This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement Nº754045

Individual Building Renovation Roadmaps

iBRoad
My path towards an energy efficient home

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THE CHALLENGE

About half of Europe’s buildings were built before 1975.

Less than 3% of EU buildings’ Energy Performance Certificates (EPCs) are label A or higher.

The building stock renovation rate in the EU is only about 1% today; 80% of current buildings will still be around in 2050.

Therefore, we need to “deep renovate” existing buildings, aiming at Nearly Zero-Energy Buildings (NZEBs).

The Renovate Europe campaign’s ambition is to reduce the energy consumption of the building stock by 80% by 2050.

Similarly ambitious targets are reflected in the revised EPBD with a clear vision for a decarbonised building stock by 2050!
THE CHALLENGE

Residential buildings correspond to 2/3 of EU’s building stock final energy consumption.

Renovating a home is complex and time consuming. There is lack of knowledge about what to do and in which order.

The main trigger for renovation is often other than energy efficiency. Building owners’ / tenants’ requirements are multiple:

✓ Thermal comfort (summer & winter)
✓ Indoor Air Quality
✓ Visual comfort
✓ Acoustic comfort
✓ Ergonomics & aesthetics
✓ Low energy costs
✓ Real estate value
✓ Privacy / Safety / Security

BENEFITS
**TECHNICAL CHALLENGES**

- A multitude of building types – Different requirements
- A multitude of services – Market fragmentation
- Technological developments – Need for education and training
- Long lifecycle / Non-modularity – Structure and components
**Socioeconomic Challenges**

- Ownership fragmentation – Decision-making fragmentation: Developers / Owners / Occupants / Operators
- Family needs changing over time
- Lack of awareness and expertise
- Non access to finance / Energy poverty
- Personal data protection – Possible lack of aggregate data
**Challenges**

- Non access to finance
- Non access to finance
- Market fragmentation
- Various
- Need for education and training
- Various
- Various
- Various

**Potential Solutions**

- Aggregation / Bundling
- **Step-by-step renovation**
- One-Stop Shops – *BetterHome DK*
- Mass customisation – *Energiesprong*
- **BUILD UP Skills / Construction Skills**
- Building Information Modelling (BIM)
- **Building Renovation Passports**
- Other market innovations (technical, financial, etc.), e.g. “energy efficient mortgage” – *EeMAP*
PROPOSED SOLUTION – iBRoad

iBRoad works on lifting barriers to renovation by developing an Individual Building Renovation Roadmap for single-family houses. This tool looks at the building as a whole, and provides a customised step-by-step renovation plan (iBRoad-Plan) over a long-term horizon (15-20 years).

The plan is supported by a logbook (iBRoad-Log), a repository of all information available about the building.
POTENTIAL SOLUTIONS — BUILDING RENOVATION PASSPORTS

DEEP AND QUALITATIVE RENOVATION

HOLISTIC RENOVATION PROCESS

BUILDING RENOVATION ROADMAP

Source: Energiesprong

Source: ifeu
THE BUILDING RENOVATION PASSPORT CONCEPT

INFORMATION AT INDIVIDUAL BUILDING LEVEL

EXISTING ENERGY PERFORMANCE CERTIFICATE (EPC)

ON-SITE GATHERED INFORMATION
- Energy audit
- Building professionals, e.g. construction plan, info installations, BIM, etc.
- Building owner or tenant
- Public authorities

AUTOMATED DATA
- Smart meters
- Monitoring systems, e.g. RES, heating, CO₂ meters, etc.

BUILDING RENOVATION PASSPORT

RENOVATION ROADMAP
- Comprehensive audit
- Systematic renovation in a sensible order and packages
- Considers individual context
- Long-term perspective

LOGBOOK
- Inventory of building-related information
- Functionalities for users
- Beyond energy
- Linking building owners and users to third parties

Source: iBRoad project
Two Parts of iBRoad

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building components have long life cycles – today, each renovation must contribute to the climate target

most renovations are stepwise and not in one step. But also stepwise renovations should be deep and avoid lock-ins.
it takes an overarching plan to combine single renovation steps to a deep renovation.

a long-term plan can consider the occasions („trigger points“) in the homeowners’ lives.
What is the Renovation Roadmap?

**iBRoad Roadmap: diagnosis tool on building’s performance and stepwise renovation plan for buildings owners**

**Purpose:**
- development of a building renovation strategy
- Definition of the targeted level of carbon savings together with the owner
- development of a customised stepwise renovation plan with reasonable and coordinated measures
- getting a long-term renovation overview

**Tasks:**
- support the homeowner in specifying his or her vision of the house and in visualising retrofit implementation strategies
- take into account intended uses, interests and wishes of inhabitants, capabilities of the homeowner and the individual building situation
- define reasonable renovation packages that contribute to the climate targets and which the homeowner agrees to realise
Five steps to create a Renovation Roadmap

1. Initial Contact
2. On-site Visit
3. Calculation of present building state with national calculation software
4. Produce Roadmap with the iBRoad Roadmap Assistant
5. Definition of Renovation Steps
Visualisation of the Renovation Roadmap

Current building state

Detailed renovation step

Roadmap overview

Detailed Roadmap

Previous Steps Benefits

- Maintenance of the building, plus upgrade of the building.
- Energy savings
- No maintenance costs due to reduced energy consumption
- Better indoor climate
- Additional benefits:
  - Improved window performance
  - Improved heating and cooling system
  - Reduced noise levels
  - Enhanced comfort

Detailed of the renovation Roadmap

Renovation Step 1

Detailed Roadmap

Step by Step Plan

Detailed Renovation Roadmap
Individual Building Renovation Roadmaps

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**iBRoad Plan**

**iBRoad Logbook**

**Step by Step Plan**

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<th>WHAT TO DO</th>
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**iBROAD Logbook**

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**1.** A lot of information about the buildings already exist (EPC data, energy audit) – but where?

**2.** Most renovations are stepwise and refer to a long period of time. How can they be remembered?
Simple presentation of the efficiency of the individual building and its components

Simple forward planning for homeowners
iBRoad Logbook – Idea

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**iBRoad Logbook:**
- Digital repository for all building related information
- Simple presentation of the building’s efficiency in the past and future

**Purpose:**
- Save all changes to the building in a new current building state
- Log all previous building states and track all building information
- Check out possible future buildings states

**Your tasks:**
- Create a logbook for your customer
- Fill in the data for the present building state
- Explain the Logbook to your customer
Logbook access

Individual Building Renovation Roadmaps

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Logbook Steps: alternative ways to produce the Logbook

- **No Roadmap audit yet**
  - Owner creates Logbook
  - Owner enters data as far as possible
  - without Roadmap audit

- **Roadmap audit ready**
  - Auditor creates Logbook from Roadmap data
  - Auditor finalises data entry
  - Auditor grants access to owner
  - Owner uses Logbook

- **Owner grants access to auditor**
  - Auditor can use existing data to create the Roadmap

- **Envelope Performance**
  - Data is shown for different years (2019-02-11, 2021-02-13, 2027-02-13, 2050)
  - Icons indicate performance levels

- **Logbook Steps**
  - Owner enters data as far as possible
  - Owner grants access to auditor
  - Auditor finalises data entry
  - Auditor grants access to owner
EXPECTED BENEFITS

The iBRoad renovation roadmap is a customised, long-term, home-improvement plan which considers the occupant's needs and specific situation and avoids the risk of 'lock-in’ effects. In this respect, it enables

✓ maintaining the overview of the building’s history
✓ planning of renovation steps
✓ achieving deep renovation levels over a long-term horizon (stepwise)
✓ access to financing (either through own resources, or by giving insurance to financing institutions)
Individual Building Renovation Roadmaps

iBRoad INDICATIVE OUTCOMES

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iBRoad – Next Steps

✓ Pilot application in BG, PL, PT, DE
✓ Refining software tools
✓ Stakeholder feedback
✓ Assessment of replicability across Europe, including data management aspects

https://ibroad-project.eu/

iBRoad overview video with subtitles in 10 languages

https://ibroad-project.eu/results/videos/