

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°754045

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.

THE BUILDING RENOVATION PASSPORT CONCEPT

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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























iBRoad Plan

Step by Step Plan

ENERGY CLASS F	ENERGY CLASS D	ENERGY CLASS A
TODAY	WHEN BOILER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
	WHAT TO DO? <ul style="list-style-type: none"> Improve the air permeability of the envelope Optimization control system 	WHAT TO DO? <ul style="list-style-type: none"> Installation of a thermal insulating layer on top of concrete ground floor in contact with the ground
	INVESTMENT COSTS 456555 €	INVESTMENT COSTS 44 €
	COSTS FOR MAINTENANCE 2467 €	COSTS FOR MAINTENANCE 44 €
ENERGY BILL 159 €/a	ENERGY BILL 144 €/a	ENERGY BILL 143 €/a



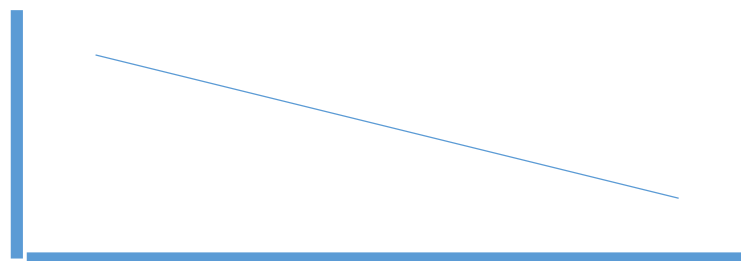
iBRoad Logbook

Start page	Envelope Performance					
My buildings			2019-02-11	2021-02-13	2027-02-13	2050
Data Store Repository My documents & plans		Walls				
Building diagnosis Overall Performance		Roof				
Envelope Performance		Windows				
Equipment Performance Comfort Performance Recommendations		Floor				



1

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



2

most renovations are stepwise and not in one step. But also stepwise renovations should be deep and avoid lock-ins.

Step by Step Plan

ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
F	D	A
TODAY	WHEN ROLLER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
	WHAT TO DO? • Improve the air permeability of the envelope • Optimization control system	WHAT TO DO? • Installation of a thermal insulating layer on top of concrete ground floor in contact with the ground
	INVESTMENT COSTS 25000 €	INVESTMENT COSTS 20 €
	COSTS FOR MAINTENANCE 2000 €	COSTS FOR MAINTENANCE 10 €
ENERGY BILL 110 €/a	ENERGY BILL 104 €/a	ENERGY BILL 102 €/a



3

it takes an overarching plan to combine single renovation steps to a deep renovation



4

a long-term plan can consider the occasions („trigger points“) in the homeowners' lives



What is the Renovation Roadmap?

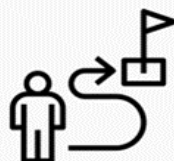
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Step by Step Plan

ENERGY CLASS F	ENERGY CLASS D	ENERGY CLASS A
TODAY	WHEN BOILER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
	WHAT TO DO? • Improve the air permeability of the envelope • Optimization control system	WHAT TO DO? • Installation of a thermal insulating layer on top of concrete ground floor in contact with the ground
	INVESTMENT COSTS 45055 €	INVESTMENT COSTS 44 €
	COSTS FOR MAINTENANCE 2407 €	COSTS FOR MAINTENANCE 44 €
ENERGY BILL 159 €/a	ENERGY BILL 144 €/a	ENERGY BILL 143 €/a



iBROAD Roadmap: diagnosis tool on building's performance and stepwise renovation plan for buildings owners



Purpose:

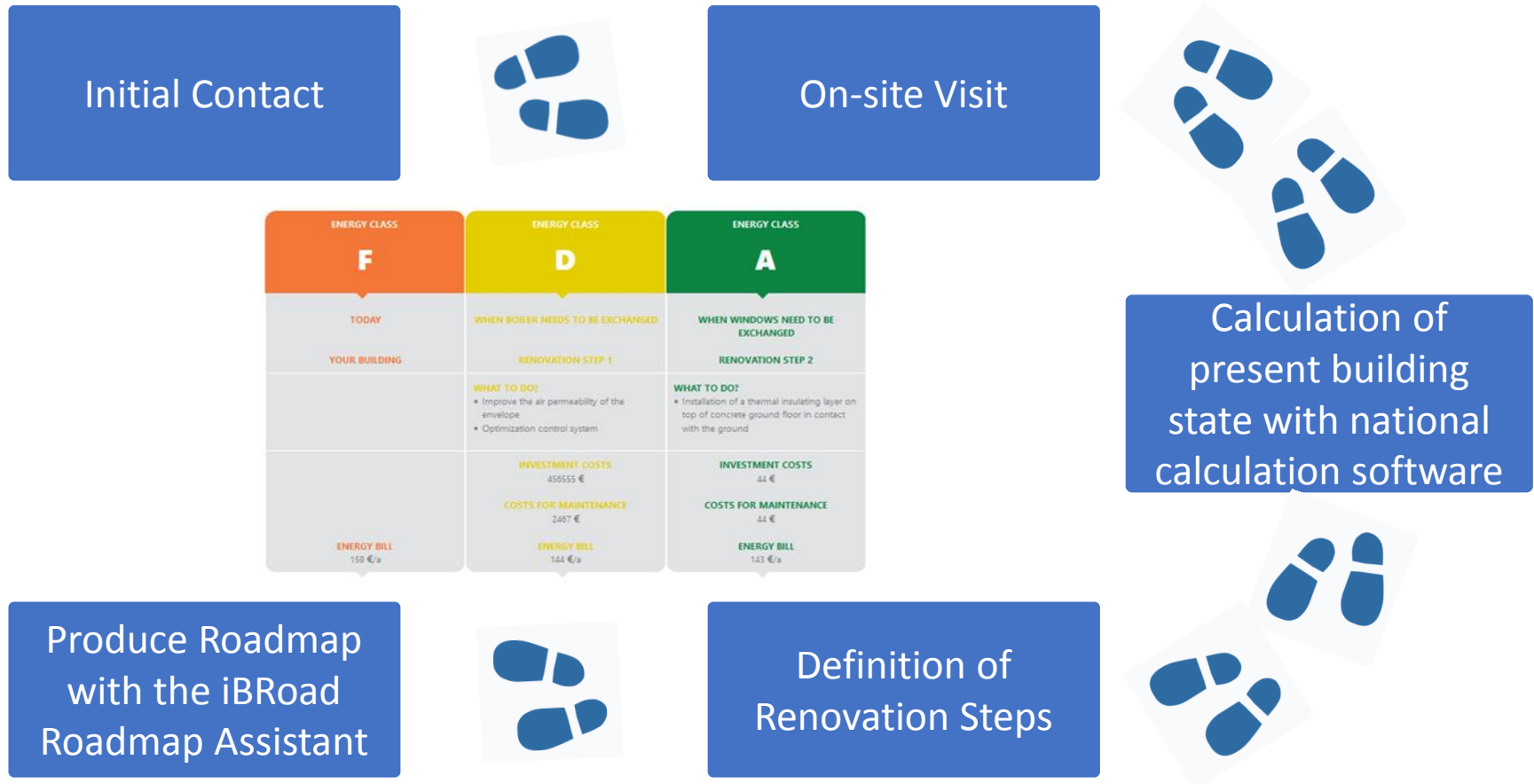
- development of a building renovation strategy
- Definition of the targeted level of carbon savings together with the owner
- development of a customised stepwise renovation plan with reasonable and coordinated measures
- getting a long-term renovation overview



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





iBRoad Plan

Step by Step Plan

ENERGY CLASS F	ENERGY CLASS D	ENERGY CLASS A
TODAY	WHEN BOILER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
	WHAT TO DO? • Improve the air permeability of the envelope • Optimization control system	WHAT TO DO? • Installation of a thermal insulating layer on top of concrete ground floor in contact with the ground
	INVESTMENT COSTS 456555 €	INVESTMENT COSTS 44 €
	COSTS FOR MAINTENANCE 2407 €	COSTS FOR MAINTENANCE 44 €
ENERGY BILL 150 €/y	ENERGY BILL 144 €/y	ENERGY BILL 143 €/y



iBRoad Logbook

Start page

My buildings

Data Store Repository

My documents & plans

Building diagnosis

Overall Performance

Envelope Performance

Equipment Performance

Comfort Performance

Recommendations

Envelope Performance

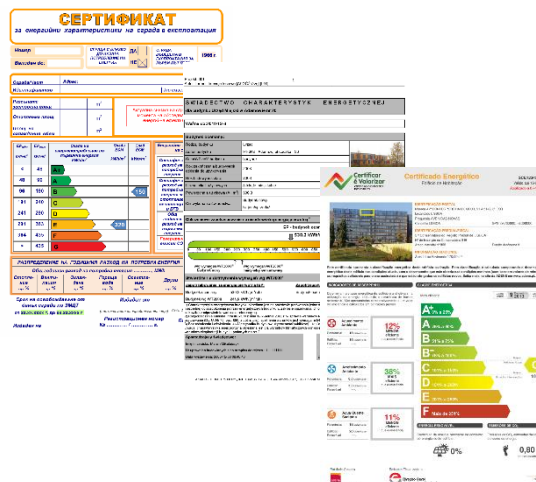
	2019-02-11	2021-02-13	2027-02-13	2050
Walls	●	●	●	●
Roof	●	●	●	●
Windows	●	●	●	●
Floor	●	●	●	●



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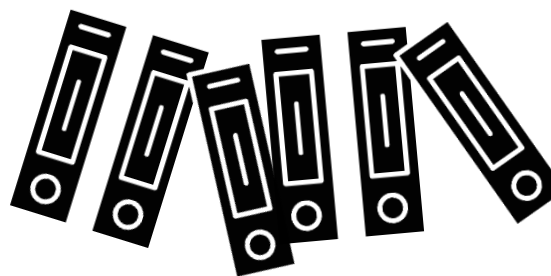
1

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



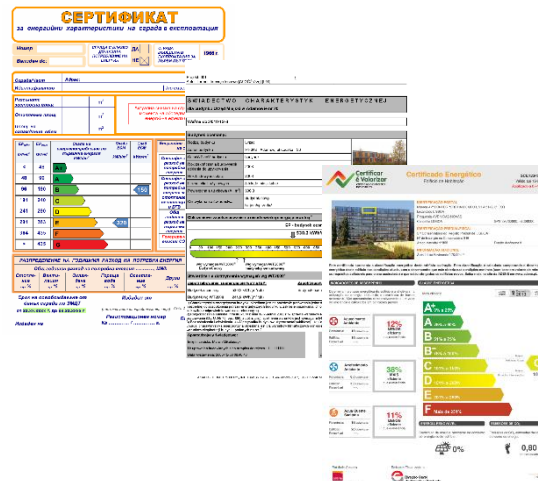
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Most renovations are stepwise and refer to a long period of time. How can they be remembered?



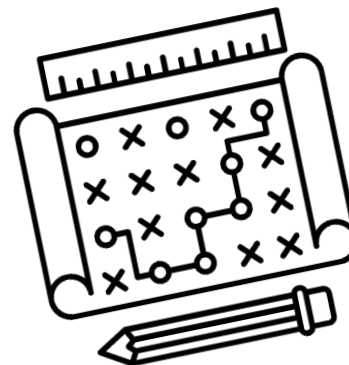
3

Simple presentation of the efficiency of the individual building and its components



4

Simple forward planning for homeowners





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

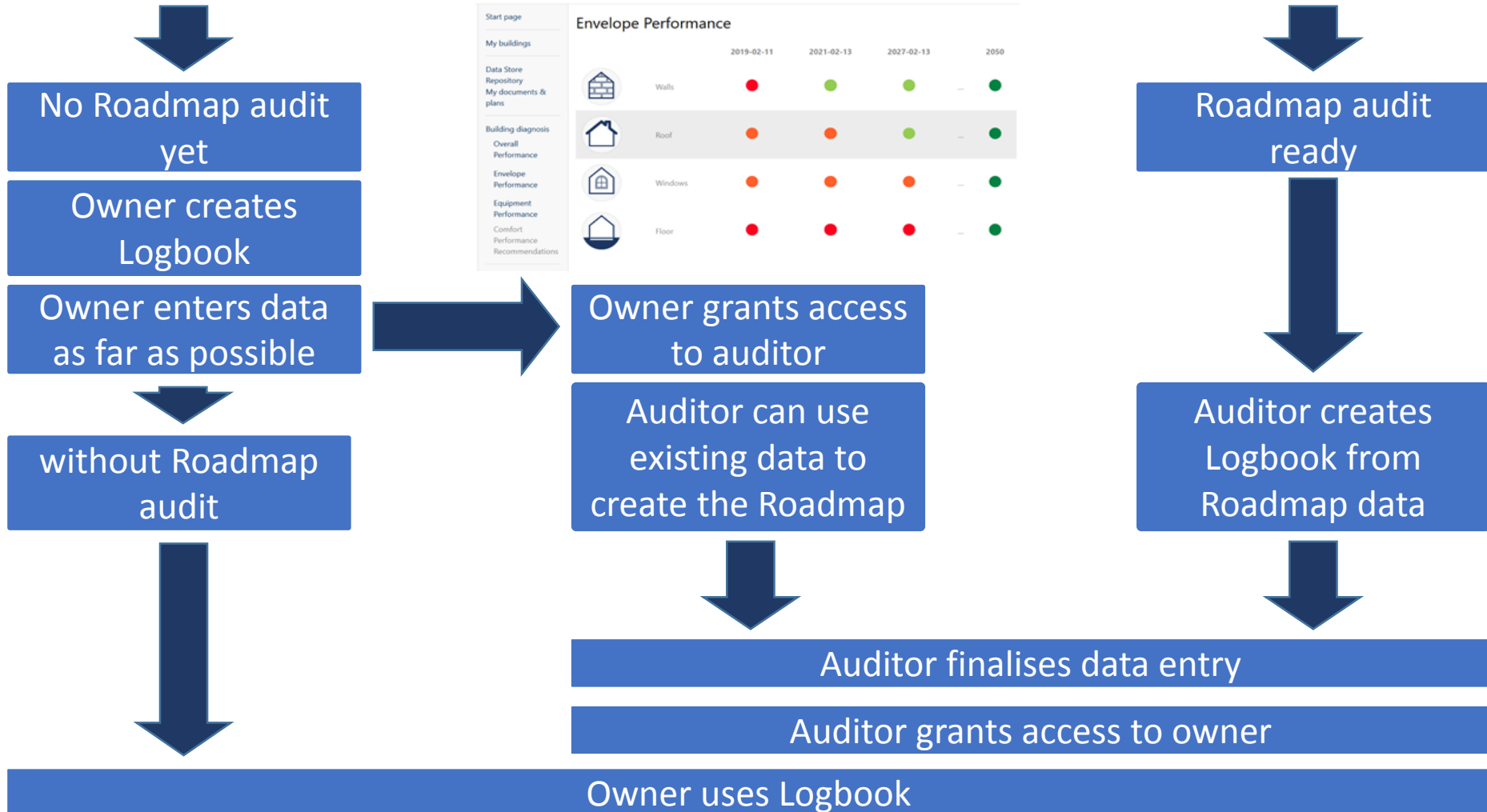


Your tasks:

- Create a logbook for your customer
- Fill in the data for the present building state
- Explain the Logbook to your customer

Start page	Envelope Performance				
My buildings		2019-02-11	2021-02-13	2027-02-13	2050
Data Store					
Repository	Walls	●	●	●	●
My documents & plans					
Building diagnosis					
Overall Performance	Roof	●	●	●	●
Envelope Performance					
Equipment Performance	Windows	●	●	●	●
Comfort Performance					
Recommendations	Floor	●	●	●	●

Logbook Steps: alternative ways to produce the Logbook



EXPECTED BENEFITS

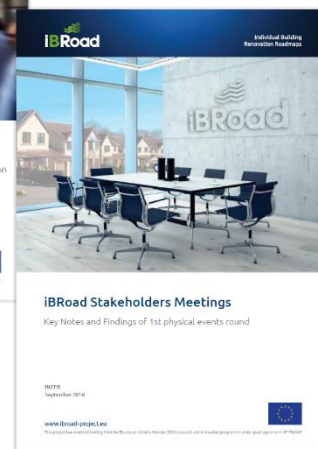
The iBRoad renovation roadmap is a customised, long-term, home-improvement plan which considers the occupant's needs and specific situation and avoids the risk of 'lock-in' effects. In this respect, it enables

- ✓ 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)

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iBRoad FIRST OUTCOMES

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iBRoad – NEXT STEPS

- ✓ Finalising software tools
- ✓ Pilot application in BG, PL, PT, DE
- ✓ Stakeholder feedback
- ✓ Replicability across Europe, including data management aspects

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Thank you



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