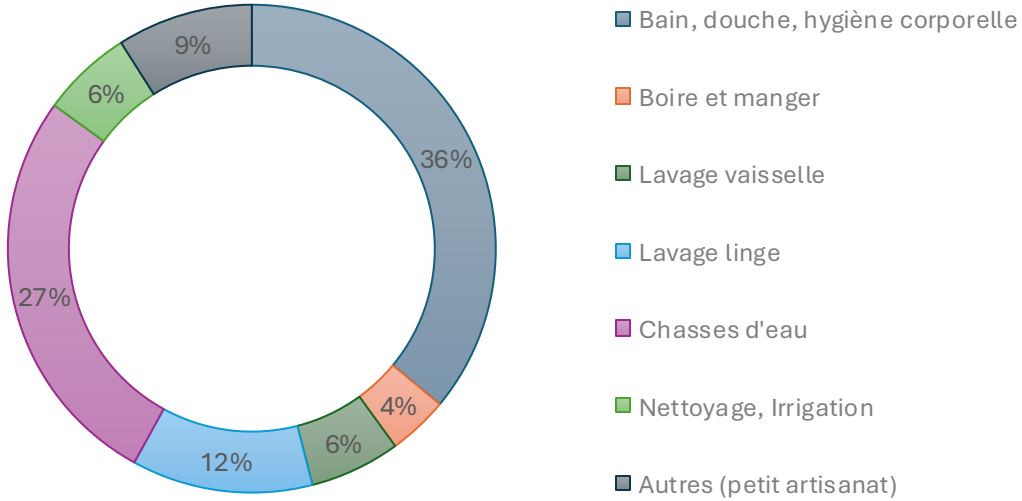
Water stress.
Use of water
Luxembourg.

Drinking water consumption by activity



Source : AGE, 19.01.2024 – Chiffres 2019

Household drinking water consumption

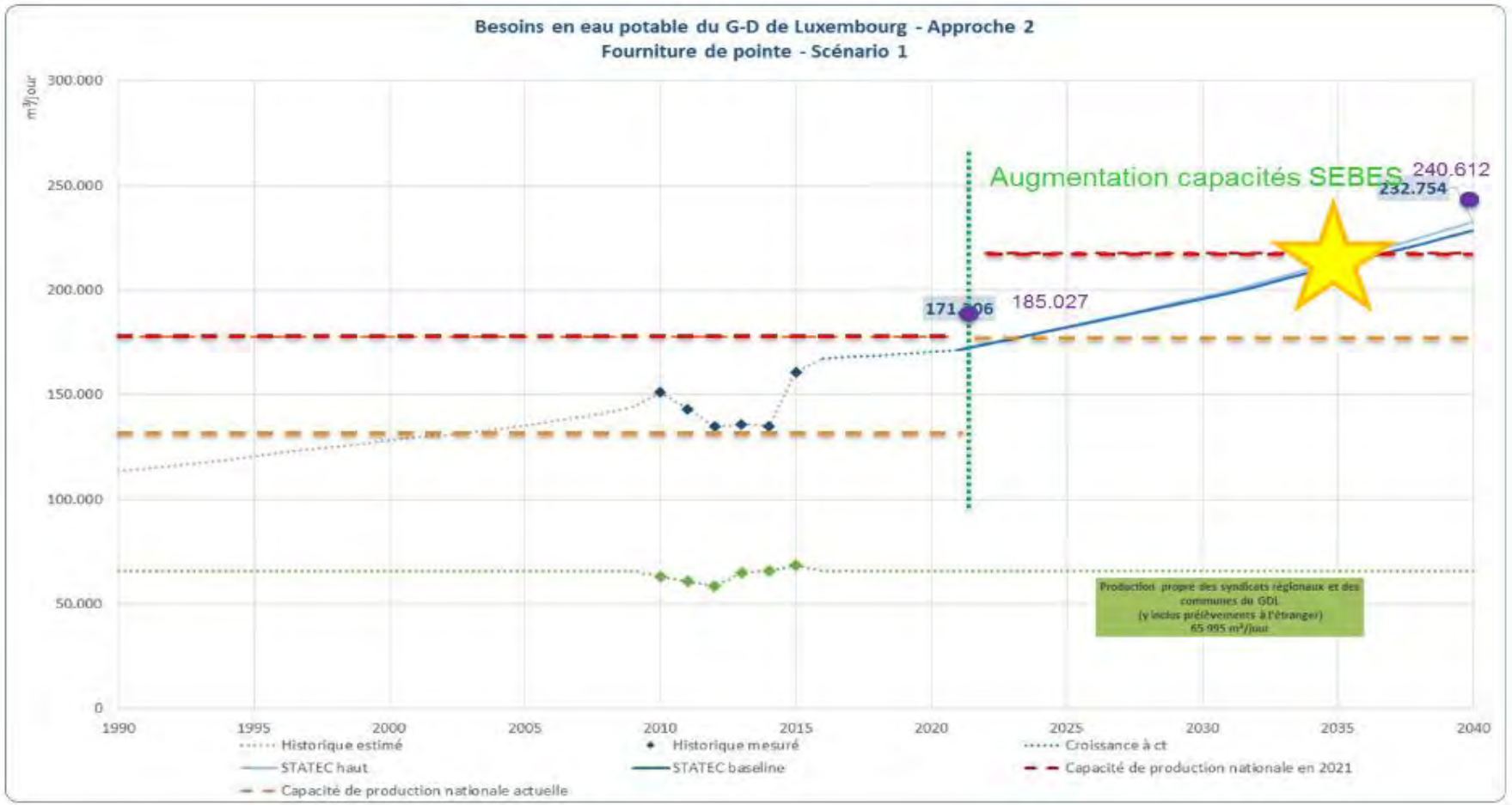


Source : AGE, 19.01.2024 – Chiffres 2019

Water stress.

What about tomorrow ?

Luxembourg.



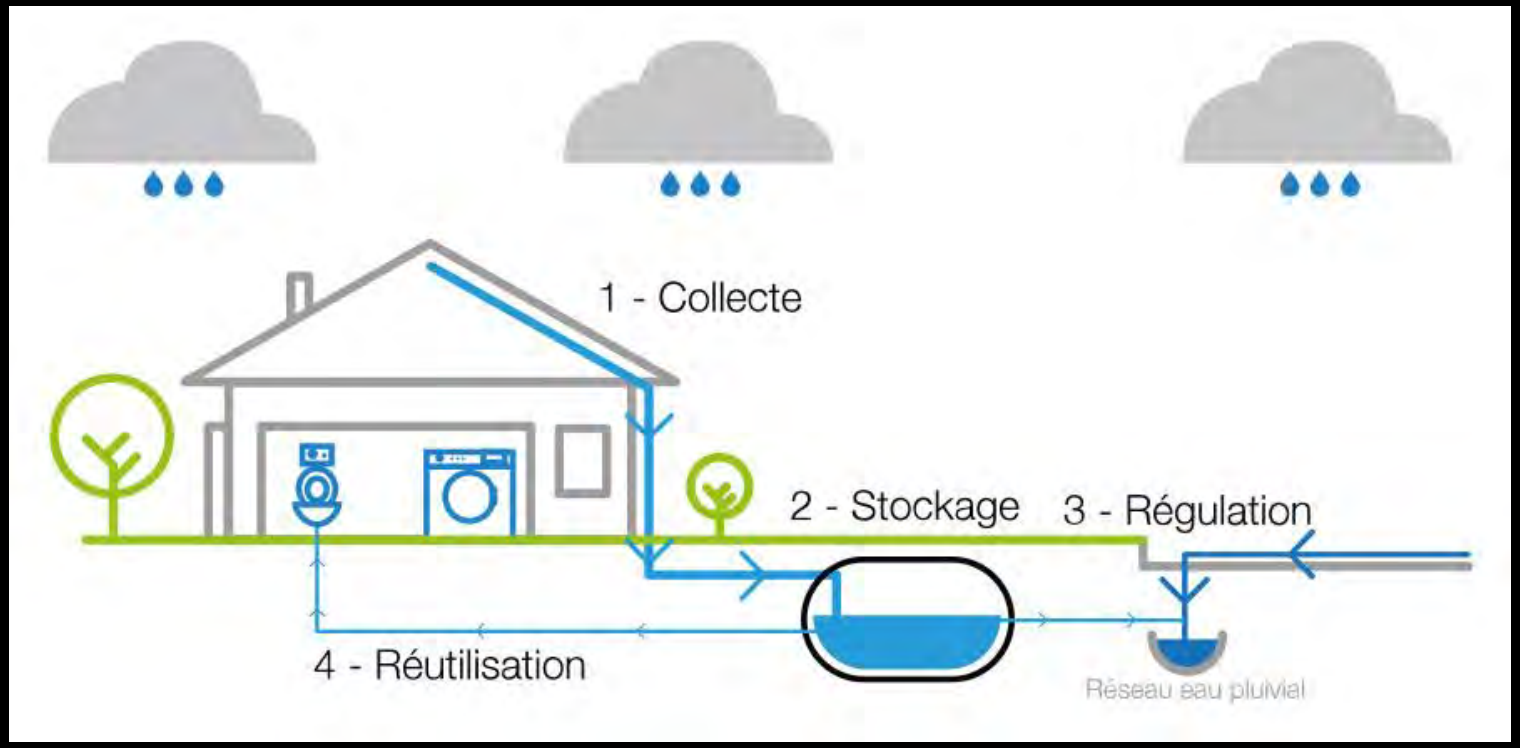
Dr. Luc Zwank, Young Water Professional conference, Luxembourg, 12.02.2020

Reuse water in the building

neobuild

Reuse water in the building

Rainwater

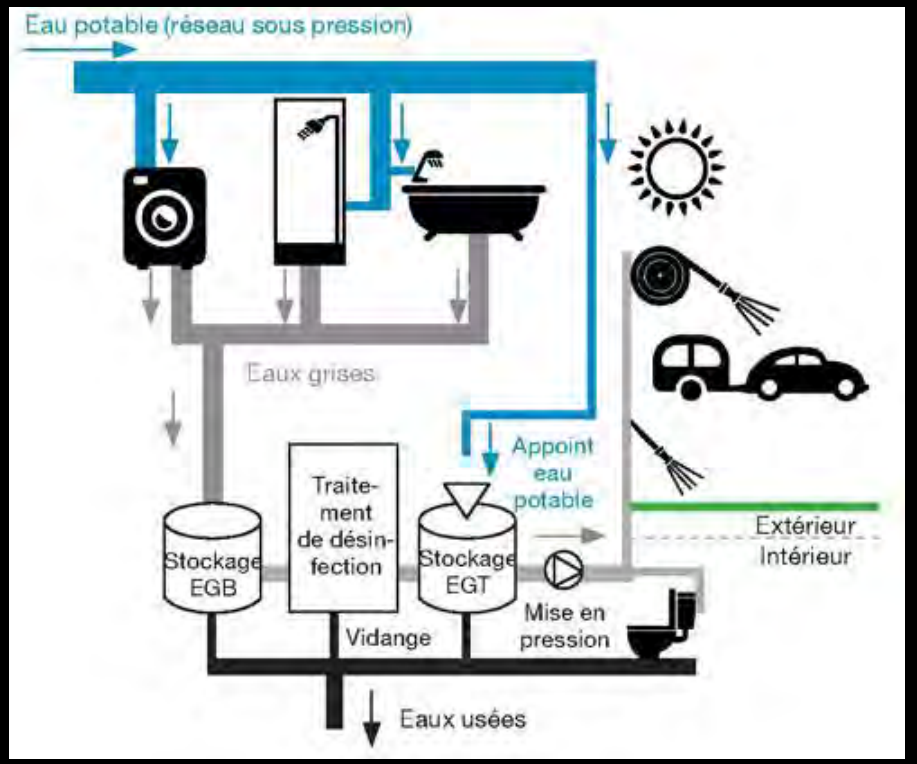


Reuse water in the building

Grey water

Technology

- CW in vertical flow configuration supported with innovative admixture (Activated biochar from plants) starting *september 2024*



Reuse water in the building

Grey water

The shower

1st water consumption item (36%)
2nd energy consumption item (13%)

Reduce water and energy consumption during showers.

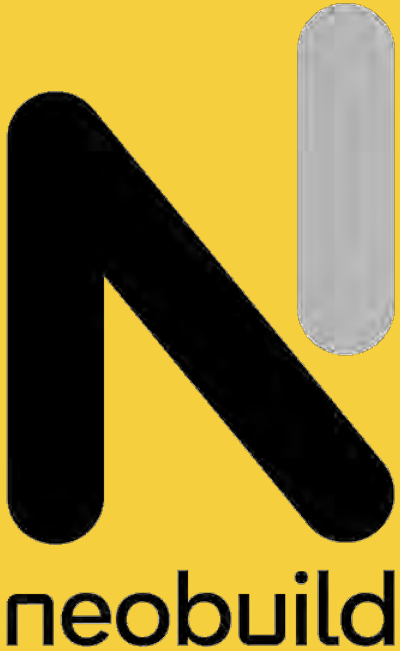
1- Specific Shower : 2 mode

- Classic Shower Mode: Water is used and then drained.

- Recycled Mode: Clean water is recovered, filtered, disinfected, reheated, and reused.

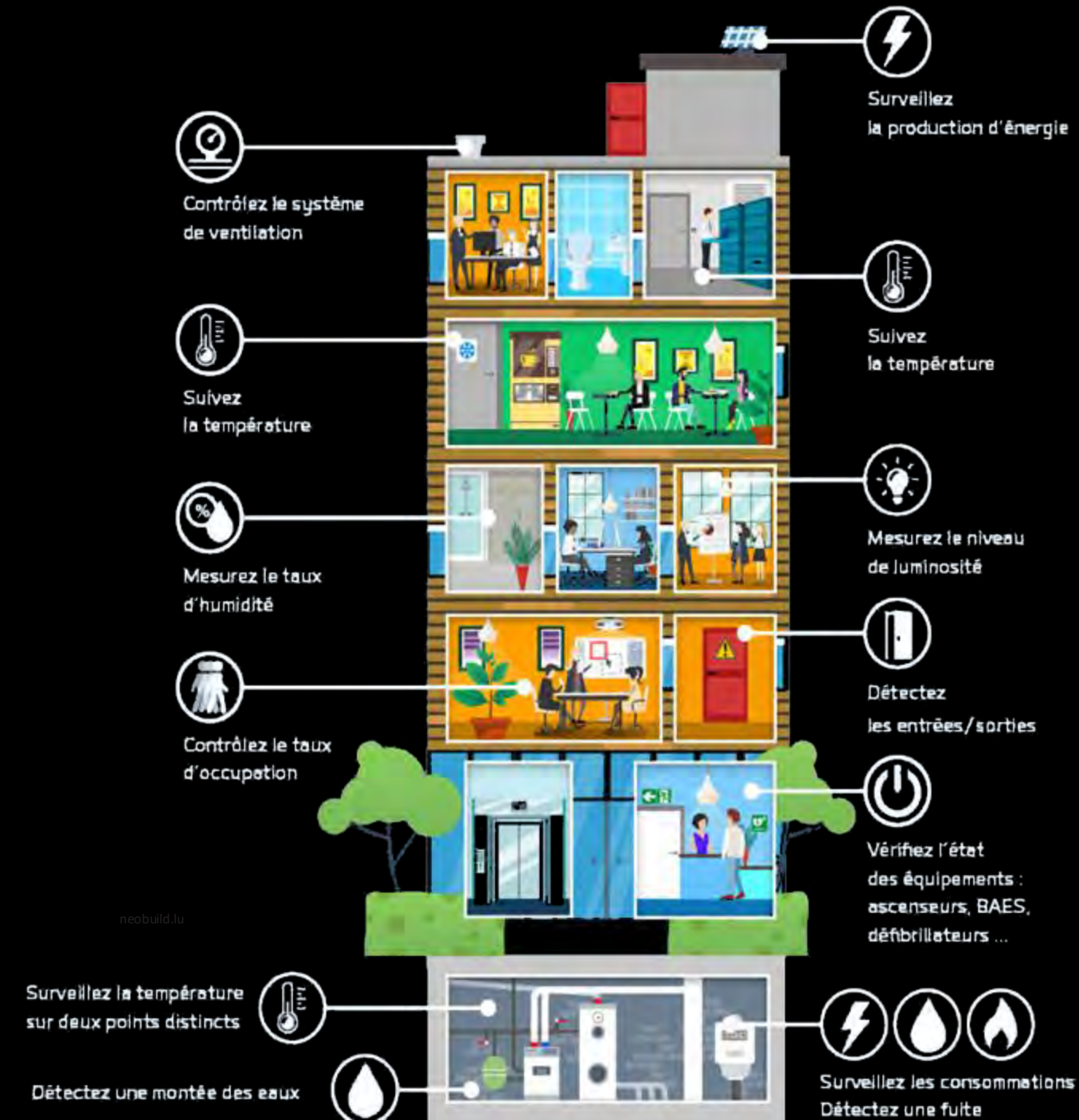
2- Sensor: Real-time Measurement

Water consumption is shown on a screen

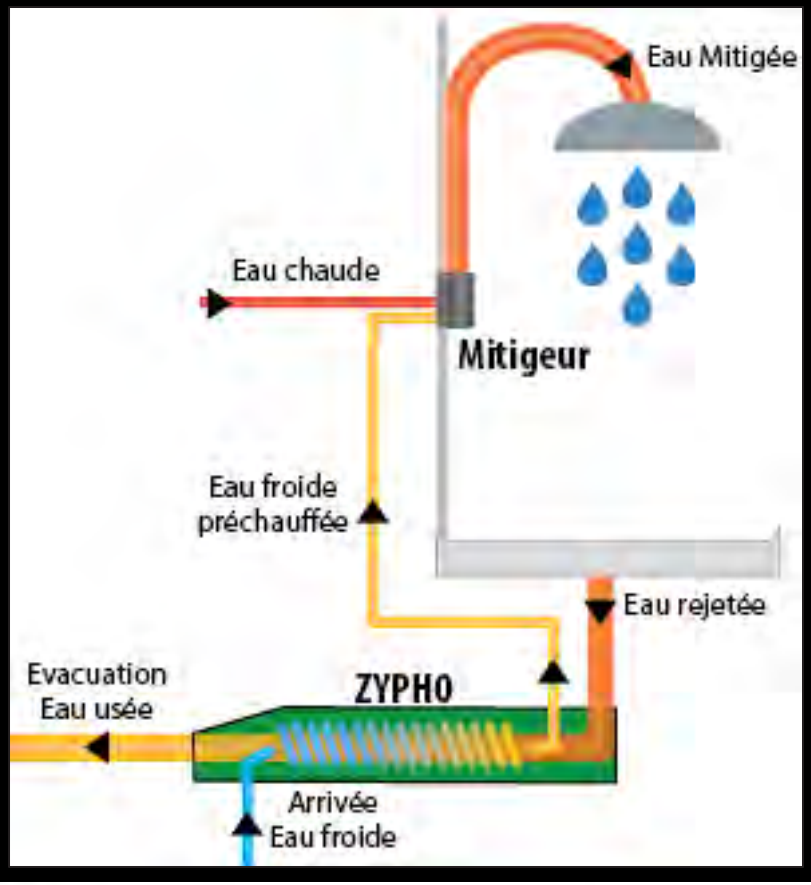


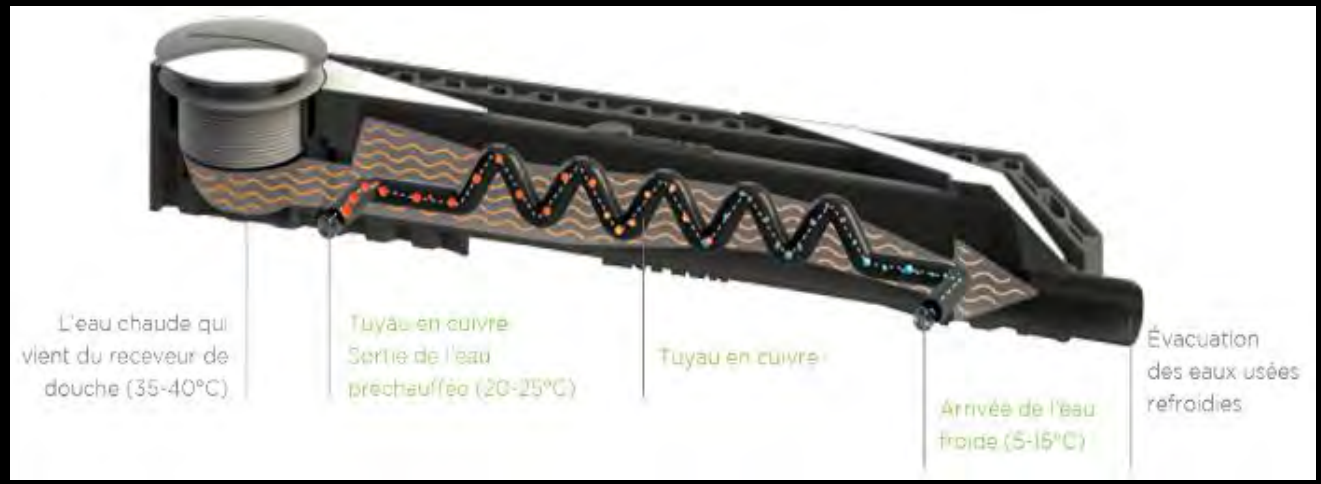
Reuse… not only

Reuse… Not only
Managing water



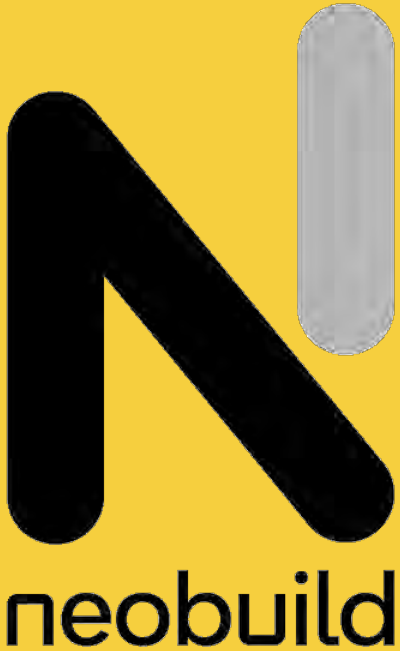
Reuse… Not only
Heat recovery from grey water





Reuse… Not only
Saving water

30 to 50% saving water

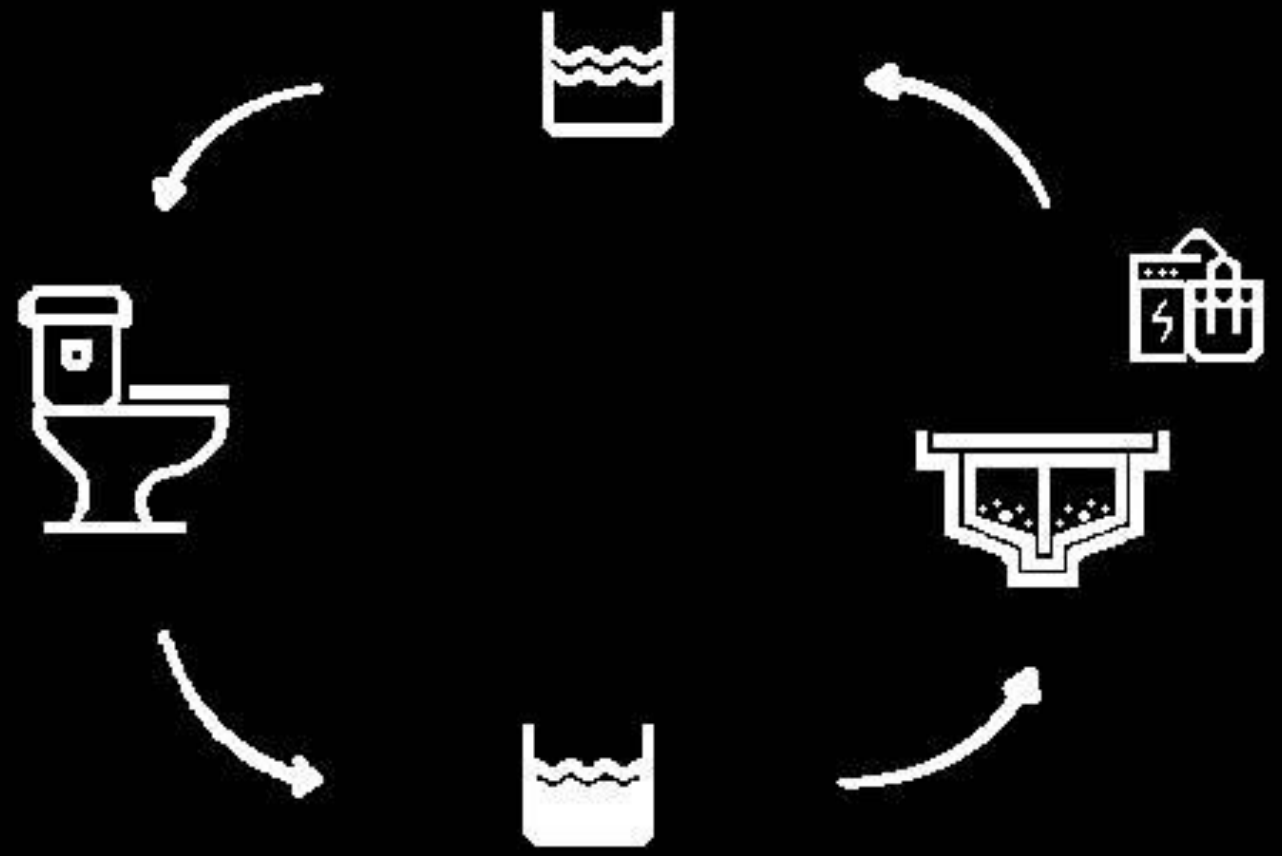


neobuild

Tomorrow

Tomorrow

Circular use of black water



Thanks !

Ing. Emmanuelle CIOTA

❑ Innovative Project Manager

☎ +352 621 499 443

✉ e.ciota@neobuild.lu

neobuild

SKYWATER CLEAR: GRAYWATER REUSE USING A GREENROOF PLANTED FILTER BED

SOPREMA GROUP

INTRODUCTION

Context

Water, an increasingly scarce resource:

- The increase of water scarcity
- A large potential of greywater reuse

Skywater Clear

- 2021 – pilot project for the cafeteria at Soprema headquarters (16 m2)
- 2022 – full size installation for the cafeteria at the new headquarters of Soprema, Le Grand Charles (128 m2)
- Main objective: 30% reduction in drinking water consumption by reusing the graywater from the restaurant, the showers and the hand-washing sinks.

Our partners

Aquafiris
Les Jardins d'Assainissement

CSTB
le futur en construction

leesu
laboratoire eau environnement systemes urbains

SOPREMA GROUP

TREATMENT DESCRIPTION

PRE-FILTRATION

- Collection of gray water from the restaurant, sinks and showers
  - **Restaurant water system:**
    - Grease trap
    - Oxygenation tank
  - **Sink and shower system:**
    - Biochar filter
  - **Mixing of the two waters in the lifting station**

PHYTO-TREATMENT

- Continuous inflow from 6 am to 3 pm and biological treatment in the tank until 2 am

POST-FILTRATION

- Collection of post-phyto water
  - **Final step of treatment:**
    - Storage tank
    - 3 mechanical filters (150 µm, 5 µm, 1 µm)
    - Hydrogen peroxyde disinfection (disinfection)

SET UP WITHIN THE BUILDING

Skywater® Clear

Les chasses d'eau de ces toilettes sont alimentées par les eaux grises de la cantine (générées lors de la préparation des plats, de la vaisselle...).

Le saviez-vous ?

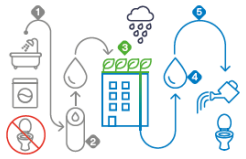
Après collecte, ces eaux sont traitées et désinfectées par le nouveau système **Skywater® Clear** afin de leur donner une seconde vie dans ces toilettes.

Cela explique qu'elles puissent présenter une éventuelle coloration ou un manque de limpidité, sans compromettre leur qualité pour cet usage.

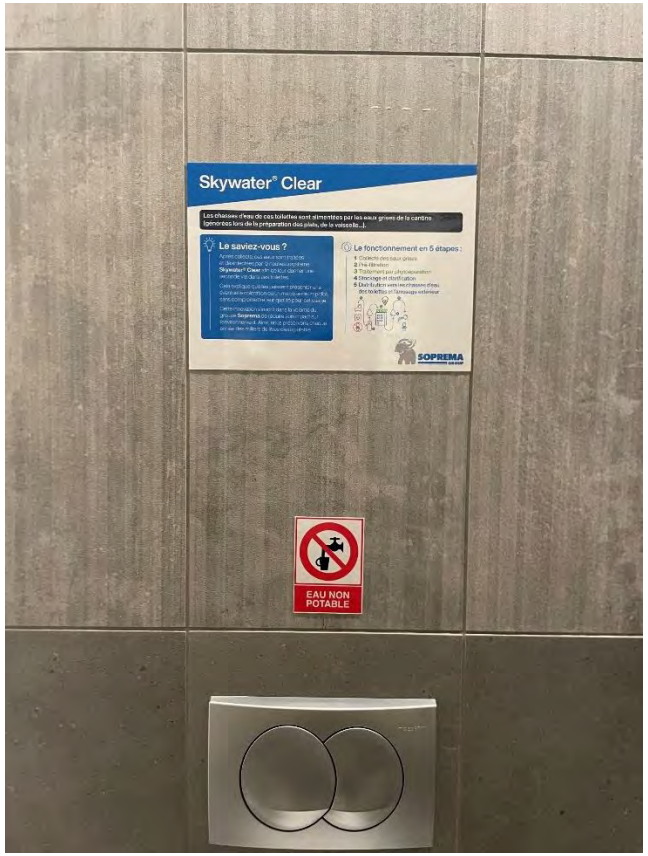
Cette innovation s'inscrit dans la volonté du groupe **Soprema** de réduire son impact sur l'environnement. Ainsi, nous préservons chaque année des milliers de litres d'eau potable.

Le fonctionnement en 5 étapes :

1 Collecte des eaux grises
2 Pré-filtration
3 Traitement par phytoépuration
4 Stockage et clarification
5 Distribution vers les chasses d'eau des toilettes et l'arrosage extérieur



SOPREMA GROUP



SOPREMA GROUP

LEGISLATIVE ASPECT

Derogation for the building for analyses based on ANSES opinion

- **Analyses once a month**
- **Bacteriological criteria: Escherichia coli, enterococci**
- **Physico-chemical criteria: TSS, Turbidity, COD, BOD5, TOC**

Paramètres	Lieux de prélèvement	Seuils
Escherichia coli	Sortie de production et point(s) d'usage	0 UFC/100 mL
Entérocoques intestinaux	Sortie de production et point(s) d'usage	0 UFC/100 mL
Turbidité	Sortie de production	2 NFU au point d'usage et < 0,5 NFU en entrée de réacteur UV
Matière en suspension (MES)	Sortie de production	< 10 mg/L
Demande biochimique en oxygène à 5 jours (DBO5)	Sortie de production	< 10 mg/L
Carbone organique total (COT)	Sortie de production	< 5 mg/L
Chlore libre	Sortie de production	Entre 0,1 et 0,5 mg/L en cas de chloration en sortie de production
Demande chimique en oxygène (DCO)	Sortie de production	< 60 mg/L
Phages ARN F-spécifiques (*)	Entrée et sortie de production	≥ 4 (abattement en log)
Spores de bactéries anaérobies sulfito-réductrices(*)	Entrée et sortie de production	≥ 4 (abattement en log)

Legislative decree for the domestic reuse of water unfit for human consumption (non-industrial wastewater)

- **Released on July 12th**
- **In effect since September 1st**
- **Replaces derogation regime, simplifies approval process**

SOPREMA GROUP

OUTLOOK FOR THE FUTURE

Several upcoming projects

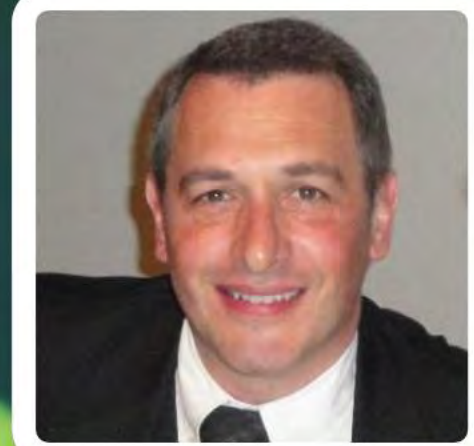
- **Olympic legacy fire station in St Denis**
- **New Soprema plant in Sausheim**
- **Hotel project in Issoire**

Thank you for your attention

For more information: cjarnigon@soprema.fr

Construction Energie

Fabian Kennel
Hochschule Trier - Umwelt-Campus Birkenfeld



Jacques Piroux
KARNO + Act Today S.A.

Interreg
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN
Grande Région | Großregion

Efficient Energy Management for Grids and Buildings

Prof. Dr. Fabian Kennel

Umwelt-Campus Birkenfeld

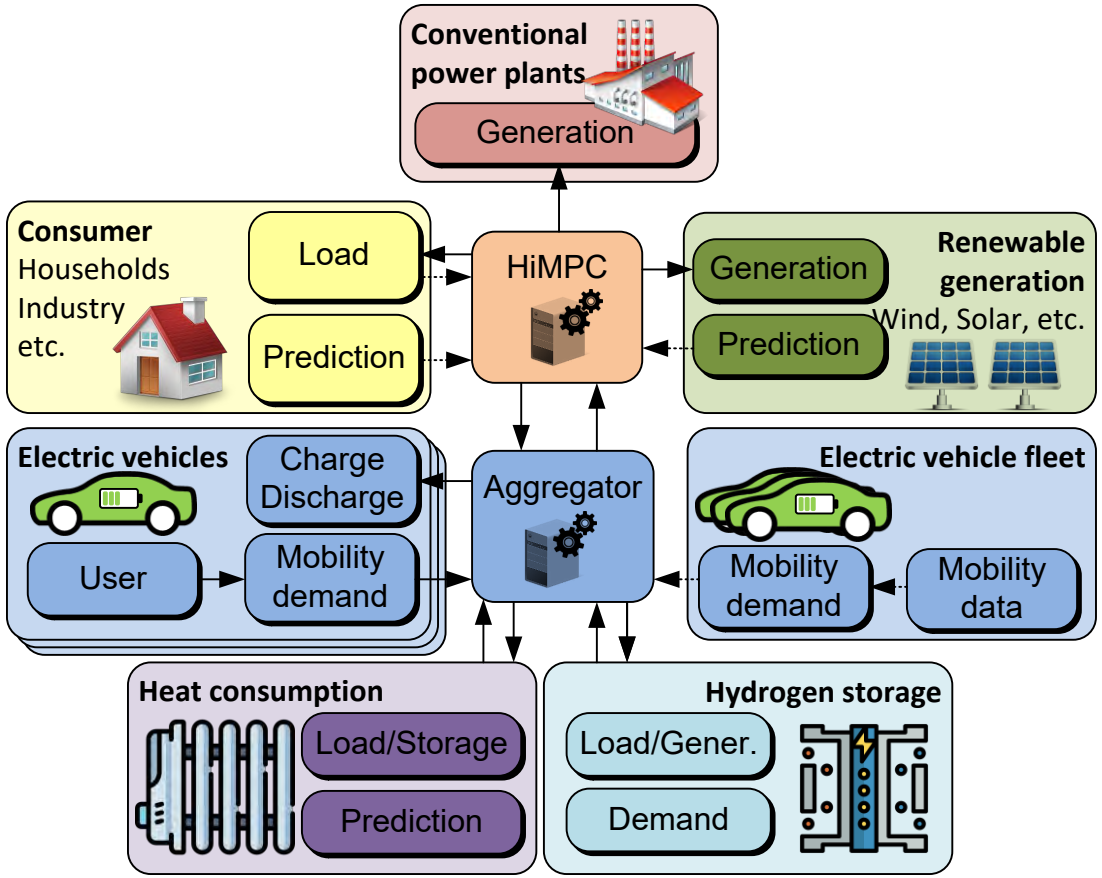
Hochschule Trier

Content

1. **Challenges of a sector coupled smart grid**
2. **Smart Grid Management**
3. **Smart Home Management**
4. **Outlook**

Challenges of a sector coupled smart grid

What is a Smart Grid?



Smart Grid:

- Intelligent adaption of power generation/consumption
- Centralized/Decentralized energy management
- Exchange of power and information
- Concept of an energy management

Challenges of a sector coupled smart grid

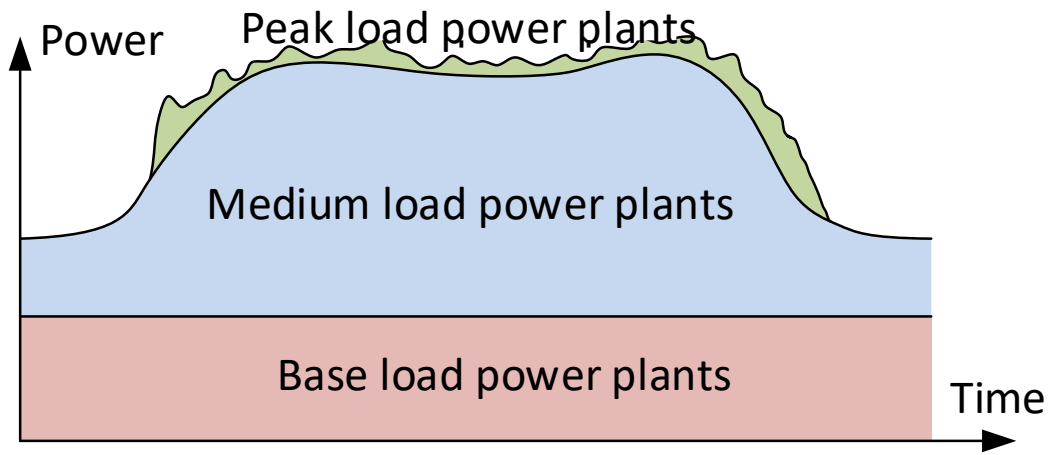
Challenges: Frequency control (electrical energy management)

Power generation ⚯ Power demand

Frequency

- Grid frequency control
  - To avoid damages on generators and loads
- Integration of prediction data
  - Daily load curve
  - Infeed of renewable energies

→Infeed of fluctuating renewable energies stresses the grid frequency control

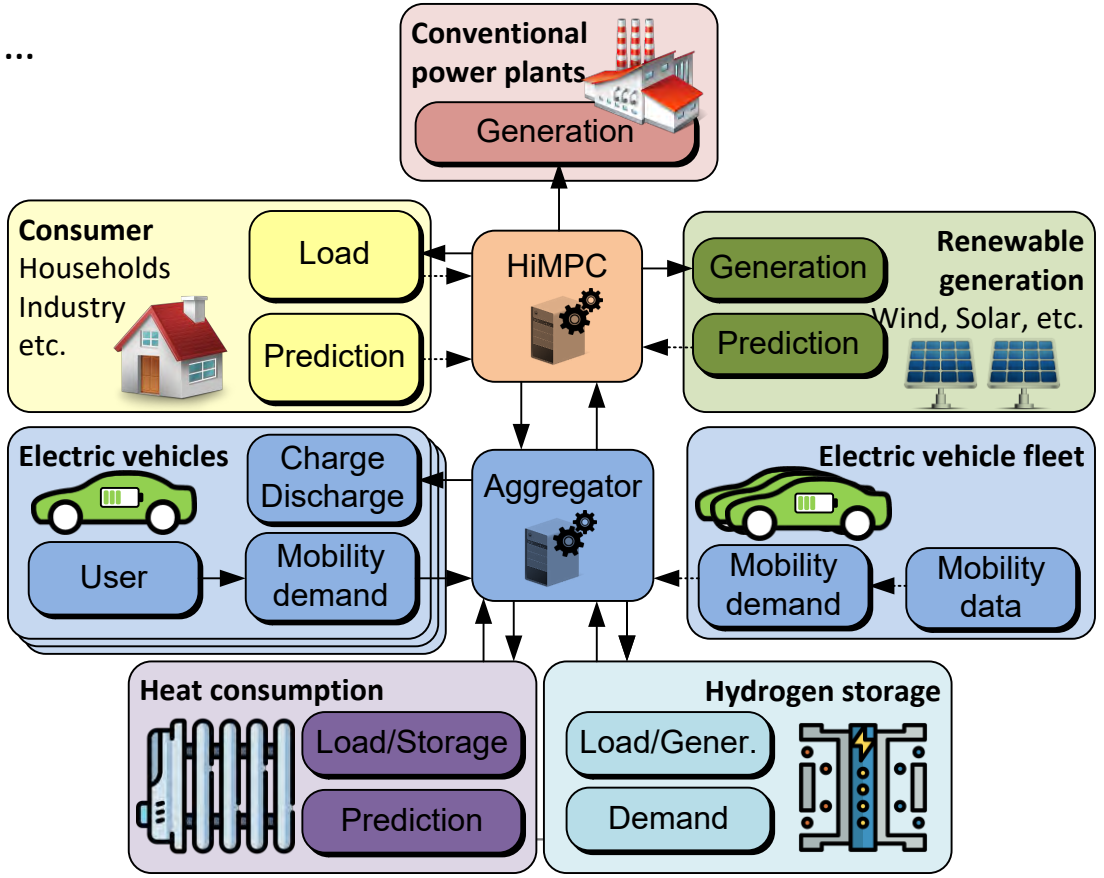


Challenges of a sector coupled smart grid

Challenges: Summary

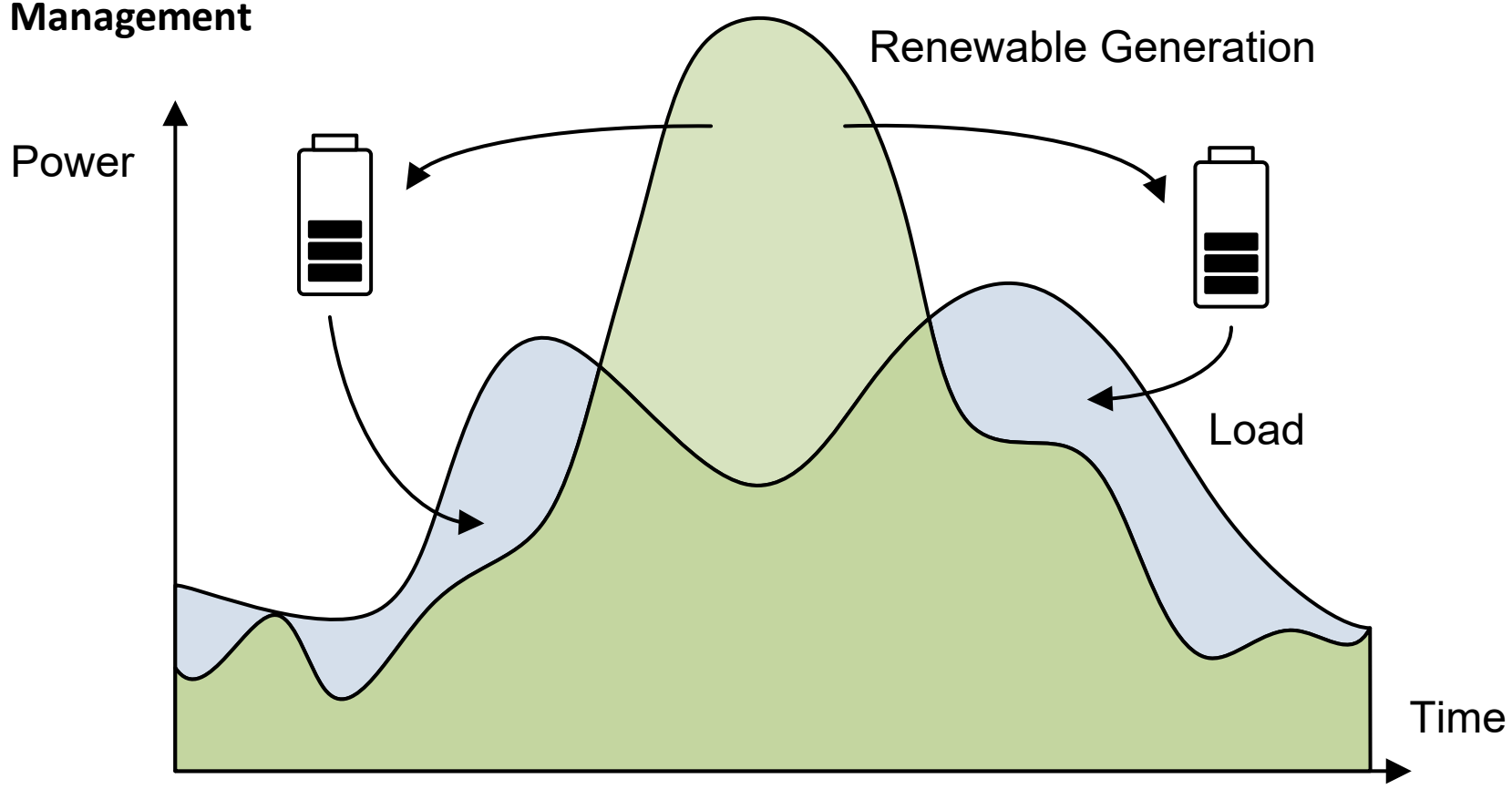
- High increase in renewable generators
  - Fluctuating infeed, loss of inertia
- Increase in power demand
  - Electric vehicles, heat pumps, …

  → Fluctuating consumption



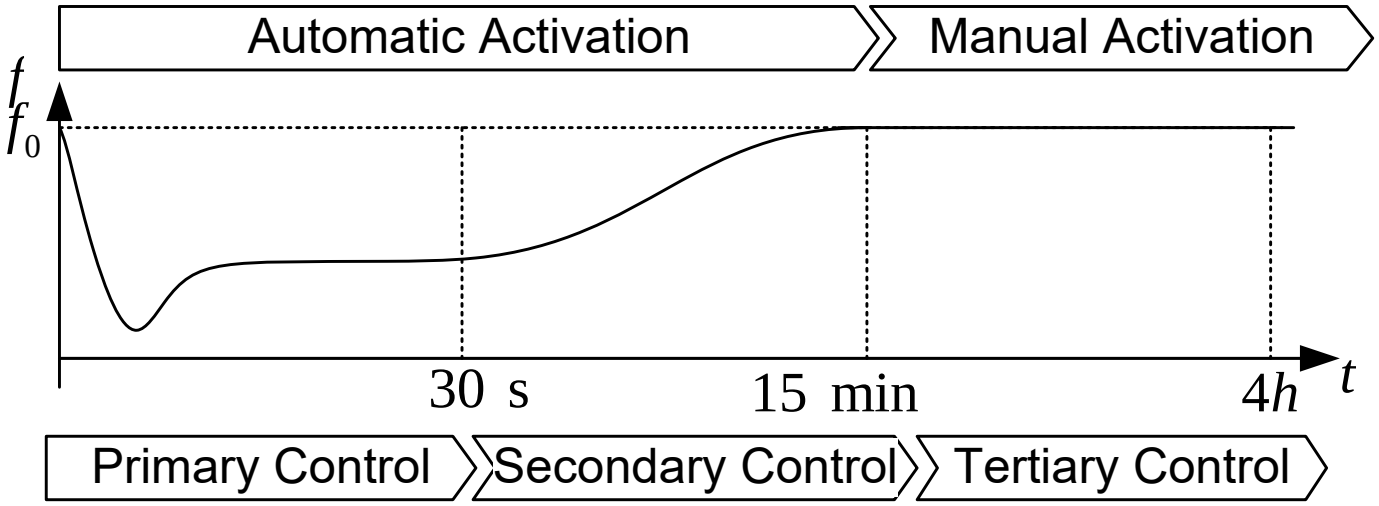
Content

1. **Challenges of a sector coupled smart grid**
2. **Smart Grid Management**
3. **Smart Home Management**
4. **Outlook**



Smart Grid Management

Classical grid frequency control:



- Stabilization of f
- P-Controller
- Decentralized
- Response - $5s$
- Activation - $0..30s$

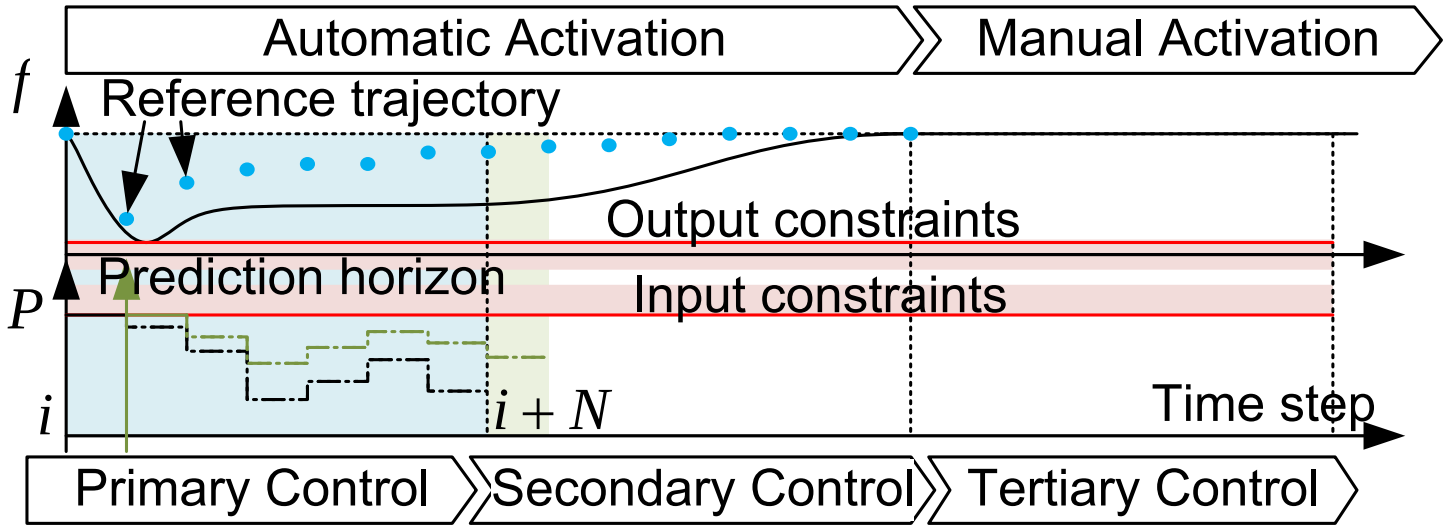
- Regulation to f_0
- PI-Controller
- Centralized
- Response - $5\ min$
- Activation - $30s..15min$

- Economic operation
- Optimization
- Centralized
- Response - $15\ min$
- Activation - $15\ min\ ..4h$

Smart Grid Management

Modern Techniques:

Model Predictive Control:



- Model Predictive Control (MPC)
  - Constraints (Power ratings)
  - Prediction (renewable generators)
  - Disturbance elimination (fluctuation)
- MPC concept
  - Based on optimization

Cascaded hierarchical MPC (HiMPC)

Content

1. **Challenges of a sector coupled smart grid**
2. **Smart Grid Management**
3. **Smart Home Management**
4. **Outlook**

Smart Home Management

Smart Home – Energy Management:

What is a Smart Home?

- Autonomous control of applications and devices
- Control and management of networked devices:
  - Temperature
  - Lighting
  - Home theater
  - Electric vehicle
  - Security and access
  - Refrigerators, washing machine, dryer, …
- Optimization of energy demand (economical, ecological)
  - Electrical output of PV generators
  - Thermal output of solar thermal collectors

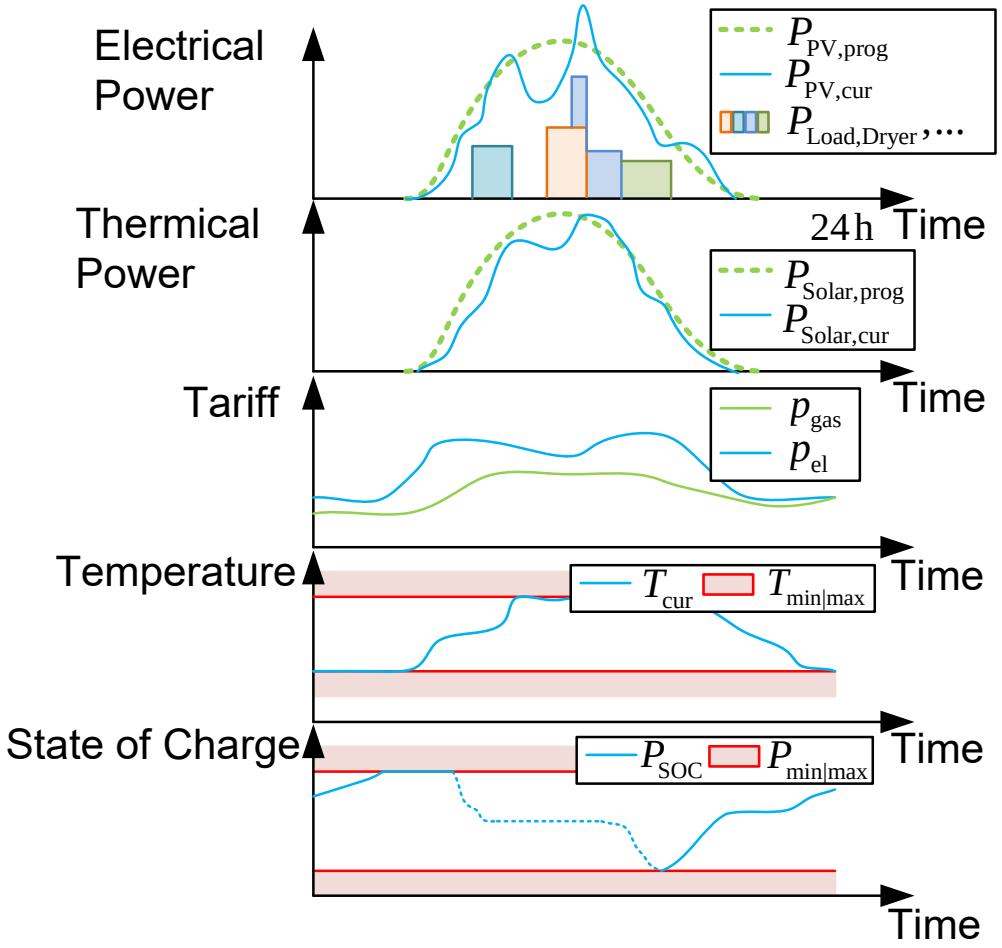
→ Increasing the quality of life

Smart Home Management

Smart Home – Energy Management:

Model Predictive Control:

- Management of the sectors: heat, power and mobility
- Integration of devices via Plug & Play
  - Control devices
  - Disturbance devices
- Integration of features per Plug & Play
  - Predictions
  - Costs
- Integration of limitations
  - Constraints
  - Solvability

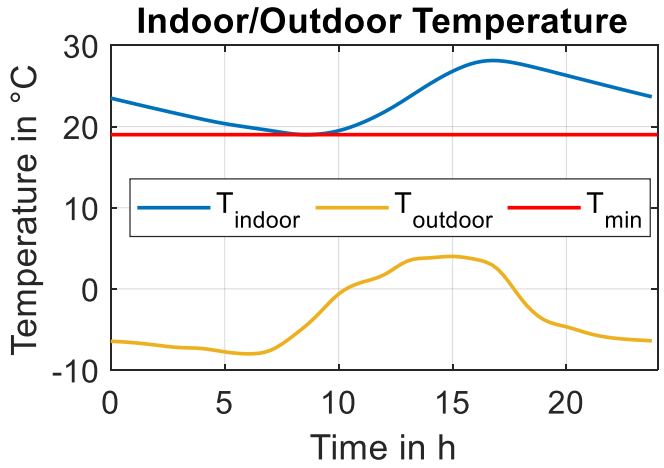


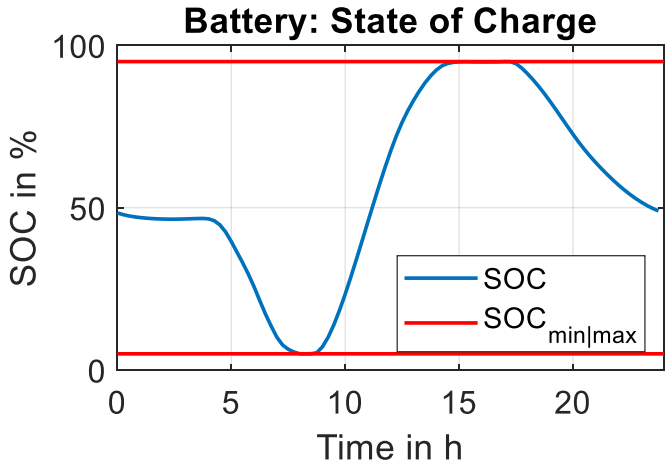
→ **Minimization of energy costs / maximization of energy efficiency**

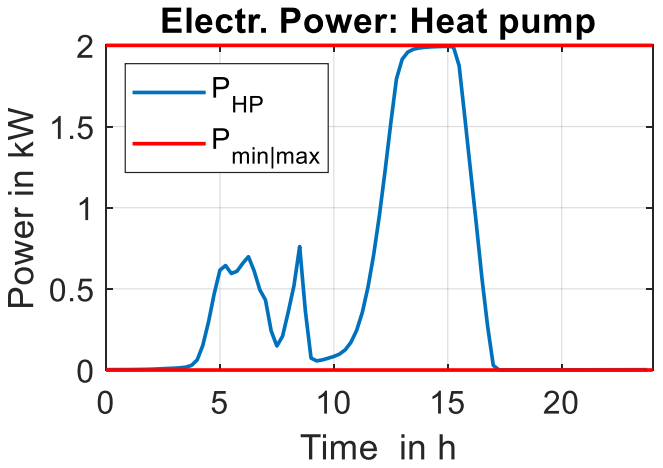
Smart Home Management

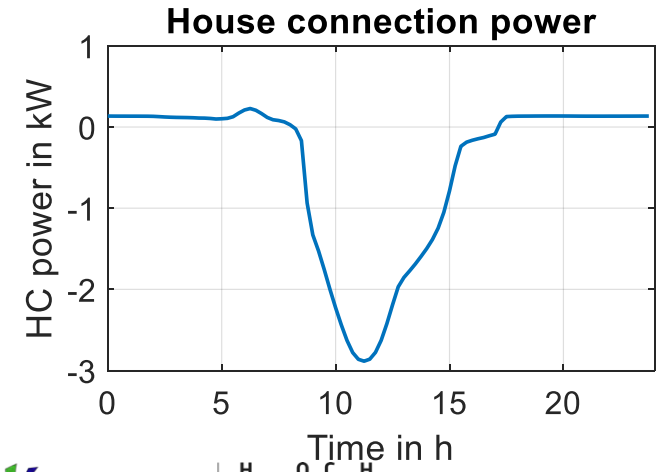
Smart Home – Energy Management:

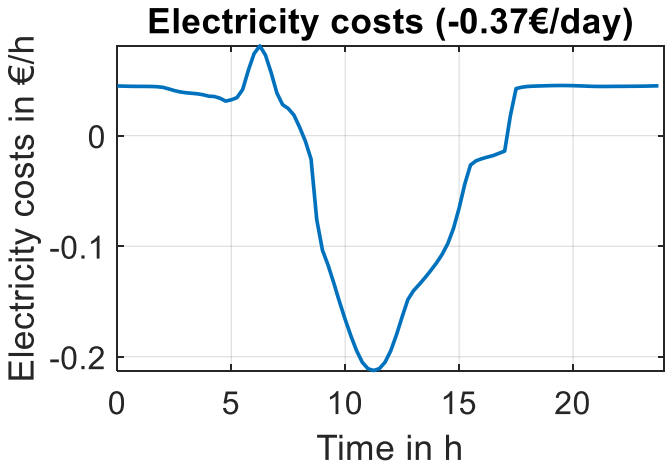
Case Study: 4-person-household, 8 kWp PV system, 5kWh battery storage, winter day, constant price

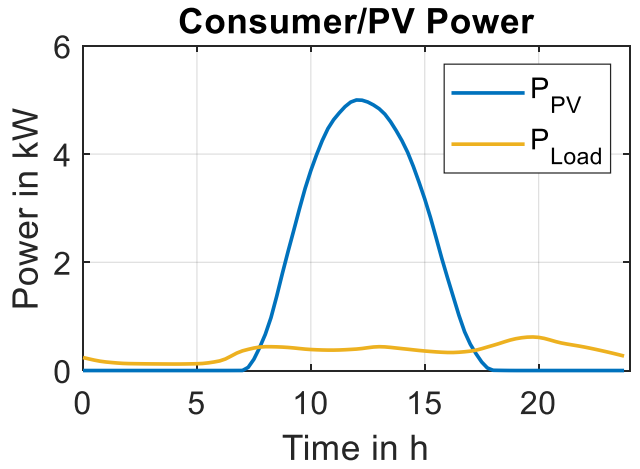








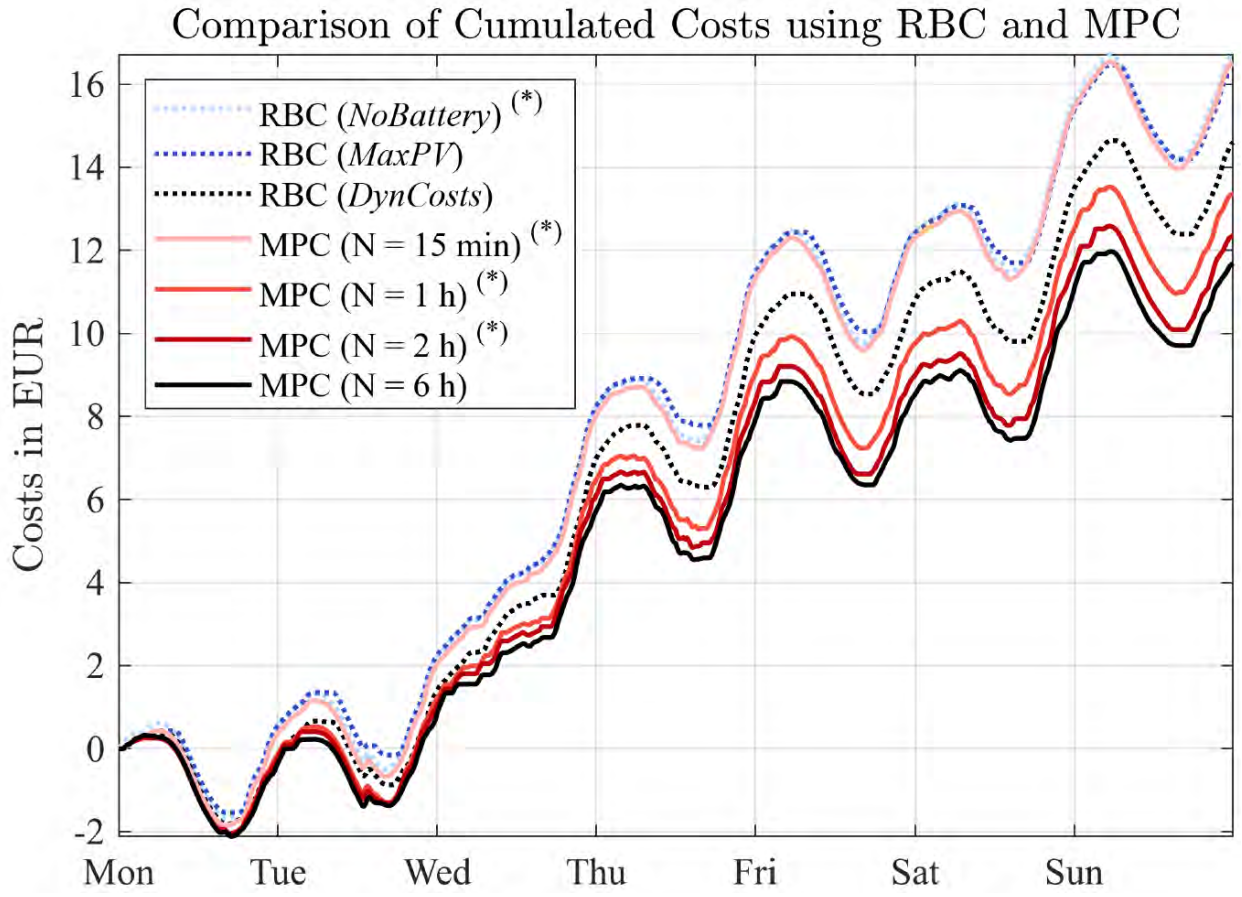




Smart Home Management

Smart Home – Energy Management:

Case Study: Comparison - Heuristic vs. Optimization for dynamic prices



Content

1. **Challenges of a sector coupled smart grid**
2. **Smart Grid Management**
3. **Smart Home Management**
4. **Outlook**

Outlook

What can we expect in the future?

Smart-Grid:

- Need for intelligent management
- Every small/large generator/consumer as a active participant
- Short-term and long-term storage

Smart Grid/Home:

- Sector coupling
- Heuristics and rules → AI and optimization
- Strong coupling between buildings, factories and grid

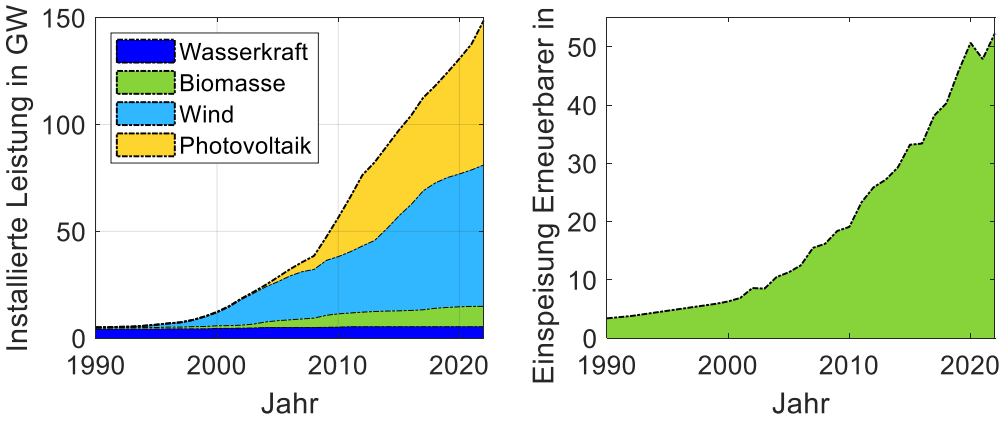
→ Future Players: AI/Optimization, Storage, Coupling

Thank you for your attention

Challenges of a sector coupled energy grid

Development in Germany?

- Current electricity supply in Germany: approx. 50% renewable energies → Target 2030: 80%
- Highly fluctuating feed-in of renewable energies
  →High deviation from the annual average value



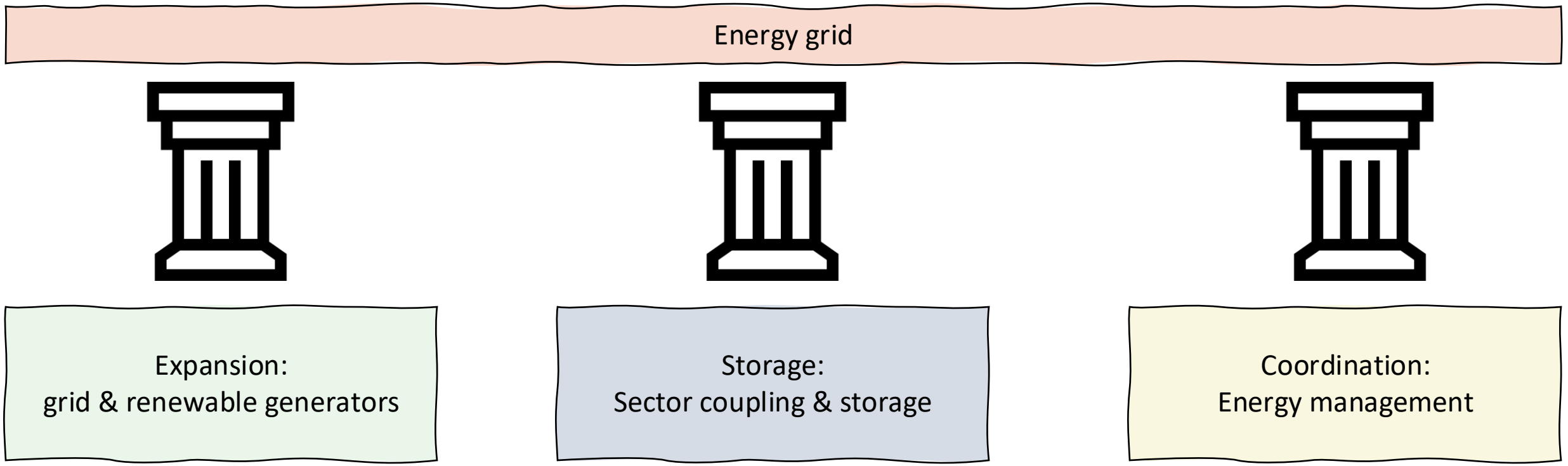
Details: (NEP 2037, 2023)

- Electricity consumption – Germany: 484 TWh
- Installed generation capacity 2022: Wind – 67 GW, PV – 66 GW
- Planned generation capacity 2037: Wind – 220 GW, PV – 345 GW

→ Target: 65% CO2-emmision reduction (compared to 1990) until 2030

Challenges of a sector coupled energy grid

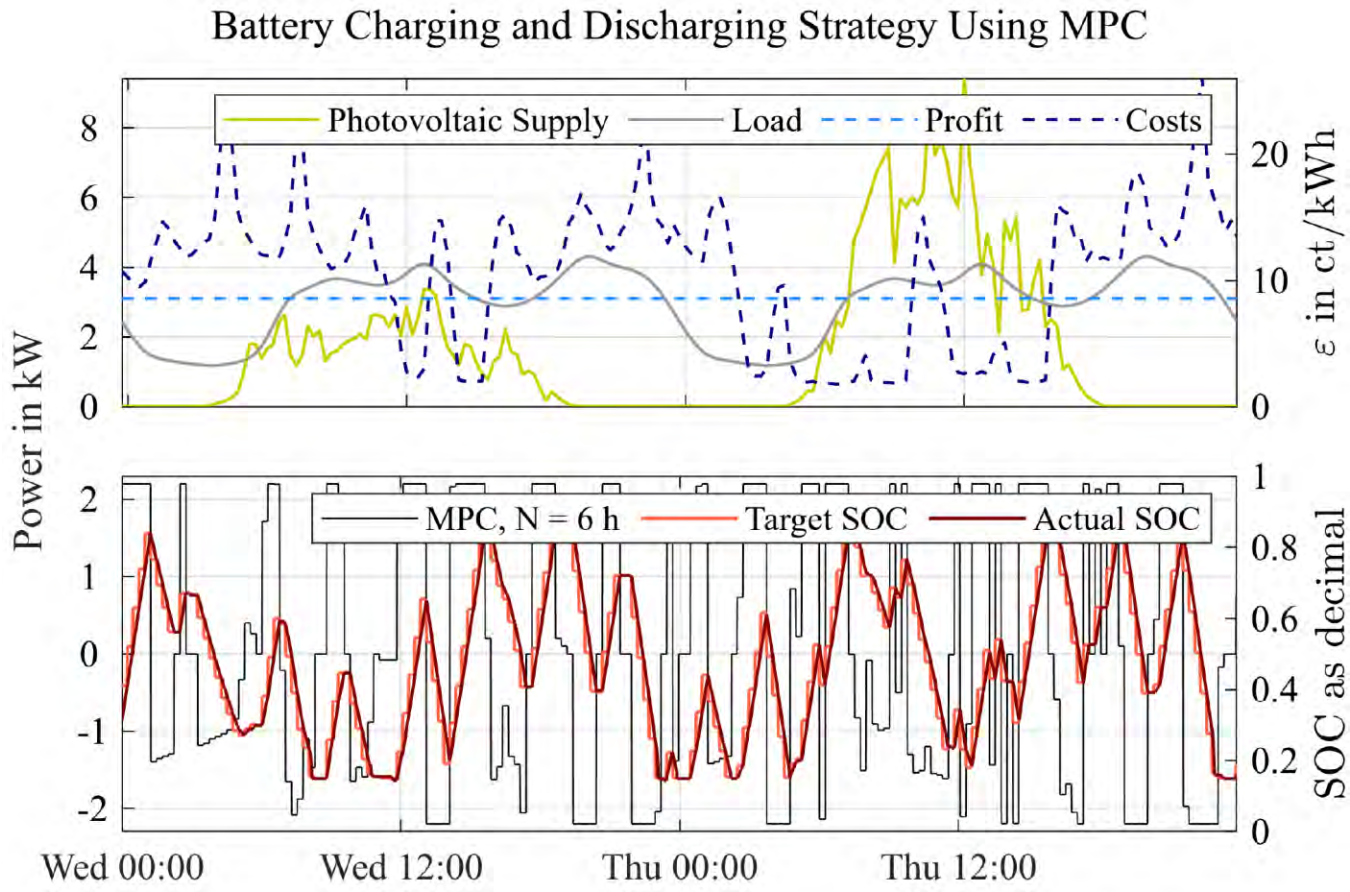
Pillars of the energy grid:



Smart Home Management

Smart Home – Energy Management:

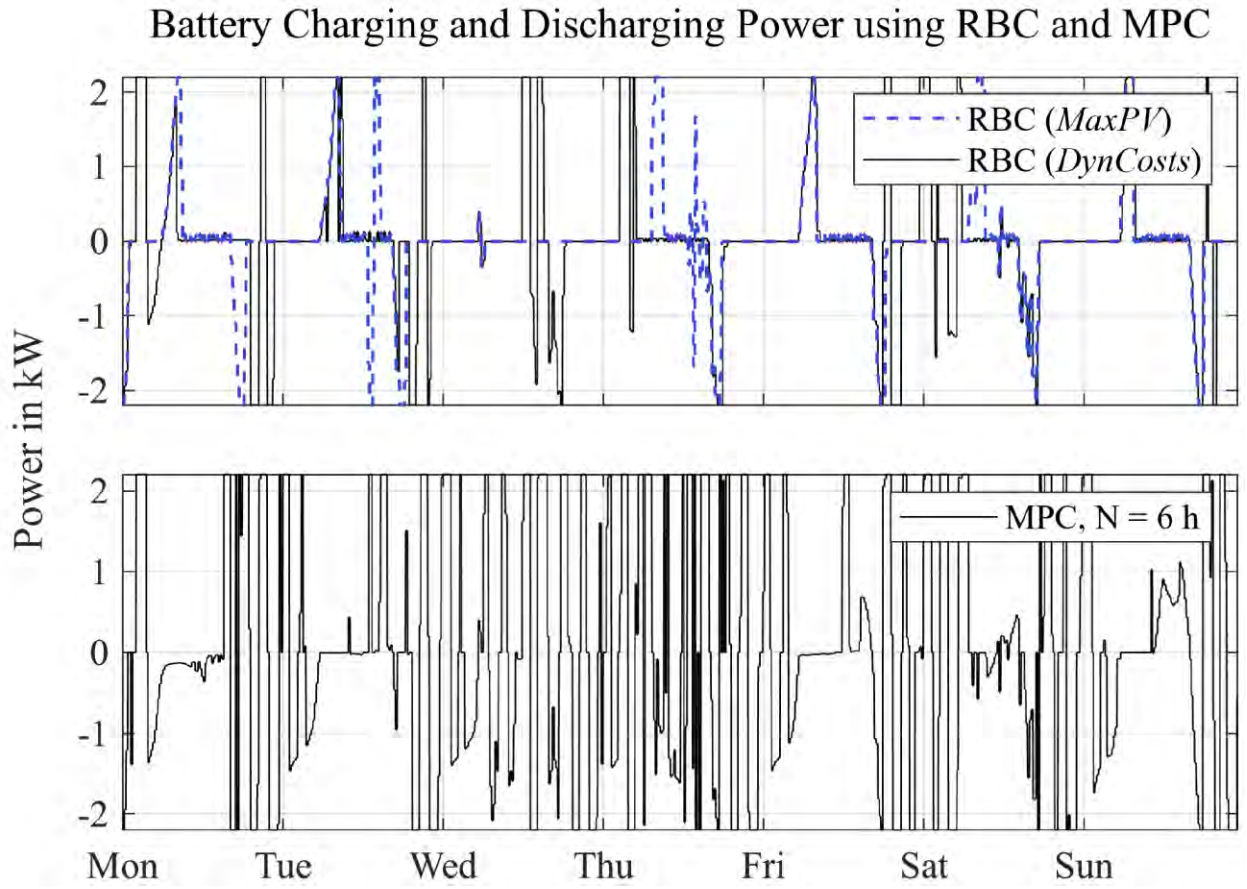
Case Study: Comparison - Heuristic vs. Optimization for dynamic prices



Smart Home Management

Smart Home – Energy Management:

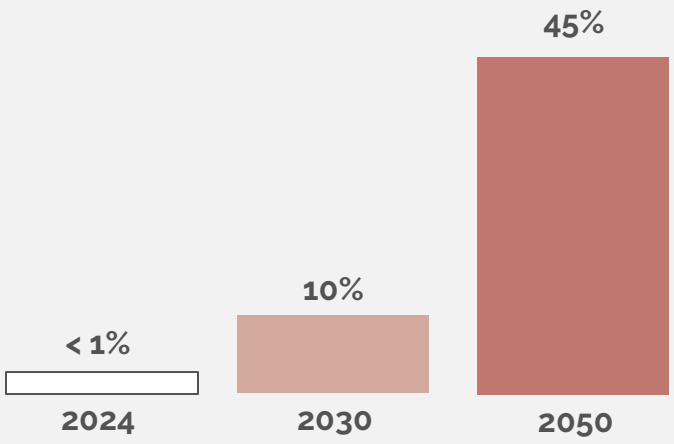
Case Study: Comparison - Heuristic vs. Optimization for dynamic prices



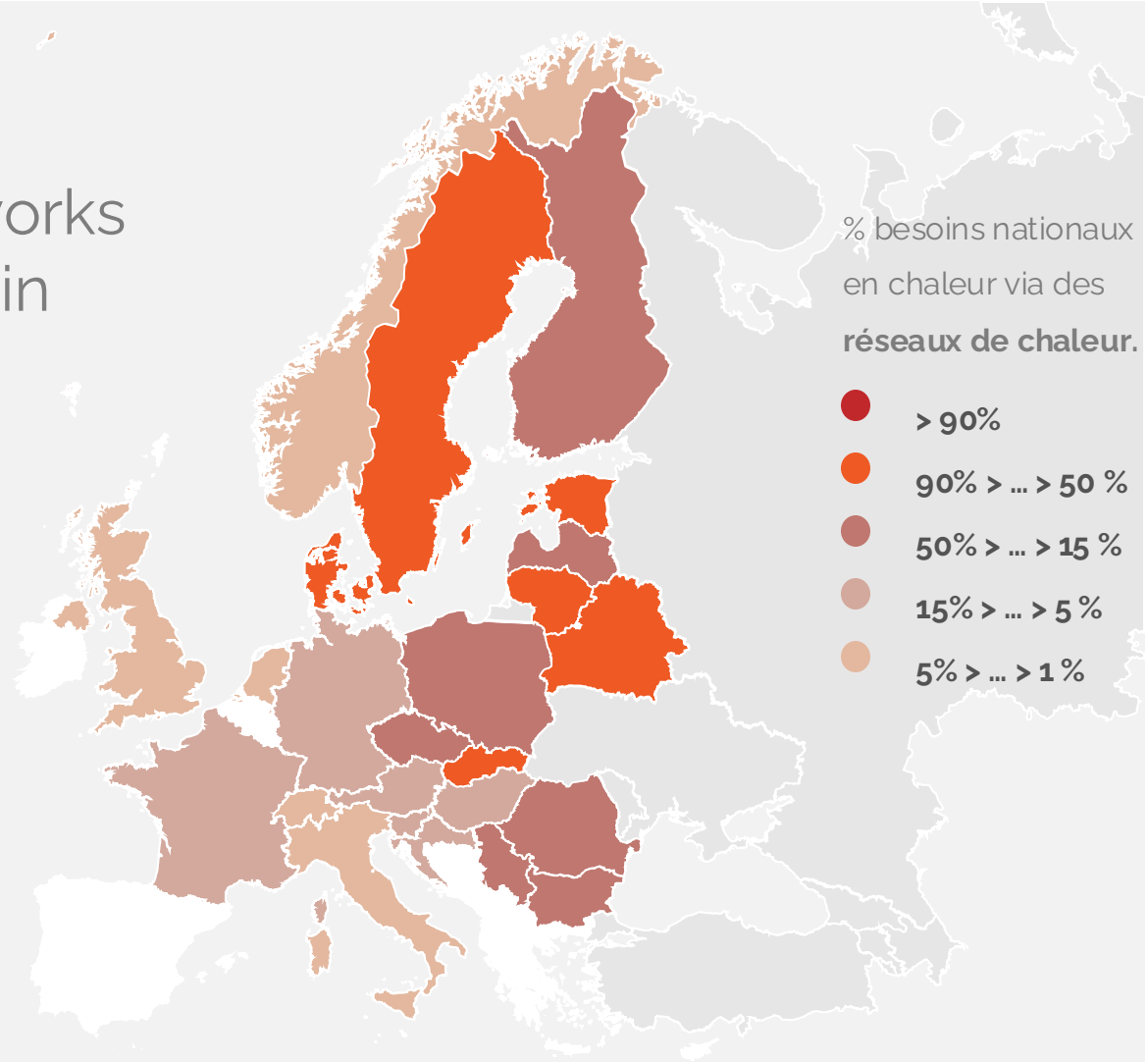
KARNO

ENERGY

EU objective :
thermal energy transiting via networks should go from < 1% today to **45%** in **2050**



Objectif EU d'augmentation des réseaux pour la Belgique



Source : Euroheat and Power 2017

Géothermie, Solaire PV & Solaire Thermique

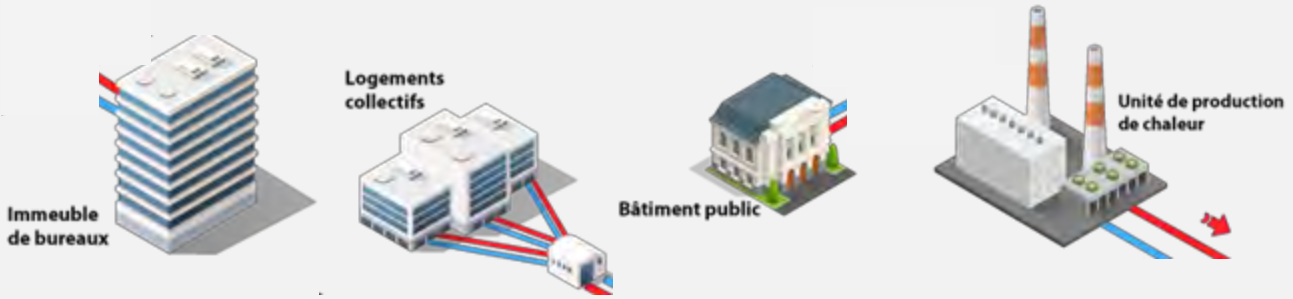
Récupération de chaleur fatale

Aquathermie & Riothermie

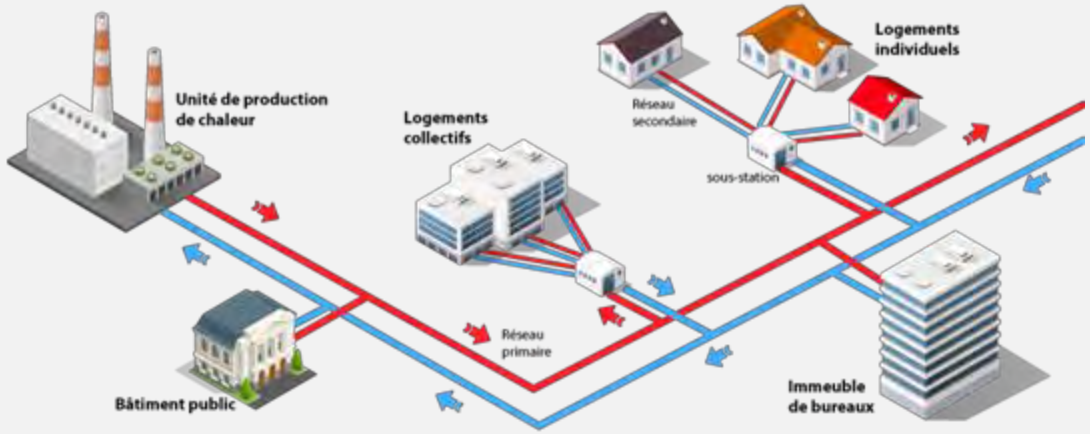
Cogénération Biogaz

Build your zero carbon heating system.

www.karno.energy

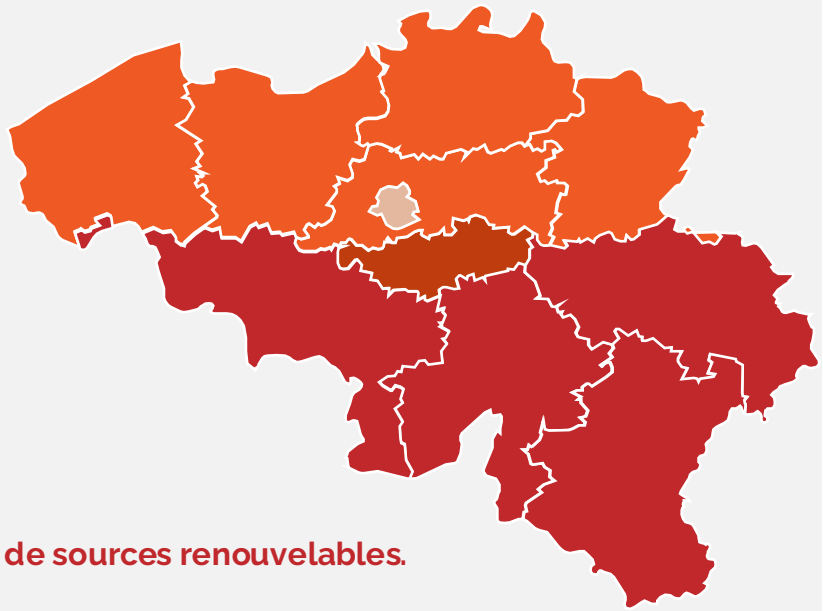


Karno **décarbone** l'énergie thermique (chaud/froid) de **grands consommateurs**.



Karno fournit de l'énergie thermique **décarbonée** aux utilisateurs via un **réseau de chaleur renouvelable**.

In strict compliance with legal frameworks



- **Européen :**

  Directive 2018/2002 relative à l'**efficacité énergétique** et

  Directive 2018/2001 relative à la promotion de l'**utilisation de l'énergie produite à partir de sources renouvelables.**

- **Wallonie :**

  Décret du 15 octobre 2020 relatif à l'**organisation du marché de l'énergie thermique** et aux **réseaux d'énergie thermique.**

  Arrêté du Gouvernement Wallon du 7 juillet 2022 portant **exécution du décret.**

- **Bruxelles:**

  Ordonnance du 6 mai 2021 relative à l'**organisation des réseaux d'énergie thermique** et à la **comptabilisation de l'énergie thermique** en Région de Bruxelles-Capitale

- **Flandre:**

  Amendement du 10 mars 2017 du Energiedecreet relatif au **développement** et à l'**exploitation de réseaux de chaleur**

  Energiebesluit du 10 november 2019 concernant la **distribution et livraison d'énergie thermique**

SERVICE ALL-IN

Le **succès** du réseau de chaleur réside en grande partie dans la gestion après la construction.
Karno propose un **service complet**, tant pour le promoteur que pour les utilisateurs finaux.

D

DESIGN

Karno s'engage sur le dimensionnement du système et en porte la responsabilité.

B

BUILD

Karno construit le réseau et le système de production d'énergie en parfaite collaboration avec l'entreprise chargée du chantier.

F

FINANCE

Karno participe au financement du réseau, assure et gère son intégrité financière durant toute sa durée de vie : extension et modernisation.
Karno n'offre pas de services Tiers-Investisseur..

M

MAINTAIN

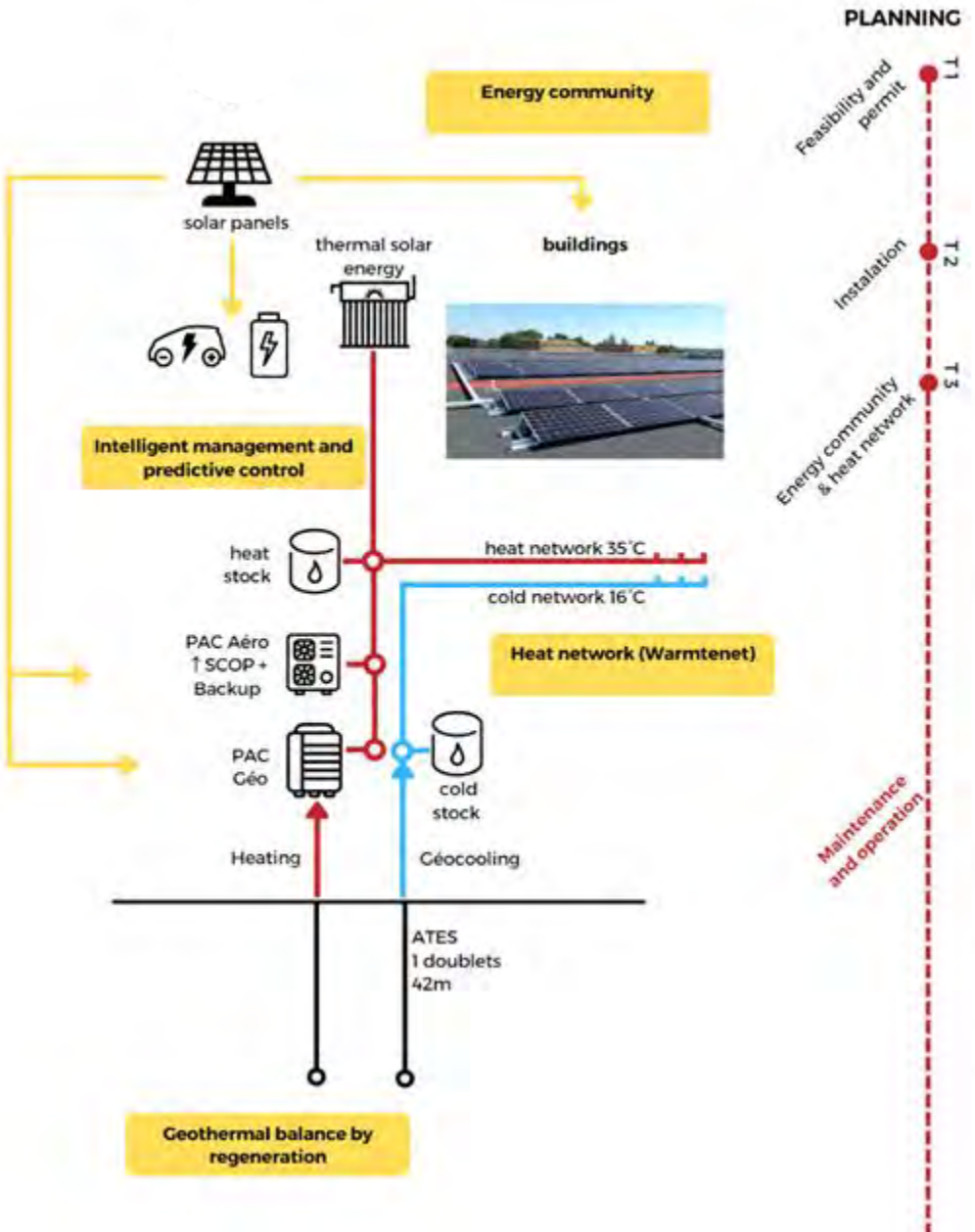
Grâce à des technologies de gestion proactive d'actifs, Karno réalise la maintenance en garantie totale du système.

O

OPERATE

Karno opère et régule le système 24/7 et délivre la chaleur et le froid directement à l'utilisateur final.

Within a Renewable Energy Community



Steps for the development of DHN

Find the seed

1. A new neighborhood

<u>or</u>

2. A dense area with structural clients

<u>or</u>

3. An efficient source of energy

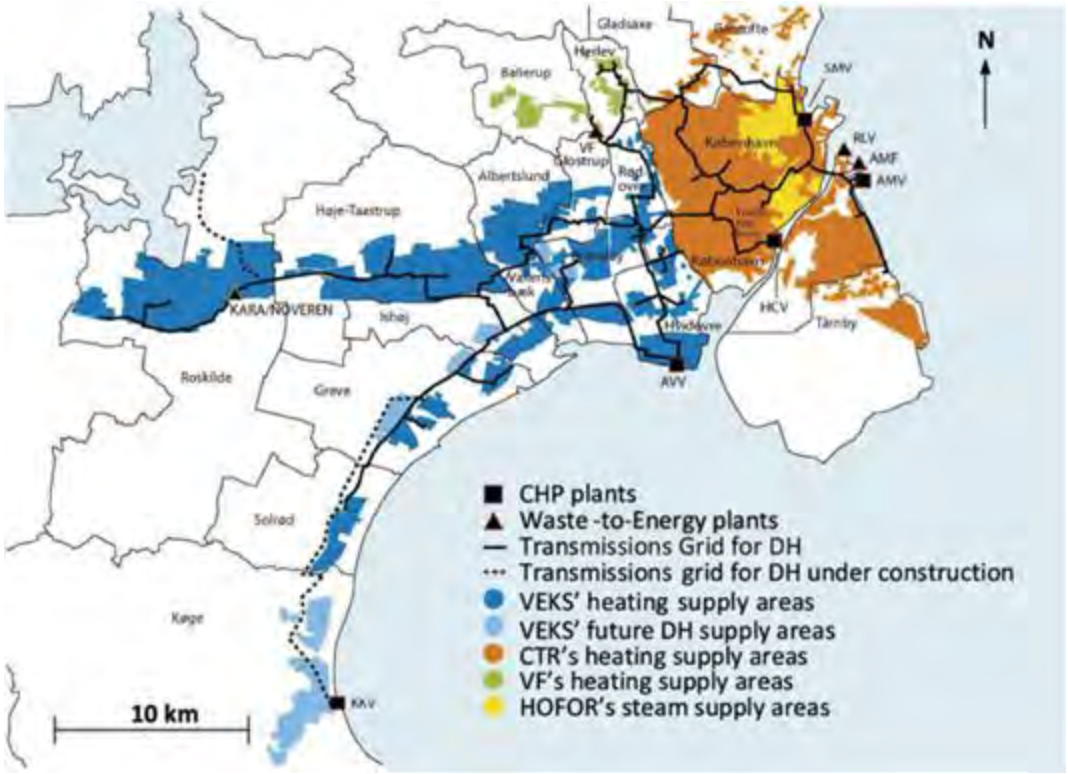
Root it properly

1. Make a first business case (feasibility study)
2. Build a local story with stakeholders
3. Contract (intentions) structural demand (60%)

Let it grow

1. Find a balanced financing model & comprehensive heat price model
2. Contract, Invest & build
3. Keep it alive (growth)

Thermal Micro-grids



Heat transport system
Copenhagen

KARNO

ENERGY

Discours de clôture

Sasha Baillie
Luxinnovation GIE

Interreg
Grande Région | Großregion
Cofinancé par l'Union Européenne
Kofinanziert von der Europäischen Union
GREATER GREEN