



Energy clustering in Flanders

IMPLEMENTATION OF THE SMART SPECIALISATION STRATEGIES (S3)

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Guy Vekemans

Strategy Co-ordinator EnergyVille



Flexibility of the energy system

Flexibility as “key feature” of the future energy system



Future decarbonised energy system needs all flexibility solutions:

- Energy storage
- Energy cluster management incl. flexible demand response
- “Dispatchable” power plants
- Interconnection with adjacent markets

*Cost-competitiveness of renewables improving
Energy efficiency 38%, renewables 30% of CO₂ reductions
Increasing electrification: growth OECD 14%, non-OECD 300%
Storage multiple roles in low-carbon electricity systems*

Energy Technology Perspectives 2014

Harnessing Electricity's Potential

Clustering in Flanders



Focus of Flanders

Energy harbours



Micro-grids



Multi-energy districts



Energy cloud platforms

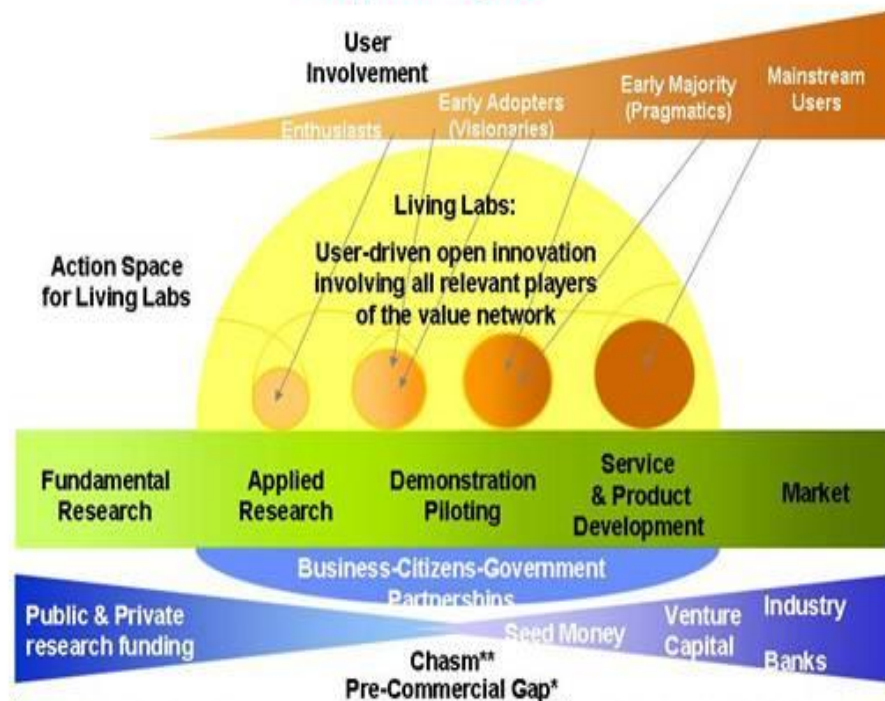


Intelligent renovation



Living labs – innovator zones

Action space for Living Labs along the technology adaption cycle



* MacDonald and Associates, 2004

** Geoffrey A Moore: Crossing the Chasm, 1999

Living Labs

- Test & development environments complementary to design lab
- Realistic setting in a confined area e.g. city or district
- Co-operation between companies, knowledge partners, government, users,...
- Development of new products, services, business models

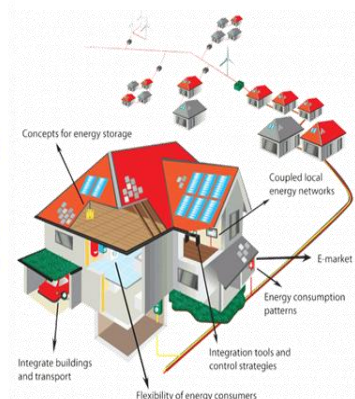
Living labs – a growing portfolio

- Example 1: In home energy intelligence
- Example 2: Renewable energy in harbours
- Example 3: Intelligent renovation
- The living labs of EnergyVille

In home intelligence - LINEAR



linear
Intelligent Networks



- Active demand response: 300 dwellings
- Appliance integrated intelligence
- Business case
 - Grid operators
 - Energy suppliers

In home intelligence - LINEAR

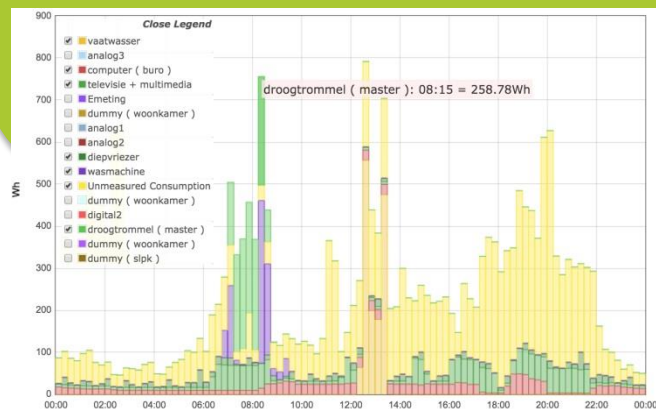


445 white good appliances

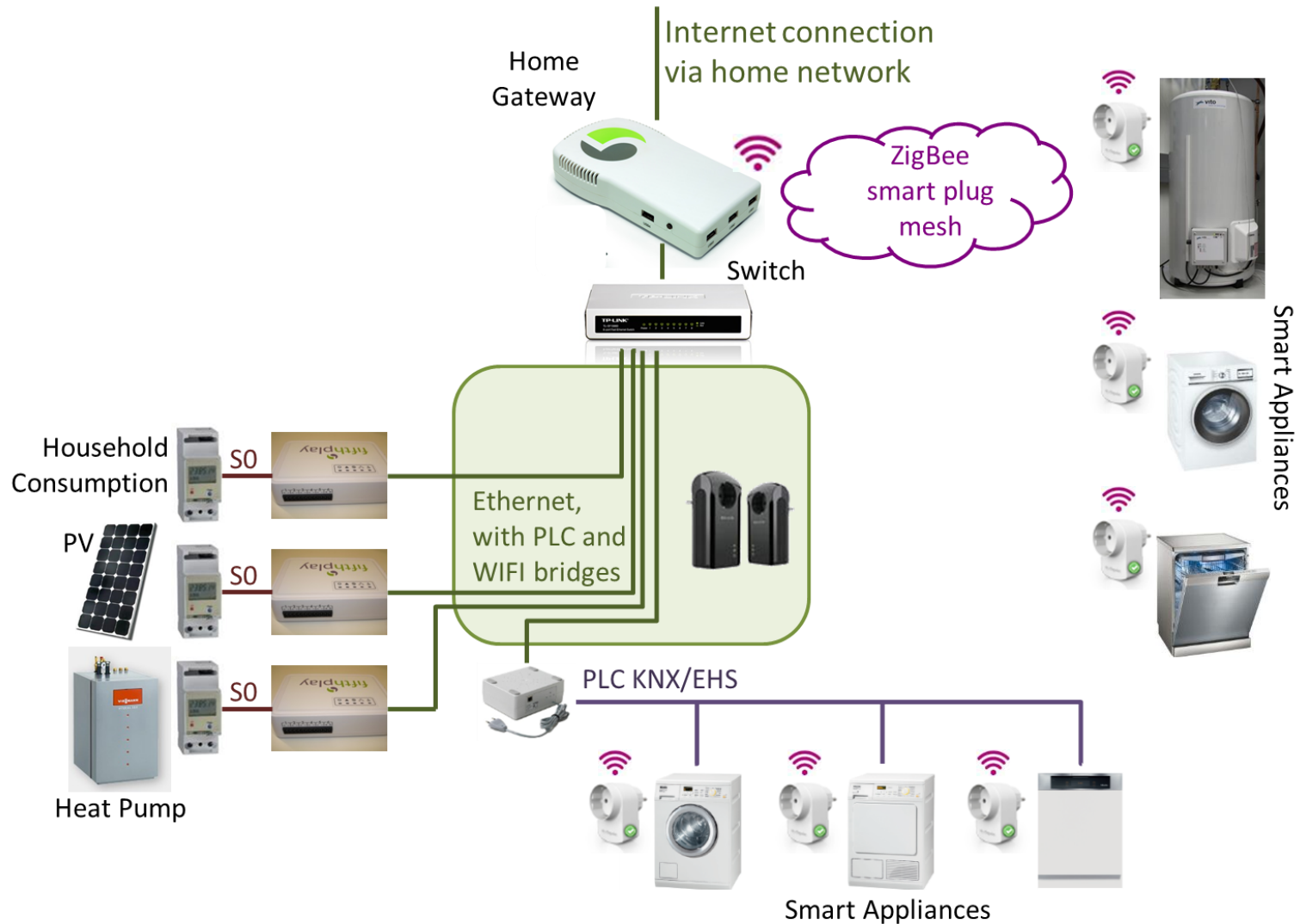
15 smart boilers

2000 smart plugs

4 business cases



In home intelligence - LINEAR

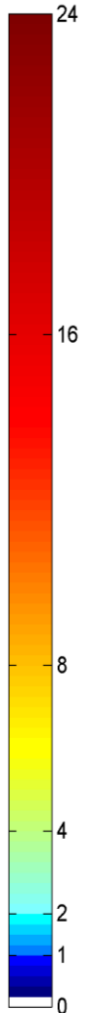
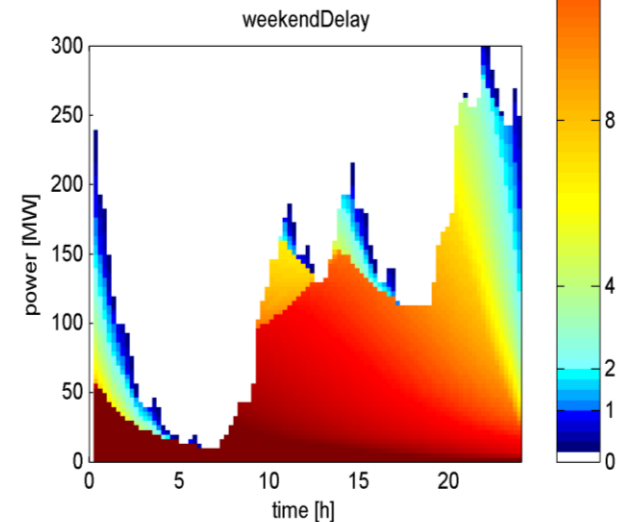
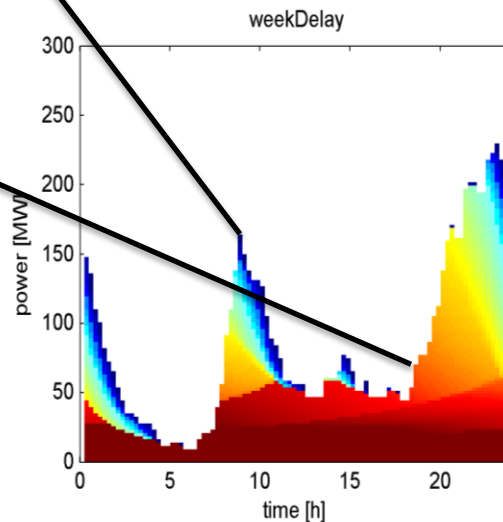
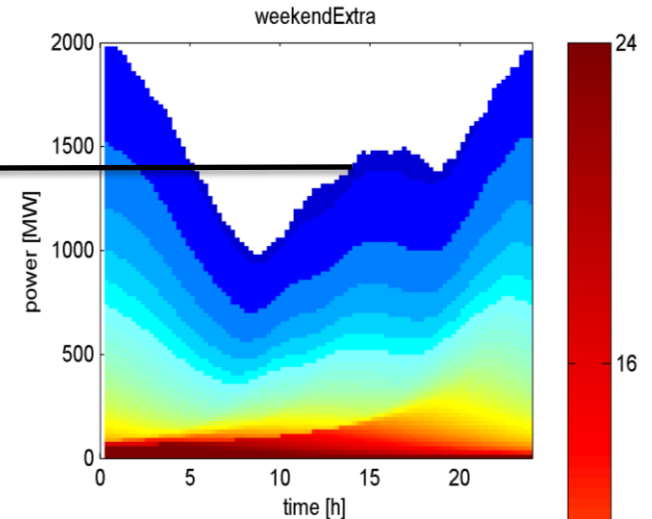
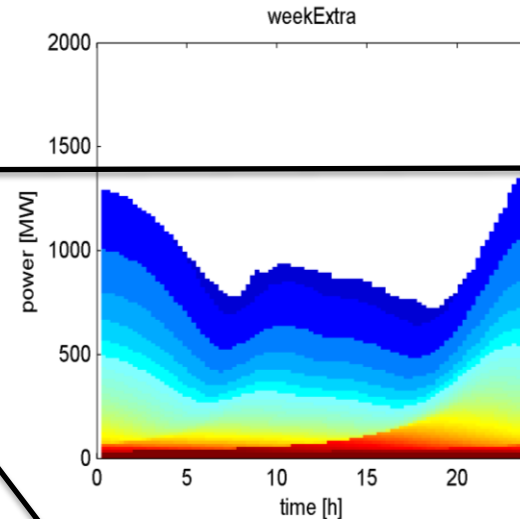


In home intelligence - LINEAR

1400 MW can maximally
be **asked extra** for 45 min
at 2 p.m.

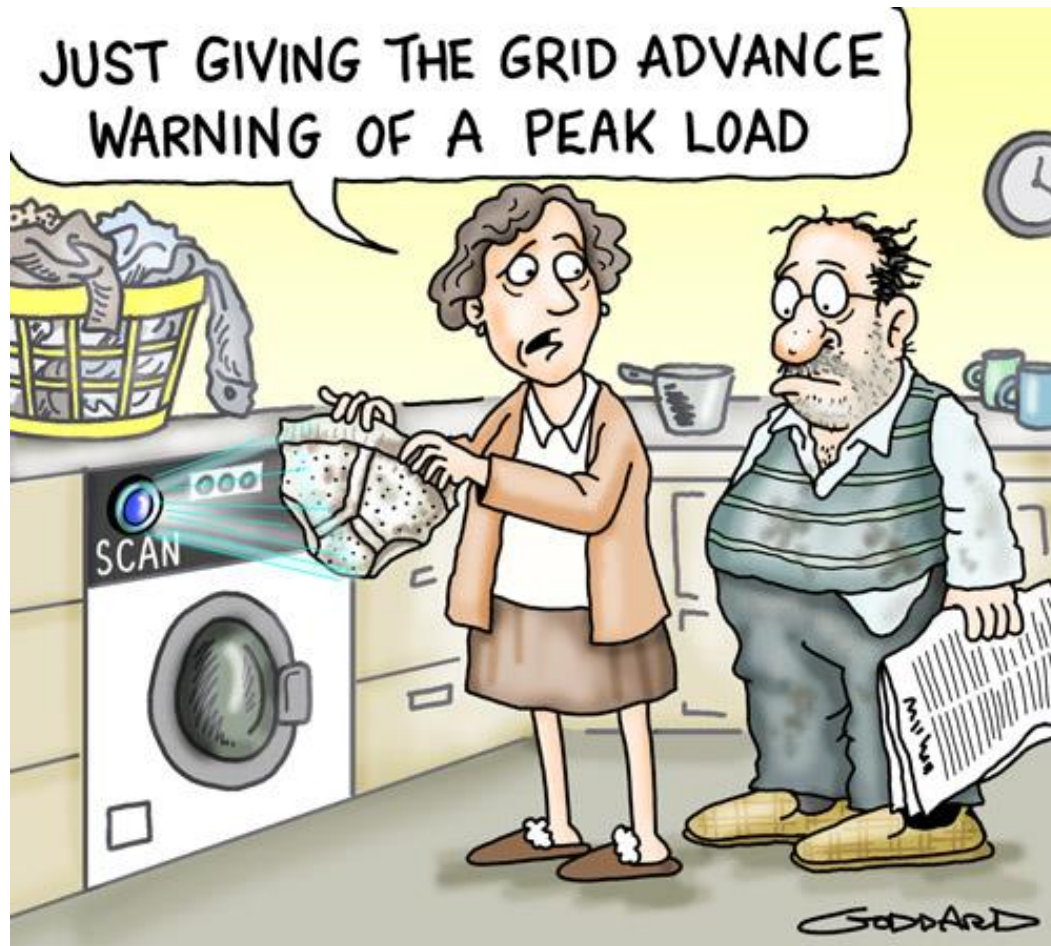
160 MW can maximally be
delayed for 15 min. at 9
a.m.

60 MW can maximally be
delayed for 11 hours at 6
p.m.



Living lab

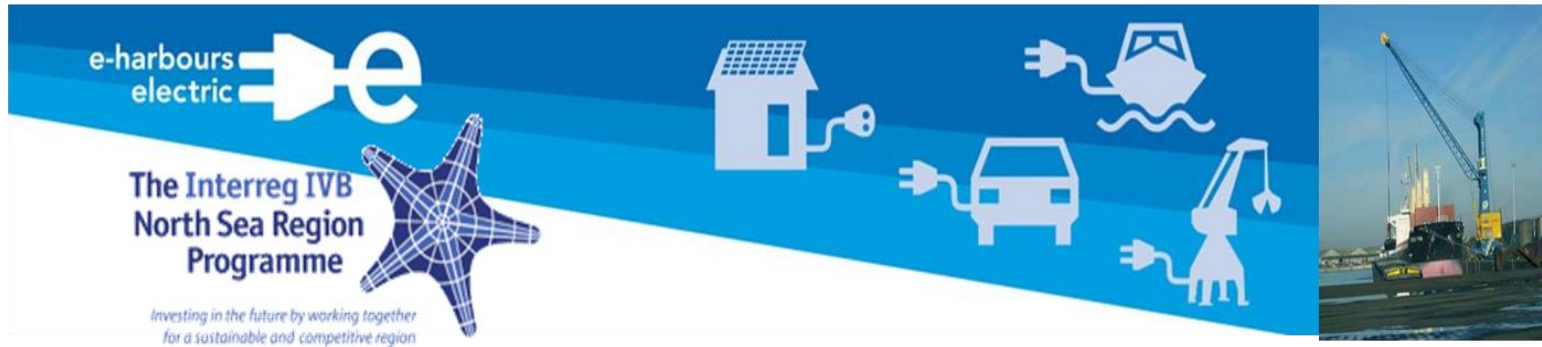
🌿 “Real” intelligence



Living labs – a growing portfolio

- Example 1: In home energy intelligence
- **Example 2: Renewable energy in harbours**
- Example 3: Intelligent renovation
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Renewable energy in harbours



Renewable energy in harbours



Rotterdam Harbour

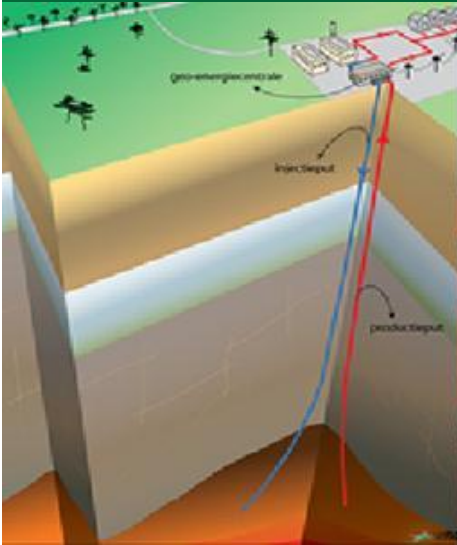
Annual: $\approx 7.600.000$ containers¹
Connection points : **12.000**
Freezing mode : $\approx 50\%$
Connection time ≥ 3 days: $\approx 50\%$
5000 reefers: **50 – 75 MW Flex**

Antwerp Harbour

Annual: ≈ 140.000 containers
Connection points : ≈ 5000
2500 reefers: **25 – 37.5 MW Flex**

Renewable energy in harbours

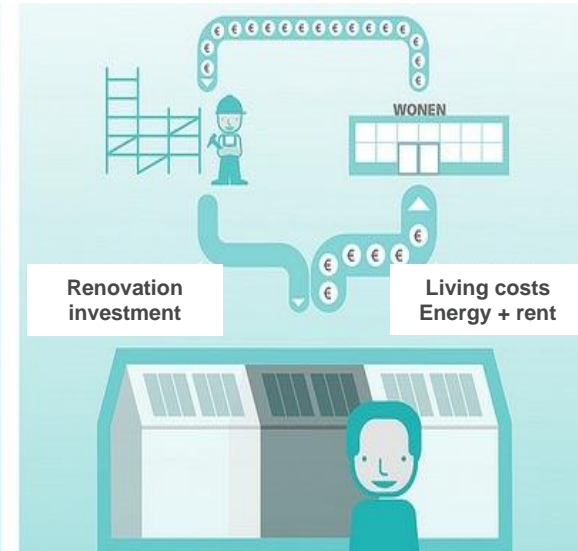
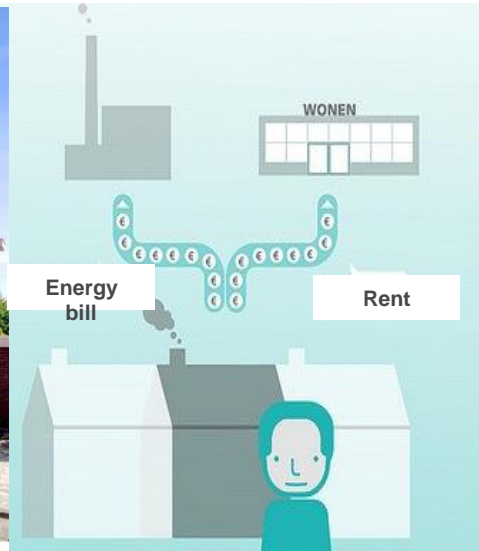
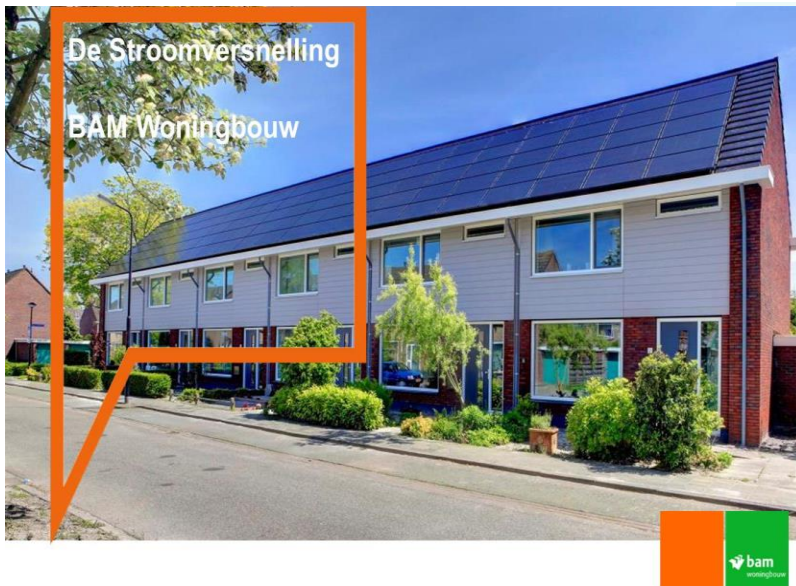
4th generation thermal networks and geothermal solutions



Living labs – a growing portfolio

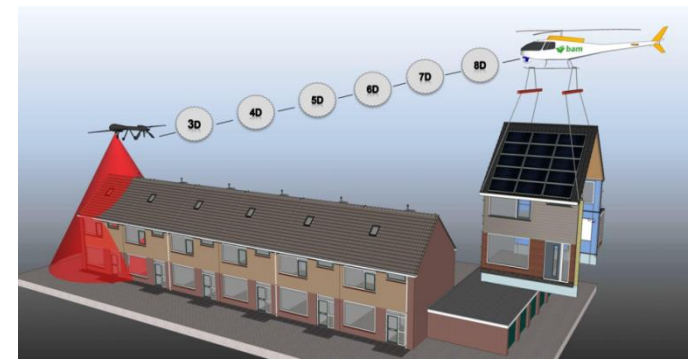
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Intelligent renovation



User driven
Zero energy renovation
Prefab building envelope
Building Integrated PV
All electric

Intelligent renovation



Installation of the Energy module

Heat pump – balanced ventilation

The energy roof

Integrated PV



Rennovates project

Grid impact

Storage

District level



Living labs – a growing portfolio

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EnergyVille – location



A collaboration between
the major research institutes
KU Leuven, VITO and Imec



Campus
EnergyVille

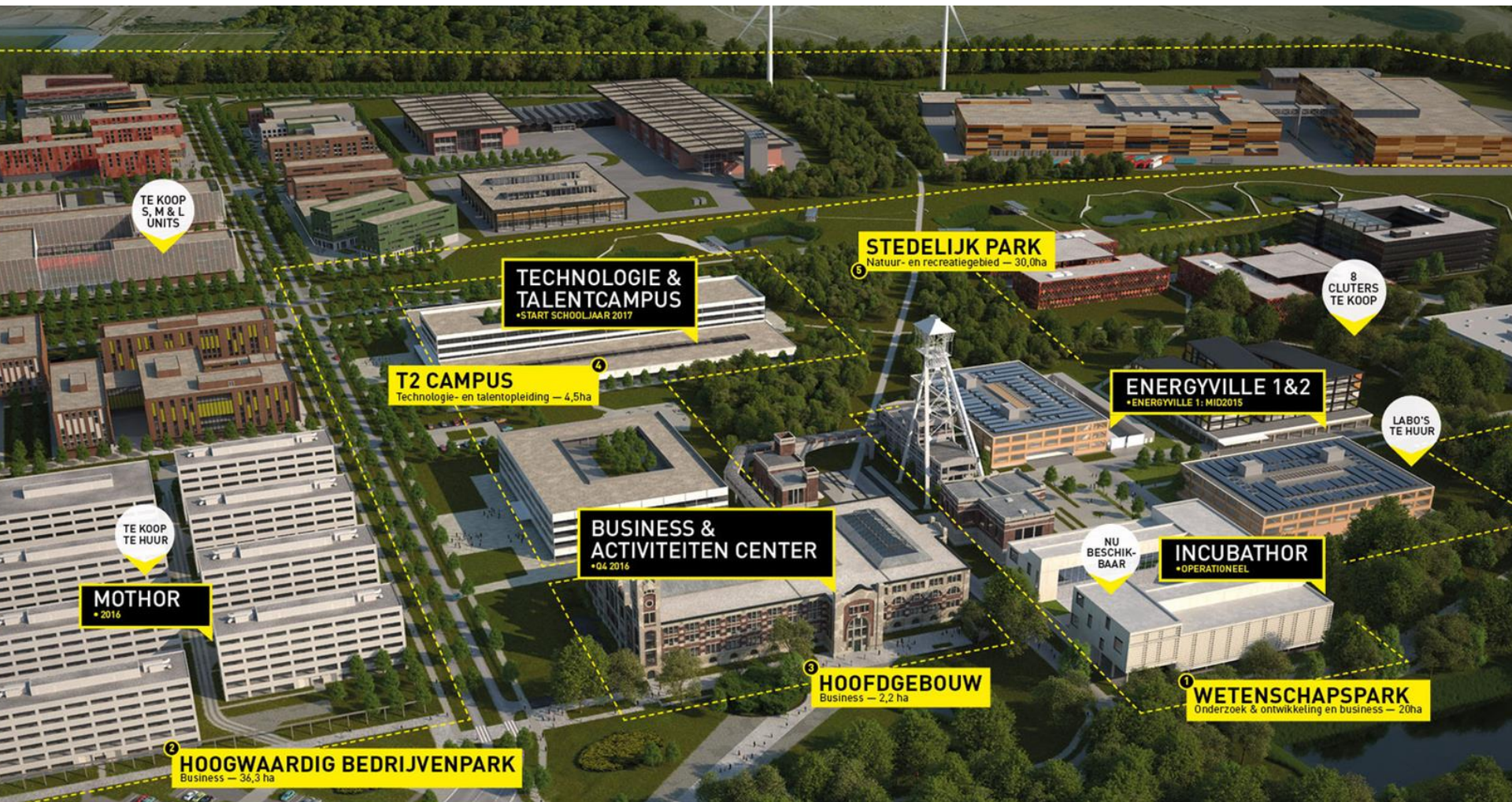
Embedded in a local context





Campus
EnergyVille

Thor Park



EnergyVille



Connected in
an interconnected world



EnergyVille



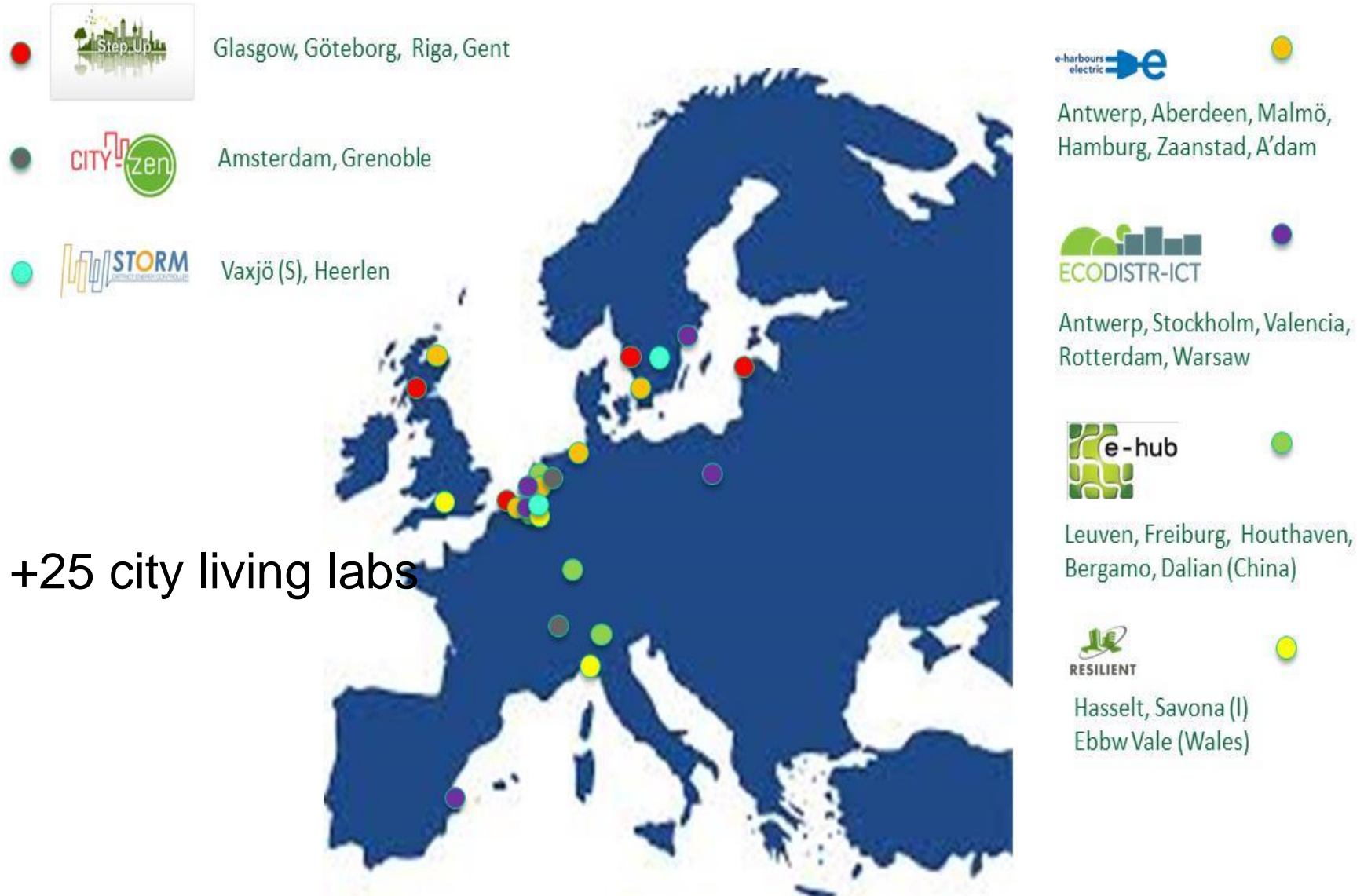
EnergyVille – Embedded in a broad context



KIC InnoEnergy
Formal Partners

A growing portfolio of living labs



Energy clustering in Flanders

Unique competences of industry and innovation:

- Energy flexibility
- Integration of energy flows
- Interoperability and scalability
- Citizen involvement