oPEN Lab
Leading the transition to Positive Energy Neighbourhoods
Evi Lambie, VITO/EnergyVille
BME Horizon Hot Topics

This project has received funding from the European Union's Horizon 2020 Research and Innovation Framework Programme under grant agreement No 101037080.
The building stock decarbonisation challenge

>95% of existing residential buildings need an energy renovation by 2050

40 to 50% of Belgian households can finance climate & comfort renovations
→ Optimal renovation flow & targeted support
→ Servitisation & valorisation non-energy benefits

Climate neutral EU by 2050
→ Cross-sectorial energy system integration
Societal optimalisation of collective approach
Driving transformational change through a community approach

Industrialised district renovation

Novel generation district H&C

Smart electricity grid

Community involvement

TARTU
GENK
PAMPLONA
Revitalisation of urban areas in Genk (BE), Pamplona (ES) and Tartu (EE) and beyond towards PEN

For local governments revitalisation of poor socio-economic neighbourhoods is key

- **PEN** within existing urban contexts
- **Open** innovation to identify commercially viable solution packages
- **Living Lab** approach: innovation processes in real-life communities

75% of Europeans live in urban areas

700 out of 800 European cities are small to medium-sized
Key challenge 1: integrating novel technologies in a PEN setting

- **ENERGY EFFICIENT BUILDINGS**
  - Cost & speed reduction through industrialisation

- **LOCAL RENEWABLE ENERGY GENERATION**
  - BIPV
  - PVT

- **SMART LOCAL ENERGY GRIDS**
  - Novel gen district heating
    - DC Grids
    - Microgrids

- **ENERGY STORAGE**
  - District batteries
  - Home batteries
  - Seasonal thermal storage

- **SMART CONTROLS**
  - Appliance control
  - Building & district energy management
Key challenge 2: accelerate PEN developments in **EXISTING** neighbourhoods

• Data collection current state
• Life cycle impact retrofit vs new
• Scale of detail for digital twins to represent energy systems
• Phasing over time
• Business models for split ownership
• Control of legacy equipment
3 open innovation living labs, 3 different settings

**Tartu (EE):** renovation of 3 apartment buildings to PEN

**Genk (BE):** single family housing neighbourhood linked to a sandbox area

**Pamplona (ES):** combining tertiary building with social housing
Key challenge 3: Engagement of the neighbourhood’s community

oOPEN Lab will engage and involve the neighbourhood’s community in the creation of a vision for their positive energy neighbourhood

- Local ecosystem and cognitive analysis
- Cooperative participatory approach that goes beyond raising citizens awareness
- Shaping of organisational models for the specific context of PENs
- Engaging all actors from the quadruple helix & identifying the value proposition for all actors

oOPEN Lab
Genk

We hebben goed nieuws voor jou! Stad Genk is gekozen om mee te doen met oOPEN Lab, een groot Europese project met hervormingen energie en menselijke well-being. Genk doet mee aan het eerste project van oOPEN Lab in Belgie. Er zijn buurten in de omgeving van onze huizen die al nauw samenwerken om energie te besparen en wat voor je mooi maken en erin genieten. Samen werken we aan energievoordeel en een duurzaam stadje.

Doe jij mee?

We oOPEN Lab graag, want we hebben er behoefte aan om samen te werken aan de toekomst van Genk. We zijn blij om te weten dat jouw buurt deelneemt aan dit project. We kijken uit naar jouw samenwerking en wensen jou het best uit!
Partners Involved in Quadruple Helix of Living Lab Genk (BE)

Citizen

- Citizen Nieuw Texas & Garden City Waterschei
- stebo

Industry

- HABENU-YD KREEKE
- VAN ROEY
- dcinergy
- FUTECH
- flux
- LITO
- cast4all TECHNOLOGIES
- DAIKIN

Nieuw dak

- IEDEREEN GENKT
- GENK

Governance/Public

- vito
- mec

Academia

- KU LEUVEN
Living Lab Methodology

Living Lab integrative process

Support from European partners: Bax&Co, BPIE, ifok, ENoLL, HES-SO, Steinbeis

1. Select a practice
   - The context is researched to understand the socioeconomic and cultural setting. User behaviours and social practices are understood.

2. Integrate stakeholders
   - A People Public Private Partnership (PPP) Model is used to integrate stakeholders.

3. Uncover barriers
   - Community-based social marketing helps to uncover barriers.

4. Co-design plan
   - A common vision and shared goals enables mash up and then co-design with the users and not for the users.

5. Pilot an intervention
   - Real-life experimentation is carried out in the field.

6. Evaluate performance
   - Measurement, verification and performance scorecards enable scale up.

7. Demonstrate the system
   - Actual system proven in operational environment.

8. Exploit the solution
   - Test the solution outside the initial scope. Enlarge the solution, pollinate it and replicate it in other settings.

*Adapted from Mastelic, 2019
First steps in community engagement

Aims:

1. Emphasize & capture the worries and barriers of the citizen
2. Inform citizen about the project
3. Raising awareness on the energy performance of the citizen’s dwelling and neighborhood
Frontrunner industry on the renovation challenge

Quantitative (n=45) & qualitative (n=14) survey over 7 market segments in construction & energy sector

- **Aggregated & upscaled renovation** of residential buildings → complex but enormous opportunity

- **New business models** for long-term energy system integration from a holistic perspective
  → incl. services
  → from CAPEX to OPEX

- **Leading role for governments** in creating societal leverage through legislation, sensibilisation & innovative tendering

- **R&I needs on uncertainties** on technology performances, social acceptance and operational complexity within a system approach
Research & innovation needs for the urban energy transition

- Challenging pilot projects
- Cross-sectorial knowledge & data exchange
- Technology interaction on neighbourhood level
- Real-life test-environment with end-user feedback
- Circular business models

EU Energy Living Labs
Planning of Living Lab Genk

**oPEN Lab:** Start 1<sup>st</sup> October 2021 – duration 4.5 years

**2021**
- Kick-off (October)
- Initiate community engagement
- Explore tendering procedures

**2022**
- Setting up implementation & engagement plans & governance structure
- Appoint design team and initiate tendering procedure
- Raising awareness & co-creation
- Optimization of assembly and prefabrication process

**2023**
- Award tender & start construction works
- Implementation & demonstration of innovative energy systems

**2024-2026**
- Monitoring and performance assessment
- User experience & feedback
- Exploitation: steering market uptake and PENs roll-out
- Local upscaling and replication

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Conclusion

**oPEN Lab** = **open innovation** in a **living lab** environment to lead the transition towards **PEN**.

Facing three key challenges:

1. Integrating novel technologies in a PEN setting
2. Accelerating PEN developments in existing neighbourhoods
3. Engaging the neighbourhood’s community

By means of the quadruple helix organisational structure and a living lab integrative process
Sign up [here](#)!
Thank you for your attention!

Contact

✉️ Evi.lambie@vito.be
LinkedIn
@oPENLab_project