Collaborating today on tomorrow's solutions

GREEN ENERGY PARK

COLLABORATING TODAY ON TOMORROW'S SOLUTIONS

POWERED BY VUB VRIJE UNIVERSITEIT BRUSSEL Universitair Ziekenhuis Brussel

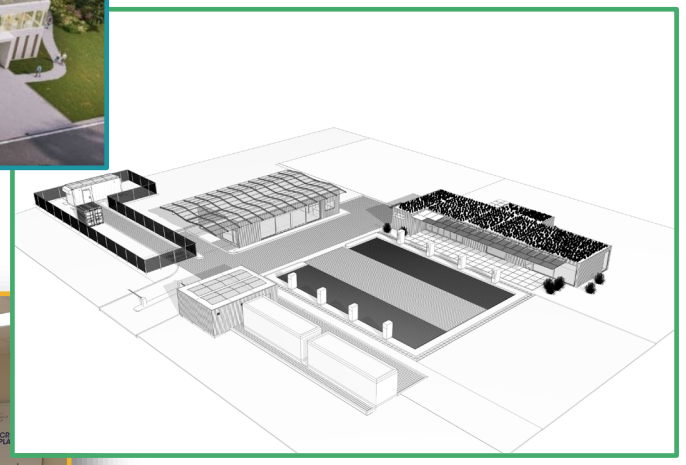
GREEN ENERGY PARK

1 State-of-the-art buildings for laboratories and research infrastructure to accelerate R&D.

2 Large-scale, realistic living labs to bridge the gap between knowledge and economy.

3 Building a powerful ecosystem that allows companies to jump ahead by fostering collaboration.

4 The training and experience center that helps companies grow in innovation sectors.



Energy & Climate

Health

Platform technology

1 | State-of-the-art buildings, lab spaces and research infrastructure

NEXUS-DATACENTER

ORIGIN – MEDICAL & TECHNICAL INFRASTRUCTURE LAB

BUILDING 3

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VUB VRIJE UNIVERSITEIT BRUSSEL

Universitair Ziekenhuis Brussel

H_2O neutraal CO_2 neutraal 2030

Results:

Nexus data center

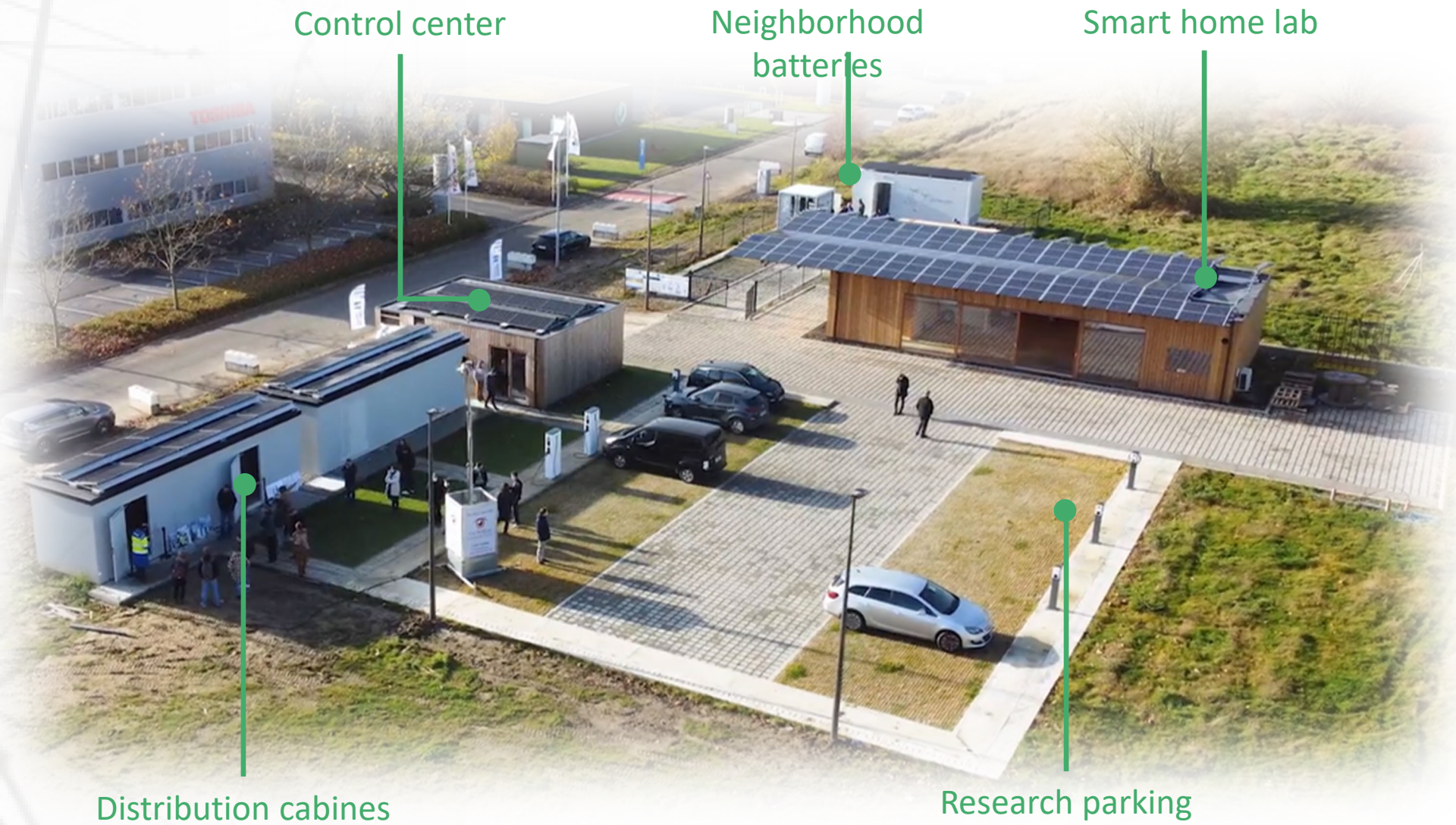
Key characteristics:

- 7.2MW IT load
- PUE: 1.2
- Uptime Tier lll, BREEAM Excellent, EDGE Advanced
- Rainwater buffer 1100m³
- Heat grid: heat producer “The heat will be distributed to the other buildings of the Research Park using a very low-temperature heat grid.”
- Other features: 3,300m² server room; PV south facade: 500kWp; 6 adiabatic dry-coolers (1280kW) and 4 cooling towers, fed from the rainwater buffer

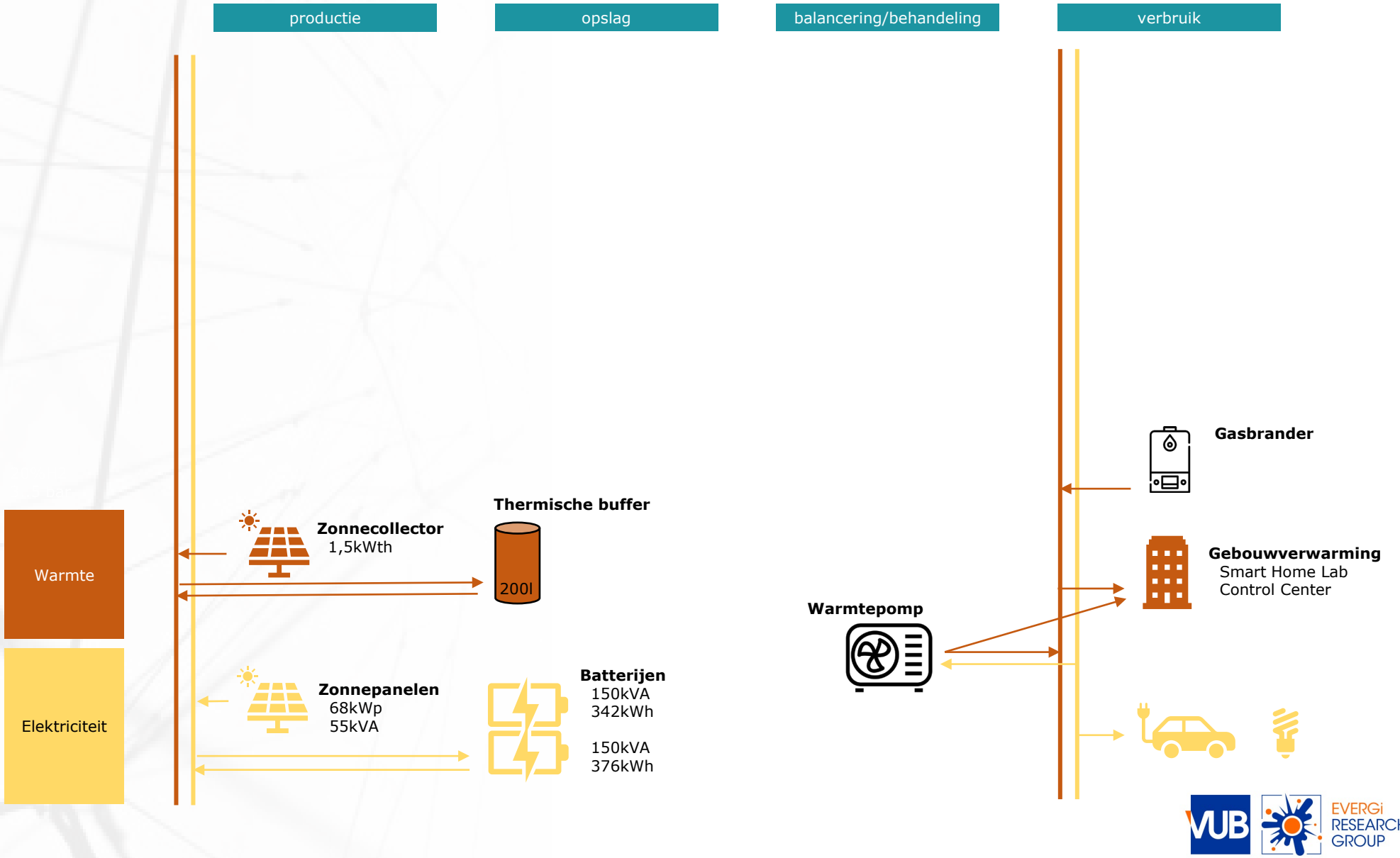
GREEN ENERGY PARK


SOLAR PANELS
LED-SCREEN
BUILDING INTEGRATED PHOTOVOLTAICS
ROOF GARDEN AND TERRACE
TECHNICAL AREA
AIR GROUPS (TO 8 AC/H)
HEAT PUMPS WITH HEAT REGUPERATION FROM DATACENTER
100% CONVERTIBLE LAB AND OFFICE SPACE
CENTRAL ENTRANCE AND ATRIUM
LOGISTICS AREA
INDUSTRIAL LABS AND TESTING SPACE
GREEN ENERGY PARK

2 | Large-scale, realistic living labs



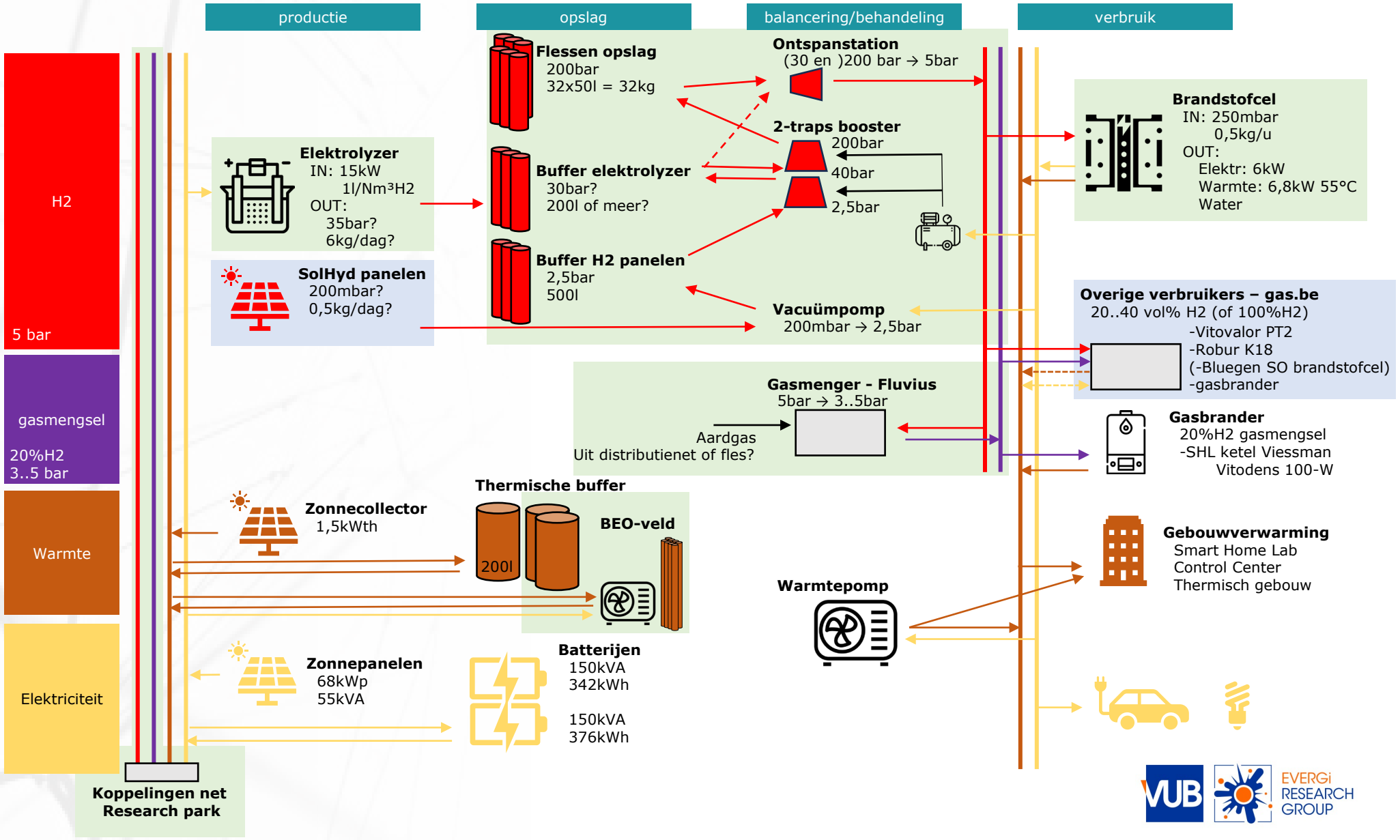
RESULTS: Smart Village Lab anno 2023



GREEN ENERGY PARK

VUB EVERGi RESEARCH GROUP

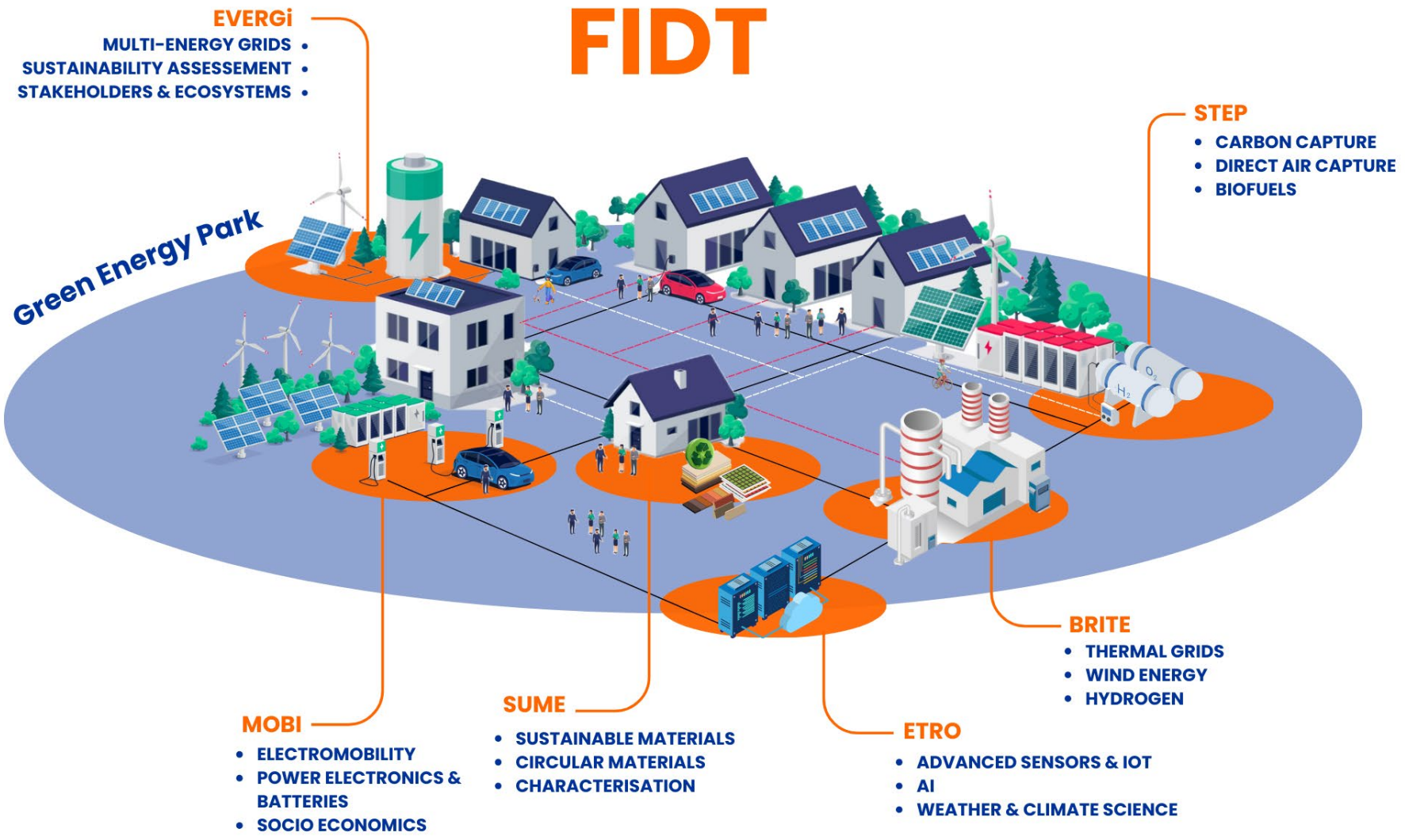
In progress: hydrogen, renewable gases and thermal storage



GREEN ENERGY PARK

VUB EVERGi RESEARCH GROUP

2.1 | Flanders INSTiTUTE FOR DECARBONISATION TECHNOLOGIES



3 | An ecosystem that inspires and fosters collaboration

Reconstruct

TIMING: JUNI 2023 – MEI 2027

Circulariteit in de Europese bouwsector stimuleren om de sterke milieu-impact van de sector te verminderen: daarom brengt Reconstruct onder leiding van het Institut de Tecnologia de la Construccion de Catalunya (ITeC) en met de steun van de EU een consortium van zestien instellingen samen.

InToWall

TIMING: FEBRUARI 2022 – JANUARI 2024

Muren zorgen bij renovaties bijna altijd voor verrassingen. Vaak heeft men geen weet van de opbouw, aanwezige leidingen en gebreken. Door in de muren te kijken, zonder 1 steen af te breken, wil InToWall bijdragen aan duurzame renovaties.

IB-Green

TIMING: 23/03/2023 - 28/02/2027 (47 MAANDEN)

De hittestress op bestaande industrie- en bedrijventerreinen verminderen door groene en blauwe infrastructuur te ontwikkelen: dat willen 11 partners uit België, Duitsland, Frankrijk, Ierland, Luxemburg, Nederland in hun gezamenlijk project IB-Green bereiken.

GREEN ENERGY PARK

4 | Training and experience center that helps businesses grow

ESF INVESTEERT IN JOUW TOEKOMST
Europese Unie
Vlaanderen is werk
Gefinancierd in het kader van de respons van de Unie op de COVID-19-pandemie

Trainings of the Future - Energy

Green Energy Park npo, as promoter in a consortium of seventeen organizations, developed innovative training courses by combining expertise in a co-creative manner.

A total of 9 trainings were created in 5 sub-themes:

- Awareness and sensitization
- Monitoring and regulation
- Techniques
- Innovativeness and systems thinking
- Communication and commercial skills

EDURGY
leren over de energie van morgen

Techlink Linking technicians · fonds323 · Th!nk E · VOLTA · SYNTRA MIDDEN-VLAANDEREN · SYNTRA PXL · Frixis · HIK VOLWASSENEN ONDERWIJS · EVB · flux50 · CLUSTA · HOGESCHOOL PXL · BOUWUNIE unie van het kmo-bouwbedrijf · wtcb.be · PROVINCIAAL ONDERWIJS VLAANDEREN · VUB VRIJE UNIVERSITEIT BRUSSEL

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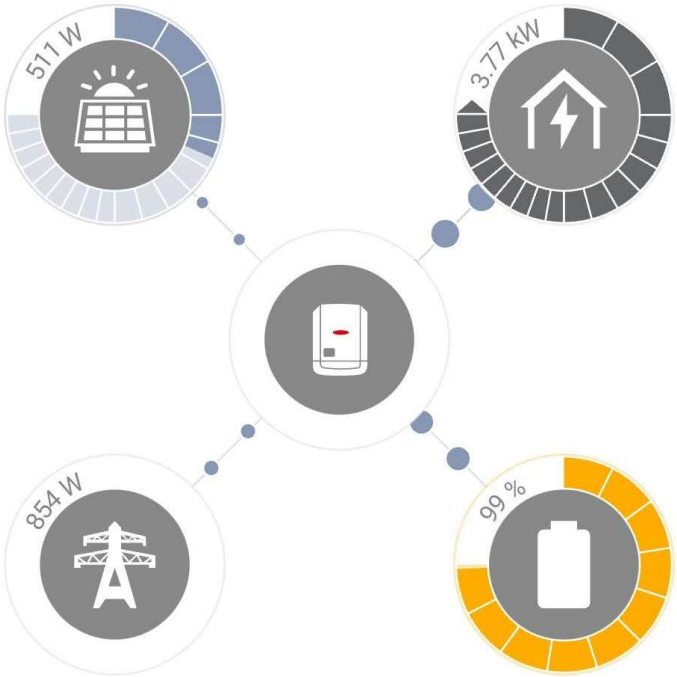
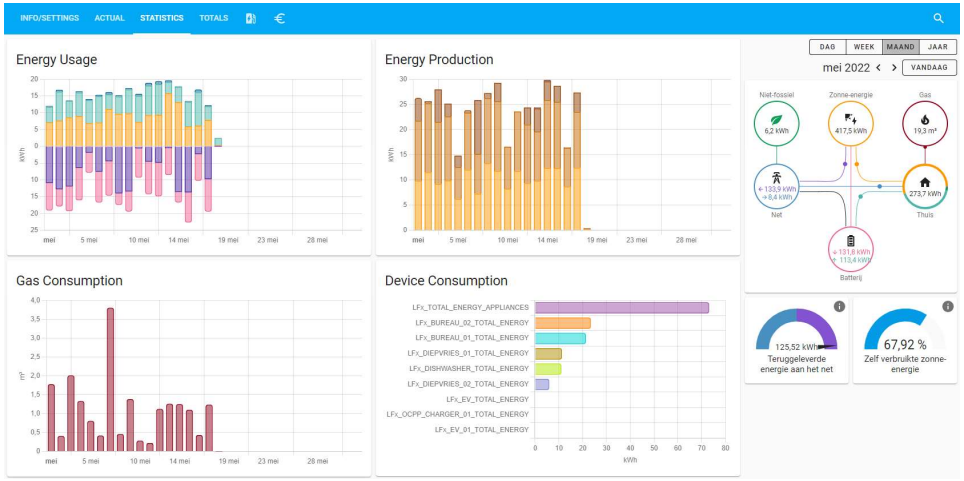
Energy Management System

Home EMS





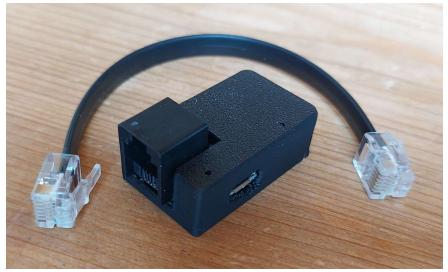
Energy Management System
Home EMS

- Being able to read out and/or control devices

- Optimise
  - Maximise self consumption
    -> kWh: energy amount taken from the public grid
  - Peak shaving
    -> kW: limiting the speed of taking electricity from the public grid, capacity tariff – help the distribution grid
  - Dynamic pricing
    -> Optimising the moment when to take from or inject to the public grid – help the energy system (consumption – production)
  - Netbalancing services
  - Energy sharing / peer 2 peer
  - CO2
  - …

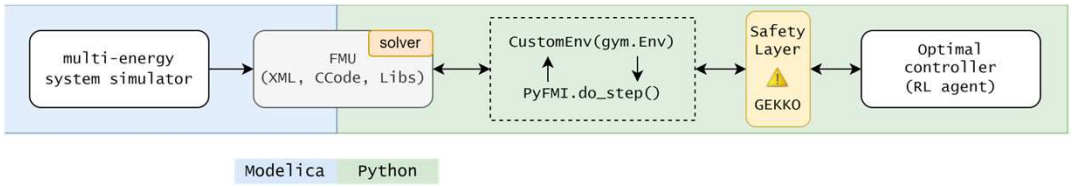
Smart Home Lab

Interconnect project

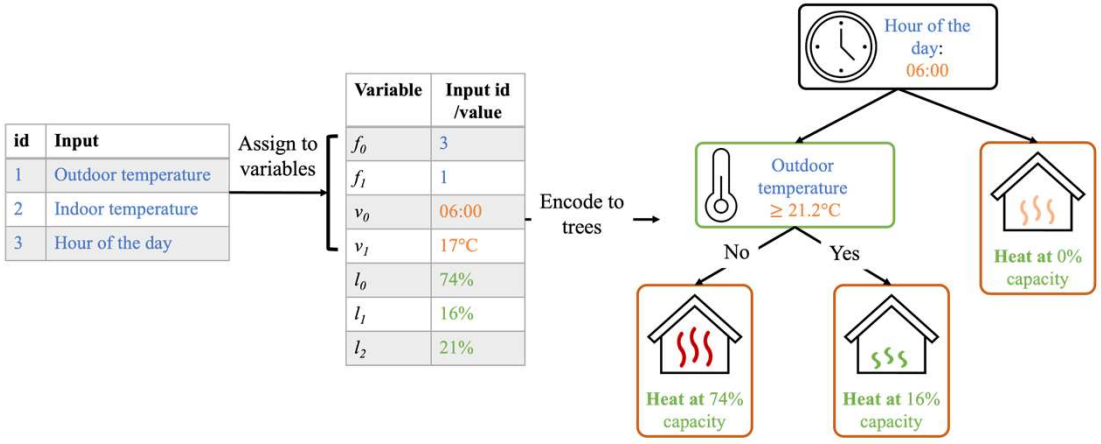


EMS comparison:

- Rule based
- Model Prodictive Control
- Decision tree-based
- Multi-energy safe Reinforcement Learning



Multi-energy safe RL EMS



Decision tree-based EMS

Questions?

lennert.callebaut@greenenergypark.be

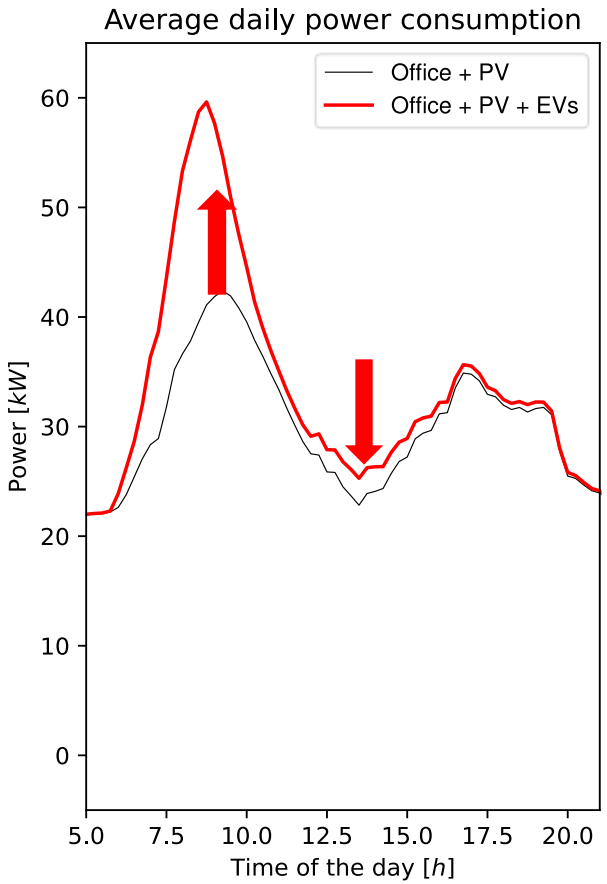
SMART CHARGING AND V2G

VRIJE UNIVERSITEIT BRUSSEL

Prof. dr. Cedric De Cauwer

CHARGING OF EV FLEETS

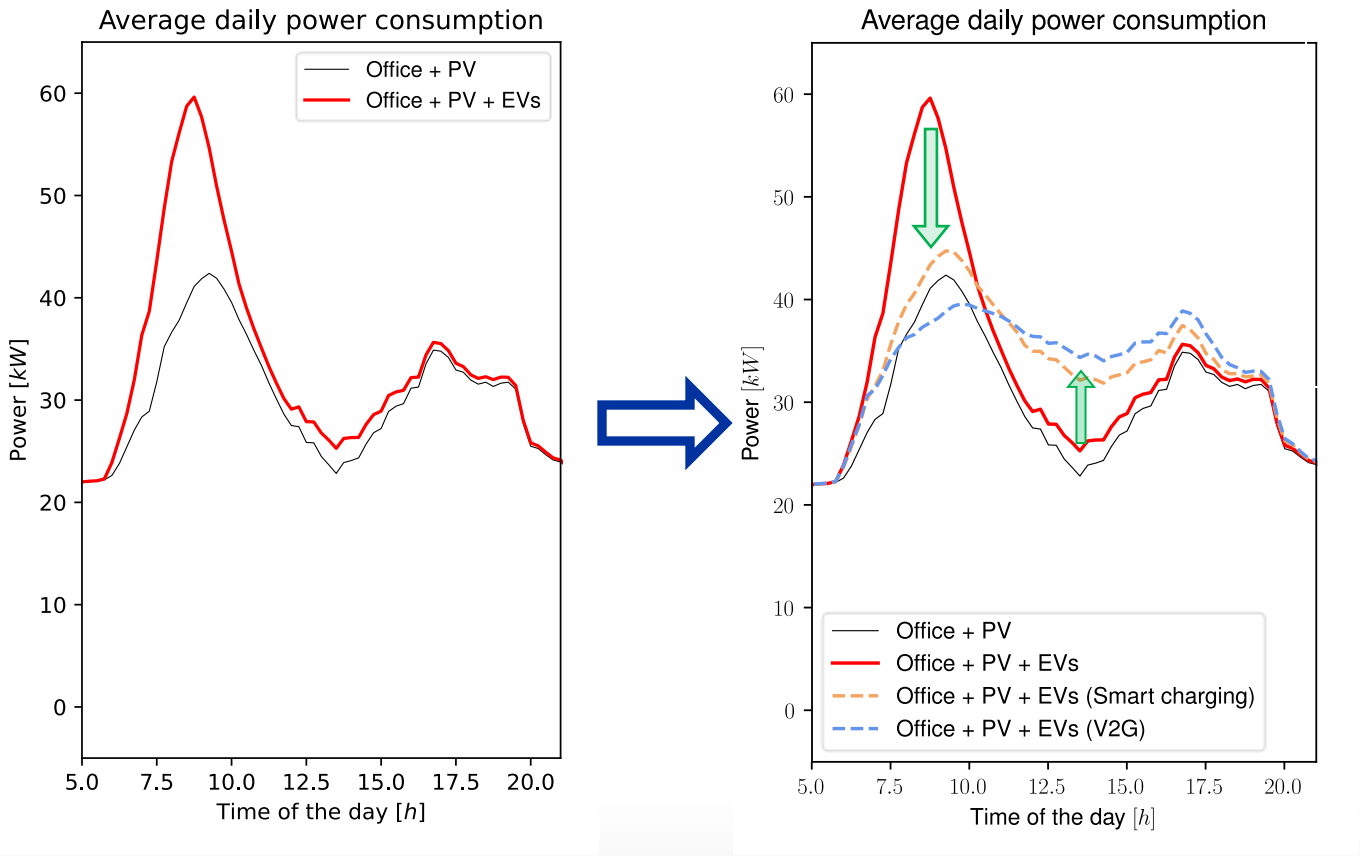
WHY SMART CHARGING?



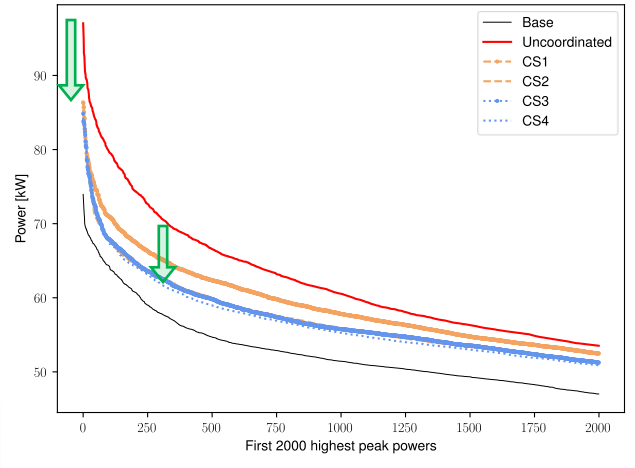
- Increased consumption
- Higher peak consumption (cf. capacity-based tariffs)
- Self-consumption not guaranteed
- Affects grid connection needs

EV SMART CHARGING SCHEDULER

ALGORITHM FOR SMART CHARGING



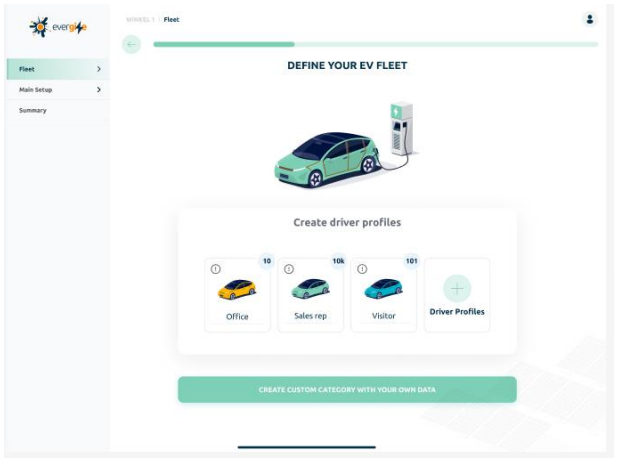
- Increased self-consumption
- Reduces peak consumption induced costs
- Limits grid connection capacity reinforcements

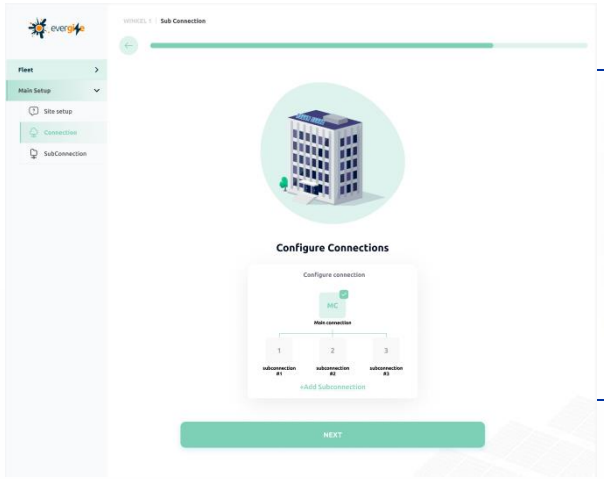


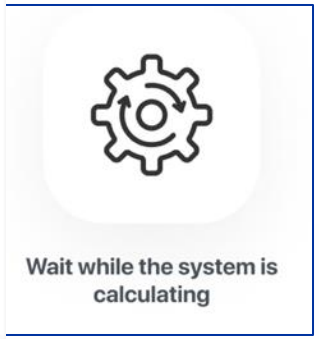
THE CHARGING HUB SIZING PROBLEM

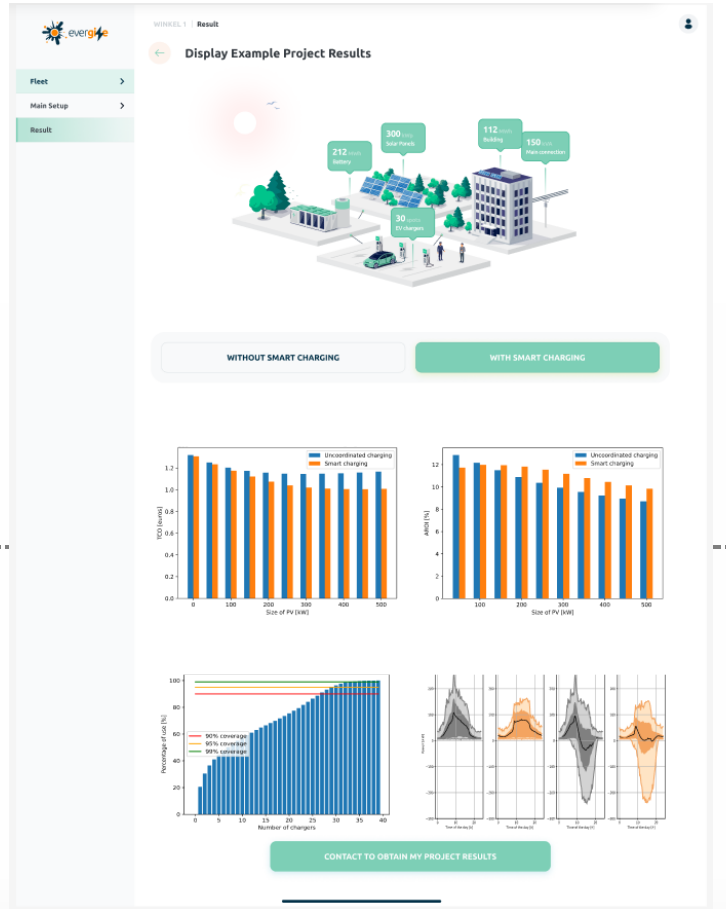
METHODOLOGY

Front End

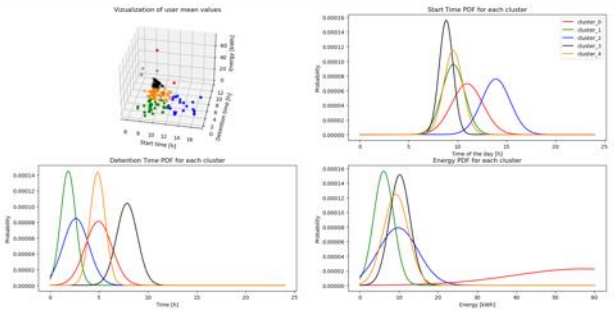


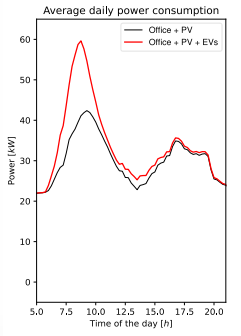


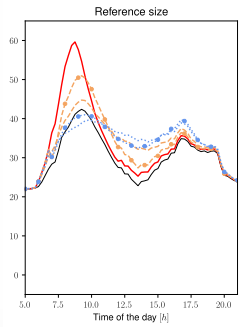




Back End







Mobility demand

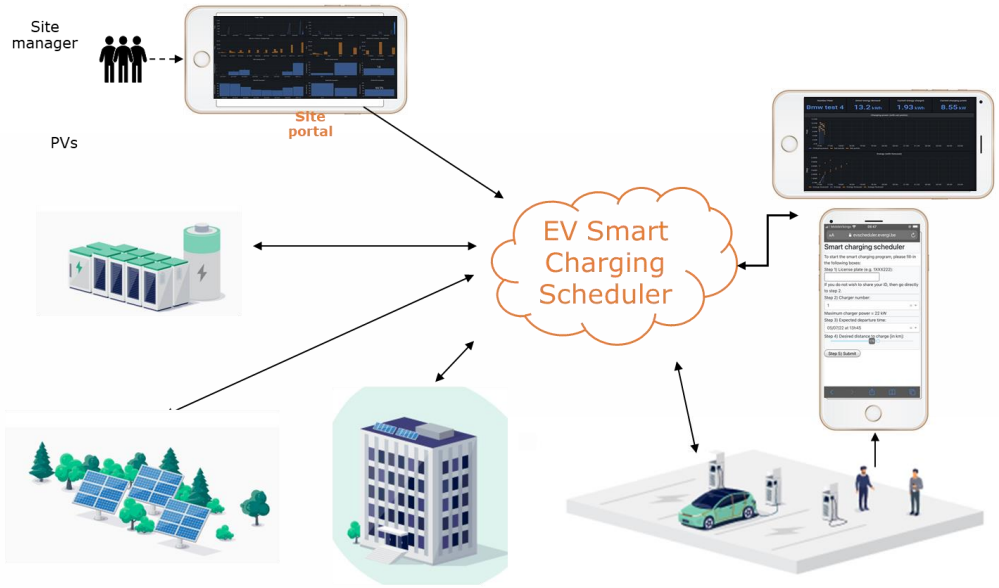
Site configuration

Energy balance w smart charging

Design & Cost

EV SMART CHARGING SCHEDULER

SOLUTION FOR SMART CHARGING OF ELECTRIC VEHICLES



- ✓ Cloud-based intelligence
  - ✓ Forecasts local consumption and production
  - ✓ Considers driver needs
  - ✓ Considers grid constraints and power-based tariffs
  - ✓ Optimizes charging power for all chargers individually
- ✓ Interfaces for managers
- ✓ Interface for drivers:
  - ✓ Charging requirements
  - ✓ Charging session status

Strategic Living Labs

MISSIE

Flux$_{50}$ **orchastrates & facilitates** the development of Flanders as a **smart energy region**, to create **economica value** for Flemish society and our members in particular


FLANDERS
INNOVATION &
ENTREPRENEURSHIP
flux50
Clusters for Innovation
220
members
82
projecten
5
innovatorzones
> 3250
tollowers
> 105M€
investments
5 living labs
> 50
events
> 70 m€
grants
14 European
projects

200 MEMBERS – UNIQUE COMBINATION

IT sector

Building sector

Energy sector

5 innovator zones

Energy Harbors

Microgrids

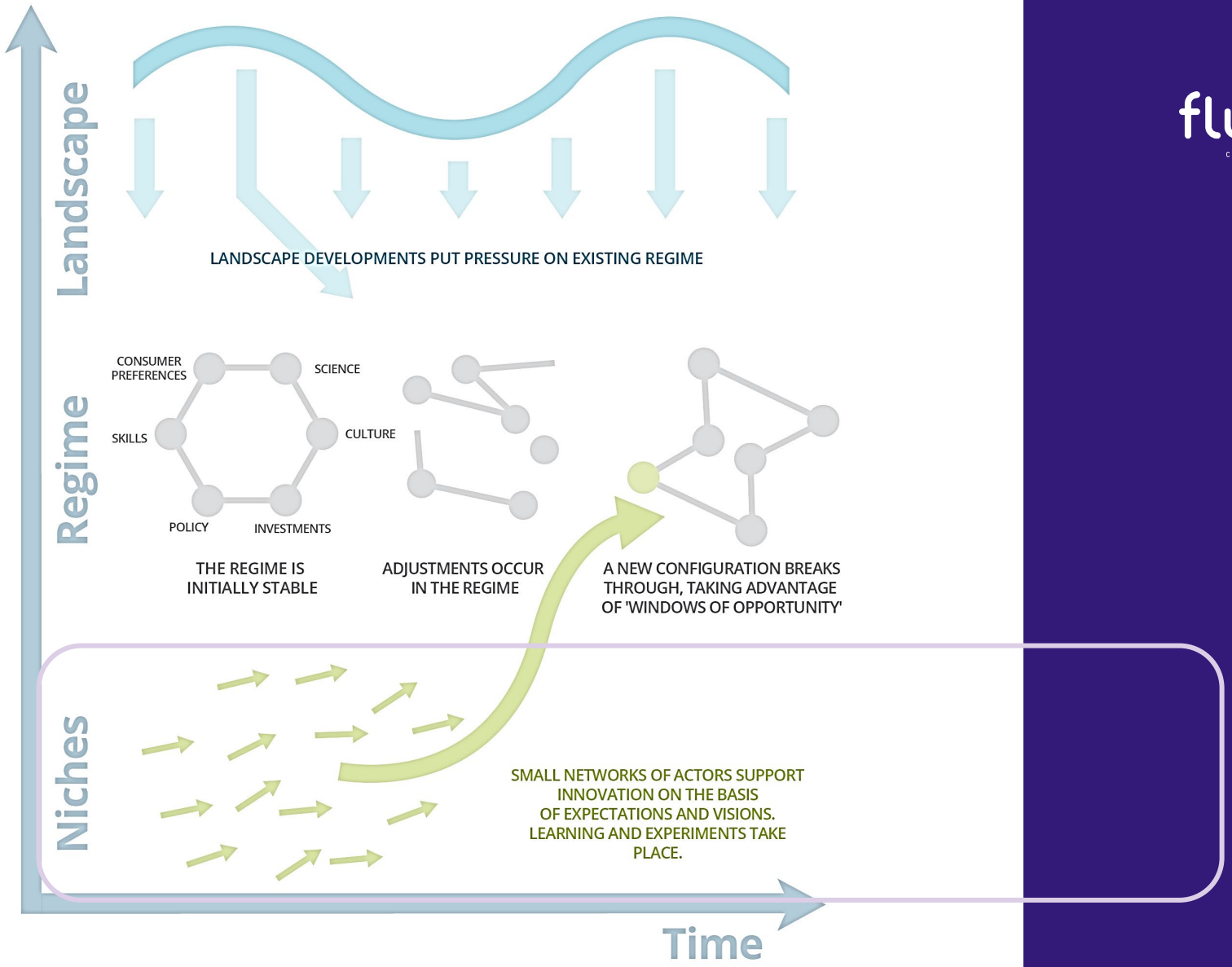
Multi-Energy Solutions

Energy Cloud Platforms

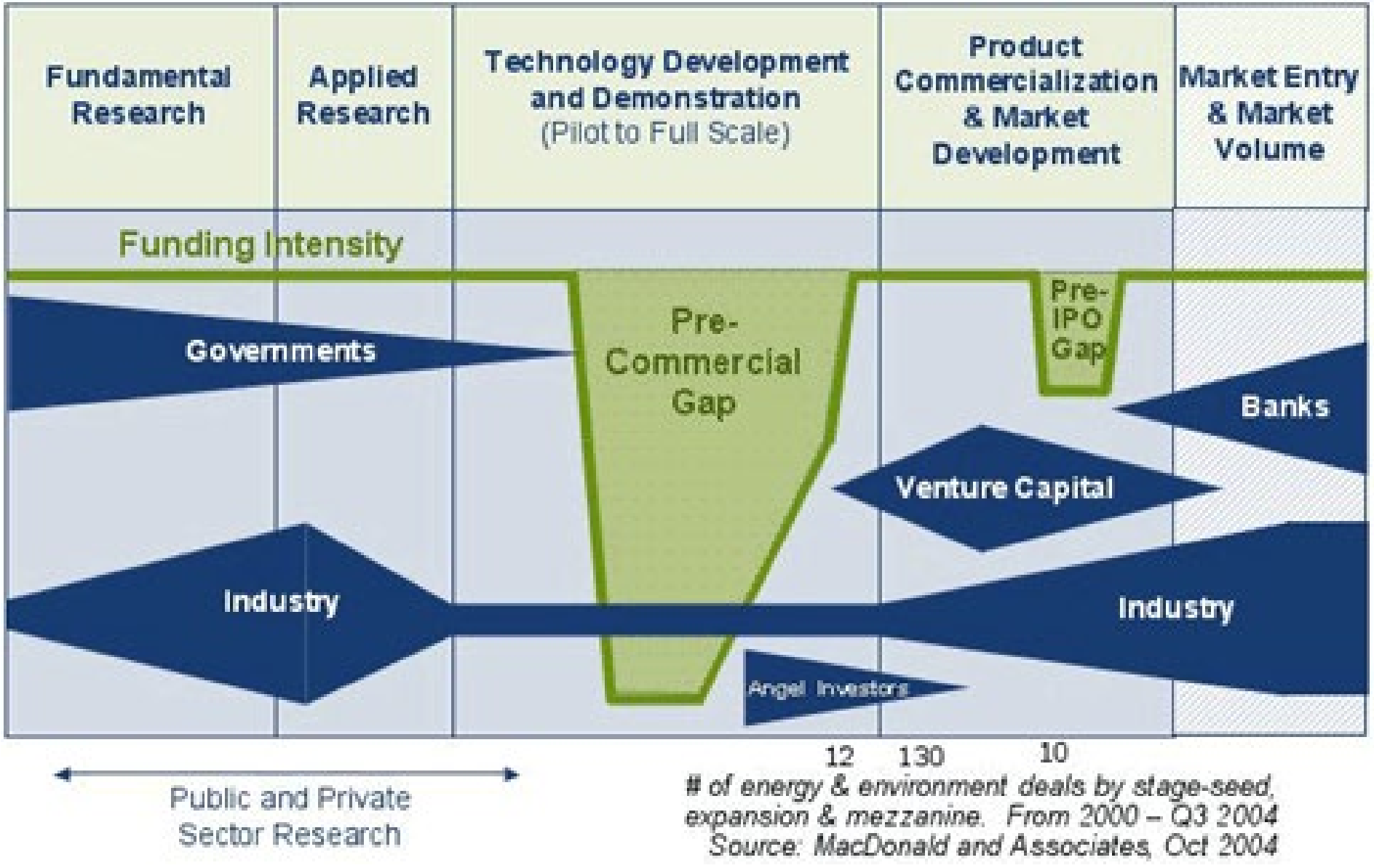
Intelligent Renovation

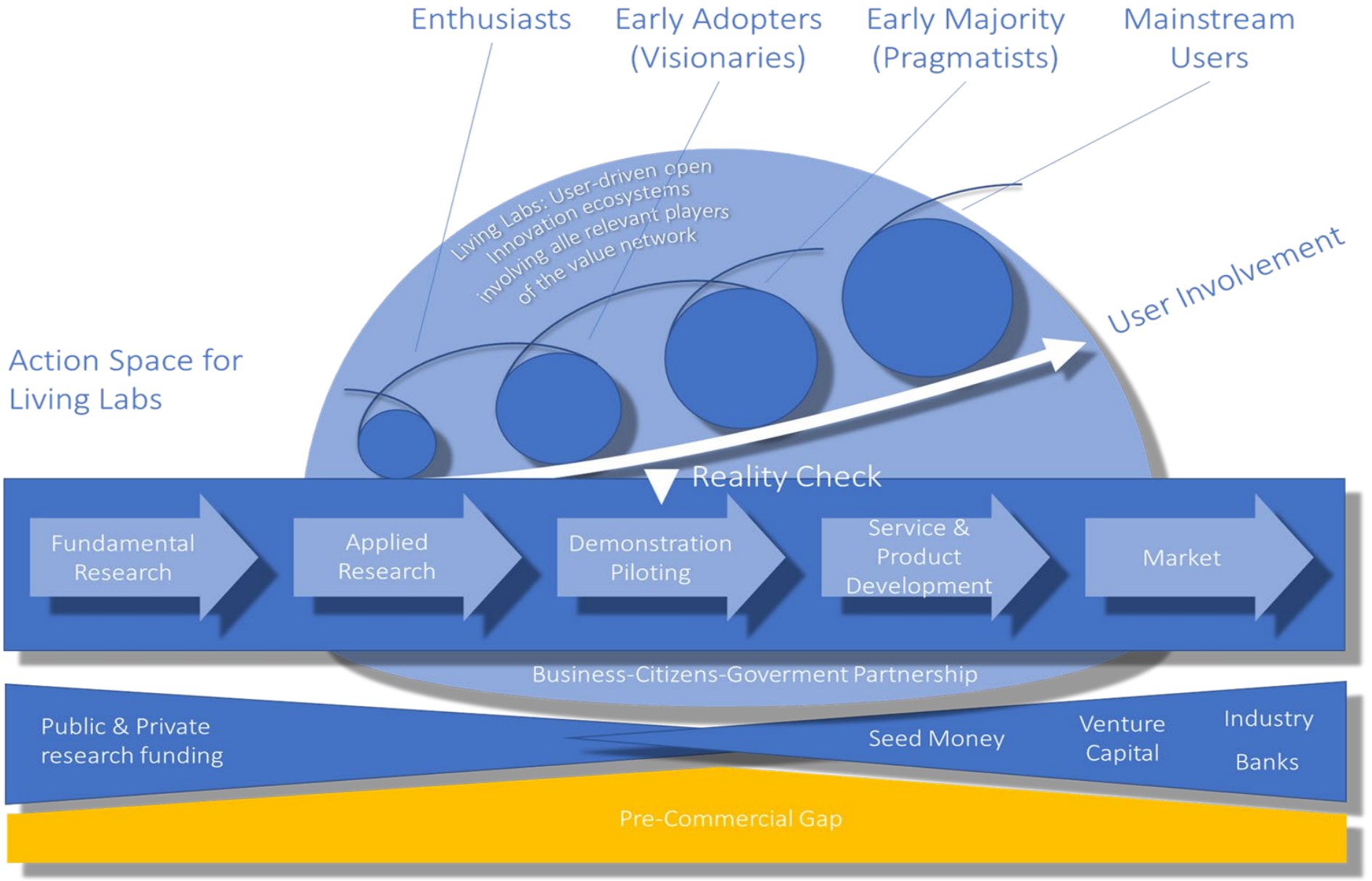
Figure 2.2

The multi-level perspective on sustainability transitions



Mc Donald and Associates, 2004
Geoffrey A Moore, Crossing the chasm,1999


Fundamental Research
Applied Research
Technology Development and Demonstration
(Pilot to Full Scale)
Product Commercialization & Market Development
Market Entry & Market Volume
Funding Intensity
Governments
Pre-Commercial Gap
Pre-IPO Gap
Banks
Venture Capital
Industry
Industry
Angel Investors
12
130
10
Public and Private Sector Research
# of energy & environment deals by stage-seed, expansion & mezzanine. From 2000 – Q3 2004
Source: MacDonald and Associates, Oct 2004



Mc Donald and Associates, 2004
Geoffrey A Moore, Crossing the chasm,1999

20% Reduction in GHG emissions[1]

20% EU energy from renewables

20% Improvement in energy efficiency

By the year **2020**

>40% Reduction in GHG emissions[1]

> 32% EU energy from renewables

32,5% Improvement in energy efficiency

By the year **2030**

60% Reduction in GHG emissions[1] by 2040

80-95% Reduction in GHG emissions[1] by 2050 (all sectors contribute)

2050 Low-carbon economy

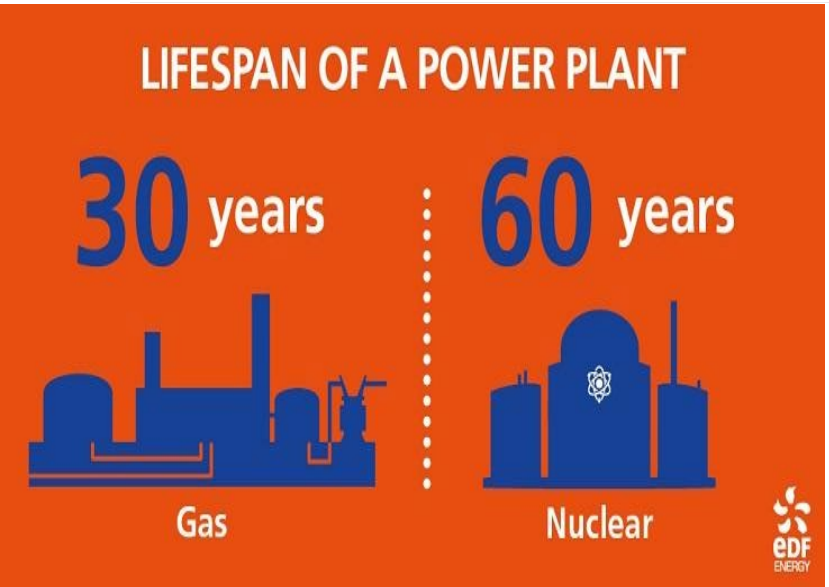
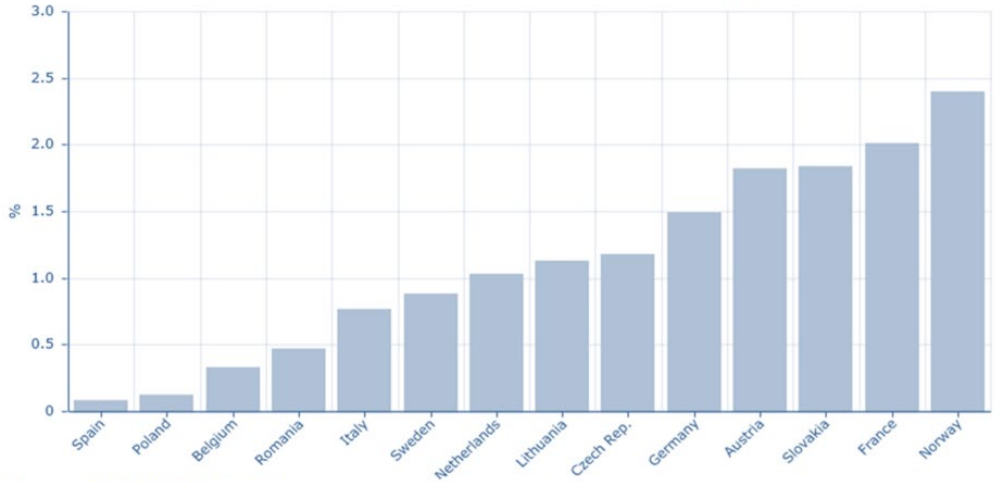
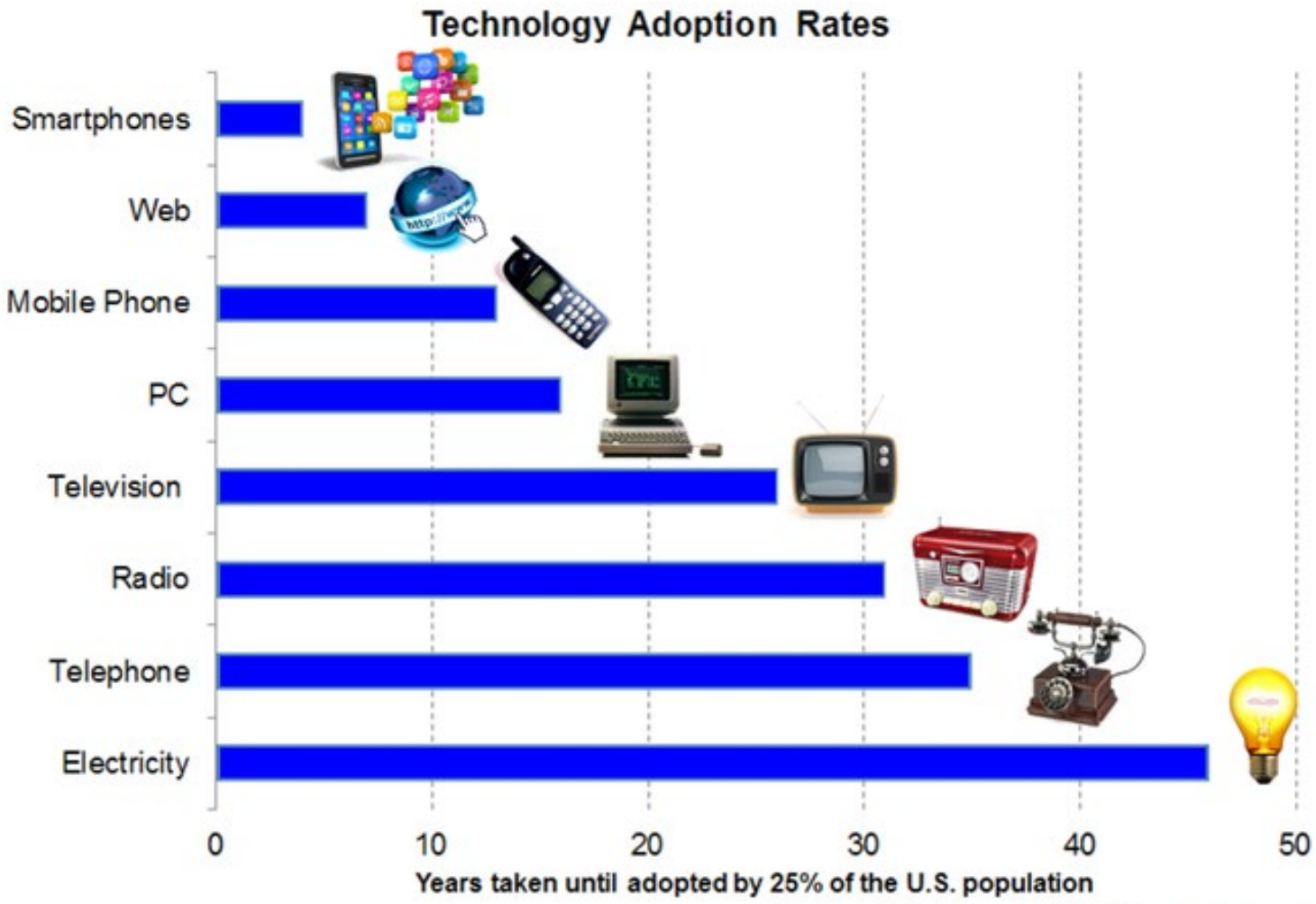
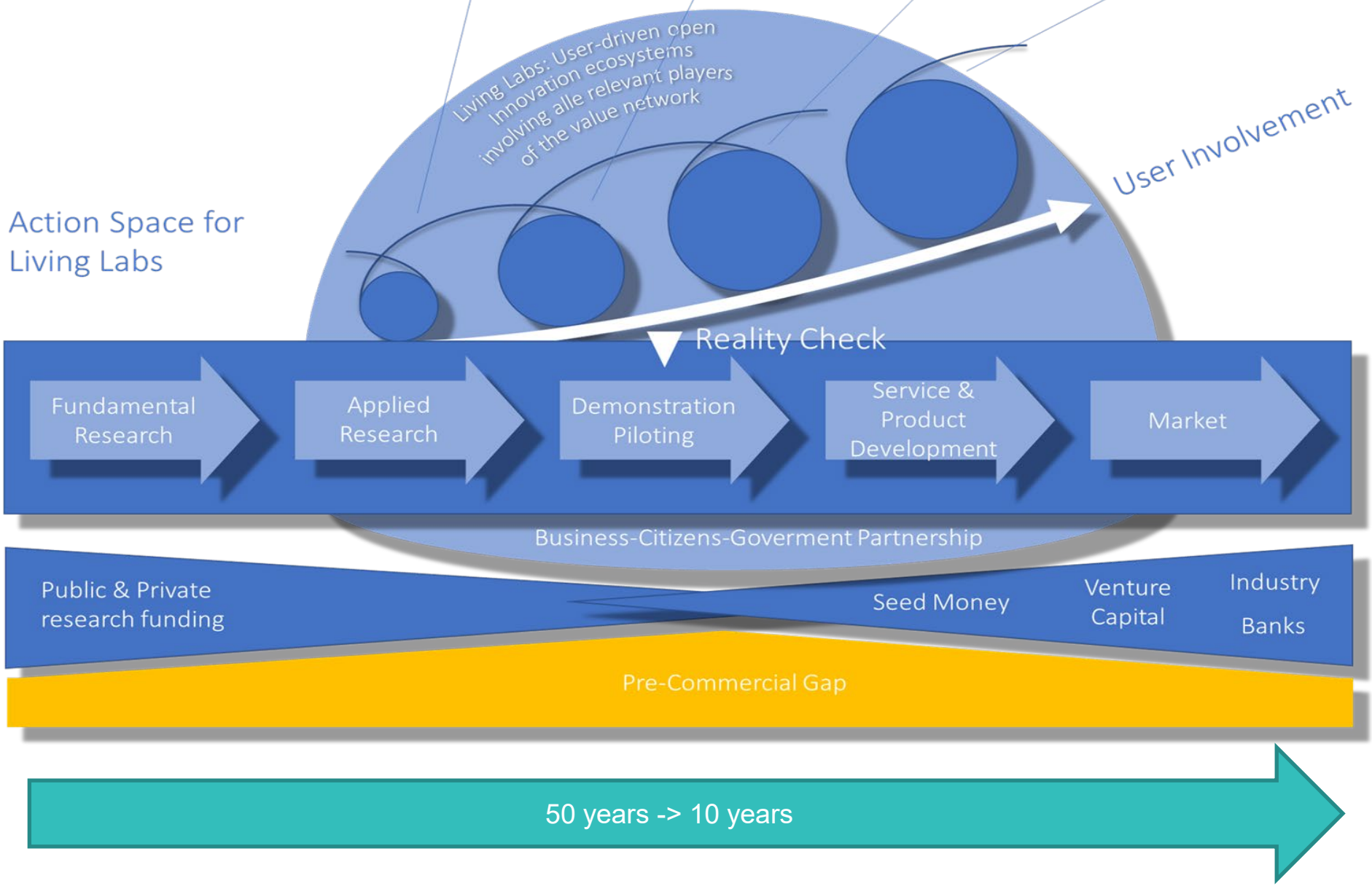


Figure 5: Major renovation rates of residential buildings across MSs

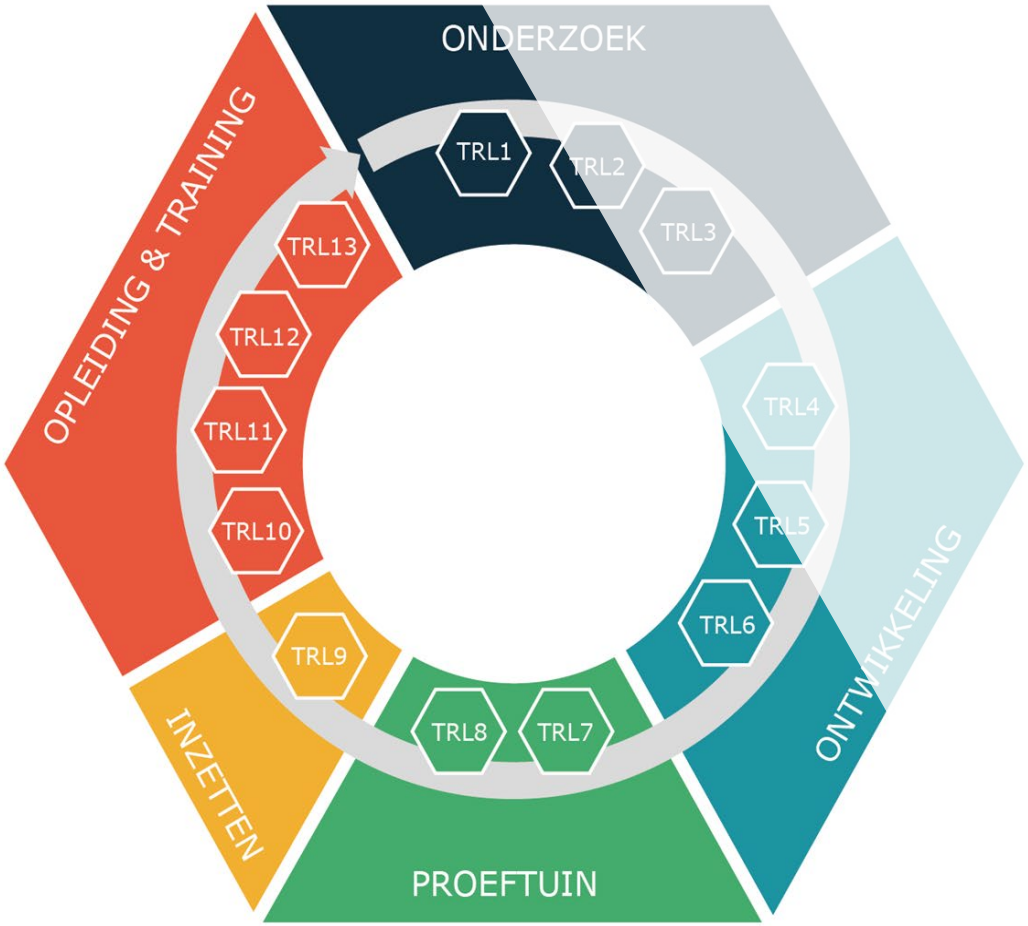


Source: ZEBRA2020 Data tool


Technology Adoption Rates
Smartphones
Web
Mobile Phone
PC
Television
Radio
Telephone
Electricity
0
10
20
30
40
50
Years taken until adopted by 25% of the U.S. population
Market Realist
Source: U.S. Census, Wall Street Journal


Action Space for Living Labs
Living Labs: User-driven open Innovation ecosystems involving alle relevant players of the value network
User Involvement
Reality Check
Fundamental Research
Applied Research
Demonstration Piloting
Service & Product Development
Market
Business-Citizens-Goverment Partnership
Public & Private research funding
Seed Money
Venture Capital
Industry
Banks
Pre-Commercial Gap
50 years -> 10 years

Green Energy Park



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FLANDERS INNOVATION & ENTREPRENEURSHIP

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Clusters for Innovation