BASAJAUN

Sustainable Wood Construction fostering Rural Development and Urban Transformation

EUROPEAN DIGITAL RESEARCH: NEB @ CERN

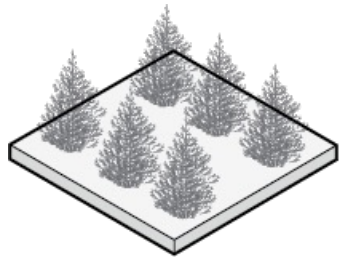
26 February 2023

Tom Minderhoud (UNSTUDIO)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº 862942

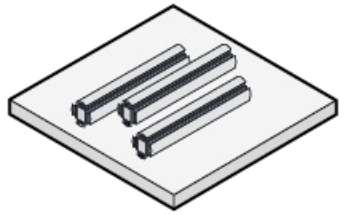
basajaun-horizon.eu

European Supply Chains: Economical Goals



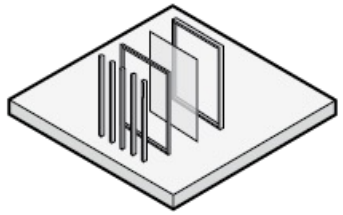
Forest ressources optimization

- Driver for rural economy
- CO2 embodied in wood sink
- Energy reduction in the manufacturing
- Lower enery consumption construction



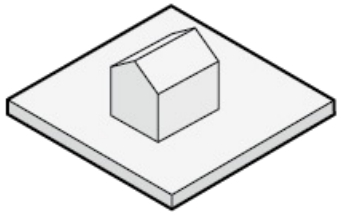
Forest products and subproducts

- Solid wood
- Fibers
- Veneers
- Sawdust
- Bark



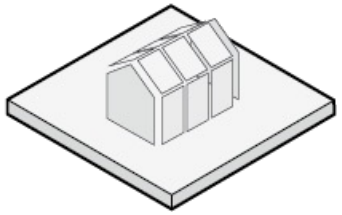
Innovative materials and construction systems

- modularity
- hot-pressed biobased profiles
- wood based thermal isolation
- wood based fire protection coatings



experimental pilot building

- northern demo office typology
- southern demo housing typology
- facade construction system based on biobased materials
- roof construction system based on biobased materials
- interior partitions based on biobased materials



cradle to cradle

- construction elements to be demountable and reusable
- database developed from tree to end product
- energy consumption

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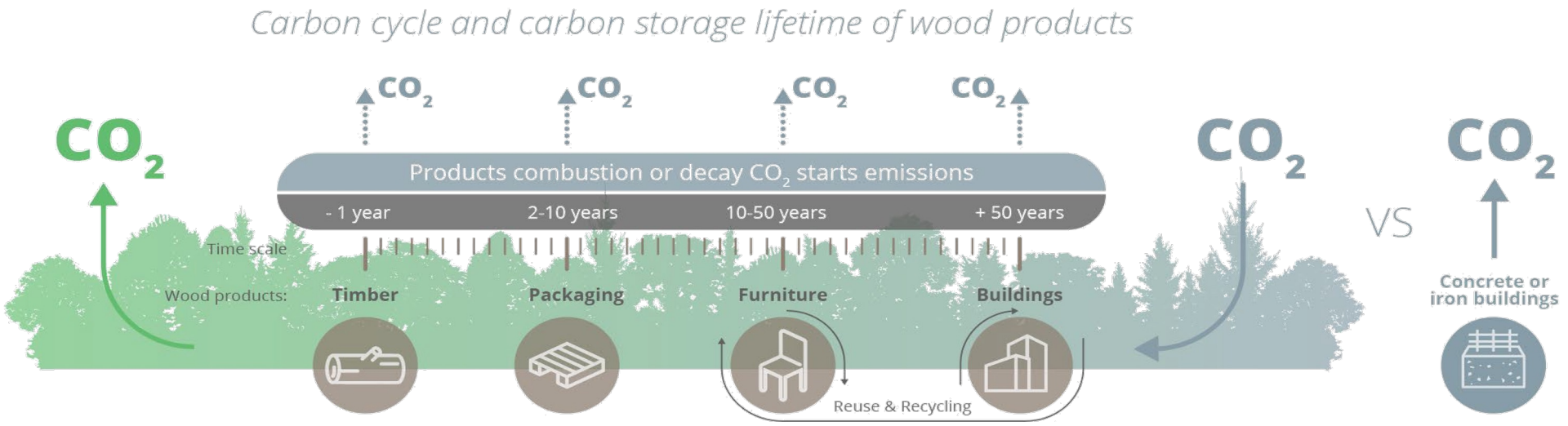
Carbon Embodyment



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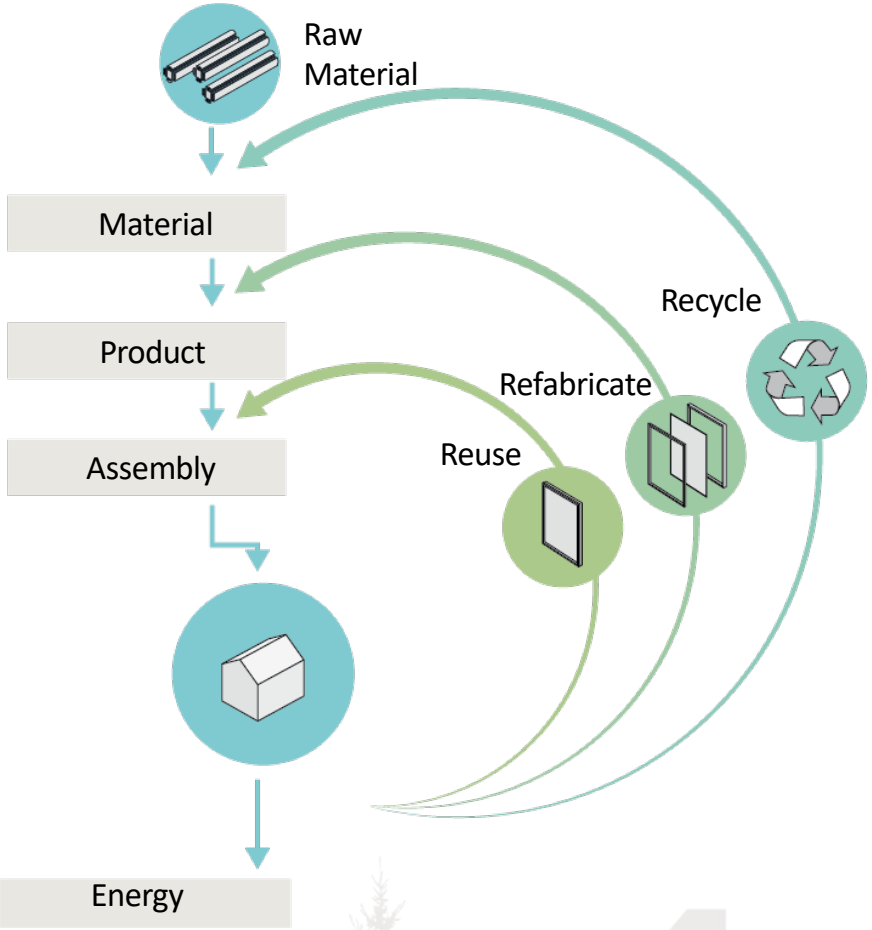
Cradle to Cradle Principles



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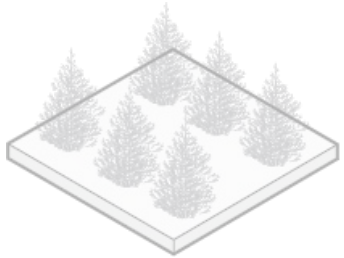
Digital Planning of Demo Buildings



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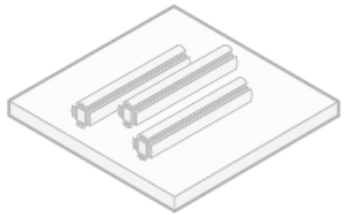

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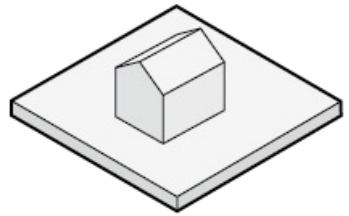

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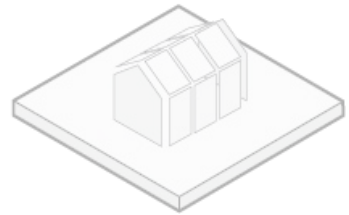

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Demo’s

- Northern Demo Concept

- Southern Demo Concept

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Northern demo building
Office / Storage
Jyväskylä, Finland

Southern demo building
Residential
Bordeaux, France

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Northern Demo

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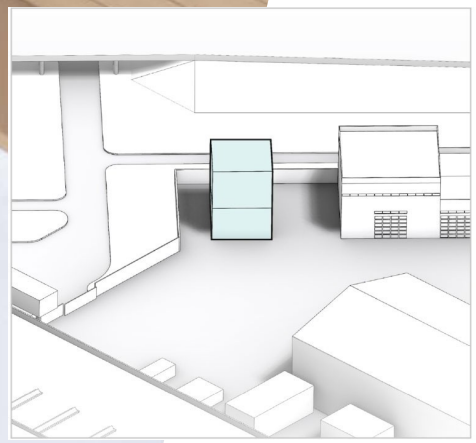
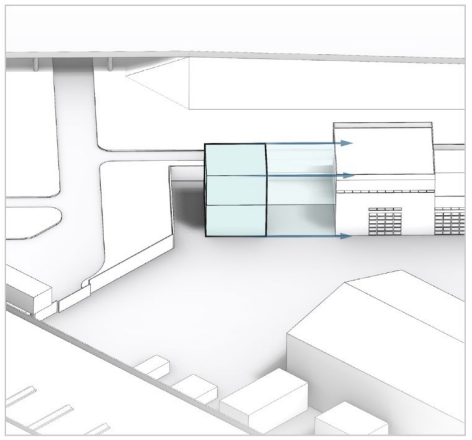
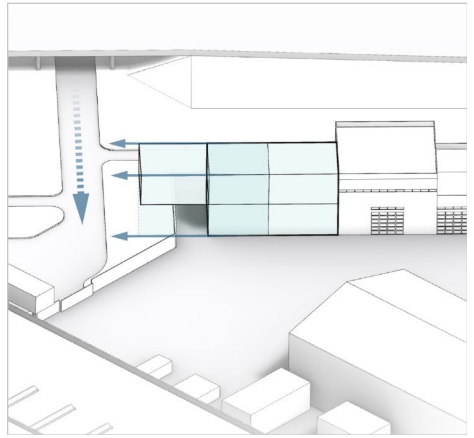


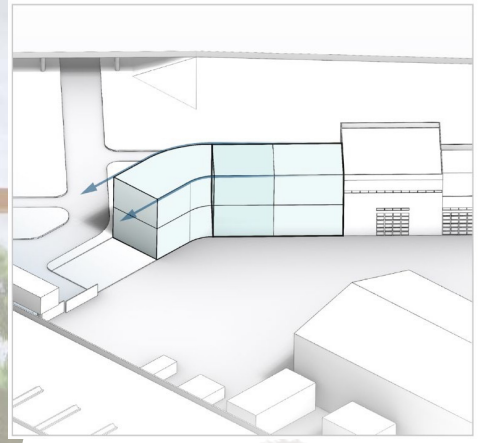
Proposed program



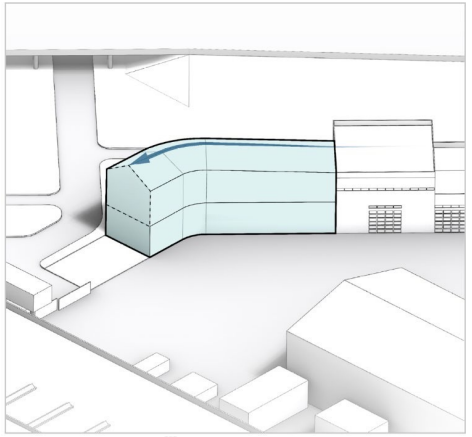
Connection to existing buildings



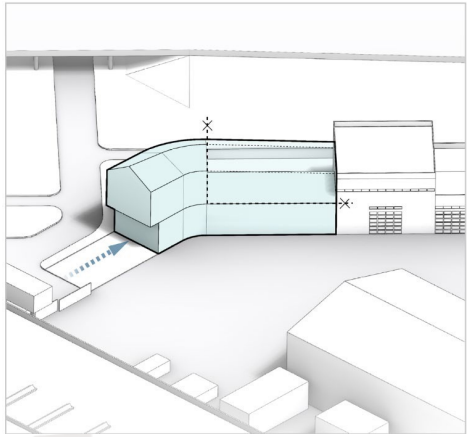
Visibility from access



Orientation towards lake views



Roof typology



Entrance and terrace

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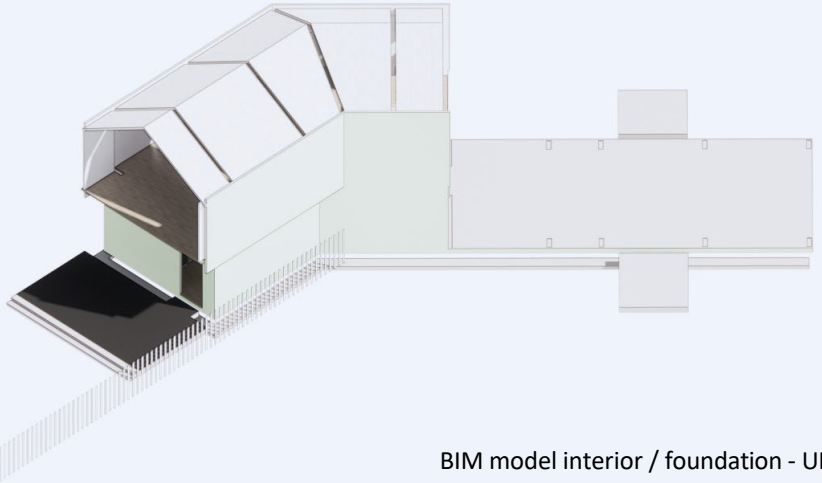
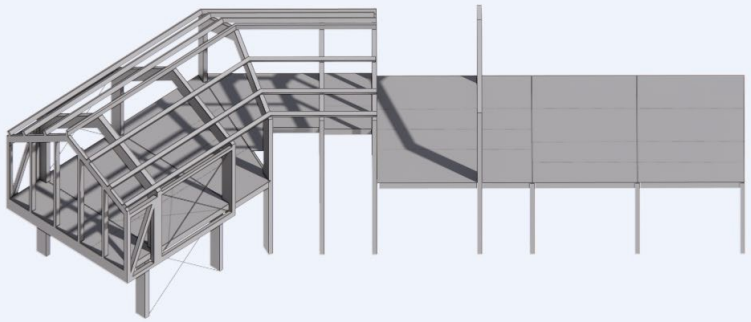
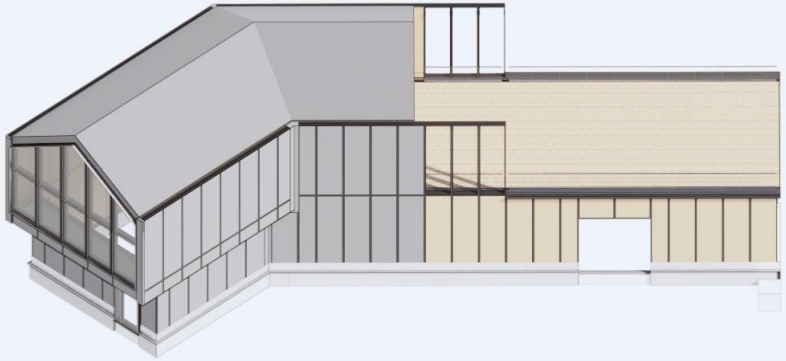


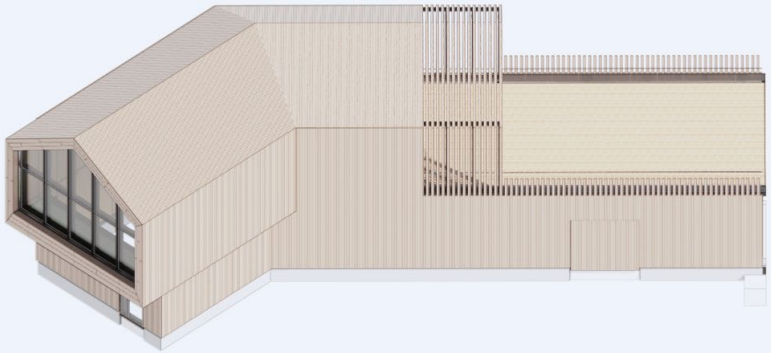
BIM model interior / foundation - UNStudio



BIM model Glulam structure - Moelven



BIM model façade / roof modules - ENAR



BIM model façade / roof cladding - ENAR

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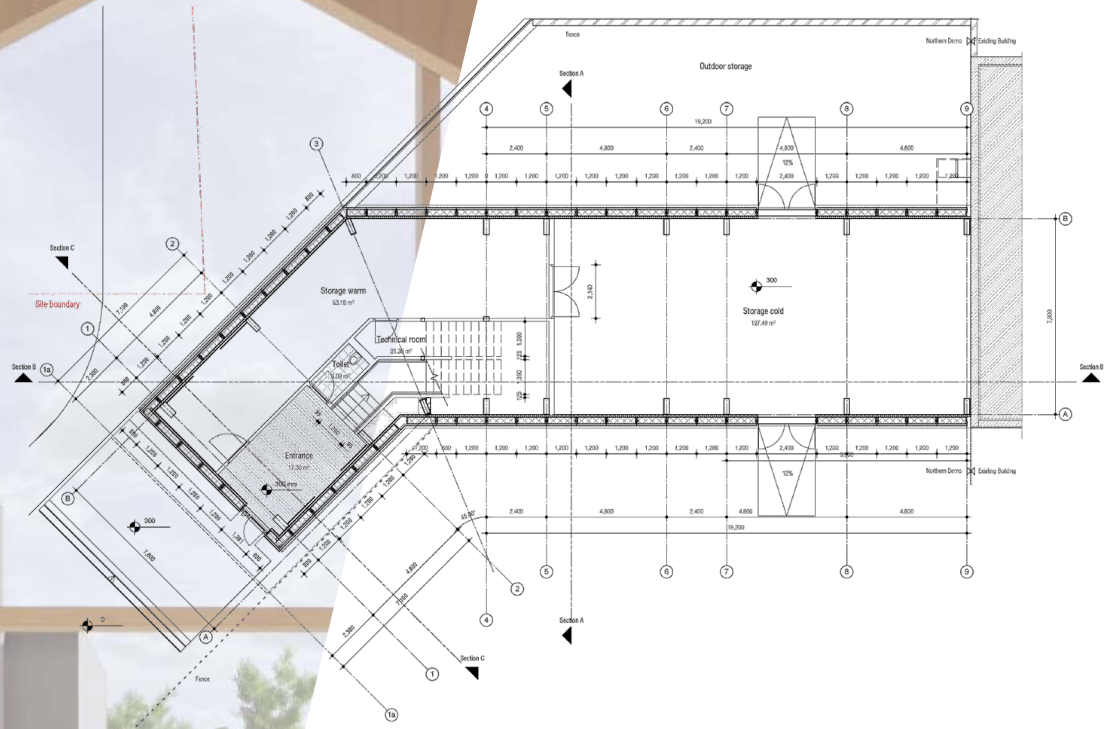
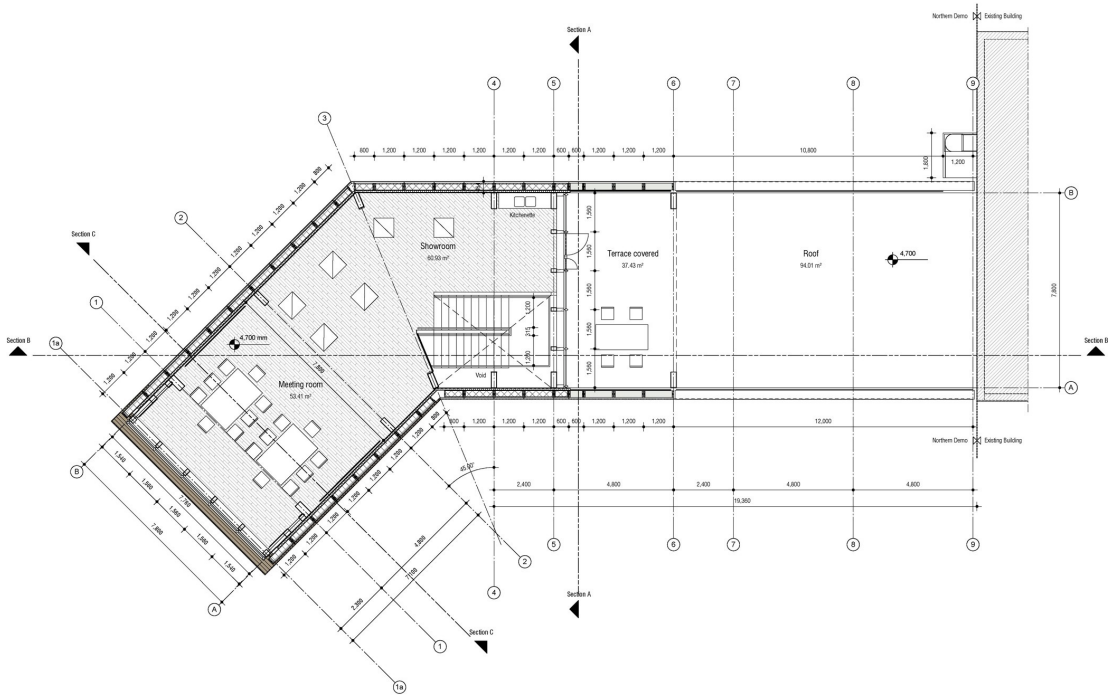


Ground floor



First floor

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Southern Demo

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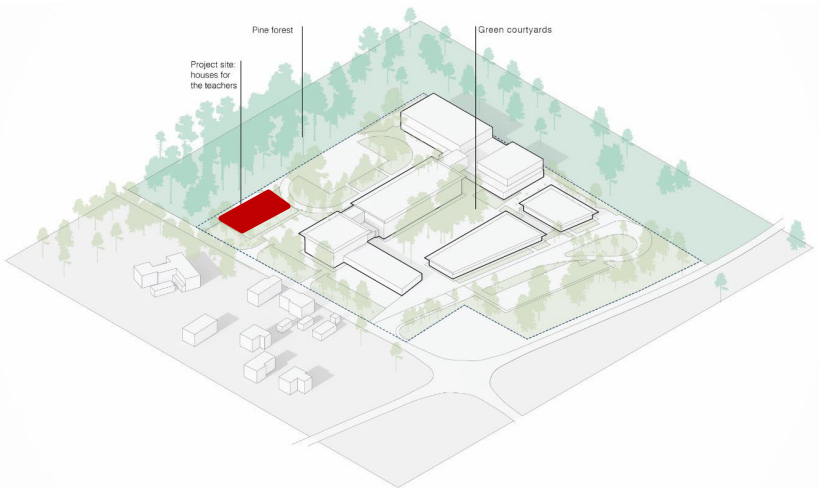
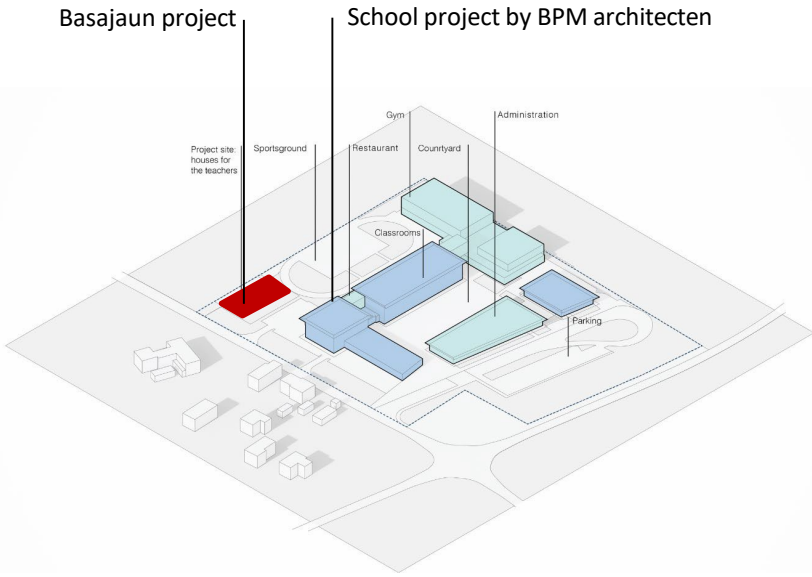


Integration within context



Functions

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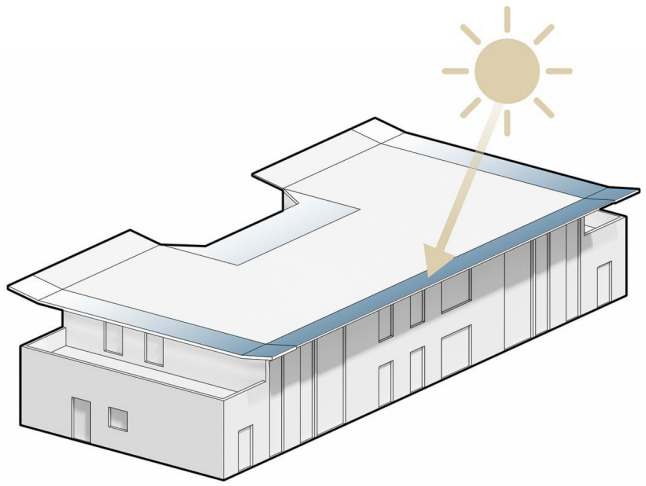
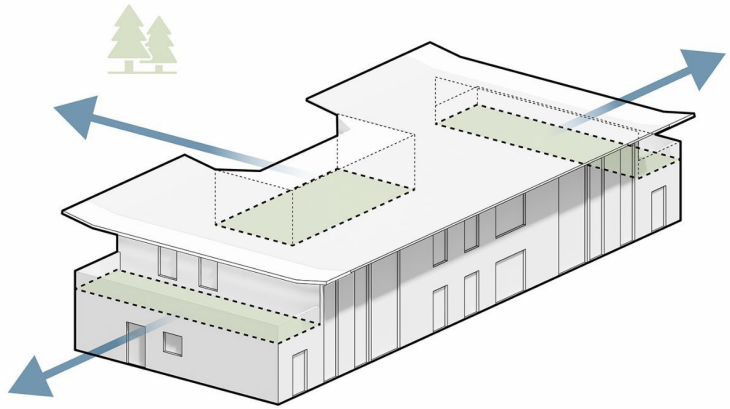
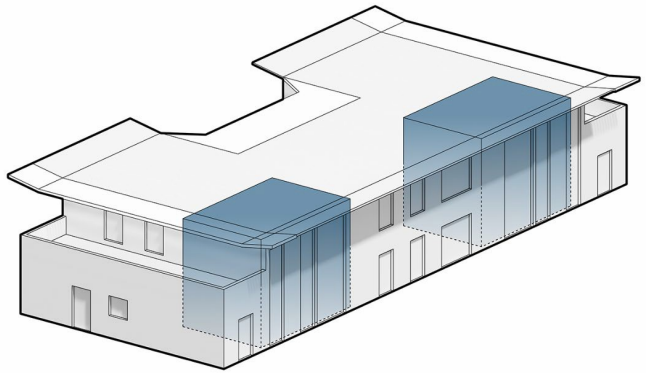
COLLÈGE DU PIAN



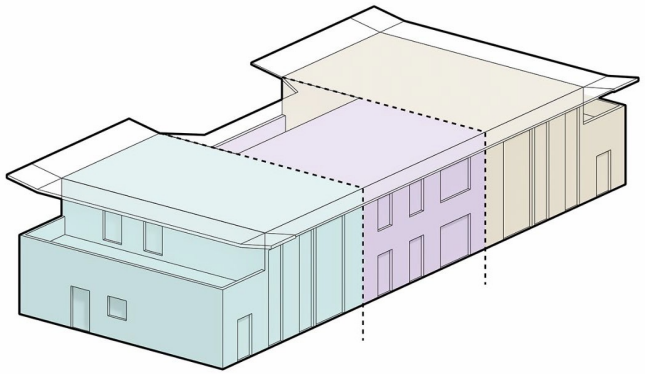
Roof edge as shading system



Individual terraces



Double height spaces



Houses division

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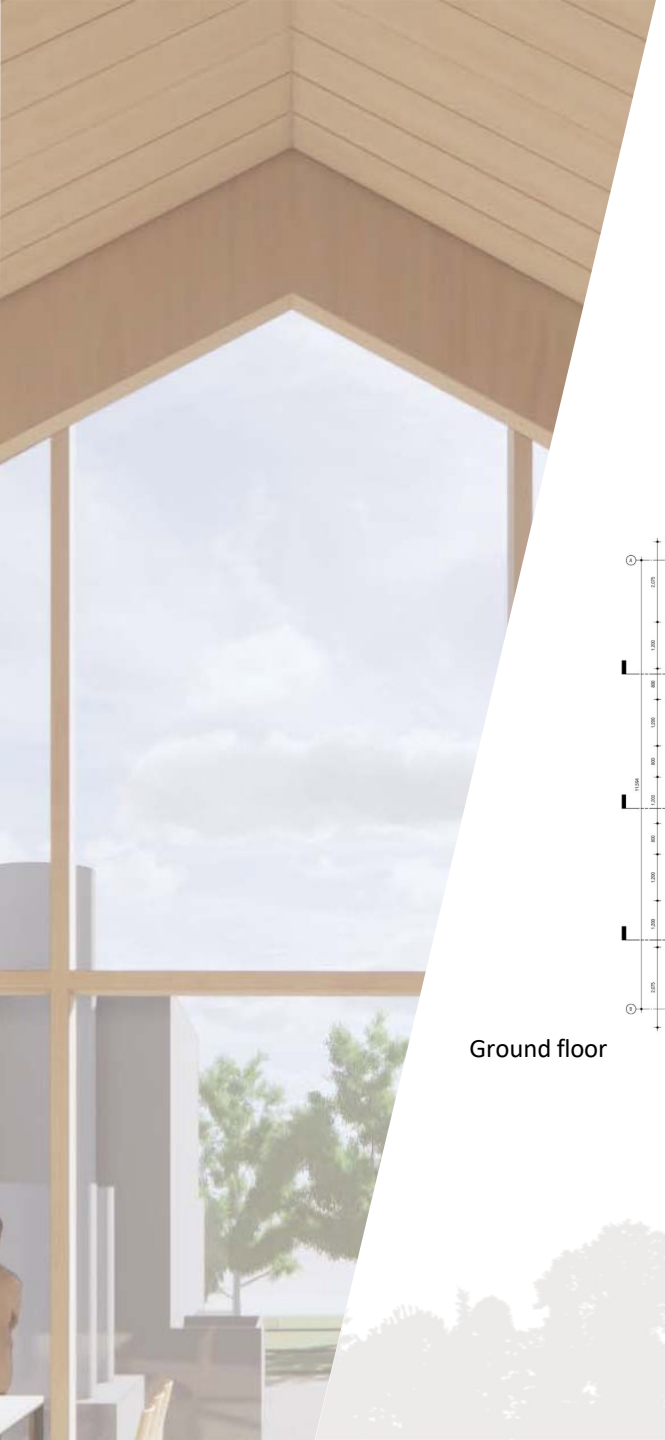

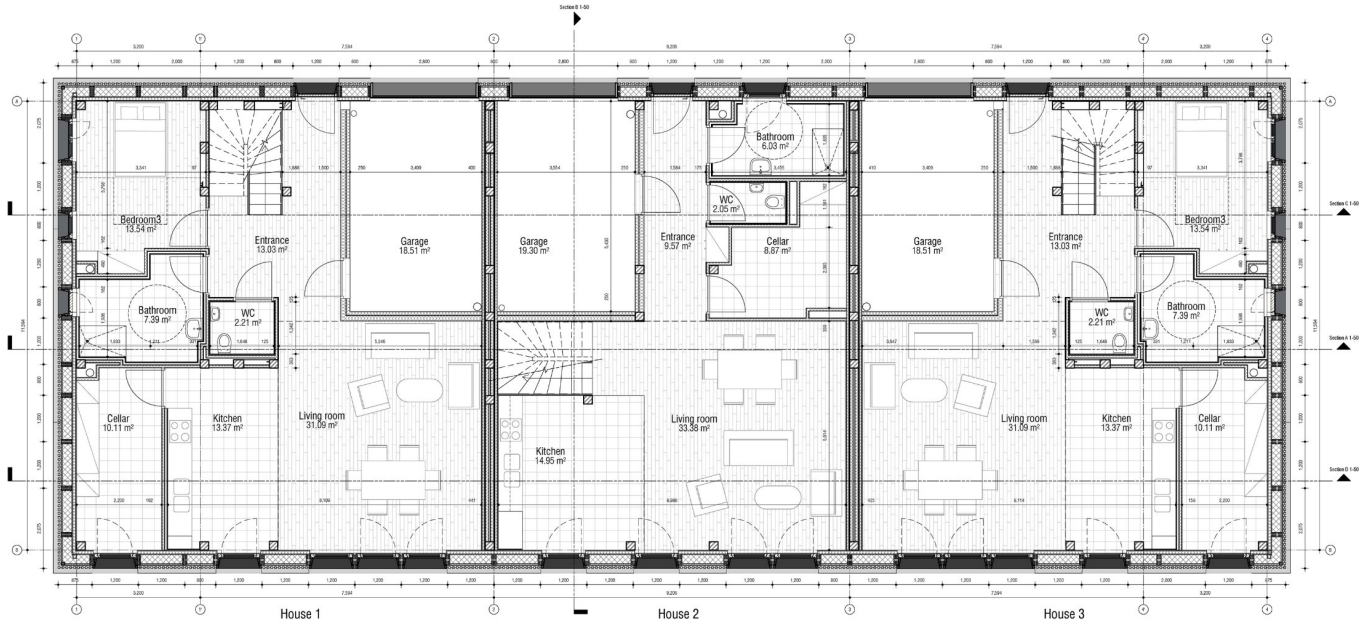

Ground floor

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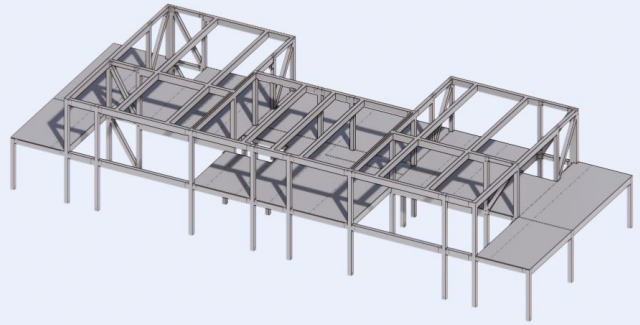

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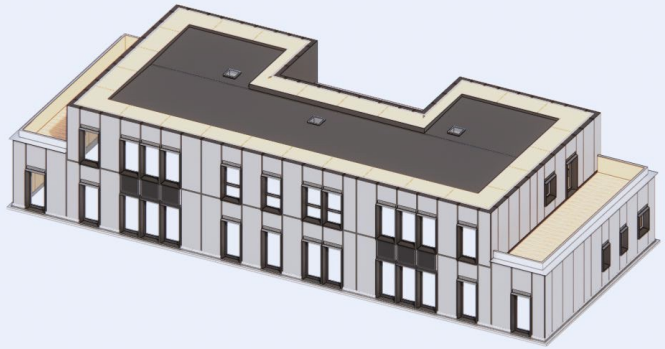

BIM model façade / roof modules - ENAR

BIM model façade / roof cladding - ENAR

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Biobased insulation
foam-formed wood fibre insulation

Details & joints
utilysing same materials as SIP panel for better unitizing and adaptation

ROOF SYSTEM
based on fire-, sound-, thermo-proof 100% eco-friendly SIP panels

Biobased insulation
foam-formed wood fibre insulation

Details & joints
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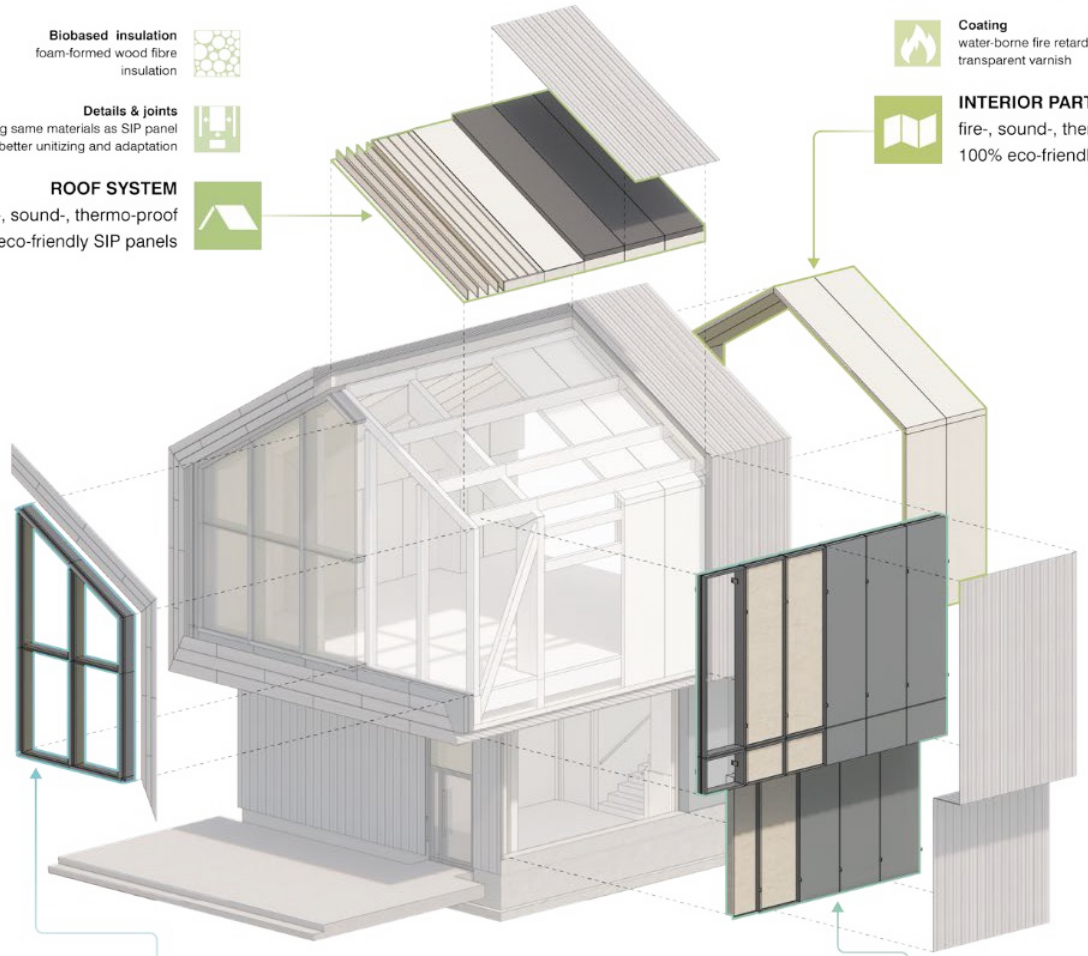
Coating
water-borne fire retardant transparent varnish

INTERIOR PARTITIONS
fire-, sound-, thermo-proof 100% eco-friendly SIP panels



VISION UNIT
modular, high thermal performance, fire-proof

Biobased facade profiles
biobased polyester resin, basalt fibers

FACADE SYSTEM
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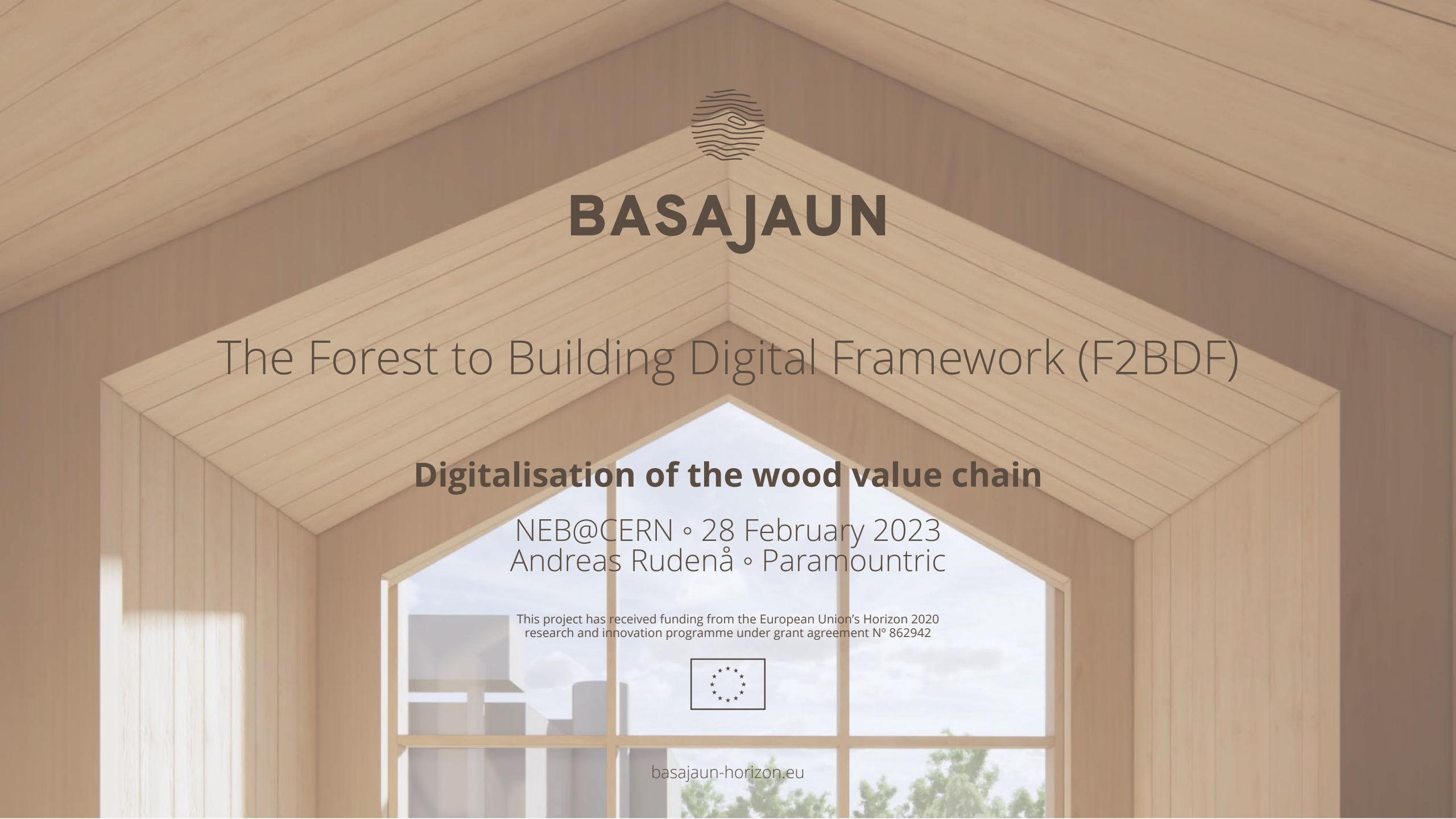
UNSTUDIO



BASAJAUN

The Forest to Building Digital Framework (F2BDF)

Digitalisation of the wood value chain

NEB@CERN ◦ 28 February 2023

Andreas Rudenå ◦ Paramountric

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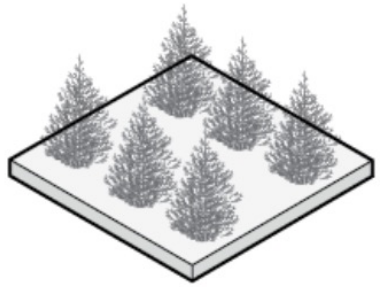

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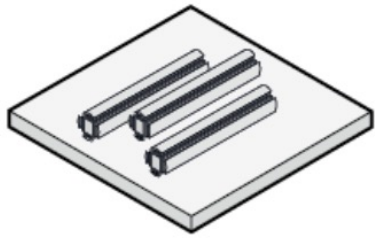

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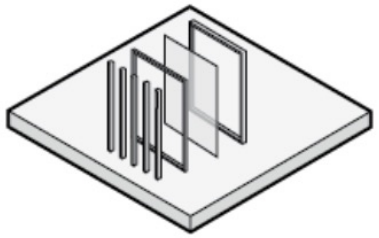

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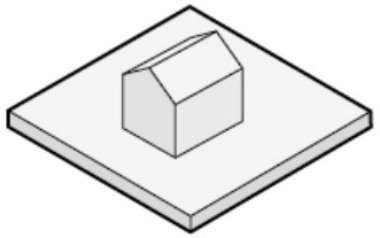

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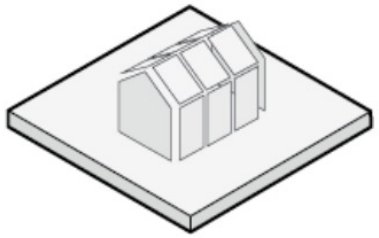

cradle to cradle

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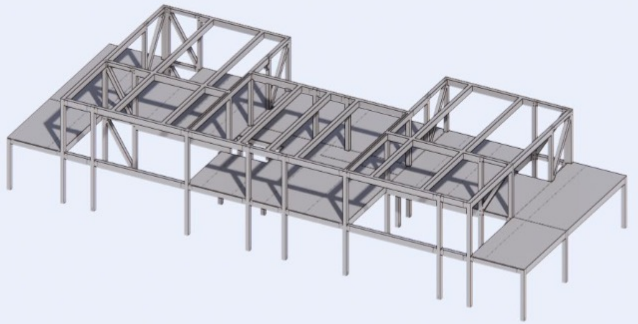

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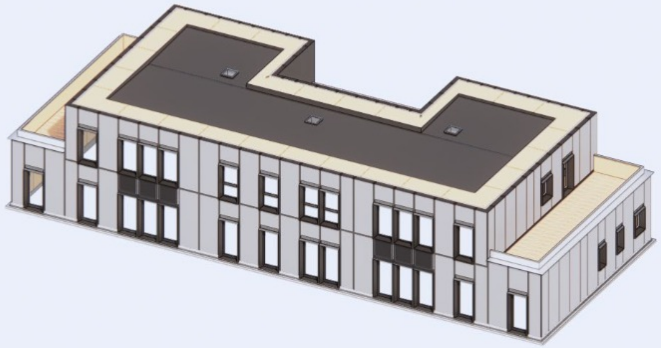

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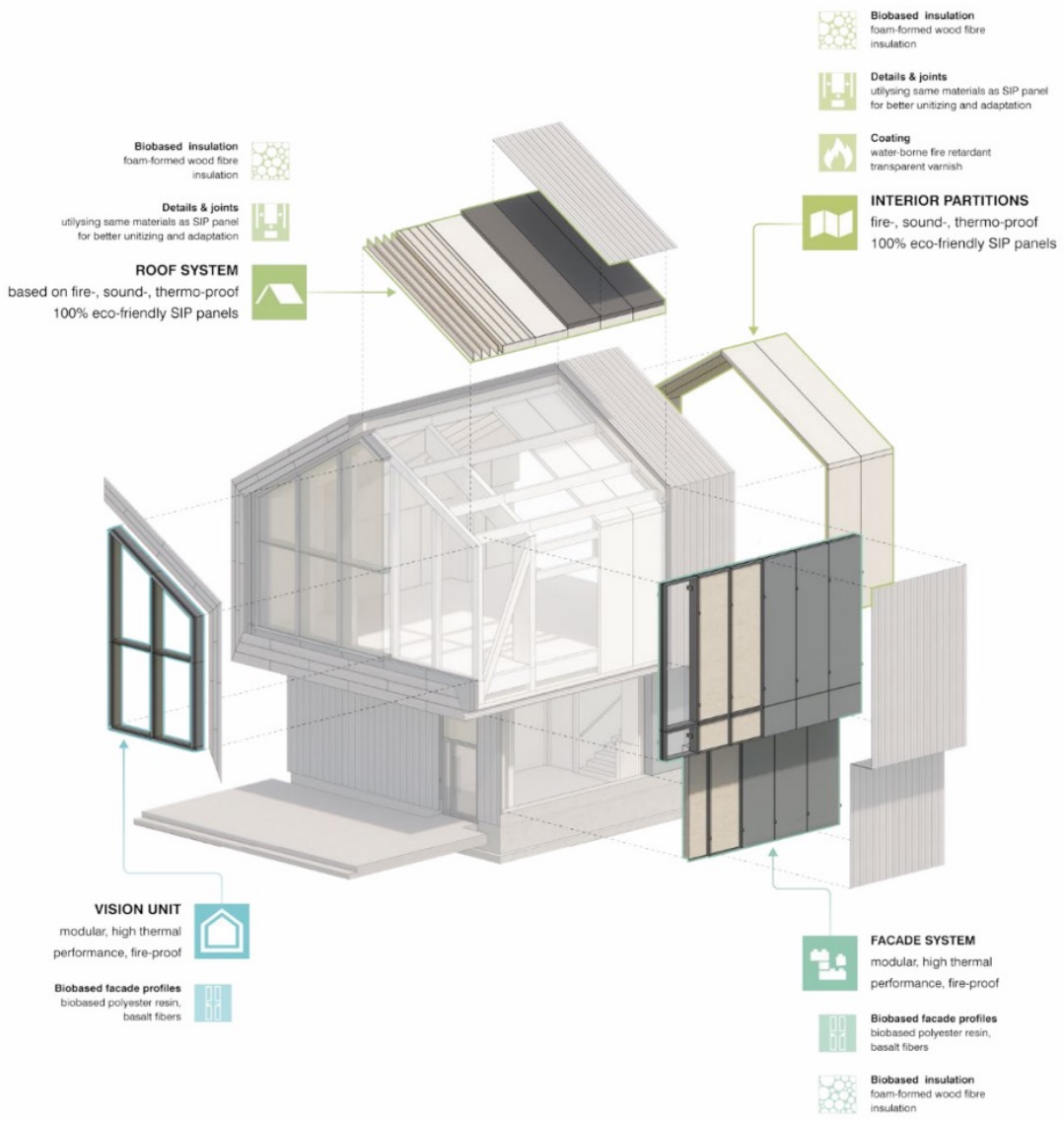
BIM model façade / roof cladding - ENAR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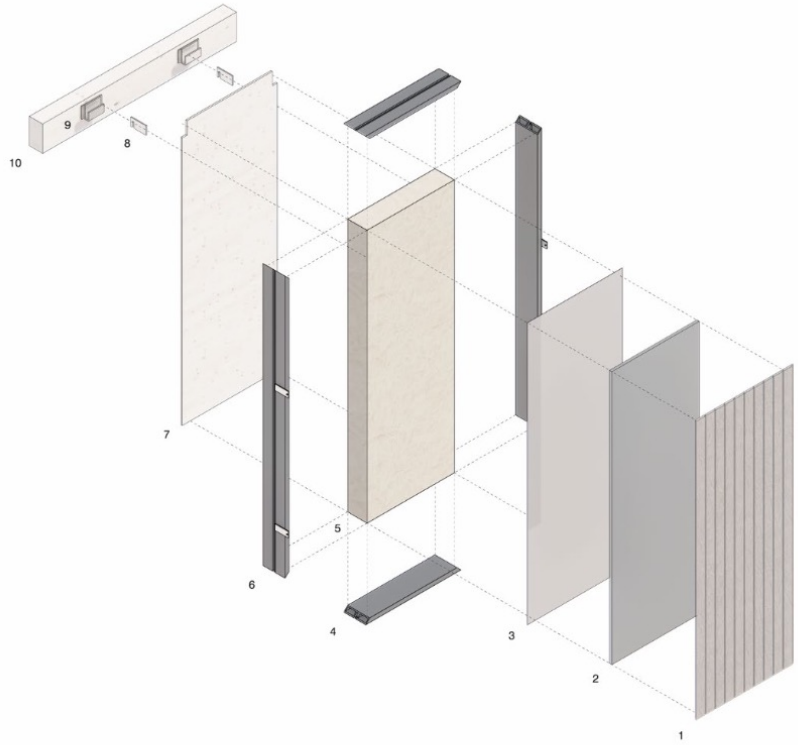


1. Tongue and groove profiles
2. Profiles substructure
3. Waterproofing

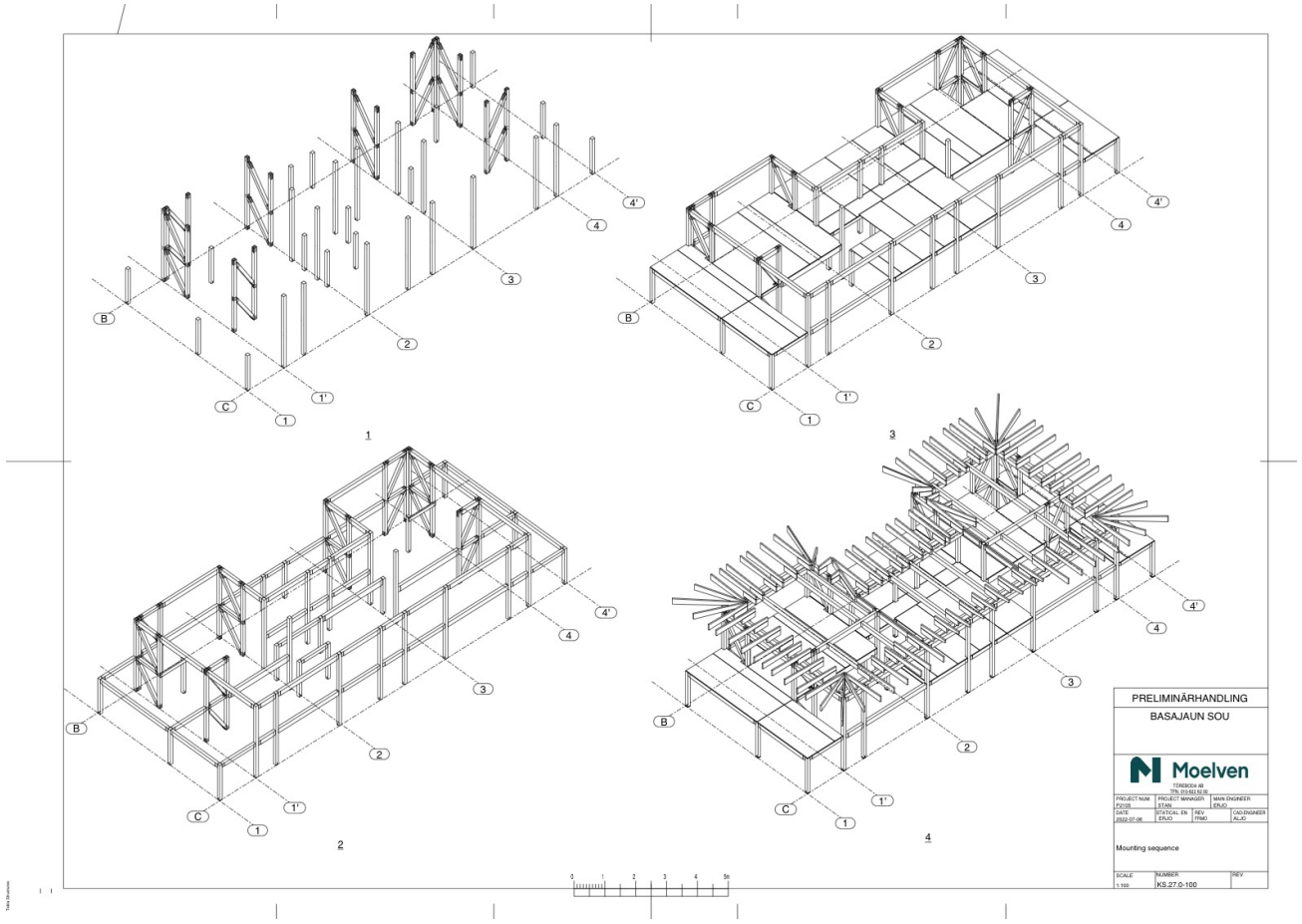
4. **Biobased facade profiles** biobased polyester resin, basalt fibers

5. **Biobased insulation** foam-formed wood fibre insulation

6. Panel-to-panel connector
7. Plywood
8. Male mount on the panel

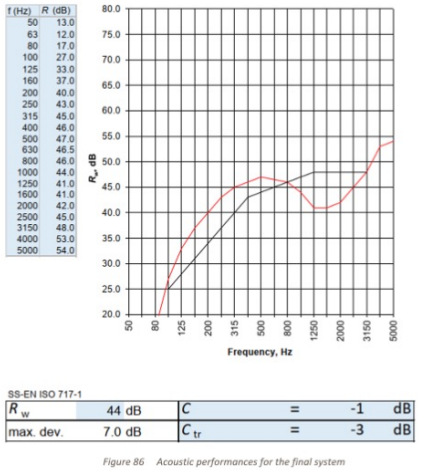
9. Female mount on the beam
10. Beam

Main partners façade : Focchi, Omikron, ENAR


1
2
3
4
PRELIMINÄRHANDLING
BASAJAUN SOU
Moelven
Mounting sequence
KS.27.0-100

Biobased façade profiles

Analysis and calculations
Main partners: Focchi, Omikron, ENAR



f (Hz)	R (dB)
50	13.0
63	12.0
80	17.0
100	27.0
125	33.0
160	37.0
200	40.0
250	43.0
315	45.0
400	46.0
500	47.0
630	46.5
800	46.0
1000	44.0
1250	41.0
1600	41.0
2000	42.0
2500	45.0
3150	48.0
4000	53.0
5000	54.0

SS-EN ISO 717-1

R_w	44 dB	C	=	-1 dB
max. dev.	7.0 dB	C_{tr}	=	-3 dB

Figure 86 Acoustic performances for the final system

Acoustic calculation

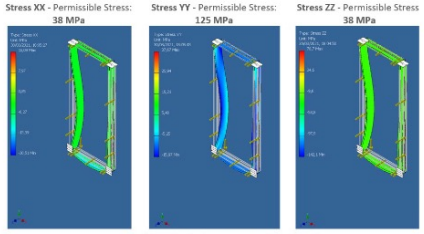


Figure 53 Perimeter Structure Stress Analysis

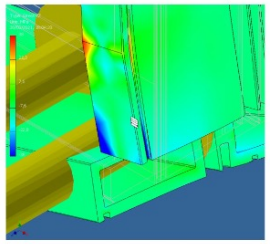
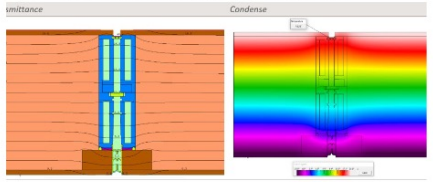


Figure 54 The maximum stress is exceeded in a really small area, so the profile is considered adequa

Structure stress analysis

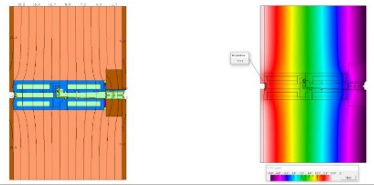
Table 30Thermal analysis the system façade -main nodes of opaque façade.

smittance	Condense



NOD01 Opaque façade system- Node Mullion-Mullion

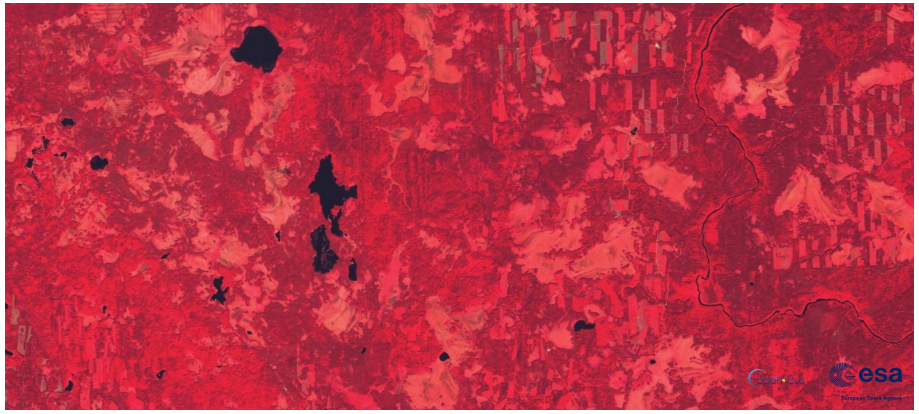
U [] = 0.414 W/m²K Tsimin= 18.2 ≥ 10.2 [°C] – VERIFIED

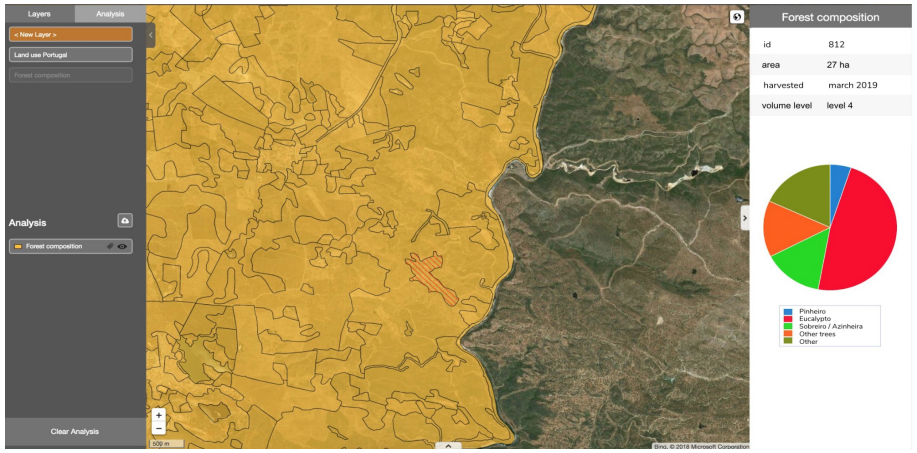


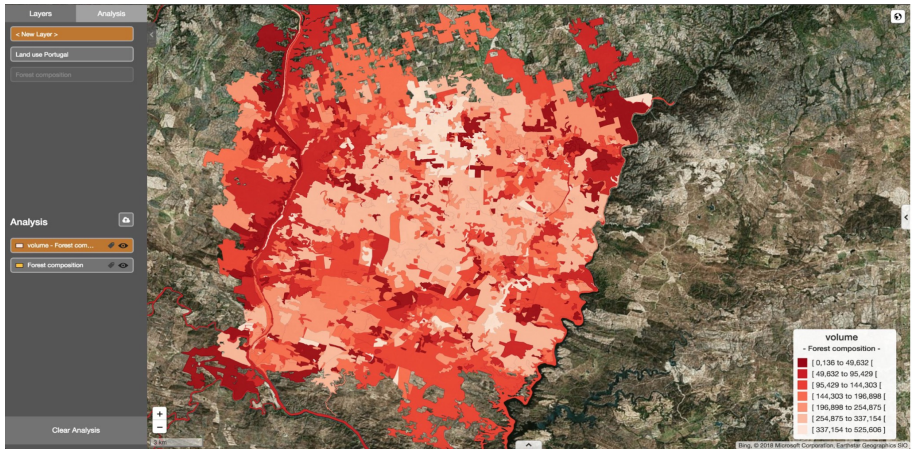
NOD02 Opaque façade system- Node transom female- transom male

U [] = 0.452 W/m²K Tsimin= 17.7 ≥ 10.2 [°C] – VERIFIED –

Thermal analysis







Images by courtesy of Overstory

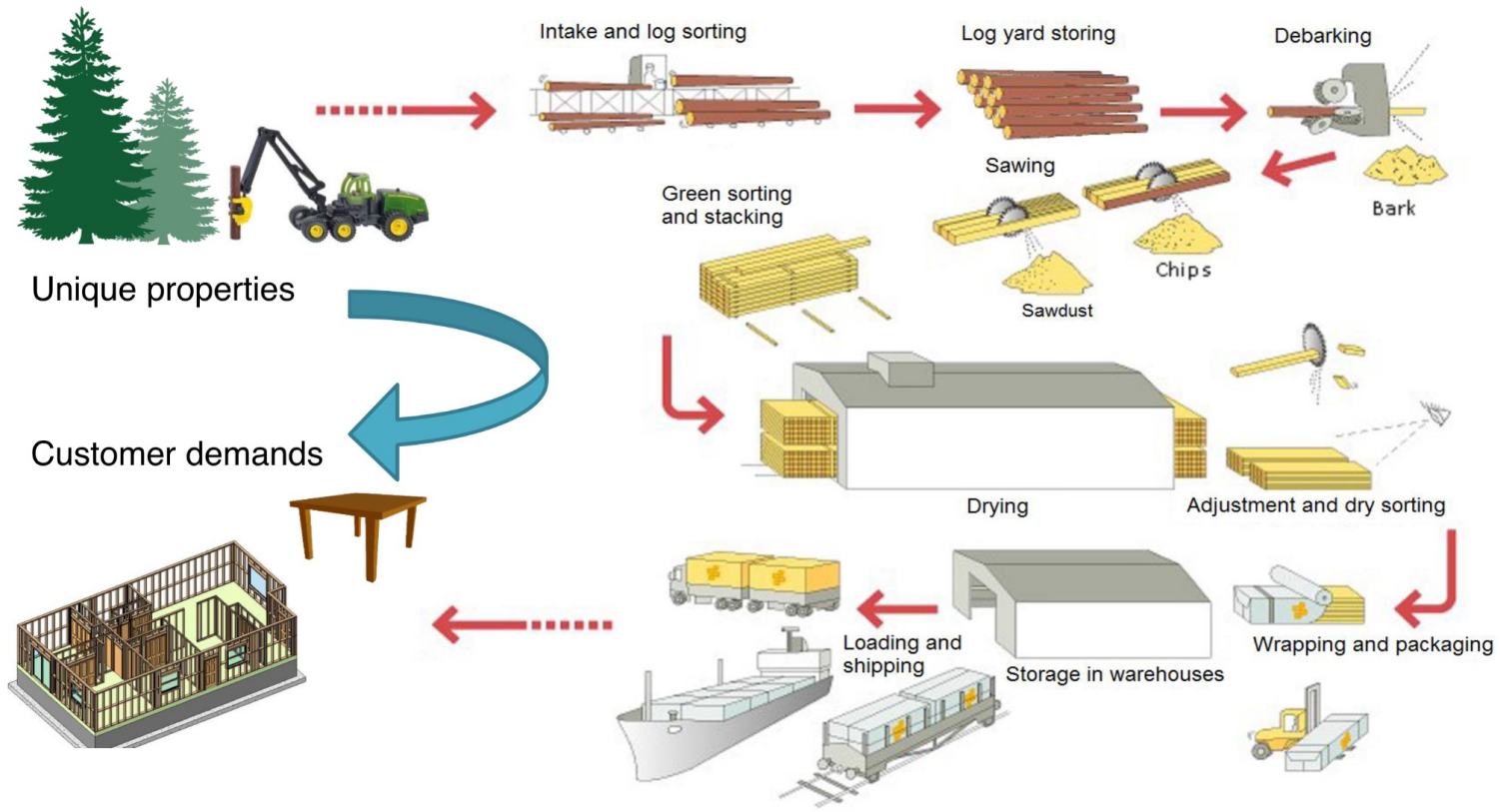


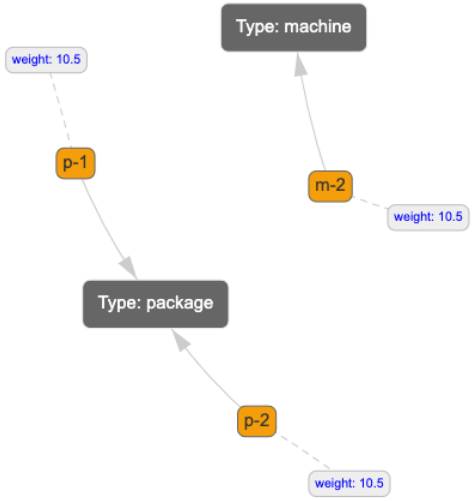
Image by Swedish forest industries federation / RemaSawco

F2BDF – is a tool for how to connect actors along the wood supply chain using collaborative a data flow


Type: package
p-1


p-1
weight: 10.5
Type: package


weight: 10.5
p-1
Type: package
p-2
weight: 10.5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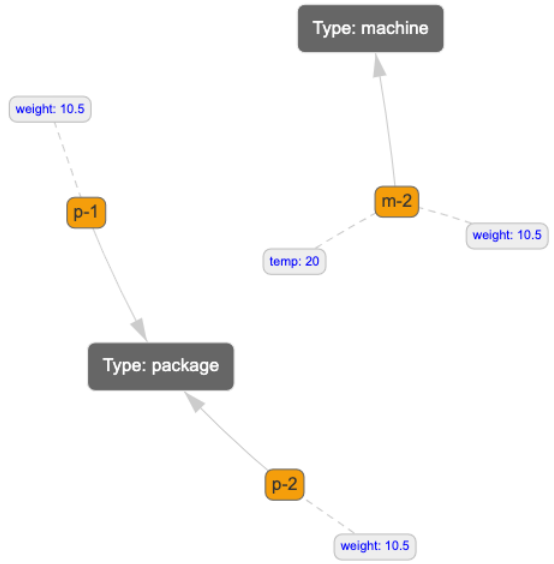
p-1
m-2
weight: 10.5
Type: package
p-2
weight: 10.5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p-1
m-2
weight: 10.5
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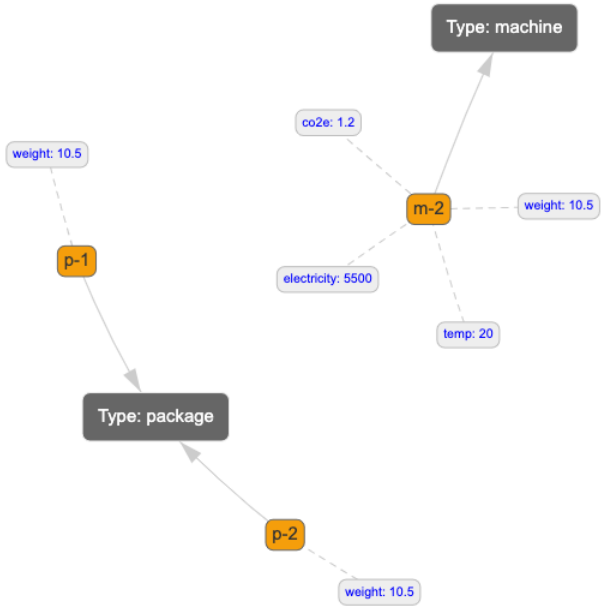
Type: package
p-2
weight: 10.5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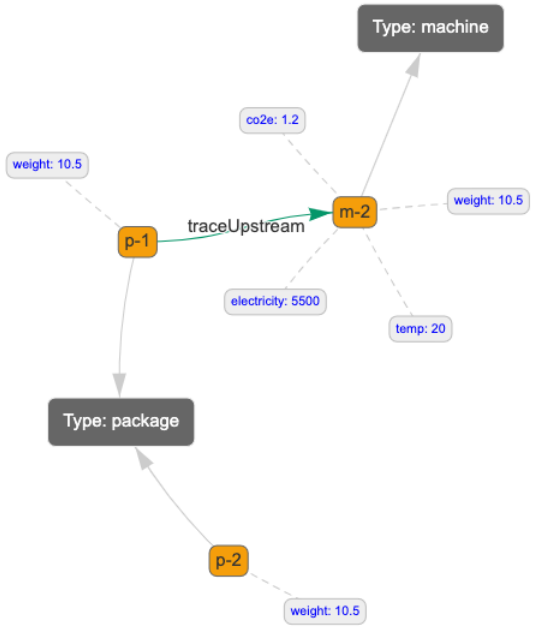
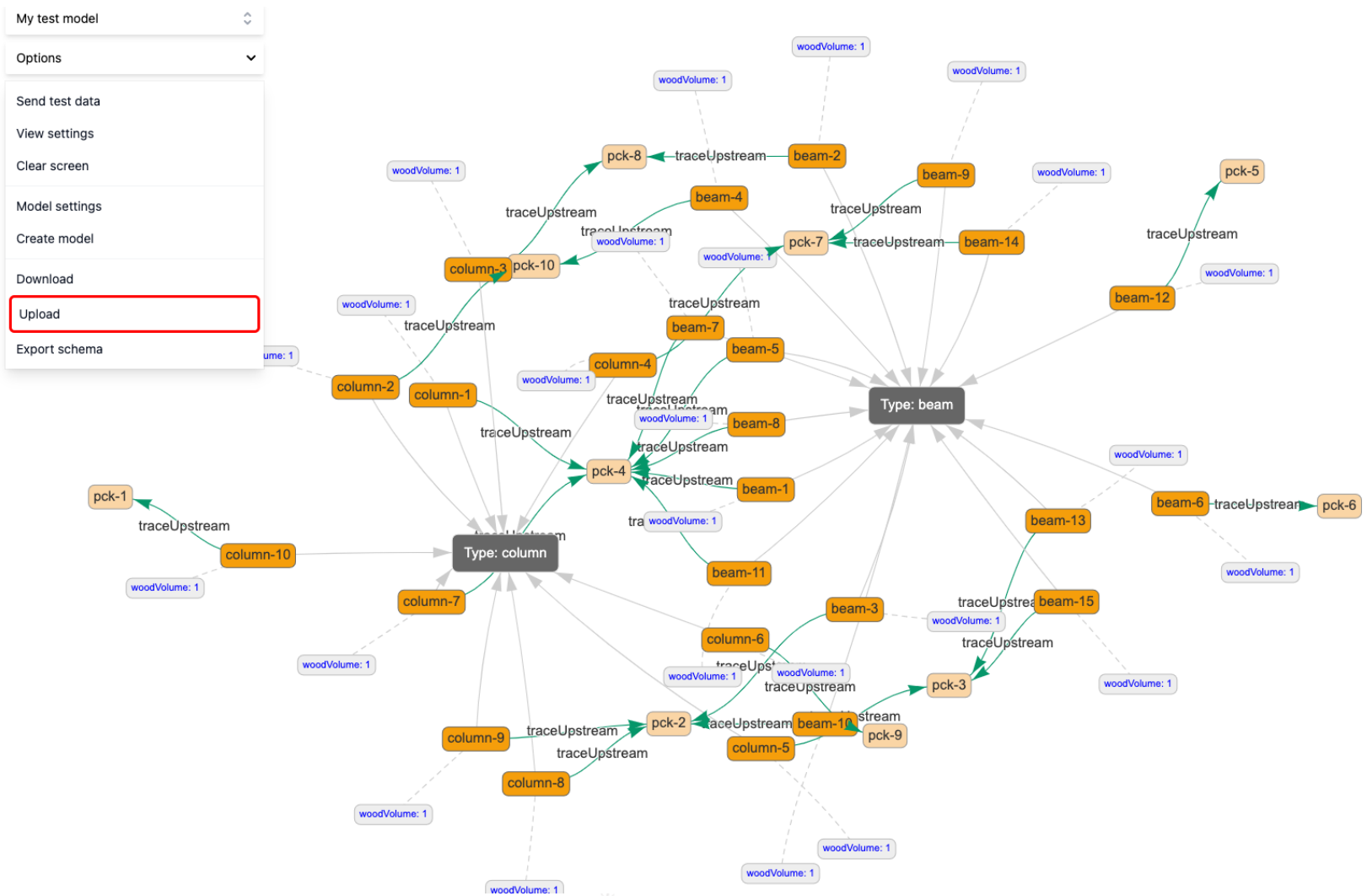
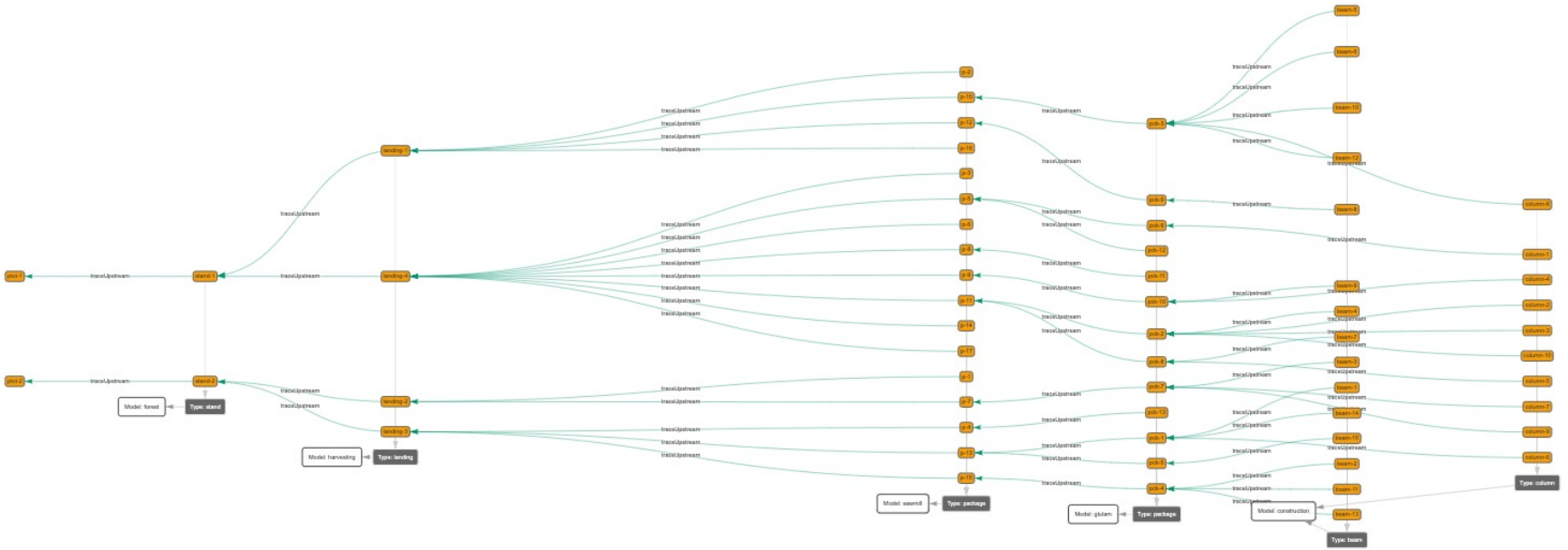
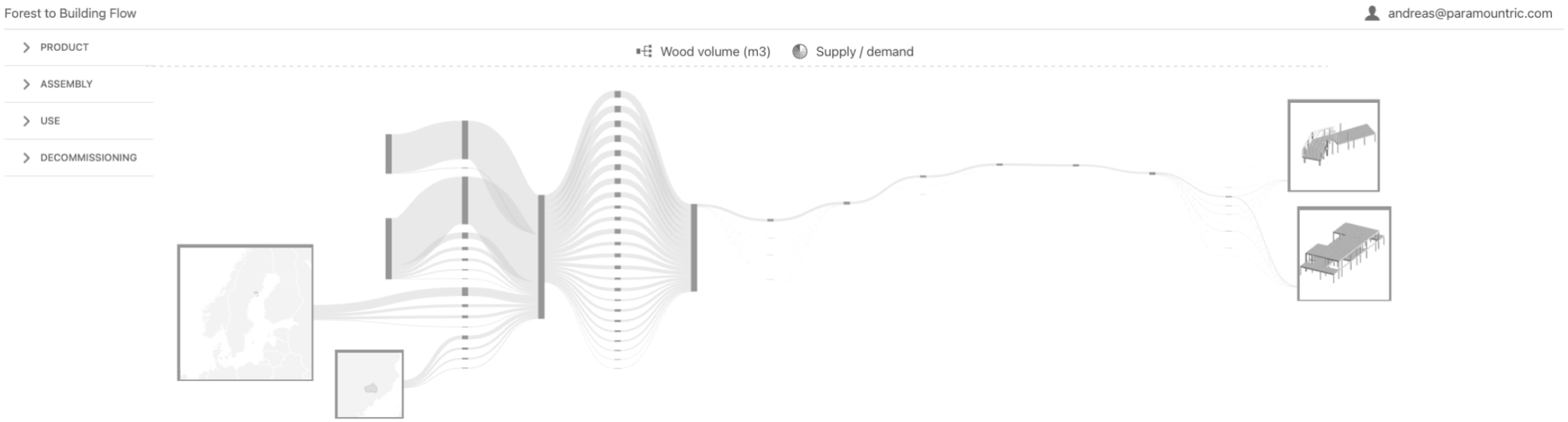
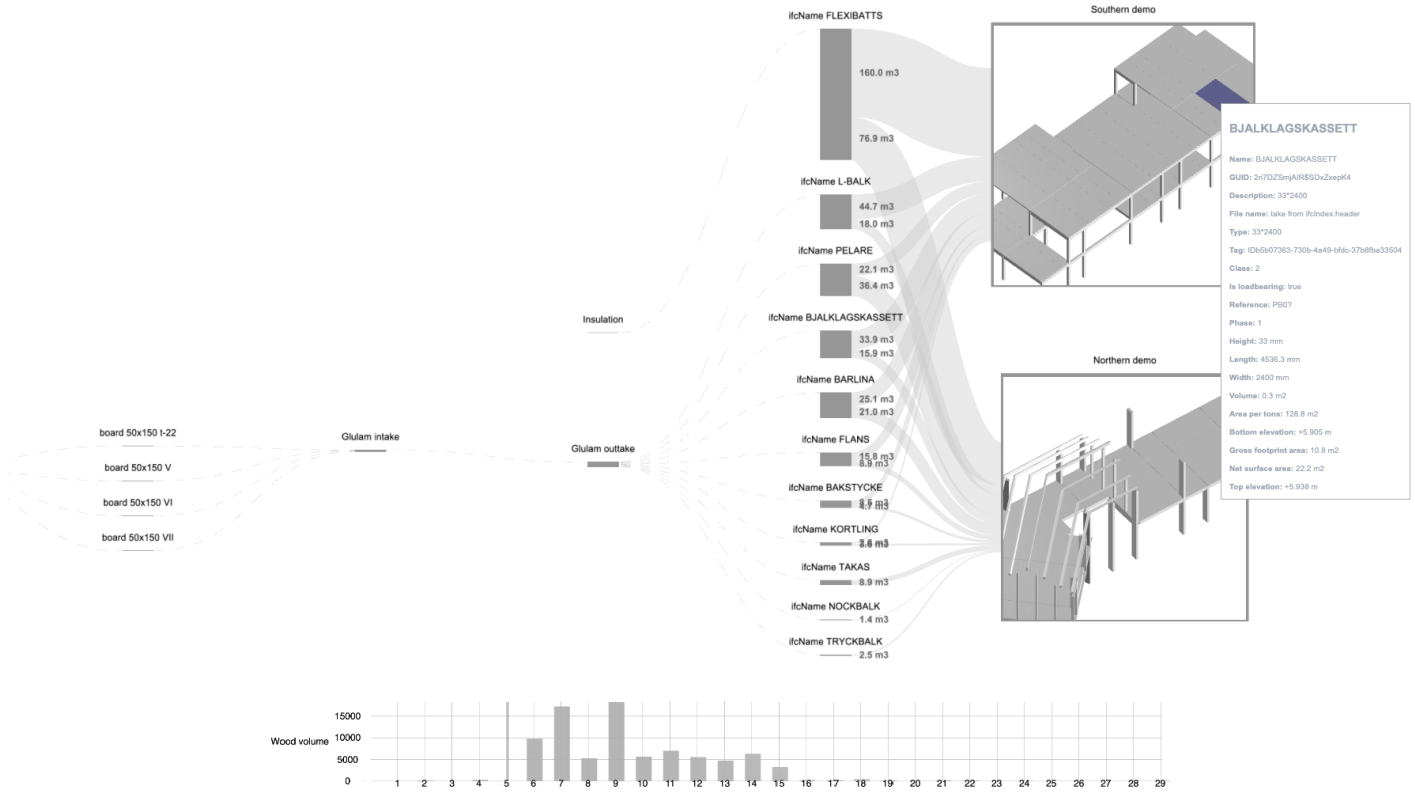
co2e: 1.2
weight: 10.5
m-2
weight: 10.5
p-1
electricity: 5500
temp: 20
Type: package
p-2
weight: 10.5

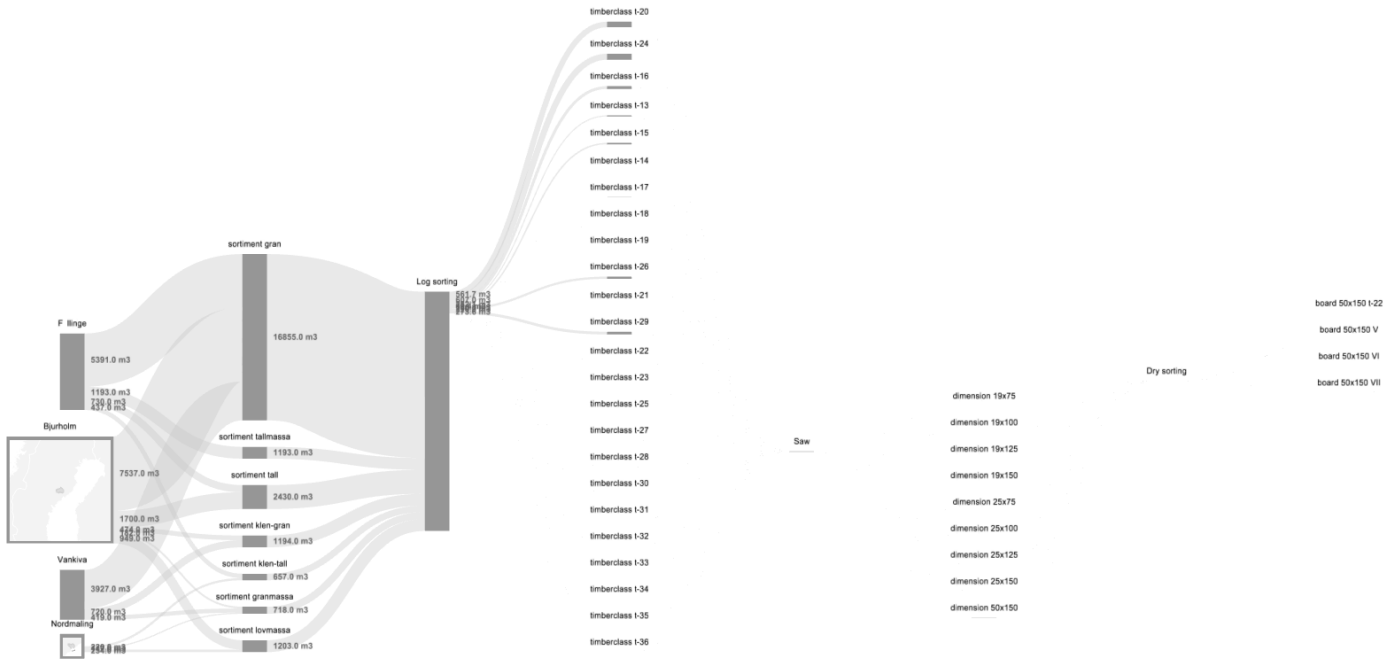

Type: machine
co2e: 1.2
weight: 10.5
m-2
weight: 10.5
traceUpstream
p-1
electricity: 5500
temp: 20
Type: package
p-2
weight: 10.5

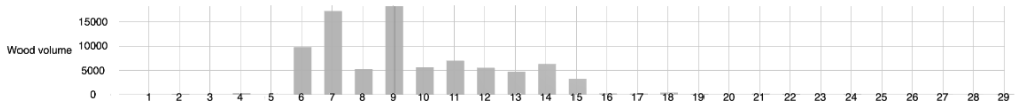

My test model
Options
Send test data
View settings
Clear screen
Model settings
Create model
Download
Upload
Export schema
Type: beam
Type: column
traceUpstream
woodVolume: 1
beam-1
beam-2
beam-3
beam-4
beam-5
beam-6
beam-7
beam-8
beam-9
beam-10
beam-11
beam-12
beam-13
beam-14
beam-15
column-1
column-2
column-3
column-4
column-5
column-6
column-7
column-8
column-9
column-10
pck-1
pck-2
pck-3
pck-4
pck-5
pck-6
pck-7
pck-8
pck-9
pck-10

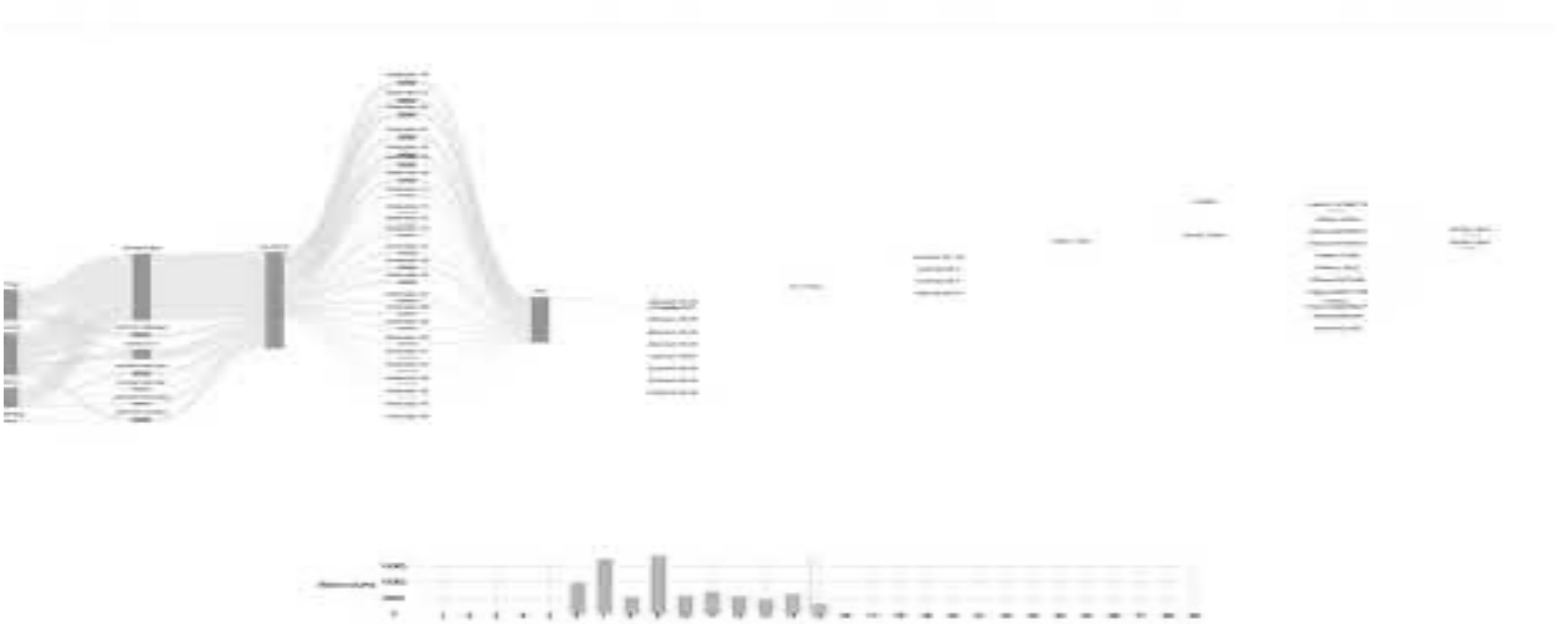

plot-1
plot-2
stand-1
stand-2
Model: forest
Type: stand
lending-1
lending-2
lending-3
lending-4
Model: harvesting
Type: lending
traceUpstream
p-1
p-2
p-3
p-4
p-5
p-6
p-7
p-8
p-9
p-10
p-11
p-12
p-13
p-14
p-15
p-16
p-17
Model: sawmill
Type: package
pck-1
pck-2
pck-3
pck-4
pck-5
pck-6
pck-7
pck-8
pck-9
pck-10
pck-11
pck-12
pck-13
Model: glulam
Type: package
beam-1
beam-2
beam-3
beam-4
beam-5
beam-6
beam-7
beam-8
beam-9
beam-10
beam-11
beam-12
beam-13
beam-14
beam-15
Model: construction
Type: beam
column-1
column-2
column-3
column-4
column-5
column-6
column-7
column-8
column-9
column-10
Type: column


Forest to Building Flow
andreas@paramountric.com
PRODUCT
ASSEMBLY
USE
DECOMMISSIONING
Wood volume (m3)
Supply / demand


board 50x150 I-22
board 50x150 V
board 50x150 VI
board 50x150 VII
Glulam intake
Glulam outtake
Insulation
ifcName FLEXIBATTS
160.0 m3
76.9 m3
ifcName L-BALK
44.7 m3
18.0 m3
ifcName PELARE
22.1 m3
36.4 m3
ifcName BJALKLAGSKASSETT
33.9 m3
15.9 m3
ifcName BARLINA
25.1 m3
21.0 m3
ifcName FLANS
15.8 m3
ifcName BAKSTYCKE
ifcName KORTLING
ifcName TAKAS
8.9 m3
ifcName NOCKBALK
1.4 m3
ifcName TRYCKBALK
2.5 m3
Southern demo
Northern demo
BJALKLAGSKASSETT
Name: BJALKLAGSKASSETT
GUID: 2n7DZSmjAlR$SDxZxepK4
Description: 33*2400
File name: take from ifcIndex.header
Type: 33*2400
Tag: IDb5b07363-730b-4a49-bfdc-37b6fba33504
Class: 2
Is loadbearing: true
Reference: PB07
Phase: 1
Height: 33 mm
Length: 4536.3 mm
Width: 2400 mm
Volume: 0.3 m2
Area per tons: 128.8 m2
Bottom elevation: +5.905 m
Gross footprint area: 10.8 m2
Net surface area: 22.2 m2
Top elevation: +5.938 m
Wood volume
15000
10000
5000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29


sortiment gran
16855.0 m3
F llinge
5391.0 m3
1193.0 m3
730.0 m3
437.0 m3
Bjurholm
7537.0 m3
1700.0 m3
474.0 m3
345.0 m3
Vankiva
3927.0 m3
720.0 m3
410.0 m3
Nordmaling
sortiment tallmassa
1193.0 m3
sortiment tall
2430.0 m3
sortiment klen-gran
1194.0 m3
sortiment klen-tall
657.0 m3
sortiment granmassa
718.0 m3
sortiment lovmassa
1203.0 m3
Log sorting
timberclass t-20
timberclass t-24
timberclass t-16
timberclass t-13
timberclass t-15
timberclass t-14
timberclass t-17
timberclass t-18
timberclass t-19
timberclass t-26
timberclass t-21
timberclass t-29
timberclass t-22
timberclass t-23
timberclass t-25
timberclass t-27
timberclass t-28
timberclass t-30
timberclass t-31
timberclass t-32
timberclass t-33
timberclass t-34
timberclass t-35
timberclass t-36
Saw
dimension 19x75
dimension 19x100
dimension 19x125
dimension 19x150
dimension 25x75
dimension 25x100
dimension 25x125
dimension 25x150
dimension 50x150
Dry sorting
board 50x150 t-22
board 50x150 V
board 50x150 VI
board 50x150 VII


Wood volume
15000
10000
5000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29



BASAJAUN

Thank you for your attention!

F2BDF - Digitalisation of the wood value chain

NEB@CERN ◦ 28 February 2023

Andreas Rudenå ◦ Paramountric

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 862942

basajaun-horizon.eu

The HuT

The Human-Tech Nexus

Building a safe haven for coping with climate extremes

Funded by
The European Union

www.thehut-nexus.eu


Last disaster in ...

Start: October 2022
Duration: 48 month
Partners: 25 from European 13 countries

Extreme Climate

SOLUTIONS are needed

Due to extreme climate conditions, Europe has to deal with substantial economic losses.

It is therefore important to find effective strategies to manage these events.

These solutions have to:

- Avoid future losses;
- Generate economic benefits and increase productivity;
- Gain social, environmental and cultural benefits.

Climate Events

The **6** events considered in the project

FOREST FIRES

DROUGHTS

HEATWAVES

LANDSLIDES

FLOODS

STORMS

Our objective

The project wants to address the impacts of such events by **integrating** and leveraging **best practices** and **successful multi-disciplinary experiences**.

The project will focus on **prevention** and **preparedness** phases of the **disaster risk management cycle**.

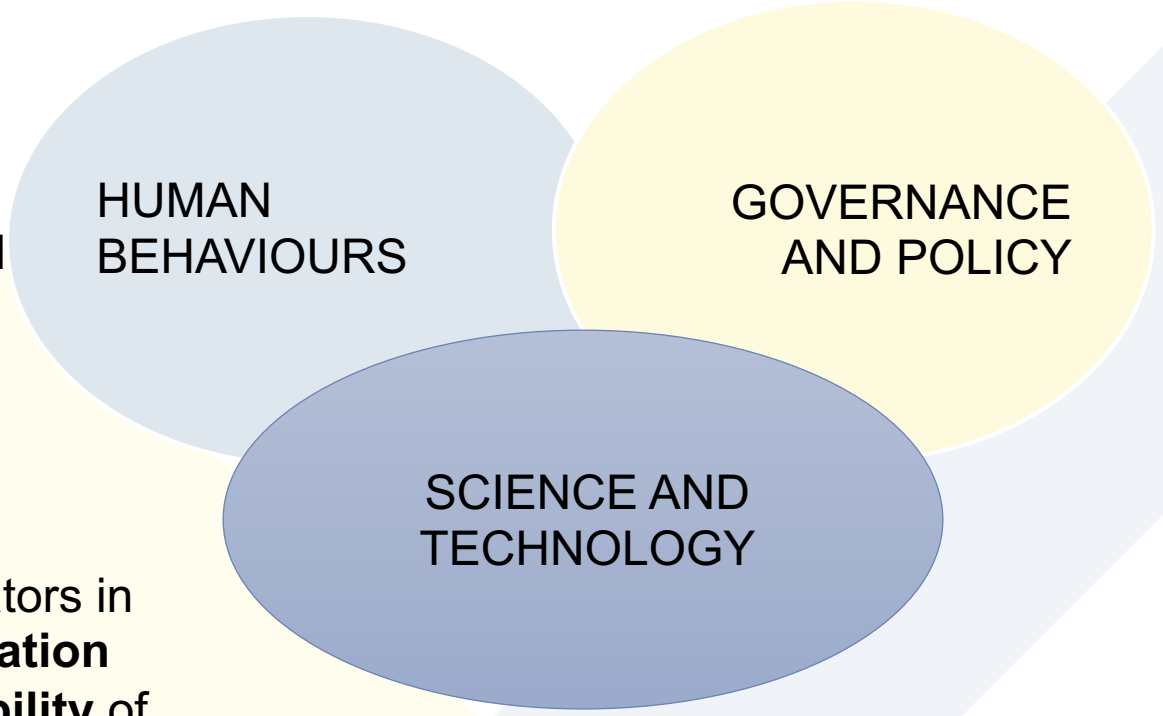
Activities and Methodologies

The main activities will be:

- **Transfer of best practice**s;
- **Development or upgrade of processes** and **tools**

The project will study carefully:

- The **Nexus** between these areas;
- Experiences across different demontrators in order to both encourage **cross-fertilisation** and assess **transferability** and **scalability** of solutions adopted



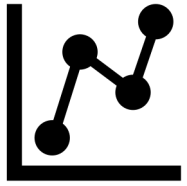
Stakeholders Needs

The **needs** that will be taken into consideration

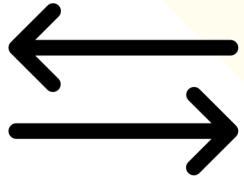
MONITORING

RISK GOVERNANCE AND POLICY

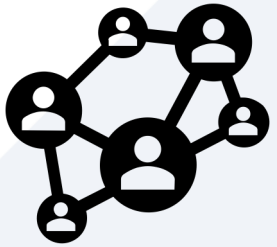
KNOWLEDGE-BASED ACTION



MODELING AND RISK ANALYSIS



RISK TRANSFER

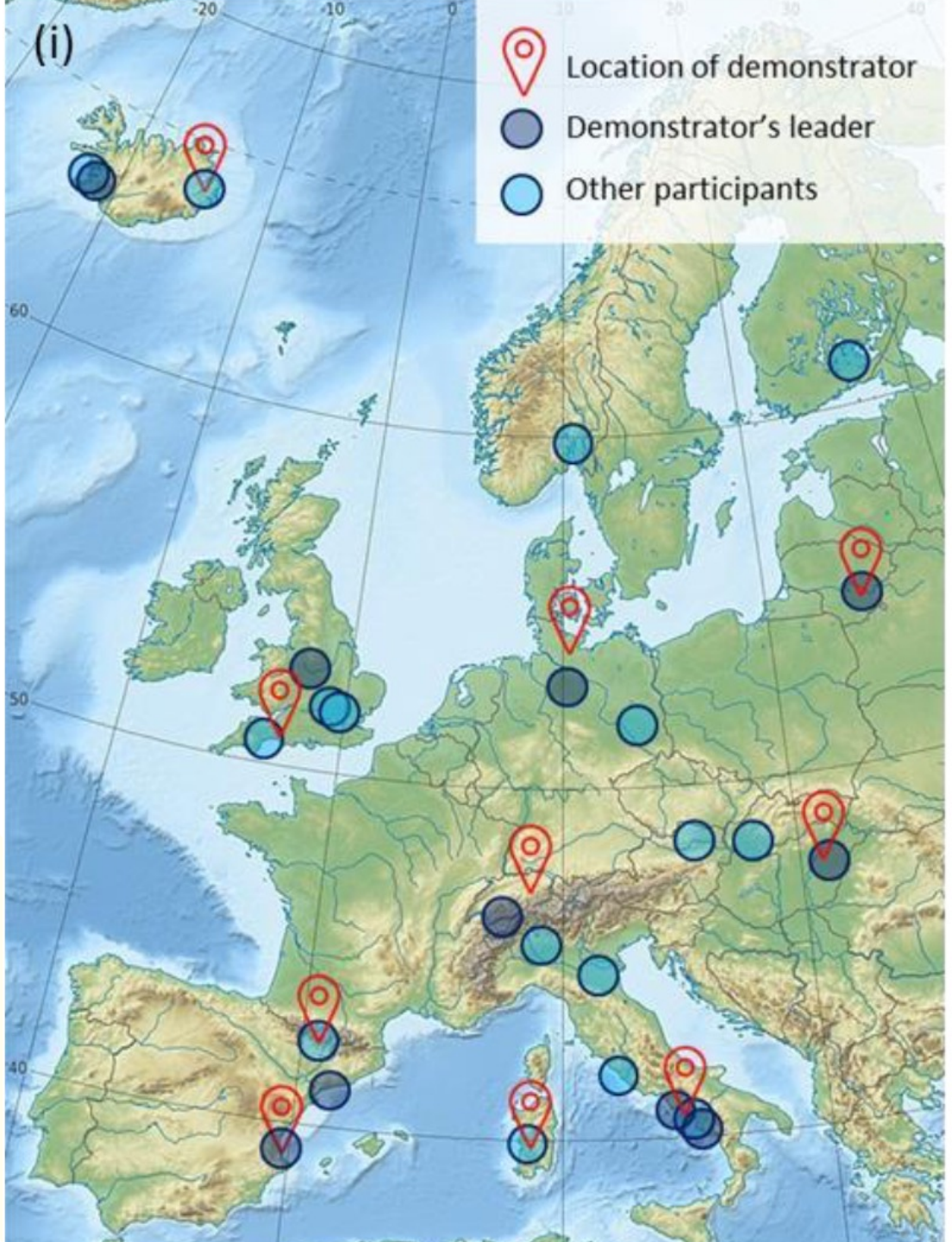


COMMUNITY INVOLVEMENT

Demonstrators

A set of **10 demontrators** impacted by extreme climate events have been identified. In these areas **some innovative solutions will be tested**.

These areas are representative of diverse climatic regions of **Europe**.



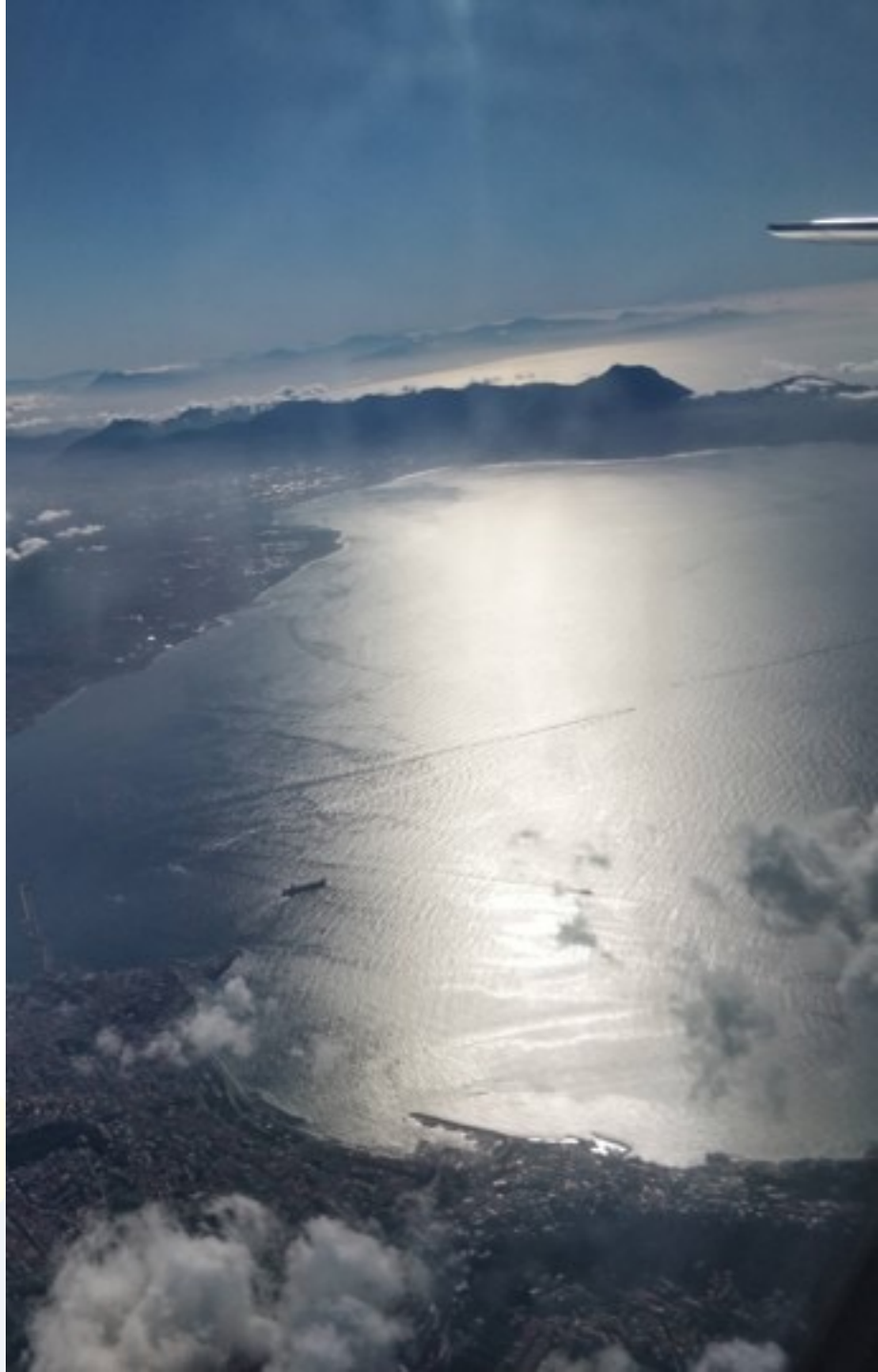
DEMONSTRATOR 3

Lattari Mountains, Italy

Smart Communities «approach»

DEM3 is developing a kind of technological infrastructure to gather information from local experts (e.g. hikers, trekkers, volunteers of Civil Protection) about the vulnerabilities in the area.

The collected information is expected to influence the decisions of the municipalities before, during and immediately after a weather-induced event.



DEMONSTRATOR 5

Schleswig-Holstein State, Germany

Within The Hut I am anchored in DEM5 with the mission to better prepare cities for climate extremes under **citizen participation**.

- Research field: **coastal towns** of **Schleswig Holstein**
- Target group: municipalities, communities and citizens
- Goal: to develop **narrative-based climate services** in **co-design** to implement climate adaptation.

Science-Art Fusion

I am also on the following 7 work packages:

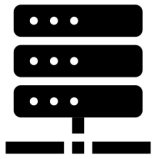
(1) Demonstrator Arena
(2) Human Behaviours
(3) Governance and Policy
(4) Science and Technology
(5) Transferability and Scalability
(6) Communication, dissemination and exploitation
(7) Coordination and Management

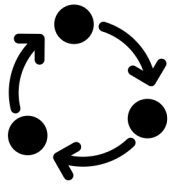
with Science-Art-Fusion in **WP5**, where we explore knowledge transfer through science-art projects.

Expected results and impacts

Advancement in knowledge 

Models and tools 

Softwares, databases, platforms 

 Methodologies

 Educational material

 Policy brief

The HuT

THANK YOU!

Visit our website at www.thehut-nexus.eu

Funded by
The European Union

"MATch Up and NEB at CERN,
Meet the Smart Communities projects session",
Geneva February 27th, 2023

Ángel Navarro
Las Naves

MATCHUP

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774477

AJUNTAMENT DE VALÈNCIA

Missions València 2030

LAS NAVES

AGENDA

1. Why?
2. What?
3. How?
4. Community
5. Next steps

Why?

Why

NEB & Smart Communities projects ?

beautiful | sustainable | together

The Smart Cities and Communities lighthouse projects are funded by the European Commission through the Horizon 2020 research and innovation programme, with the aim of bringing together cities, industry and citizens to demonstrate solutions and business models that can be scaled up and replicated, and that lead to measurable benefits in energy and resource efficiency, new markets and new jobs.

What? Match Up at glance

28 partners |8 cities

€ 19,5 M

October 2017 - September 2023

3 Lighthouse cities & 4 Follower cities

MATCHUP

SHOULD WE WAIT TO LIVE IN THE FUTURE OR CAN WE CREATE IT OURSELVES?

MAtchUP is an EU-funded Smart City project which designs and implements a palette of innovative solutions in the energy, mobility and ICT sectors. These solutions will define a model of urban renovation for other cities in Europe and beyond.

3 LIGHTHOUSE CITIES take the lead of the project by implementing innovative and technological solutions to boost their local economies and improve the quality of life of their citizens.

VALENCIA
(Spain)

DRESDEN
(Germany)

ANTALYA
(Turkey)

4 FOLLOWER CITIES have the key role to replicate the solutions that have proven to deliver results in the Lighthouse and maximise their potential.

OSTEND
(Belgium)

HERZLIYA
(Israel)

SKOPJE
(FYROM)

KERAVA
(Finland)

CHALLENGES

- Planning of Sustainable urban transformation and transition considering both the economic challenge and the social aspects
- Improvement of cities' SEAP and SECAP
- Demonstration, validation and transferability of solutions
- Outline of replication and upscaling solutions in our smart cities
- Implementation of the upscaling and replication plans, or rather the formal commitment of cities to implement the solutions

OPPORTUNITIES

- Replication potential in follower cities and beyond
- Increase in energy efficiency and use of renewable energies at city-level
- More liveable, inclusive and citizen-centric cities
- Increase in e-vehicles and cut in CO2-based transports
- New job opportunities in green energy and mobility, research, digitalisation, social field
- Mentoring and staff exchange to trigger knowledge exchange between partners and cities
- Stronger connections among EU cities, stakeholders and investors

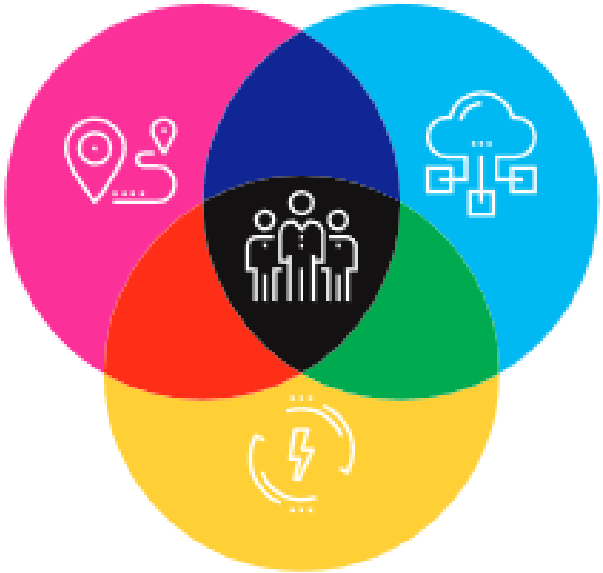
BARRIERS

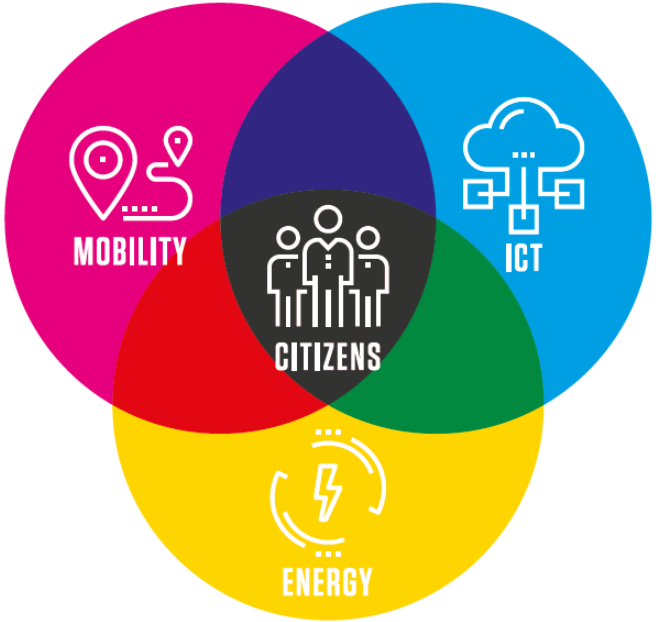
- Legal and policy: construction standards, energy codes, flexibility in urban change, market legislation, different EU normative
- Economic: viability of the technologies, price distortions and variability, cost-effectiveness perception, risk of investments
- Information & Education: lack of skilled workforce, information asymmetry among different countries
- Social and behavioural: public participation and acceptance, comfort barriers, consumers' behaviour hard to change

How?

A CITIZEN-CENTRIC APPROACH

To become a smart city means to provide the right services, tools and technologies tailored on citizens and on their urban environment. By implementing technology-driven solutions together with non-technical actions in a smart and innovative way, cities can become more attractive for citizens and businesses. A citizen-centric approach is crucial for the success of a smart city. MAtchUP activities will be highly tailored on citizens who will play an active role in the co-creation of new urban strategies.





LESS ENERGY, MORE SOLUTIONS

SMART SOLUTIONS, BETTER MOBILITY

CONNECTED CITIES, LIVEABLE CITIES

SMART CITIES, SMART CITIZENS

Genera 2023, Laurie Barriol-LNV.

ENERGY

LESS ENERGY, MORE SOLUTIONS

MAtchUP aims to achieve high-performance districts through a series of interventions:

- improvements in buildings' energy efficiency,
- high integration of renewables in the energy supply,
- implementation of advanced energy management systems combined with innovative storage systems.

Moreover, an advanced management of the urban energy infrastructures will be set up, integrating innovative storage technologies to increase the global performance and RES contribution. Several innovative management systems will be deployed, from smart meters to overall recharging management solutions to reduce the grid impact.

+45%
ENERGY EFFICIENCY IMPROVEMENT

MOBILITY

SMART SOLUTIONS, BETTER MOBILITY

New electromobility solutions, both for persons and goods, will be implemented in MAtchUP through new electric vehicles (EV) and charging infrastructures.

The most relevant actions that MAtchUP will implement in this area are:

- conventional vehicles replacement: more than 150 EV will be introduced,
- implementation of around 120 innovative charging infrastructures for e-vehicles and e-buses,
- improved logistic solutions, like last mile logistics based on e-Bikes, and
- multimodality strategies.

+4,000
TONS OF CO_2 SAVED PER YEAR

ICT

CONNECTED CITIES, LIVEABLE LIVES

MAtchUP will develop ICT solutions for improved planning management, control and maintenance of physical urban infrastructures and operational technologies in buildings, energy and transport, to enable better services for individuals and businesses.

An Open Specifications ICT concept will be established, defining a common approach in all functional requirements, software architecture and data structures to be designed and implemented.

Following this open specification concept, the current existing ICT models present in the cities will be improved with ICT solutions fully integrating at urban level to complement the demonstration.

SMART
INTEGRATION OF CITY SERVICES

CITIZENS

SMART CITIES, CITIZENS' CITIES

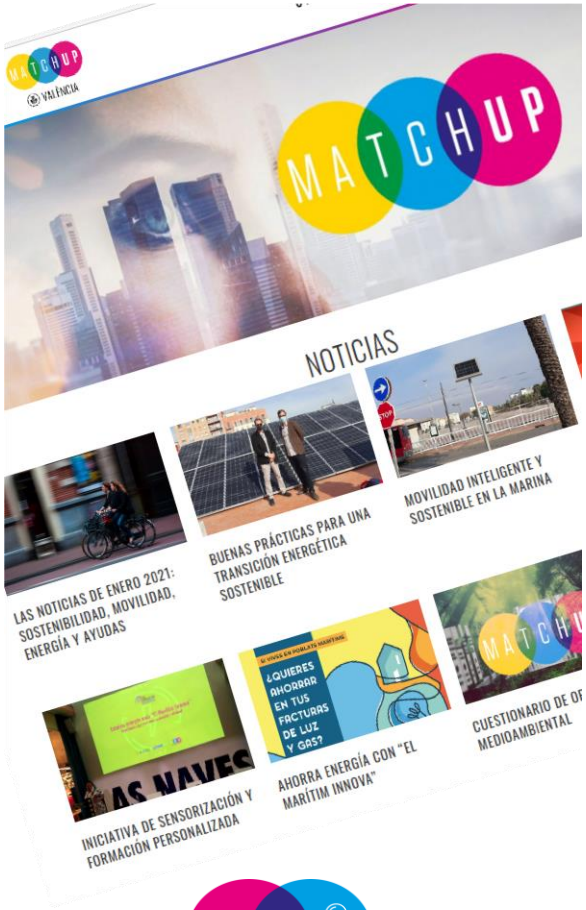
MAtchUP wants to redesign cities by complementing the technical solutions with a set of non-technical ones, such as specific social engagement activities, sustainable employment initiatives, staff exchange, city mentoring, and validation of innovative business models.

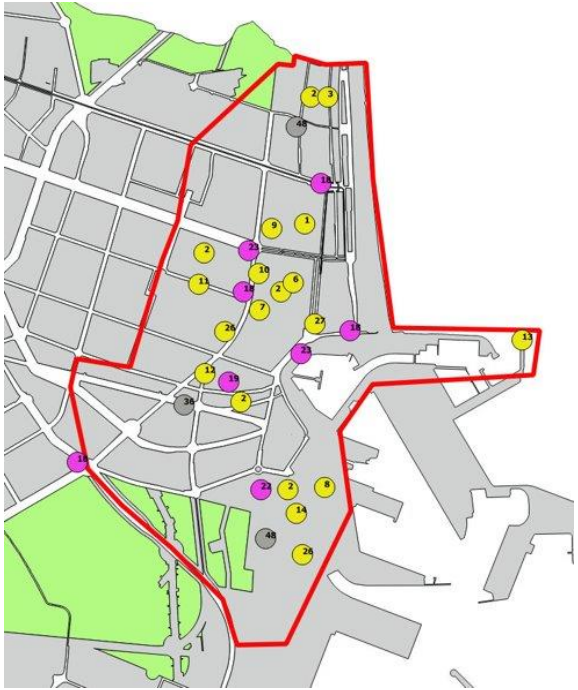
Different key actors – policy makers, universities, industry, investors and, most importantly, citizens – will join forces to develop smart models of innovation, inclusion and prosperity to restore cities' liveability.

MAtchUP aims to strengthen the city transformation strategies in a sustainable and inclusive manner, empowering citizens to participate in the planning process and integrating their voice in the replication and scale up plans.

90,000
CITIZENS INVOLVED IN 3 DISTRICTS

3 districts





MATCHUP

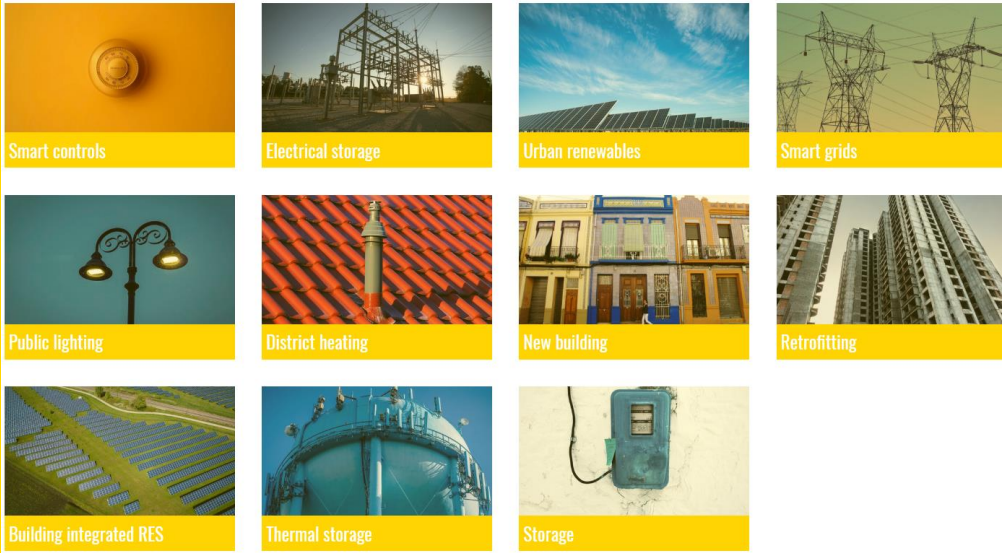
Web

www.elmaritiminnova.com

www.delmaritimalmon.com

ENERGY

- Retrofitting and reconstruction of 600 public and private homes
- Retrofitting and reconstruction of 10 public buildings
- Including 223 kW PV and 1100 kWh for 218 kW of storage
- Aerothermal and solar thermal
- 550 Smart controls
- 3 Demonstrative NZEBs
- Advanced geothermal sytem
- Sea wave energy converter
- 4000 street smart light controllers



+45% ENERGY EFFICIENCY IMPROVEMENT

MOBILITY

- 101 eVehicles public fleet
- 2 eBuses + 37 hybrid
- 5 eBikes disabled mobility and last mile logistics
- 72 eCharging points
- 3 V2G
- 10 humble lamp posts
- 2 multimodal hubs + 8 smart panels
- Management systems for echarging and smart parking
- Analysis of Eco driving patterns


Charging station


Electric vehicles


Demand management


Multi-modality


Intelligent transport system


Urban freight

+4,000 TONS OF CO_2 SAVED PER YEAR

ICT

- Integration with VLCi urban platform
- Open data and open KPIs
- IoT integration
- Big data analysis of KPIs
- Smart systems to energy control for homes and public buildings

Urban platform

Internet of Things

SMART INTEGRATION OF CITY SERVICES

CITIZENS

- New policies & upscaling of strategic plans
- Participacion, education and cocreation
- Civic engagement activities
- New business opportunities based on energy solutions
- Social entrepreneurship program
- Prosumers initiative
- Toolkits for self consumption deployment
- City mentoring


Policy improvements


Innovative businesses


Urban planning


Staff exchange


Citizens' engagement

90,000 CITIZENS INVOLVED IN 3 DISTRICTS

Monitoring

If you can't measure it, you can't improve it. – Lord Kelvin

DEL MARITIM AL MON!

ENERGY

- Reconstruction and retrofitting at 600 homes
- Communication campaign for civic engagement
- Installation of 550 smart controls and sensors
- APP to save energy
- Integration with smart city platform

RETROFITTING OF TERTIARY BUILDINGS

ENERGY

CABAÑAL MUNICIPAL MARKET

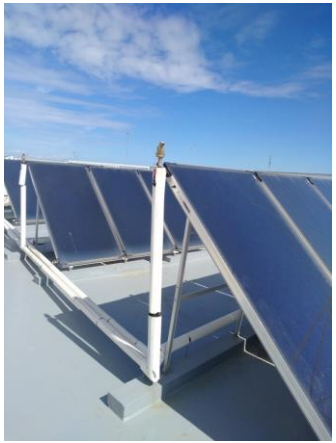
- Refurbished (3 550 m2) with improvement in air conditioning system.
- PV pergola (62 kWp) installed
- Shading, glazing and wall insulations pending

223 KW PV INTEGRATION

- Municipal Youth Centre: 37.05 kWp
- Malvarrosa Sports Centre: PV pergola (57,75 kWp)
- Municipal Energy Office: 13-40 kWp
- Las Naves: 100 kWp for a socialized plant
- Nazaret Sports Centre: 60-120 kWp
- Civic Centre: 70.9 kWp

RETROFITTING OF TERTIARY BUILDINGS

ENERGY



STUDENT RESIDENCE COLLEGIATE

- Installation solar thermal in Students' residence collegiate
- Deep retrofitting
- 9 EV charging points
- Installation of monitoring and control strategies
- SHEMS with a gamification model.

WAVE ENERGY CONVERTER

ENERGY

- 1 floating device
- Capacity generation 20kWp
- Feed public light at the port
- 105 m2

	% of time		pow
h			
Waves 0,7 m (0,5-0,9m) ……. 45%		16 kW	7,2
Waves 1,4 m (0,9-2,0m) ……. 17%		32 kW	5,4
Waves 2,1 m (>2,0m) …… …. 5%		48 kW	2,4
Total…… 67%			15.0 kW h

MONITORED PUBLIC ELECTRIC FLEET

MOBILITY

- 101 local government eVehicles: bikes, cars, vans
- 2 Electric and 37 hybrid Buses
- Analyze performance of batteries
- Analyze driving patterns

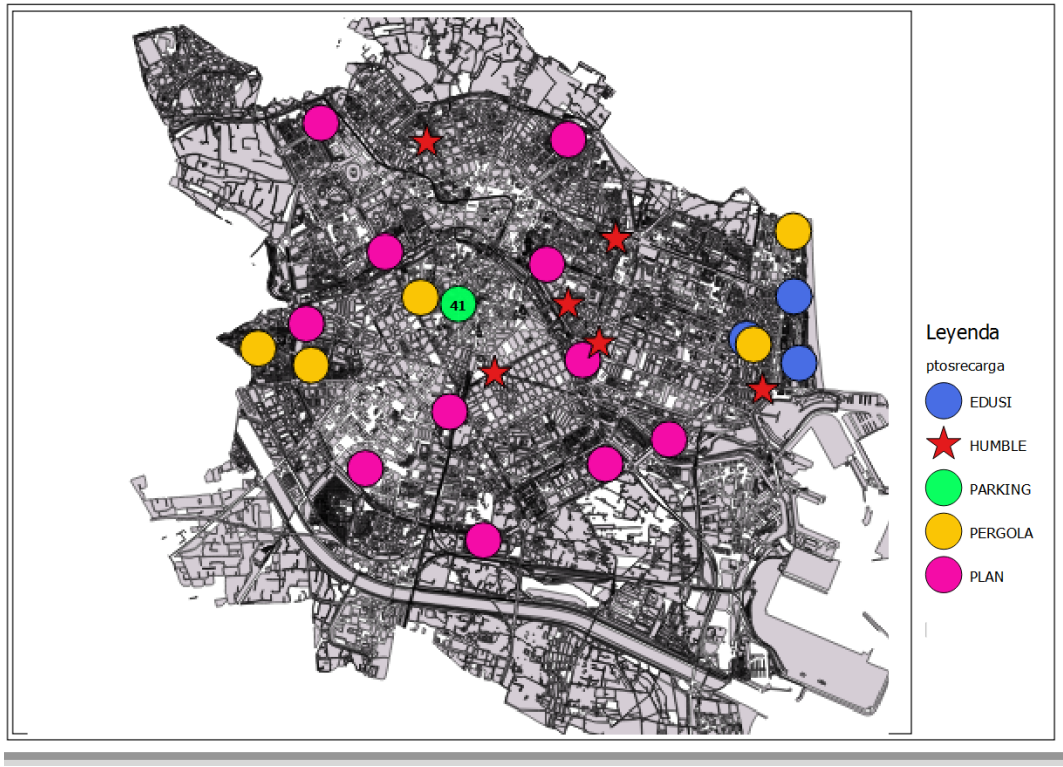
HUMBLE LAMPOSTS

MOBILITY

- 20 eV charging points installed in the city lights
- Integrated with eV charging network of the city

MANAGEMENT OF CHARGING NETWORK

MOBILITY



- 72 eV charging points reporting to smart city platform
- Managed by a common system

MULTIMODAL HUBS

MOBILITY

- Information about public transport in one point: bus, bikes, tram, metro

MAYORS SOBRE RODES

MOBILITY

- Free transport for elders with electric tricicles

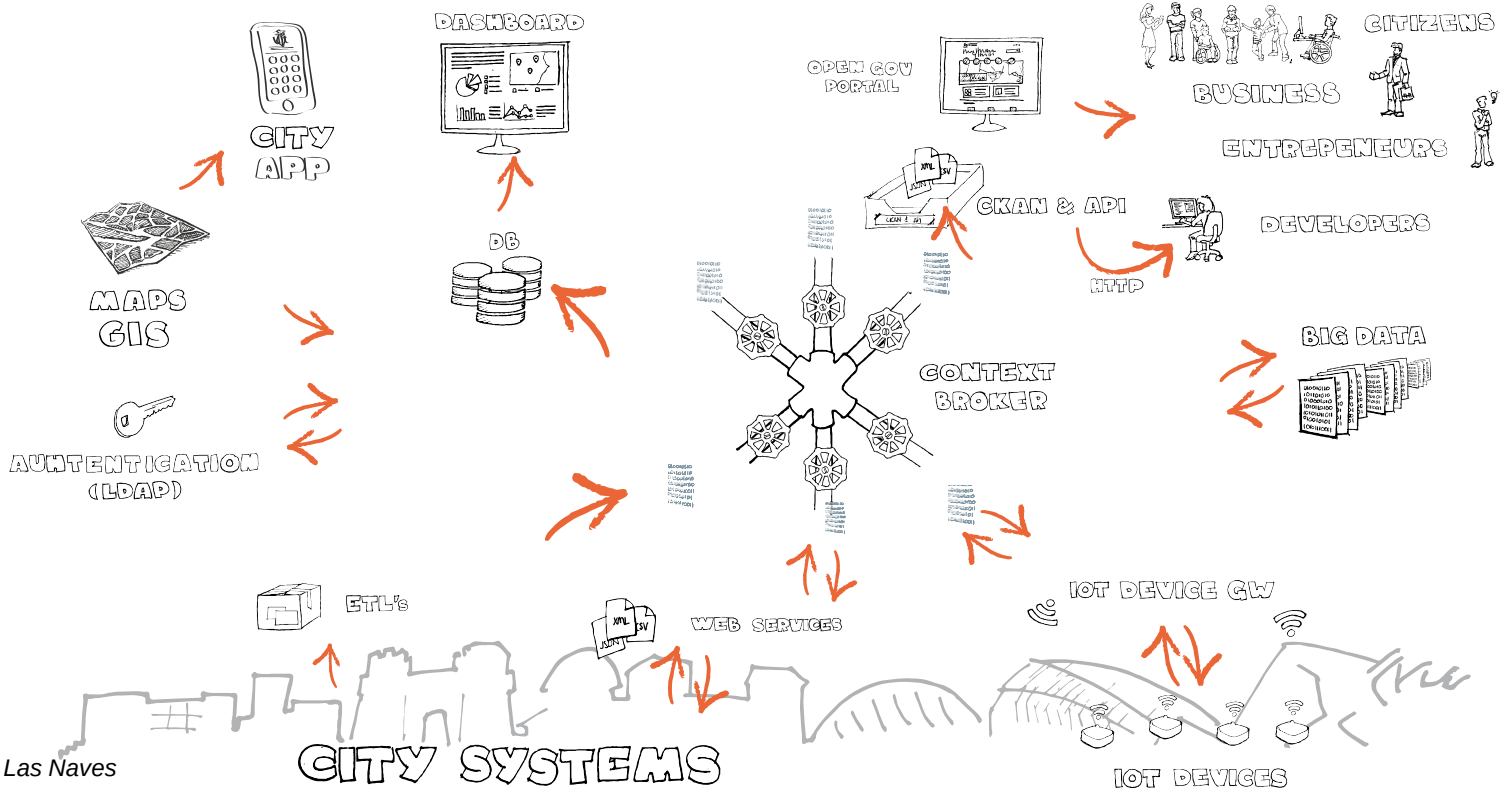
DE LA CISTELLA A CASA

MOBILITY

- Free transport of articles, food, etc. From the local shops to home.

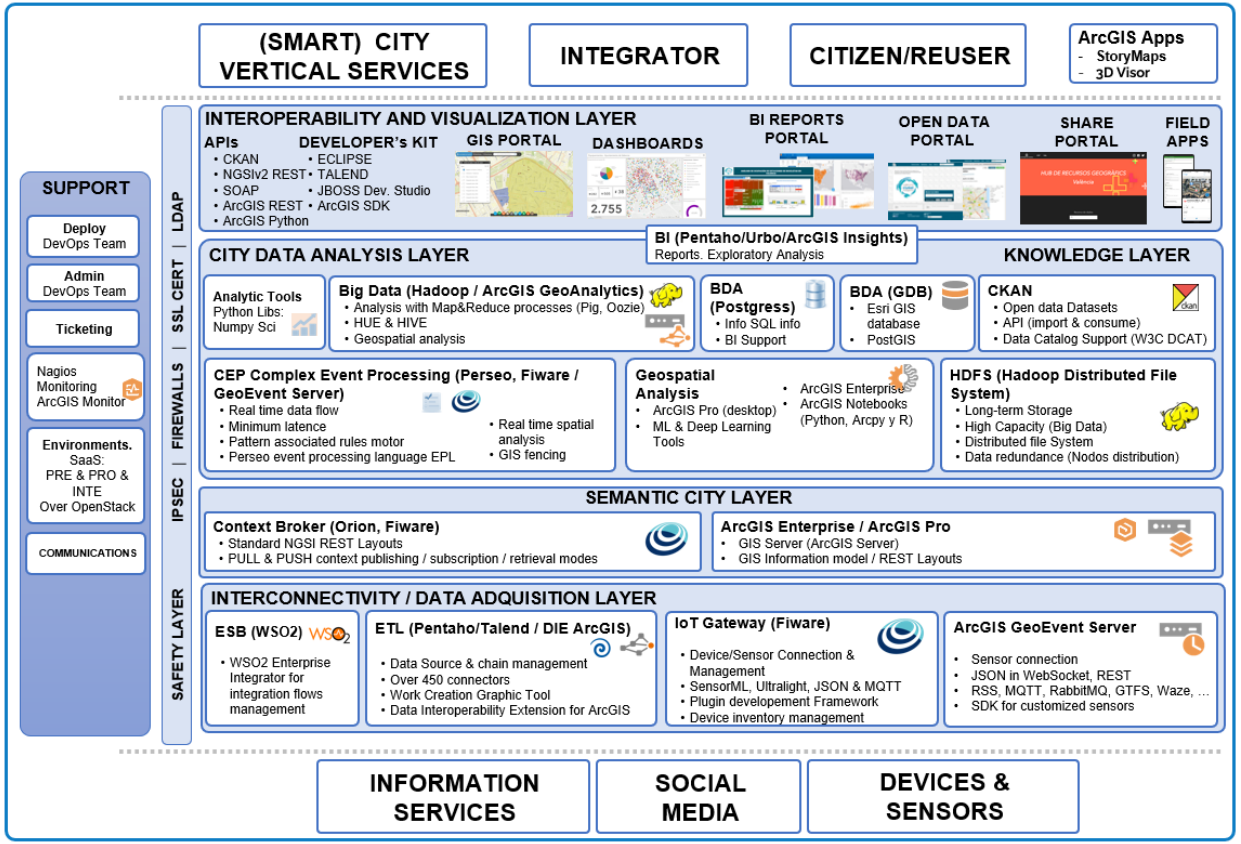
VLCi

ICT


DASHBOARD
CITY APP
OPEN GOV PORTAL
CITIZENS
BUSINESS
ENTREPENEURS
CKAN & API
DEVELOPERS
HTTP
DB
MAPS GIS
CONTEXT BROKER
BIG DATA
AUNTENTICATION (LDAP)
ETL's
WEB SERVICES
IOT DEVICE GW
CITY SYSTEMS
IOT DEVICES

VLCi

ICT


(SMART) CITY VERTICAL SERVICES
INTEGRATOR
CITIZEN/REUSER
ArcGIS Apps
- StoryMaps
- 3D Visor
INTEROPERABILITY AND VISUALIZATION LAYER
APIs
• CKAN
• NGSIv2 REST
• SOAP
• ArcGIS REST
• ArcGIS Python
DEVELOPER's KIT
• ECLIPSE
• TALEND
• JBOSS Dev. Studio
• ArcGIS SDK
GIS PORTAL
DASHBOARDS
BI REPORTS PORTAL
OPEN DATA PORTAL
SHARE PORTAL
FIELD APPS
SUPPORT
Deploy DevOps Team
Admin DevOps Team
Ticketing
Nagios Monitoring ArcGIS Monitor
Environments. SaaS: PRE & PRO & INTE Over OpenStack
COMMUNICATIONS
LDAP | SSL CERT | FIREWALLS | IPSEC | SAFETY LAYER
BI (Pentaho/Urbo/ArcGIS Insights)
Reports. Exploratory Analysis
CITY DATA ANALYSIS LAYER
KNOWLEDGE LAYER
Analytic Tools
Python Libs: Numpy Sci
Big Data (Hadoop / ArcGIS GeoAnalytics)
• Analysis with Map&Reduce processes (Pig, Oozie)
• HUE & HIVE
• Geospatial analysis
BDA (Postgress)
• Info SQL info
• BI Support
BDA (GDB)
• Esri GIS database
• PostGIS
CKAN
• Open data Datasets
• API (import & consume)
• Data Catalog Support (W3C DCAT)
CEP Complex Event Processing (Perseo, Fiware / GeoEvent Server)
• Real time data flow
• Minimum latence
• Pattern associated rules motor
• Perseo event processing language EPL
• Real time spatial analysis
• GIS fencing
Geospatial Analysis
• ArcGIS Pro (desktop)
• ML & Deep Learning Tools
• ArcGIS Enterprise
• ArcGIS Notebooks (Python, Arcpy y R)
HDFS (Hadoop Distributed File System)
• Long-term Storage
• High Capacity (Big Data)
• Distributed file System
• Data redundancy (Nodos distribution)
SEMANTIC CITY LAYER
Context Broker (Orion, Fiware)
• Standard NGSI REST Layouts
• PULL & PUSH context publishing / subscription / retrieval modes
ArcGIS Enterprise / ArcGIS Pro
• GIS Server (ArcGIS Server)
• GIS Information model / REST Layouts
INTERCONNECTIVITY / DATA ADQUISITION LAYER
ESB (WSO2)
• WSO2 Enterprise Integrator for integration flows management
ETL (Pentaho/Talend / DIE ArcGIS)
• Data Source & chain management
• Over 450 connectors
• Work Creation Graphic Tool
• Data Interoperability Extension for ArcGIS
IoT Gateway (Fiware)
• Device/Sensor Connection & Management
• SensorML, Ultralight, JSON & MQTT
• Plugin developement Framework
• Device inventory management
ArcGIS GeoEvent Server
• Sensor connection
• JSON in WebSocket, REST
• RSS, MQTT, RabbitMQ, GTFS, Waze, ...
• SDK for customized sensors
INFORMATION SERVICES
SOCIAL MEDIA
DEVICES & SENSORS

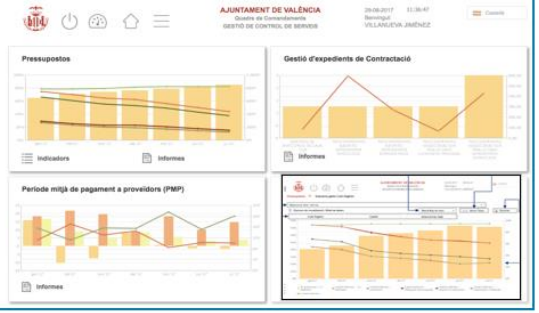
VLCi

Unified City Dashboard

- All City Areas
- KPI list. +800 KPIs
- GEO Analysis
- KPI in detail
- IoT Dashboards
- Massive Data Studies

Administrative Dashboard

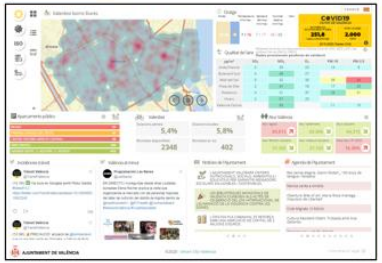
- Budgets
- Average Payment Period
- Public contracting
- Administrative Activity



València al minut - Citizen's Dashboard

http://www.valencia.es/valenciaalminut/

- Maps: Noise, transport, works on public roads ...
- Real time information: Air quality, Parking availability, use of municipal bicycle service ...
- Unemployment rate
- Agenda, News, Social Networks ...



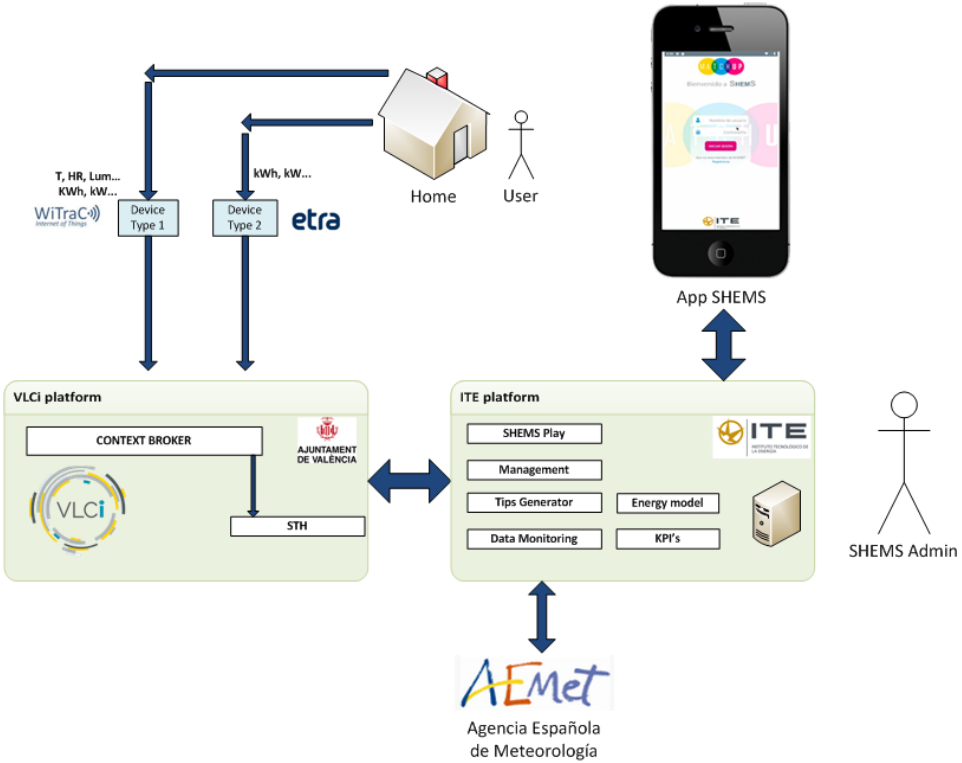
Geoportal and Spatial Dashboards

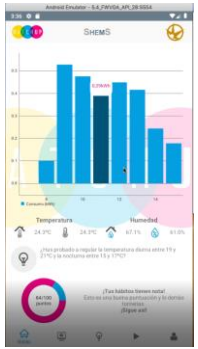
https://geoportal.valencia.es/home/?lang=1

- 68 Geoportal Services
- 17 Internal dashboards
- Public Maps 13
- Field Inspection Maps 4

SMART HOME ENERGY MANAGEMENT SYSTEM (SHEMS)

ICT





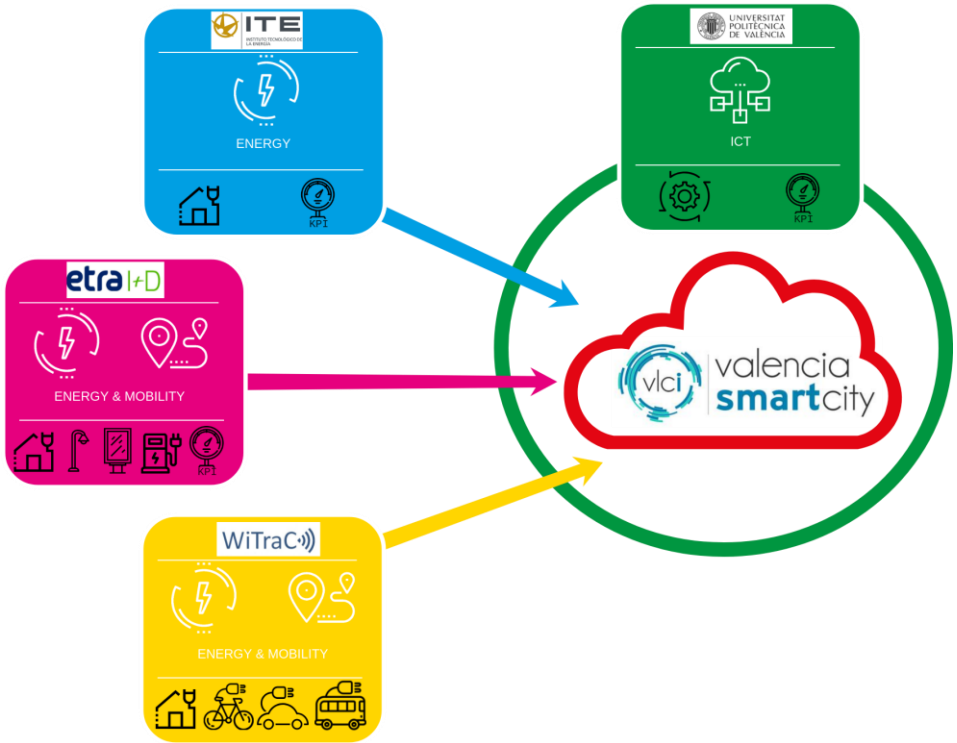
- Data protection fully integrated
- Personalized information for user in real time: energy consumption , tips to reduce the bills, monitoring of temperature/humidity/luminance and calculation of energy generated by PV…)

Smart District energy management system (SDEMS)

ICT

IOT INTEGRATION WITH VLCi

ICT



- Generation of new open data
- Integration of different systems
- Big Data to calculate new KPIs
- New open APIs

TRANSFERENCE TO NEW POLICIES

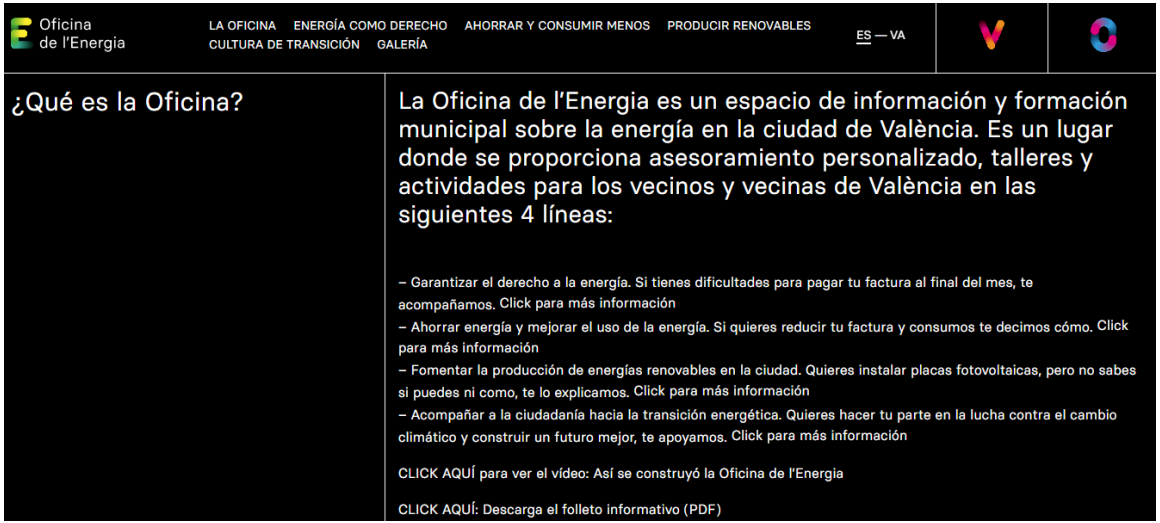
CITIZENS

Plan de Acción para el Clima y la Energía Sostenible de la ciudad de València

- Sustainable Energy and Climate Action Plan (SECAP) of Valencia.
- Recommendation in mobility policies

DISTRICT REFURBISHMENT LOCAL INVESTMENT FUND, LOCAL TOOLKITS & ENERGY POWERTY

CITIZENS



- Energy office
- Local toolkit for development of Near Zero Emission Buildings
- Local toolkit for production, storage and self-consumption of renewable energy at the district scale
- Guidelines for energy communities

50/50 PROGRAM

CITIZENS

EDUCACIÓ
CLIMÀTICA

COMPETITION OF PROJECTS

CITIZENS

- 60.000 €
- 3 innovative projects that use MAtchUP open data to improve the district

Community

"If you want to go fast, go alone, if you want to go far, go together". African Proverb

MATCHUP


AJUNTAMENT DE VALÈNCIA

LAS NAVES

WiTraC
Internet of Things

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

etra I+D

ITE
INSTITUTO TECNOLÓGICO DE LA ENERGÍA

I+D+i
Kveloce

Dresden.

DREWAG

DVB

VONOVIA

Fraunhofer
IVI

TECHNISCHE UNIVERSITÄT DRESDEN

ANTALYA
METROPOLITAN
MUNICIPALITY

sampas

DemirEnerji

ANTEPE

TAYSİM
Proje

AKDENİZ UNIVERSITY
1982

VTT

TECHNOLOGY CENTRE
CARTIF

Università Bocconi

ICONS

tecnalia
Inspiring Business

IF WE WILL IT
HERZLIYA
CITY OF HERZLIYA

Oostende
DE STAD AAN ZEE

CITY OF SKOPJE

kerava

NETWORK

Collaboration is essential to grow

MAtchUP is part of the EU Lighthouse projects network. It is fully aligned with the network strategy and participate in network events to reinforce the collaboration with the rest of the European Smart City projects.

The Smart Cities Youtube Channel | SCIS - Smartcities Information system | EIP - European Information System

2014

REMOURBAN | GrowSmarter | triangulum

2015

Smarter Together | REPLICATE | SHARINGCITIES | smarter city

2016

my SMART Life | RUGGEDISED

2017

IRIS Smart cities | STARDUST | MATCHUP

2018

+CITYXCHANGE | Making City

2019

POCITYF | SPARCS | atelier

Next steps

"It is the long history of humankind (and animal kind, too) that those who learned to collaborate and improvise most effectively have prevailed."

– Charles Darwin

The 100 Climate Neutral Cities and Smart Communities

misión climática València 2030

#OnAMissionTogether

CONTACT US

MATCHUP

www.matchup-project.eu

@matchupEU #matchupEU

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774477

angel.navarro@lasnaves.com

Projects: BD4Energy, SB4EU, SmarterSchool, Ro3kvit, Energy Communities

Speakers:
Natalie Samovich-Co-Founder Resilient Group, SB, Chair WG

BD4NRG
Big Data for Next Generation Energy

Smart Built4EU
The European Smart Buildings Community

smarter school

ro3kvit

> Europe must orchestrate its scarce resources in new research and innovation in such a way that they collaborate across modalities and the value chain to deliver not only research results but also socio-economic results and address the new challenges that are brought by the convergence of technologies such as 5G, Internet of Things/Industrial Internet of Things (IoT/IIoT), edge computing and Artificial Intelligence (AI) including at the edge.

In 2050 the Customer is fully engaged

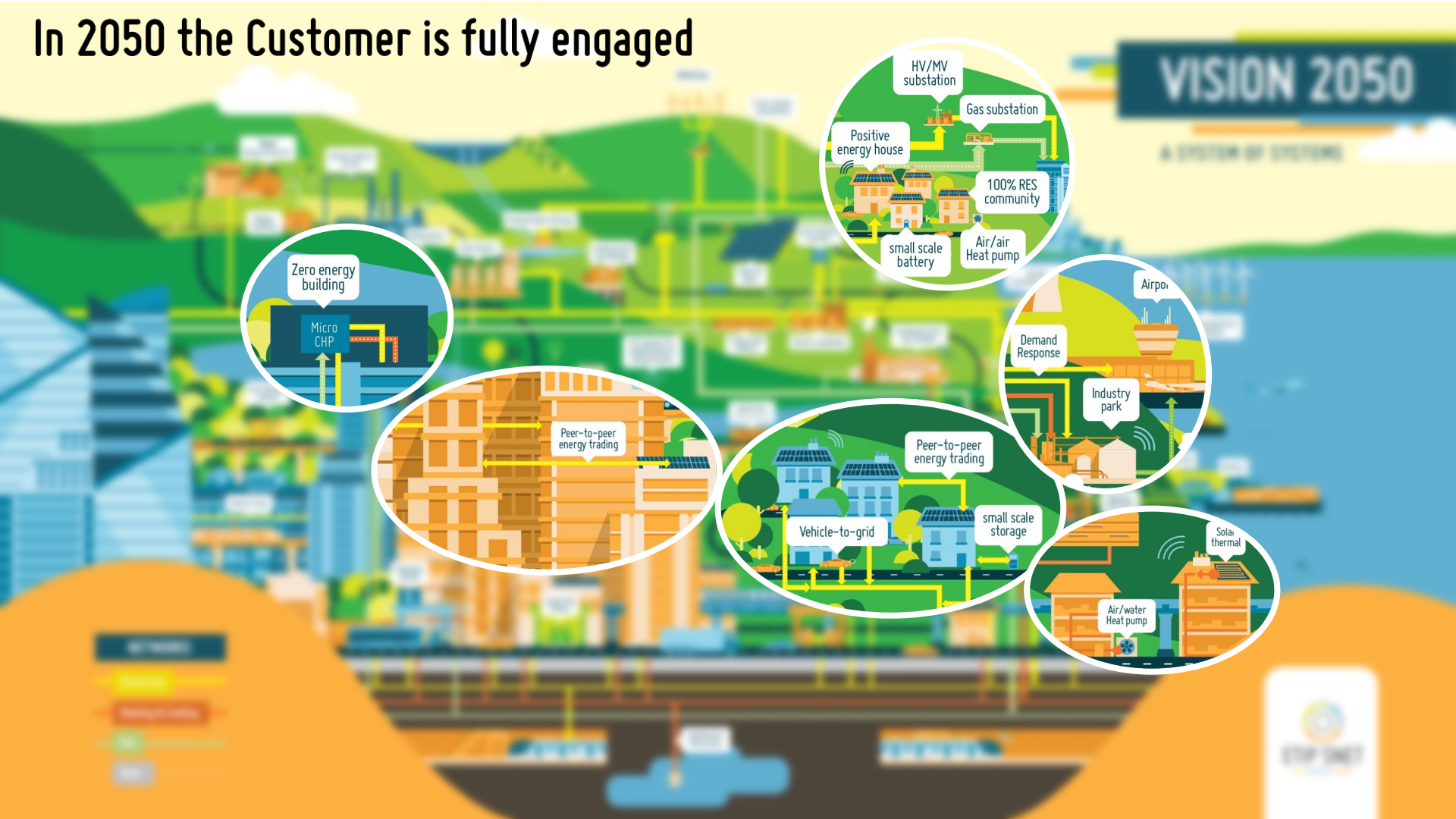
VISION 2050

A SYSTEM OF SYSTEMS

ETIP SNET

PLAN. INNOVATE. ENGAGE.

In 2050 the Customer is fully engaged



Industrial Internet of Things: the strategic picture for Europe CONTEXT

Next-generation IoT

Power to the edge, where data is

Seamless connectivity

Next-generation operating systems

Decentralised/swarm intelligence

Cognitive computing continuum

Chips Act

Next-generation chips powering intelligence at the edge

Semiconductor chips made in Europe

Standardisation, interoperability

Vertical, horizontal, x-sector integration

Common Open Digital Platforms & Ecosystem

Competition law, geopolitics

Strategic autonomy

Investment in Data Spaces

EU 5G & cloud-edge infrastructure/services

Data Strategy

Data legislation:

- Data Act: access & fairness on data market
- Data Governance Act: foster trust in data sharing & intermediaries

Transition pathways towards resilient, innovative, sustainable & digital ecosystems

Open, dynamic ecosystems for EU tech businesses

New Industrial Strategy

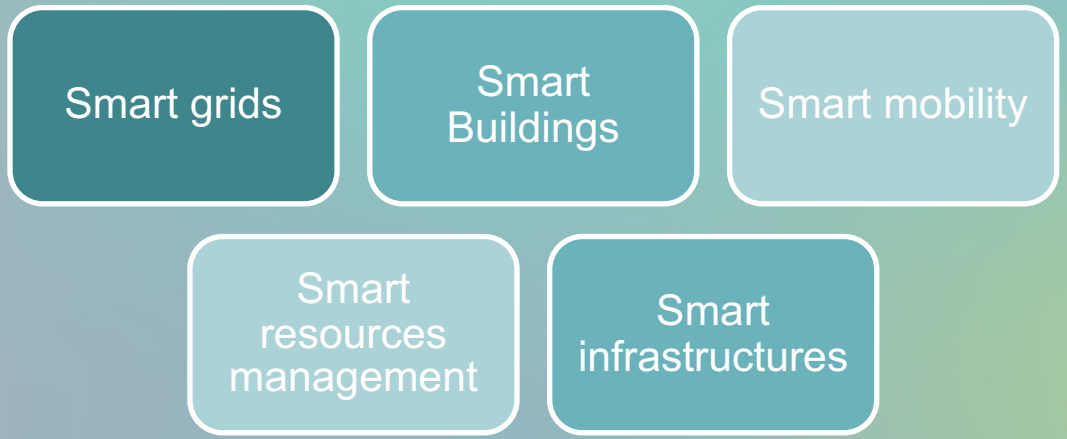
The EU Policy Context:

- NextGenerationEU
- REPowerEU
- Twin Transition:
- Digital Compass
- Green: Fit for 55

Slide adapted from Dr. Max Lemke, CNECT E4

Innovation areas within EU:

ETIP-SNET, AIOTI, EU Partnerships….



- Data Spaces and cross domain coordination platforms
- ICT driven data processing and visualization , edge computing
- Decarbonisation of Energy production
- New governance models (DAO, WEB3)

Intelligent’ application domains

Smart and multi-service Next Generation Internet based on Intelligent connectivity:

- **Smart Cities**, addressing the challenges in livability and sustainability of large and small cities as well as communities
- **Intelligent Living**, addressing amongst others the challenges of an (ageing) society and healthy living, supported by wearable devices, robots and intelligent home control
- **Intelligent Industry**, enabling efficiency, flexibility and automation transformations in manufacturing and providing ecosystems that are leading the way towards a new era of networked, knowledge driven and autonomous value systems that flexibly adapt to changing operating environments and user needs.
- Intelligent and dynamic **Energy and Water Management**, addressing optimisation of resources
- **Intelligent Mobility** including connected vehicles creating solutions for the increasing transportation challenges
- **Intelligent Buildings**, creating functional buildings with minimal ecological footprint and getting higher-level intelligence out of smart buildings.

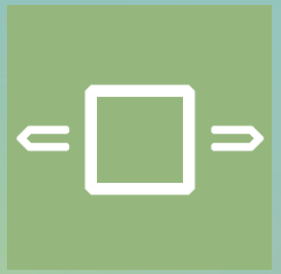
Energy communities` enabling Components

Digital Platforms
technical and business convergence of cloud, edge and IoT

Sensors and Connectivity
EDGE Processing

RES Generation
Energy Storage
EV Charging

Smart contracts
Blockchain, AI
Metaverse, DAO



How to utilise synergies within the energy system to maximise efficiency, reduce cost, CO2 emissions and energy losses?

How to reach an affordable energy independency mainly maximising local self-consumption based on RE?

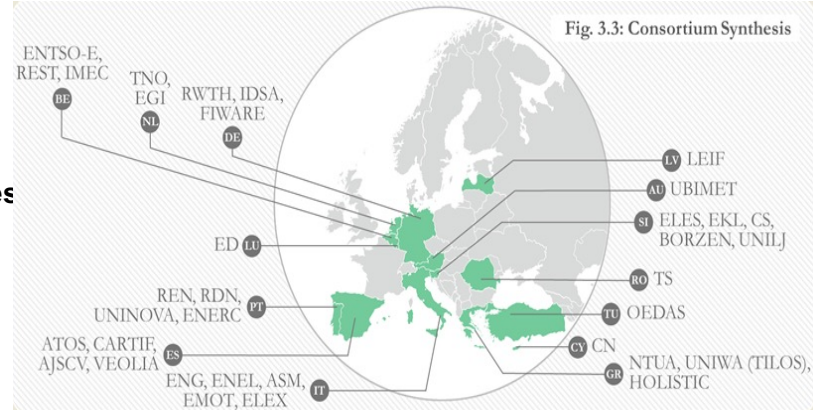
How to interconnect local energy grids?

Project Identity Card

BD4NRG aims at evolving, upscaling and demonstrating an innovative **energy-tailored Big Data Analytics Toolbox (BD4NRG Toolbox), and the underlying big data management Framework** which will significantly contribute to **unlock novel cross-stakeholders business opportunities for electricity and other non-energy stakeholders** as result of ***multi-value chain energy-centered data-driven AI-based services***

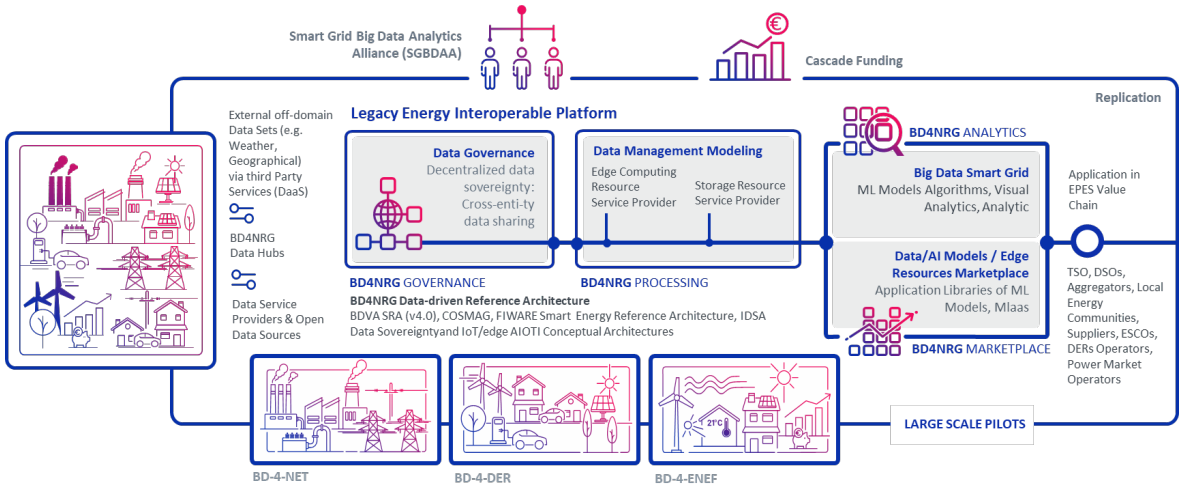
Project Identity card

- Call -> H2020-DT-2019- / DT-ICT-11-2019 IA
- Starting Date: 1st January 2021 – Duration: 36 months – Now M23 of 36
- Total Costs: 11.883.025 Euro - EU contribution: 9.996.700 Euro
- **35 partners from 11 Countries covering the whole energy value chain**
- **12 Large Scale Pilots where to validate Big Data AI Analytics Services**
  - ✓ Optimised management of non-grid owned (behind-the-meter) assets
  - ✓ Improved efficiency and reliability of electricity networks operation
  - ✓ Near real time energy-efficient end user comfort management
  - ✓ Optimal risk assessment for energy efficiency investments planning



BD4NRG Achievements To Date

- Innovative energy-tailored **Big Data Analytics Toolbox** (**BD4NRG Toolbox**) which will significantly contribute to achieve a techno-economic optimal management of Electric Power and Energy Systems (EPES) value chain
- **BDA Analytics Services for (i) optimised management of grid and non-grid owned assets; (ii) improved efficiency and reliability of electricity networks operation; (iii) optimal risk assessment for energy efficiency investments planning**

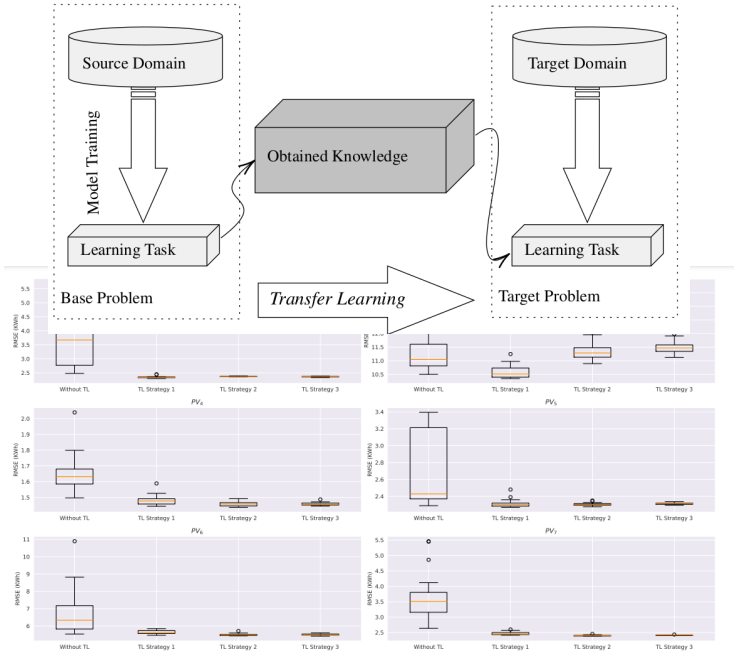


…To enable a **consumer-centric data-driven electricity-centered energy system**

How are the data analysed?

Transfer Learning

- What happens when few data are available?
- **Application: Cross-context transfer learning algorithms for residential flexibility asset profiling with a view to reduce the time necessary for model training**



Publication: Transfer learning strategies for solar power forecasting under data scarcity. Scientific Reports (Nature), 12 (14643), 2022.

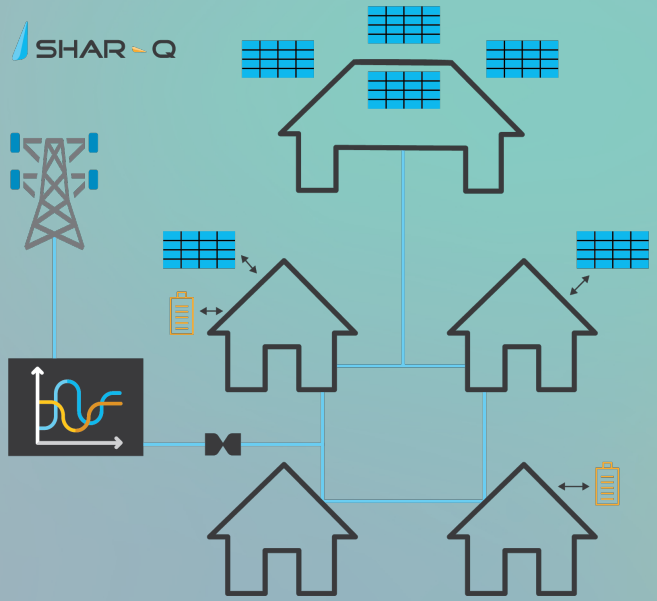
ENERCOUTIM
ASSOCIAÇÃO DE ENERGIA SOLAR DE ALCOUTIM

COMUNIDADE ENERGÉTICA DE MARTIM LONGO

RESEARCH & INNOVATION PROJECTS

ONENET one network for Europe	GREEN FLAMINGO	PEARLS EMPOWERING LANDSCAPES	SHAR-Q	EETUR	VICINITY 2020
EU ENERGY PLATFORM	GREEN HYDROGEN SOLAR ECONOMY	SOCIO-ECONOMIC IMPACT RES DER	PEER-TO-PEER DIGITAL ENERGY STORAGE ENERGY COMMUNITIES	ENERGY EFFICIENCY FOR TOURISM	ENERGY DIGITALISATION INTEROPERABILITY

Energy community components



ENERCOUTIM
ALCOUTIM SOLAR ENERGY ASSOCIATION

Collective INNOVATION

- Future flexibility services markets
- Leverage of local resources and better match of supply and demand
- P2P energy and ability

ENERCOUTIM
ALCOUTIM SOLAR ENERGY ASSOCIATION

Resilient Energy

ENERGY COMMUNITIES
WORK ON RESEARCH INNOVATION PROJECTS

SOLAR SYNERGY GROUP

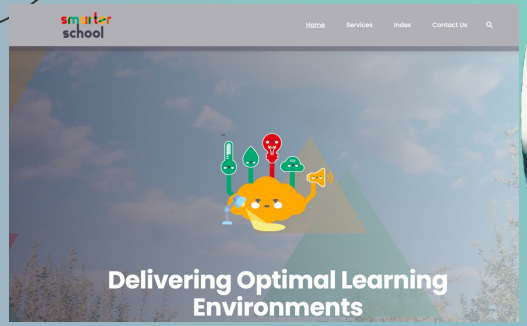
EFFICIENT RENEWABLE ENERGY GENERATION

KNOWLEDGE SHARE

OPTIMAL CONSUMPTIONS AND SYSTEM SHARE

DIGITALISATION FLEXIBILITY MARKETS PARTICIPATION

ENERCOUTIM
ALCOUTIM SOLAR ENERGY ASSOCIATION



SOLUÇÃO SMARTER SCHOOL

https://smarterschool.eu

UM PROJETO EM EVOLUÇÃO - evolutionary project

Smarter School Solution

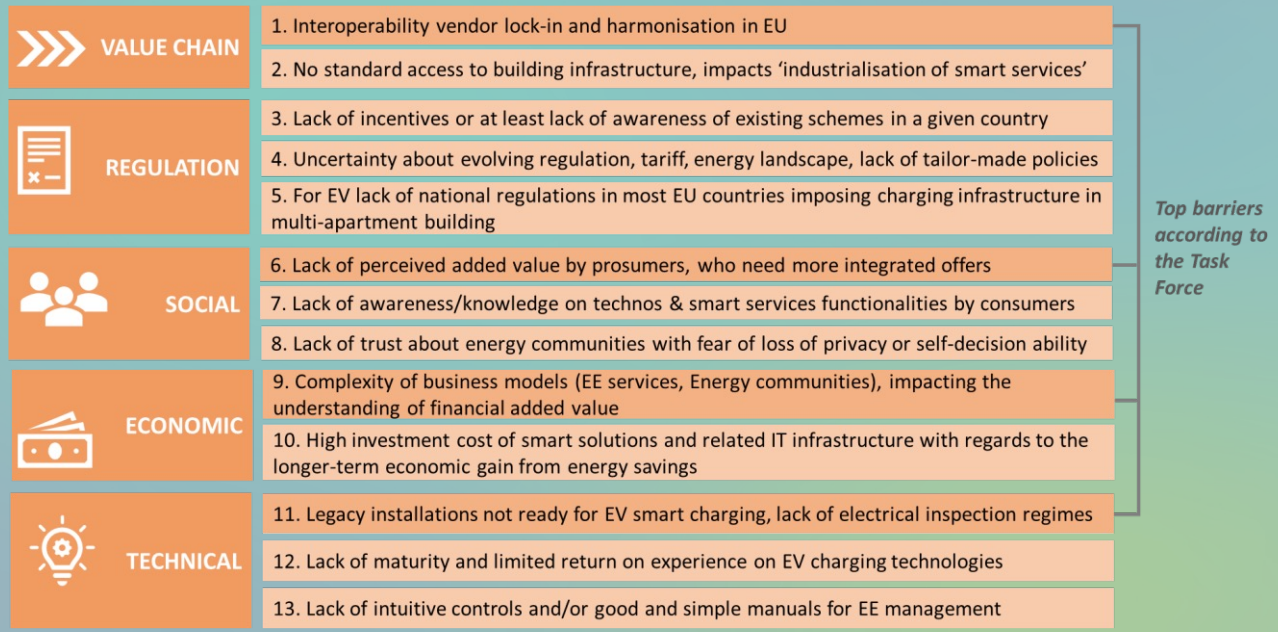
Solution components:

- IoT sensors infrastructured and connectivity
- Digital platform
- Educational program
- Digital services
- Optimal learning environment index™

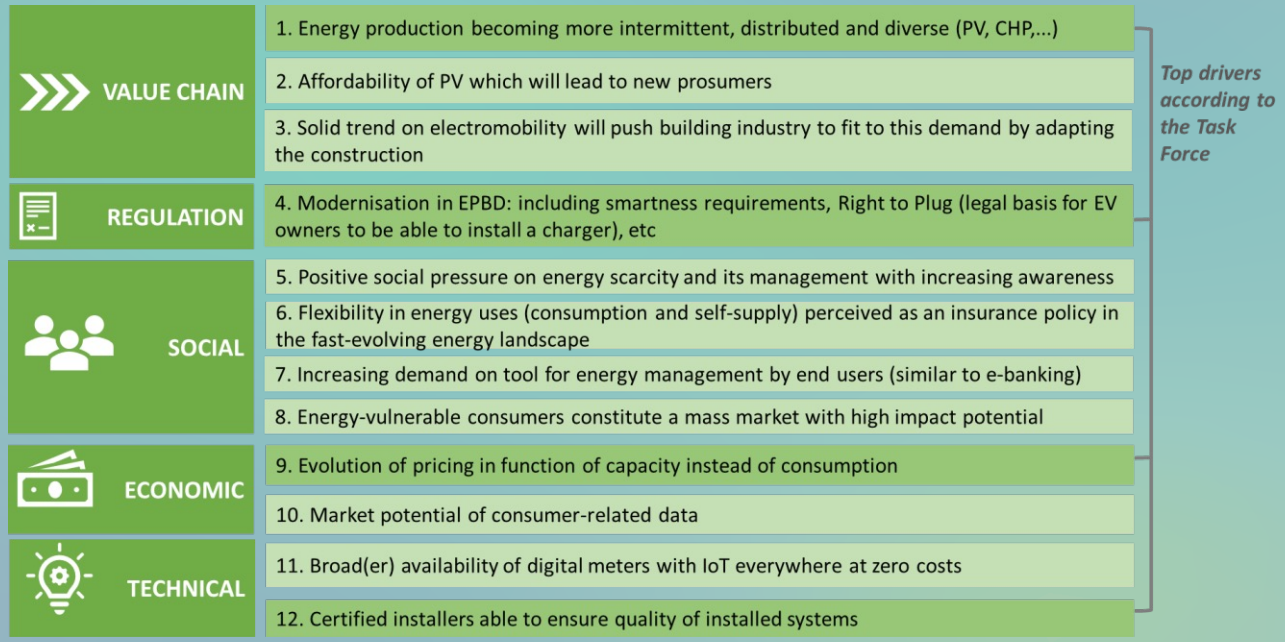
Smarter School Solution

Energy Layers

1. Energy efficiency
2. Renewable generation nodal distributed and centralised
1. Enabling Advanced communication
2. Clean fuels
3. Flexibility of demand and supply
4. Resilience of smart sector integration (water and industrial)
5. Mobility as an and integral Energy vector
6. Enabling digital platforms and data governance



https://smartbuilt4eu.eu/?jet_download=3332



https://smartbuilt4eu.eu/?jet_download=3332

Smart Built4EU
The European Smart Buildings Community

REGULATION & LEGAL FRAMEWORK	Data transparency: ensure the information portrayed on documentation registering the process and results are easily available and understandable for prospective business or investors
	Involvement of public governments and policy makers for cofunding and promotion of innovations
	'Right-to-plug' for renters and owners, enabling the upgrade of existing dwellings and removing the current barriers to home charging
CERTIFICATION & STANDARDISATION	Standardisation of smart energy services
	Consolidation of (different) service catalogue(s) for the Smart Readiness Indicators
	Systemic approach to stakeholders' interviews prior to the start of solutions design and demonstrations through structured approaches of feedback loop
SCALING UP & INDUSTRIALISATION	Public co-funding and promotion of innovations to support early adoption
	Consolidation of service catalogues for the Smart Readiness Indicators
	Systematic design of use cases beyond a given technology
	Effective integration of business models beyond the strict technology
	Structured and systemic approach to get stakeholders' feedback (ex ante and ex post)
AWARENESS RAISING	Knowledge on 'Learning curve of next technology and reduction of cost' according to scale
	Lessons learnt from Social Science and Humanities on new energy practices to facilitate the route from early adopter to massive adoption
	Access to well-documented success stories: documented demonstrations could be used to incentivise commercialisation

Priority gaps according to the Task Force

https://smartbuilt4eu.eu/?jet_download=3332

SIRUS

We deliver
smart innovation.

IOT /.NET / Cloud / Data

Smart Communities

Sirus NV

Gert De Tant, CEO

Why build a Smart City Data Platform?

Challenges

Cities & Municipalities are facing lots of big challenges, such as climate change, an aging population, mobility, ….

Technologies

Technologies such as IoT can help make life more **sustainable** and more **qualitative**

Data

Data is key to be able to build relevant future **applications**, as is making this data **available** through a **smart city data platform**

Smart City Data Platform – making maximum use of your city data

Quadruple helix

BRUGGE

leuven

Vlaamse overheid

AGENTSCHAP INNOVEREN & ONDERNEMEN

ROESELARE
IS 'R VOOR JOU

Urban Sense CONSORTIUM

Founding partners

cegeka

SIRUS

Subcontractors

Klarrio
CITYMESH
kpn

SLIMMEREGIO vlaanderen

imob INSTITUUT VOOR MOBILITEIT UHASSELT

imec

Start

ROESELARE
IS 'R VOOR JOU

B R U
G G E
WERELDERFGOEDSTAD

leuven

- Need for a data platform for new flemish projects or strategic Smart City goals & SDG's
- 3 cities combine efforts for a joint frame agreement with a budget of 30M euros over 20 years
- Other cities can still join
- Key requirements:
  - Cost sharing
  - Enabling ecosystem collaboration
  - Scalable & Secure

SCWE WINNER
Enabling technologies

Digital Twin

NEW SERVICES

App development

A.I.

DATA INTERACTION

Securely manage and use data

Azure

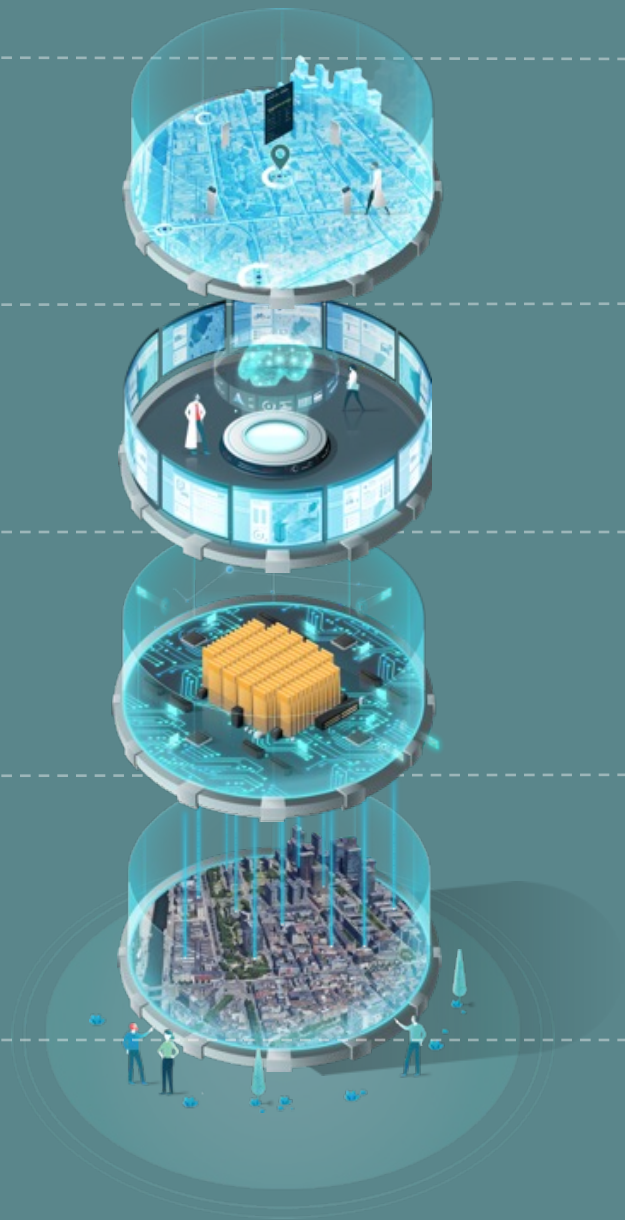
DATA COLLECTION

Onboarding data streams

CONNECTIVITY

Digitizing the physical world

PHYSICAL SERVICES



Urban Digital Twin

Urban IOT Dataplatform

Network

Physical City

Key Principles

Open standards & interoperability

Open source

Security

Scalability

Ecosystem & Decentralized

Shared Data (models) & Data ownership

Standardisation in architecture

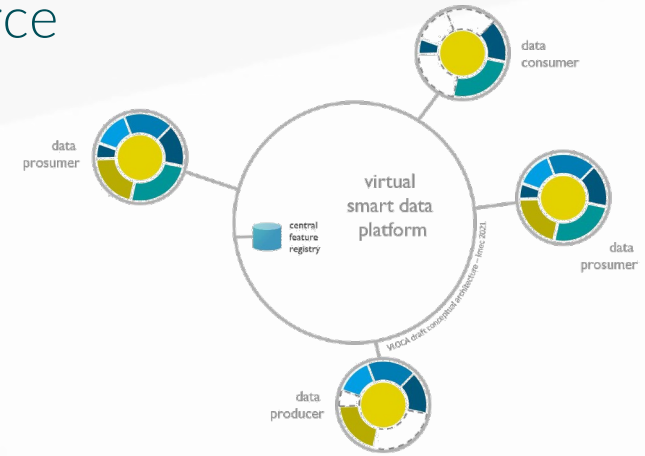
VLOCA Architecture

Own architecture

Bi-directional
Low Latency
Secure
Realtime processing
Domain neutraal
Pay Per Use
Open source

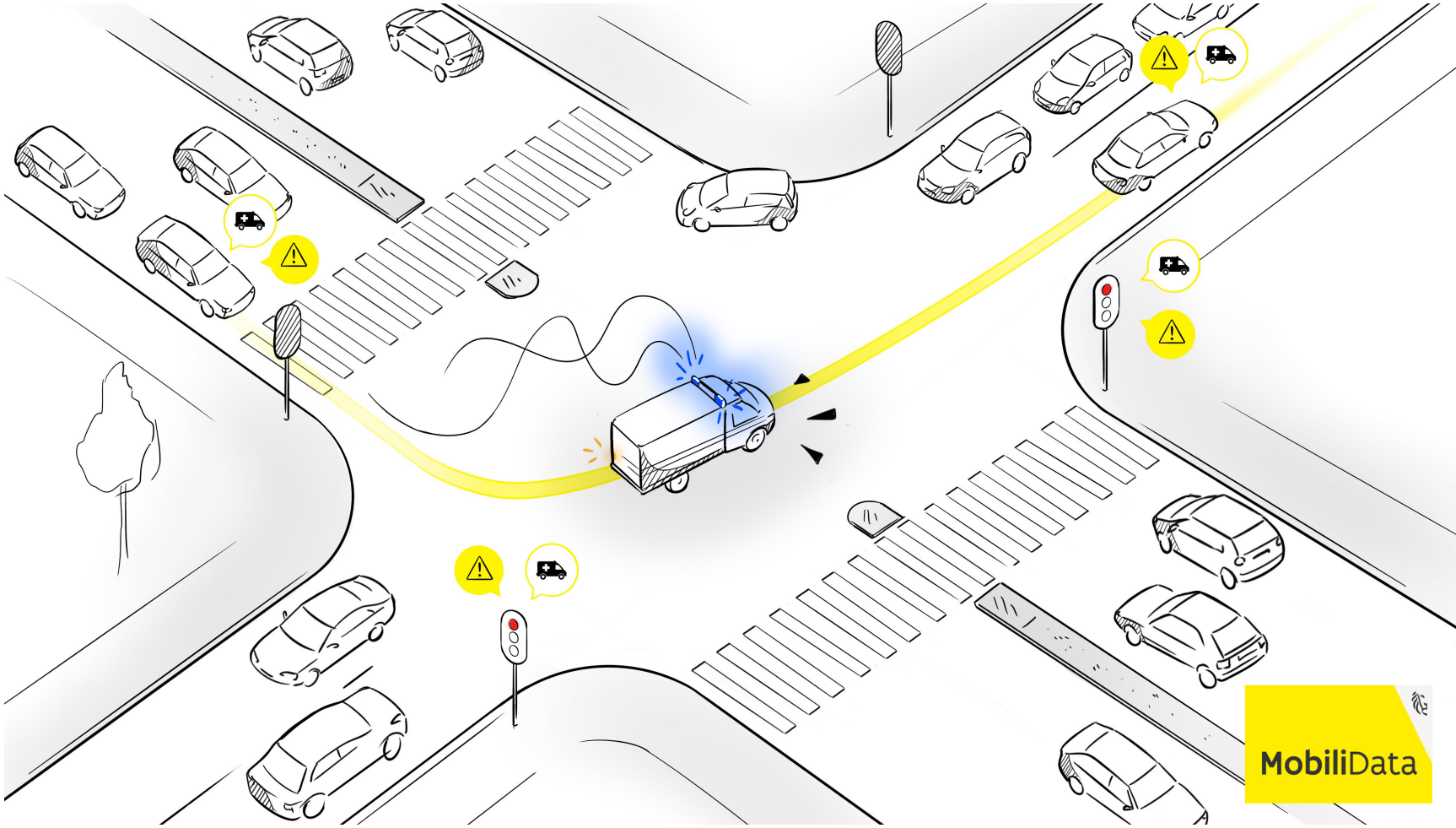
Data requirements

Interoperable
FAIR
OSLO
NGSI-LD
MIM



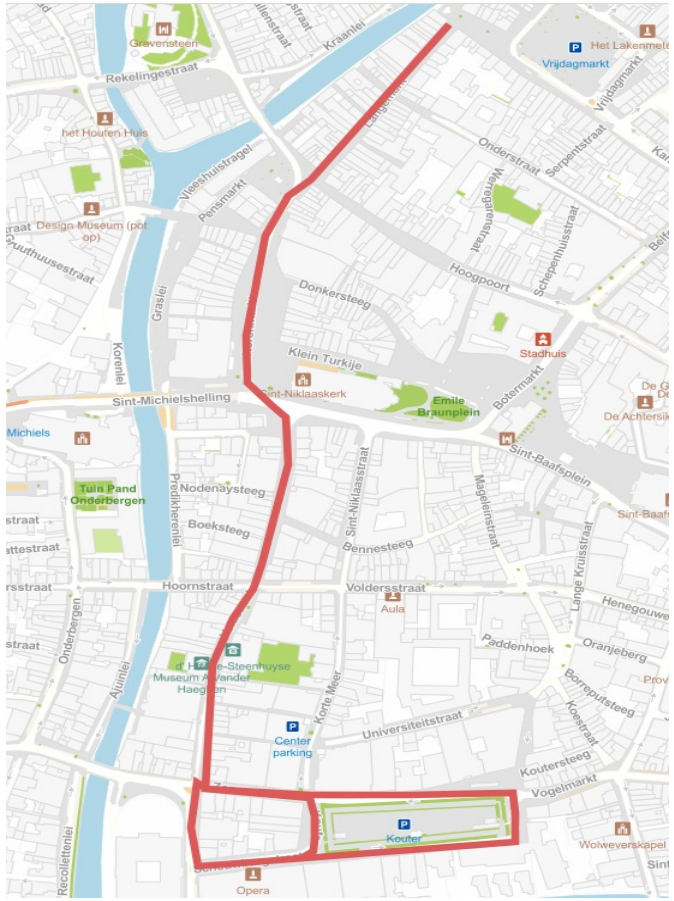
Working towards **concrete mobility use cases**

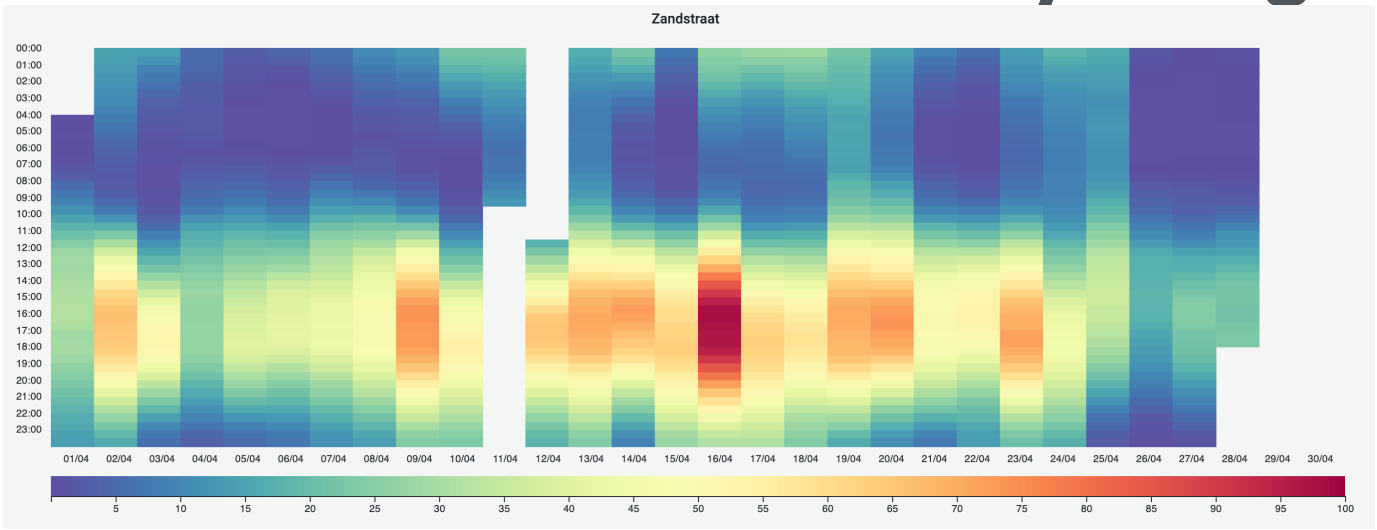
- Personalized information for all road users to facilitate safe & comfortable driving
- Optimized traffic flows through intelligent traffic light controllers
- Modal shift in mobility and in transport
- Accurate insights for mobility and transport planners



Case - VLOED

City - Bruges





Use Cases

Earlier Later

5 min | SMARTEST ROUTE 16:56 → 17:01
4 min E-bike | **35** kCal | ± **0** euro
1,2 km

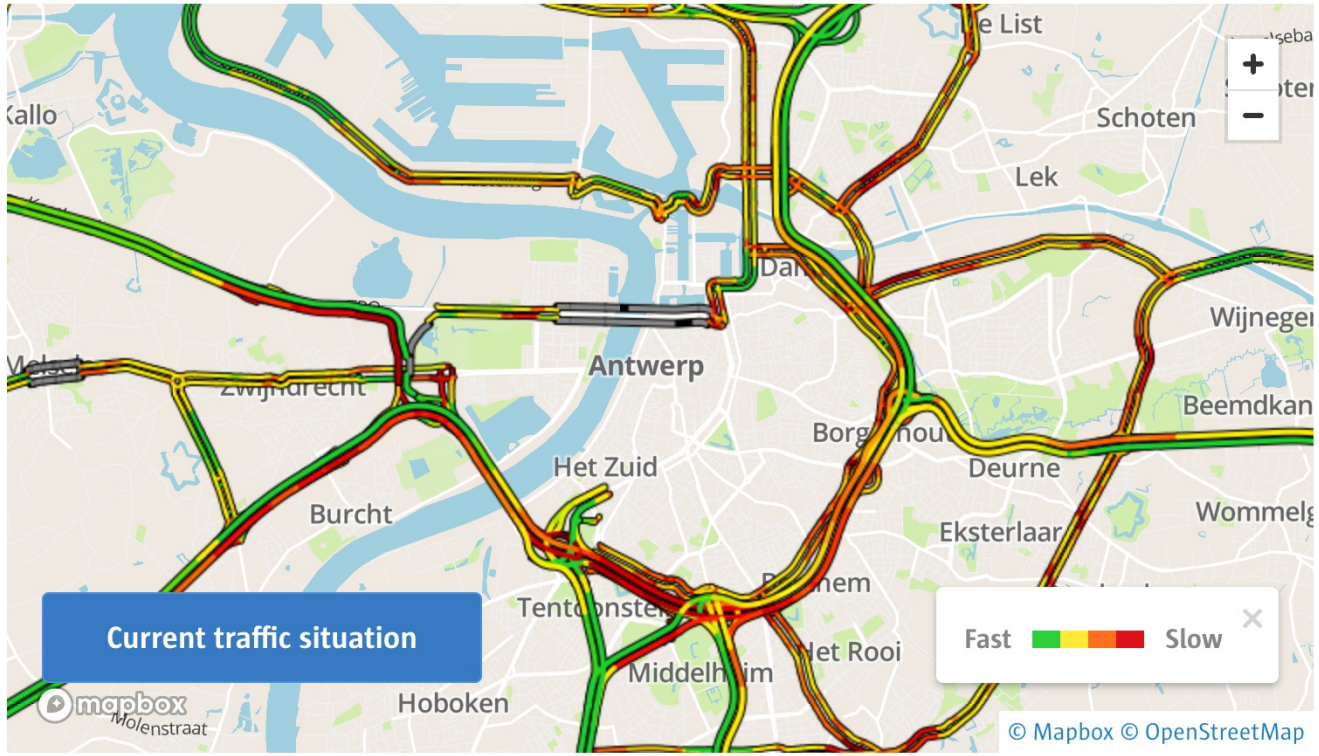
6 min 16:56 → 17:02
2 kCal | **50** steps | ± **0.95** euro
1 km

17 min 16:57 → 17:13
24 kCal | **549** steps | ± **2.5** euro
7 | 310 m

9 min 16:56 → 17:05
45 kCal | **251** steps | ± **5** euro
1,1 km

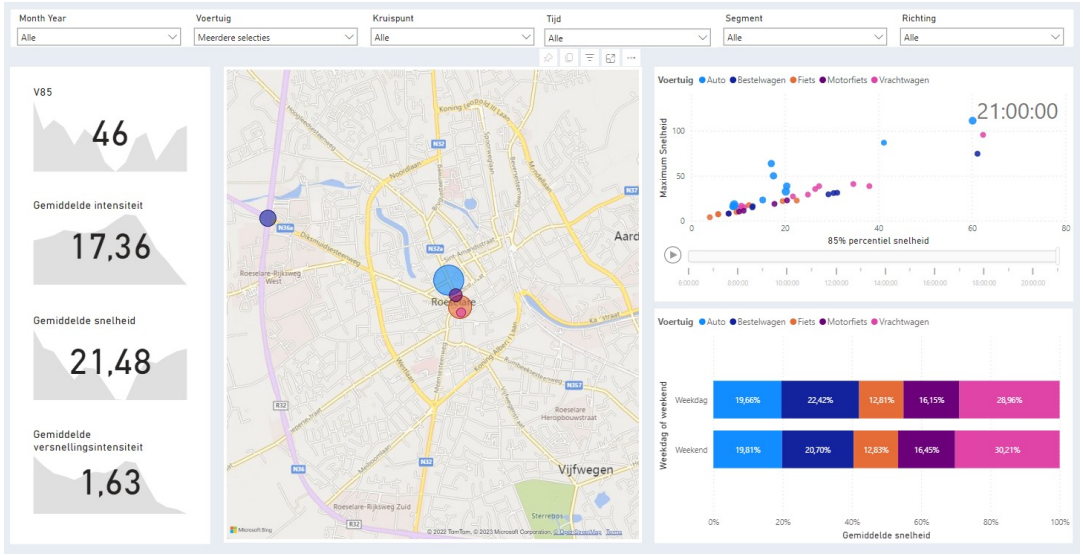
15 min | MOST ACTIVE ROUTE 16:56 → 17:11
64 kCal | **1,310** steps | ± **0** euro
996 m

Current traffic situation



Use Cases

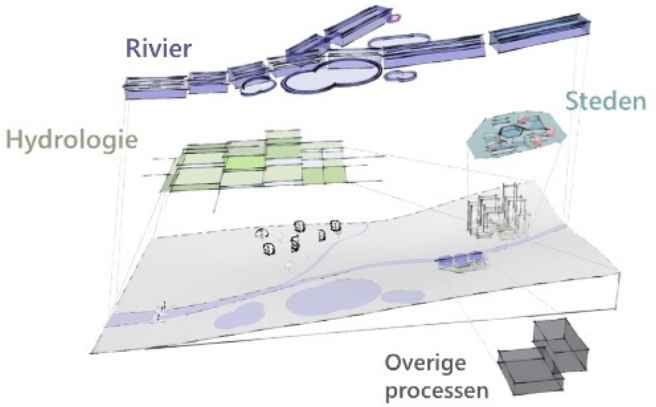
Case - RainBrain

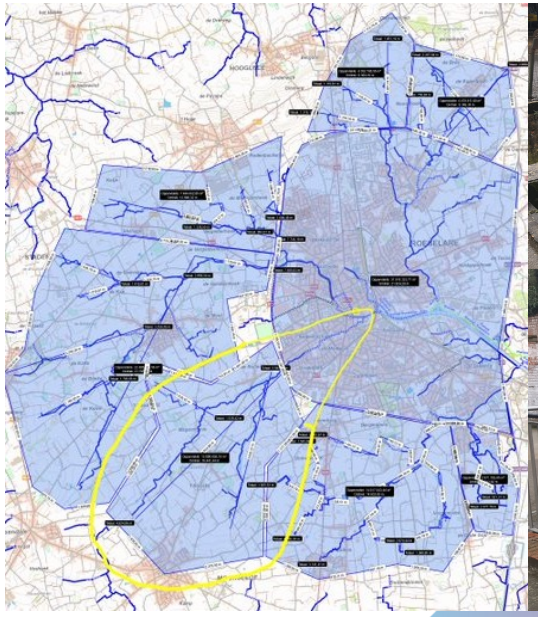


Use Cases

City - Roeselare

ROESELARE
IS 'R VOOR JOU



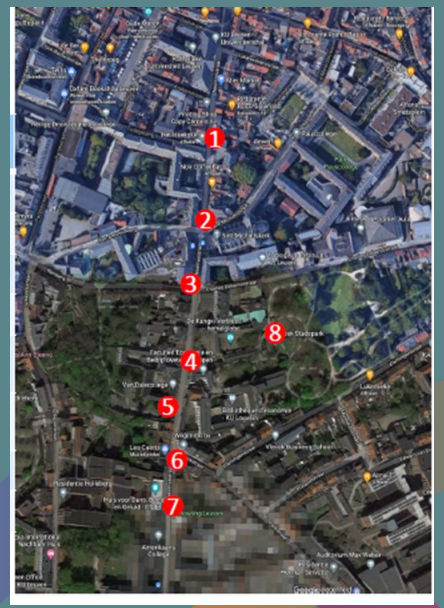


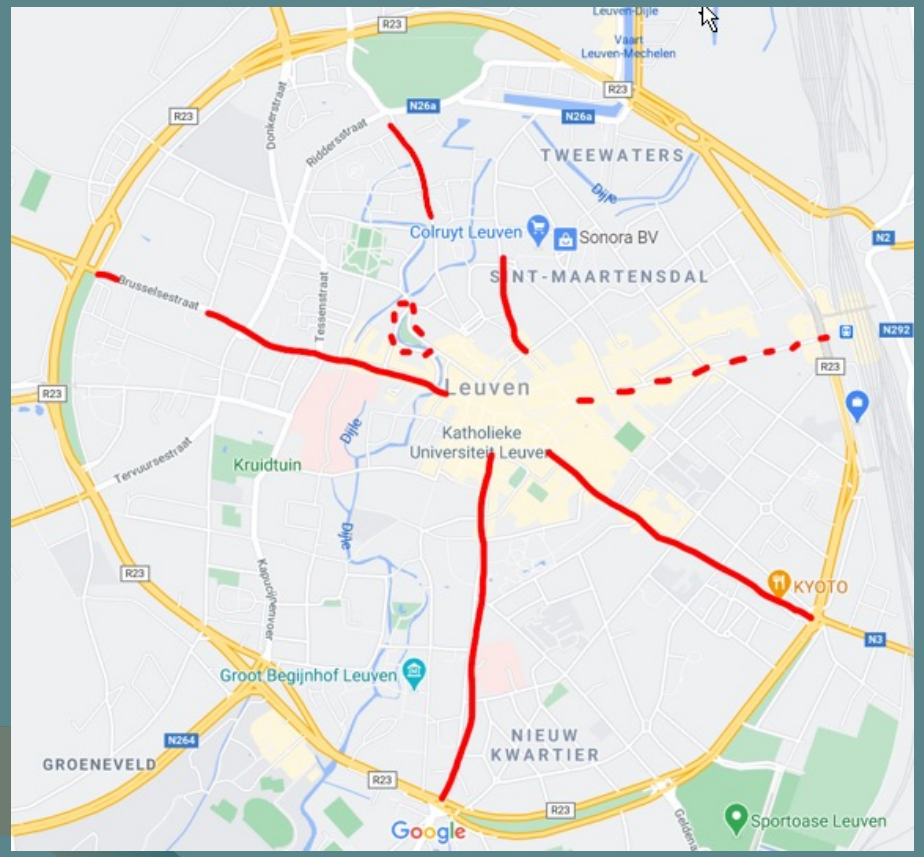

Vijversdreef
Brugge
Powered by
cegeka

Scenario 1:
cut main axis & introduce one-way streets

Use Cases

Use case Leuven: nightly noise





Stad Leuven Afmelden

Nieuwe melding

Tijdstip

8/12/2021 - 12:32 Pas aan

Soort lawaai

Kies oorzaak

Duur lawaai

Kies duur

Mijn raam is ... (niet verplicht)

- ○ Open
- ◉ Dicht
- ○ Er is geen raam

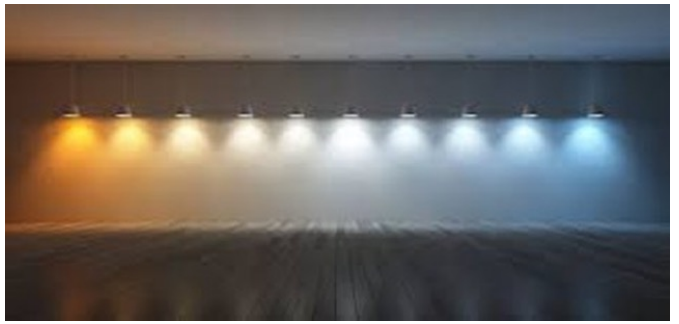
Extra info (niet verplicht)

Verstuur melding

Nuissance (harmonica index)

Human voice - Transport road – Passenger car

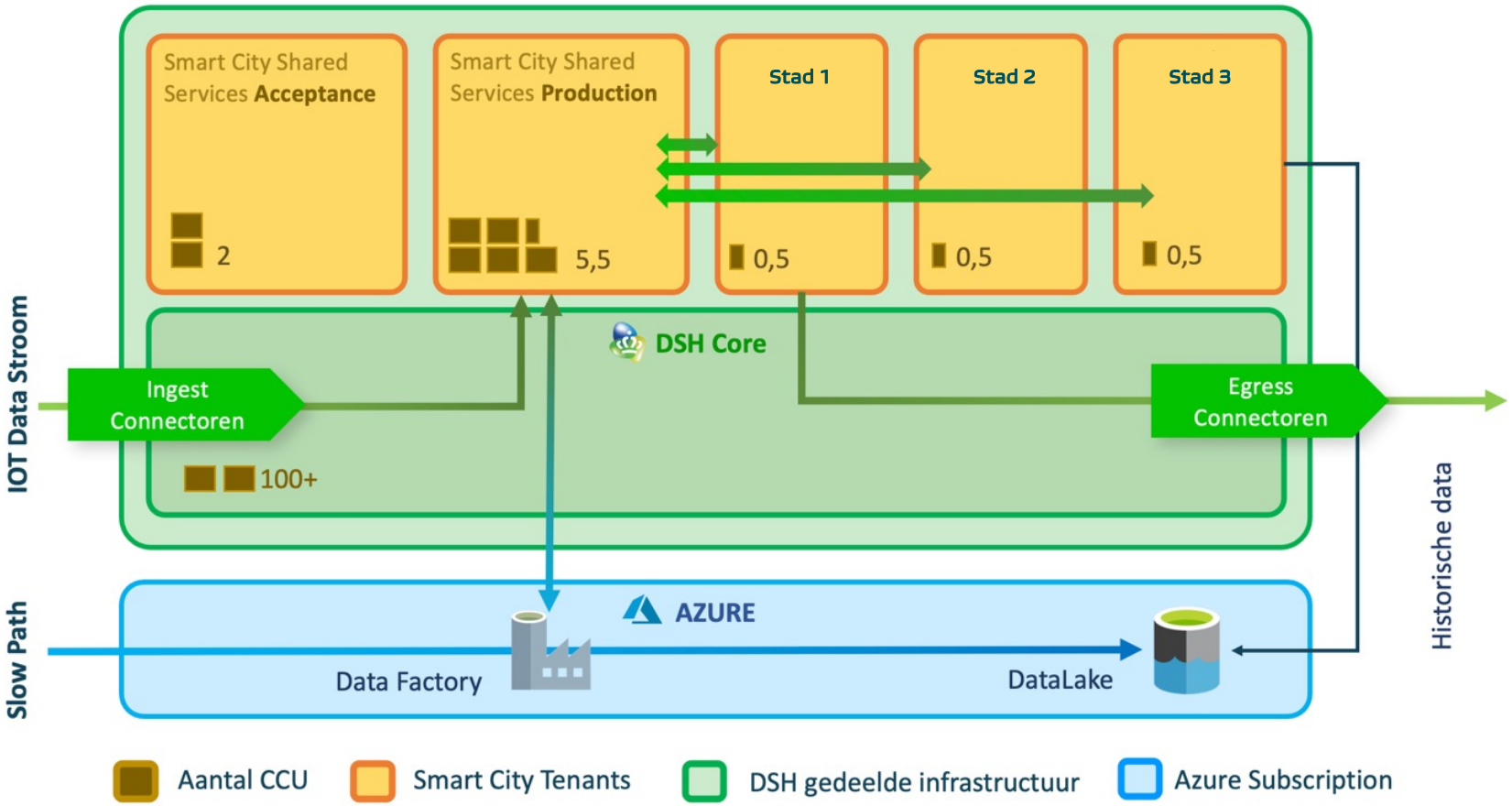
Testing real-time nudges



Use Cases

Thank you!

Platform Building Blocks



1 Container Capacity Unit (CCU) =