

Webinar

Test driving the IBRoad Roadmap and Logbook;
Preparation, Execution and Evaluation of the field test

Peter Mellwig

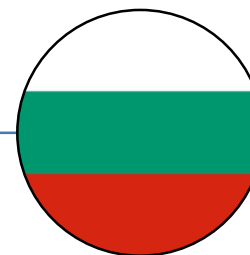
ifeu – Institut für
Energie- und
Umweltforschung

Feb 27th 2020

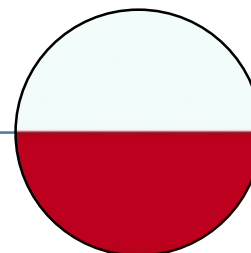
Field Test

- 3 pilot countries
- 10 energy auditors per country
- 20 real buildings per country
- 60 Renovation Roadmaps
 - 60 Building Logbooks

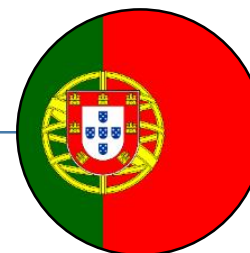
Additional survey on the logbook in Germany.



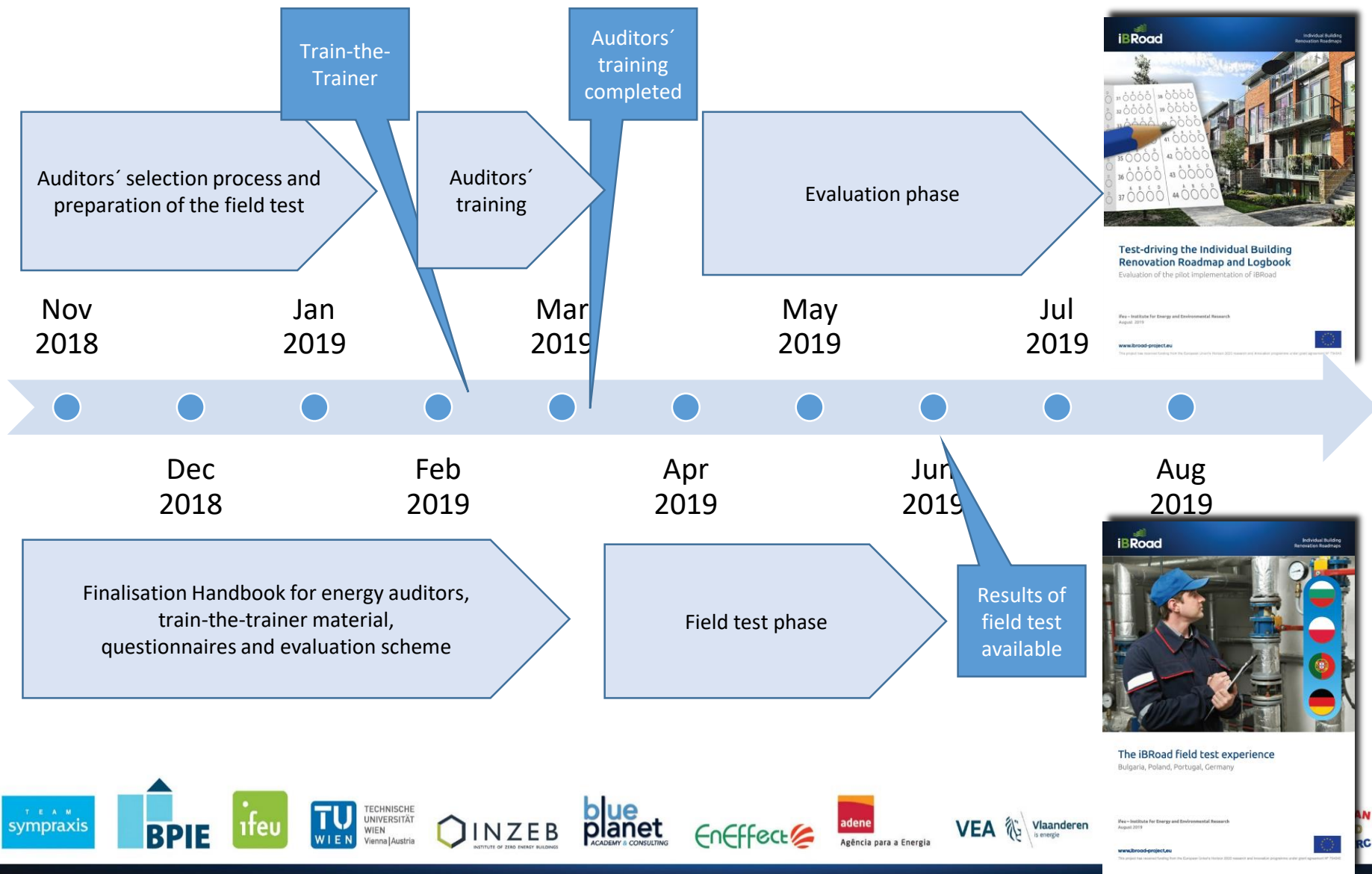
Bulgaria



Poland

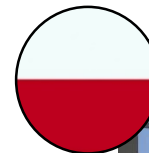


Portugal



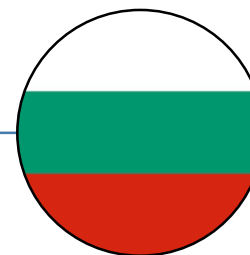
Auditors' Training Seminar

- 9:00 Welcome and Introduction
- 9:15 Why a Renovation Roadmap?
What is the Renovation Roadmap?
Steps to create a Renovation Roadmap
- 11:00 Coffee Break
- 11:20 Why a Logbook?
What is the Logbook?
Steps to create a Logbook
- 13:00 Lunch
- 13:45 Evaluation of the Field Test
- 14:30 Questions
- 15:15 End of the Seminar

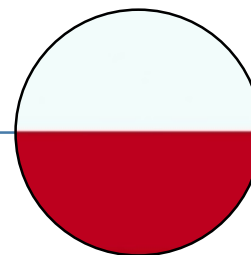


Toolkit for the field test

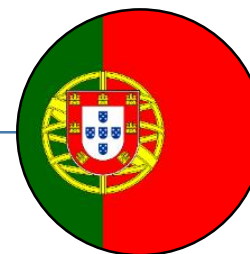
- Online tool Roadmap Assistant
- Online tool Logbook
- Handbook for auditors
- Telephone-hotline in the respective language



Bulgaria



Poland



Portugal























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 2467 €	COSTS FOR MAINTENANCE 44 €
ENERGY BILL 159 €/a	ENERGY BILL 144 €/a	ENERGY BILL 143 €/a

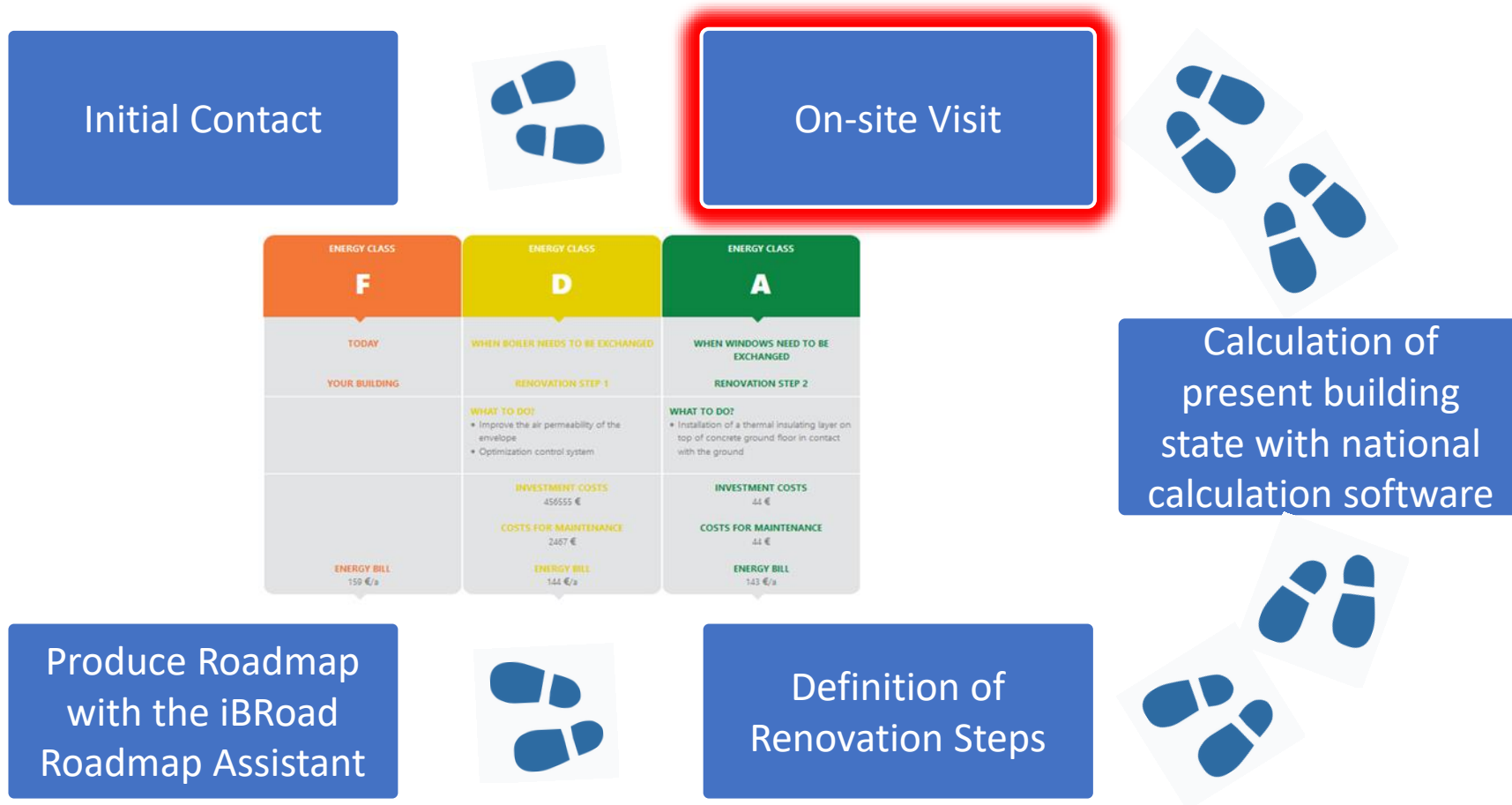


iBRoad Logbook

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	 Roof				
Overall Performance	 Windows				
Envelope Performance	 Floor				
Equipment Performance					
Comfort Performance					
Recommendations					



Five steps to create a Renovation Roadmap



Checklist for the on-site visit (in the handbook)

Checklist for the on-site visit

- ✓ What does the homeowner feel disturbing about his/her current living situation?
- ✓ Is it mostly too warm or too cold in the house?
- ✓ Will there be changes in the living situation with regard to the building or are changes foreseeable (e. g. child birth, children moving out, grandparents moving in etc.)?
- ✓ What are the homeowner's and habitants' preferences in comfort?
- ✓ What kind of measures does the homeowner plan to undertake anyway?
- ✓ What measures is the homeowner interested in anyway?
- ✓ Is a certain system technology preferred by the homeowner?
- ✓ Which renewable energy source is the homeowner interested in?
- ✓ Does the owner face a problem with moisture or mould?
- ✓ Is the ambient air polluted or is there a lot of noise outside?
- ✓ Are there foreseeable occasions, when future renovation steps can be carried out preferably concerning the living situation of the owner or user or periods in which renovation is inappropriate?
- ✓ Are there weak points in the building that require rapid action?
- ✓ Are there any measures that lead to major improvements with little effort?
- ✓ Are there any measures that can be carried out at any time without preconditions?
- ✓ Which components and systems of the building will soon reach the end of their life cycle? Which components and systems can probably be used longer?
- ✓ Which components and systems should be renovated simultaneously for physical or

Five steps to create a Renovation Roadmap

Initial Contact



On-site Visit



ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
F	D	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 envelopeOptimization 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 45655 €	INVESTMENT COSTS 11 €
	COSTS FOR MAINTENANCE 2407 €	COSTS FOR MAINTENANCE 11 €
ENERGY BILL 150 €/a	ENERGY BILL 144 €/a	ENERGY BILL 143 €/a

Calculation of present building state with national calculation software



Produce Roadmap with the iBRoad Roadmap Assistant



Definition of Renovation Steps

Tasks of the Calculation of present building state with national calculation software

- Enter building envelop (surface areas, u-values)
- Enter heating, hot water, ventilation, cooling
- Calculate final energy demand, primary energy demand (same as EPC calculation)
- Calculate energy cost or copy energy cost from bill

• ENSI EAB Software for Energy Auditing of Buildings

Bulgaria



• Audytor OZC
• ArCADia Thermo BuildDesk Energy Certificate
• ENSI Profitability

Poland



• Energy Plus,
• ESP-r

Portugal



Five steps to create a Renovation Roadmap

Initial Contact



On-site Visit



ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
F	D	A
TODAY	WHEN BOILER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
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Calculation of present building state with national calculation software

Produce Roadmap with the iBRoad Roadmap Assistant

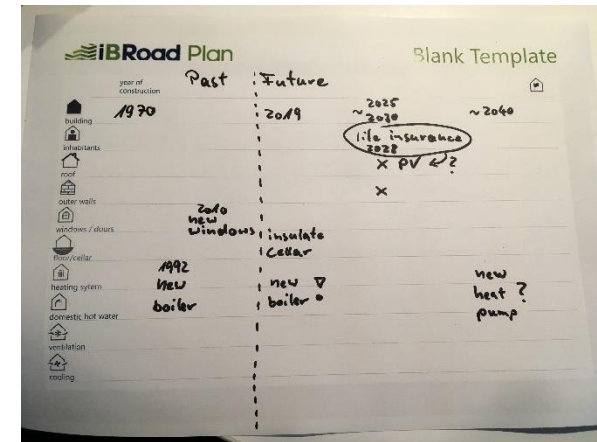


Definition of Renovation Steps

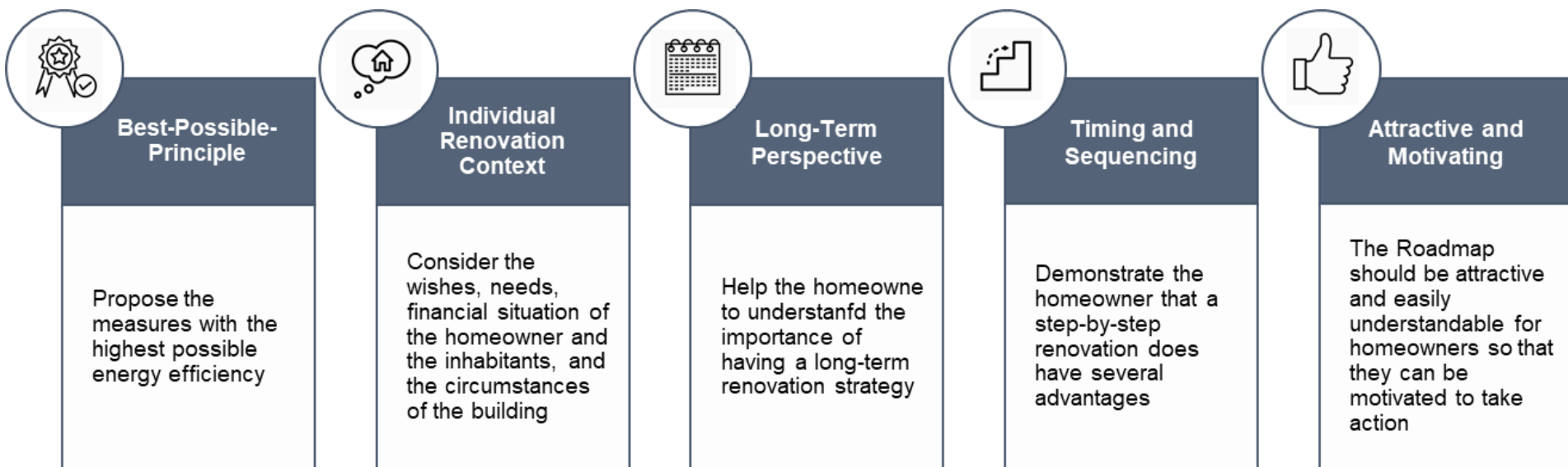


Guiding questions to define Renovation Steps

- Can the owner implement measures that are **independent** from the age of a building component (e.g. insulation of the cellar ceiling,)?
- Are there measures that provide considerable energy **savings at low investment cost**?
- Do the owners complain about specific **comfort** aspects, e.g. draught or summer heat?
- Are there components that need to be renovated or exchanged **anyway** in the near future?
- When will components need maintenance in the future according to their specific **life span**?
- Are there technical needs that require a specific **order** of renovations? Some renovations are much easier if they are combined.



Guiding Principles for Issuing the Roadmap



Five steps to create a Renovation Roadmap

Initial Contact



On-site Visit



ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
F	D	A
TODAY	WHEN BOILER NEEDS TO BE EXCHANGED	WHEN WINDOWS NEED TO BE EXCHANGED
YOUR BUILDING	RENOVATION STEP 1	RENOVATION STEP 2
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Calculation of present building state with national calculation software

Produce Roadmap with the iBRoad Roadmap Assistant



Definition of Renovation Steps







Roadmap Assistant online tool to issue the Roadmap

Building Address

Street	Number	Postal Box
<input type="text" value="Exemplestreet"/>	<input type="text" value="1"/>	<input type="text"/>
Municipality	Zip Code	Country
<input type="text" value="Berlin"/>	<input type="text" value="12159"/>	<input type="text" value="Germany"/>

Building Facts

Subtitle		<input type="button" value="x"/>
<input type="text" value="House_side 1"/>		
Subtitle		<input type="button" value="x"/>
<input type="text" value="House_side 2"/>		
Subtitle		<input type="button" value="x"/>
<input type="text" value="House_side 3"/>		
Subtitle		<input type="button" value="x"/>
<input type="text" value="House_side 4"/>		
<input type="button" value="+ Attach new Building Image"/>		
Number of Residential Units	Building Type	
<input type="text" value="1"/>	<input type="text"/>	
Living Space Area		
<input type="text" value="250"/>		
Year of Construction of the Heating System	Year of Construction	
<input type="text" value="1994"/>	<input type="text"/>	
Number of Floors		
<input type="text" value="3"/>		
<input type="text" value="No Energy Improvements in the Past"/>		

Here you can edit the results ...

Current State

Your Building Today



ENERGY CLASS	Building Data	User Influence on Energy	Technical Data
G	Year of Construction of the Building 1994	Attendance Time Hot Water Use Habits several persons take a shower daily and take a bath at least once a week	Renewable Energies Year of Construction of the Heating System 1994
	Building Type Single Family House	Ventilation Use Habits during heating period one window open for several hours per day	Energy Bill 4600 €/a
	Number of Floors 3		
	Number of Residential Units 1		
	Living Space Area 250 m ²		
	Previous Renovations		

User Influence



Even your behaviour influences energy use

Reduce room temperature: Every degree less 20 to 22 °C* is sufficient in living rooms, 18 to 20 °C* in the bedroom.

Short and intensive ventilation: Tilted windows and doors in all rooms. This ensures correct intensive ventilation should be provided.

Vent radiators: If radiators chortle and do not warm up properly even though the thermostat is fully turned on, there is air in the radiator which wastes unnecessary energy. By regular venting you save heating costs and consume less CO₂.

... that you want to show in the unified design of the Renovation Roadmap

Pages of the Renovation Roadmap

Current building
state

Detailed
renovation step

Roadmap
overview

Detailed
Roadmap

Current State

Your Building Today

House, side 1
 House, side 2
 House, side 3
 House, side 4

ENERGY CLASS	Building Data	User Influence on Energy	Technical Data
G	Year of Construction of the Building 1994 Building Type Single Family House Number of Floors 3 Number of Residential Units 250 m ² Previous Renovations	Hot Water Use Habits Several persons take a shower daily and take a bath at least once a week Ventilation Use Habits During heating period one window open for several hours per day	Year of Construction of the Heating System 1994 Energy Bill 4000 €/a Living Space Area 250 m ²

User Influence

Even your behaviour influences energy use. Here are some pointers to lower your total energy use.

- Reduce room temperature: Every degree less room temperature saves around 6% of heating energy. Usually 20 to 22 °C is sufficient in living rooms, 18 to 20 °C in the kitchen, 22 °C in the bedroom and 16 to 18 °C in the bathroom.
- Short and intensive ventilation: Third windows hardly provide fresh air, but they cool walls and rooms down. Correct intensive ventilation should be provided 2 to 3 times a day for about 4 to 5 minutes, with open windows and doors in all rooms. This ensures the necessary air exchange.
- Use radiators if radiators (close and do not warm up properly even though the thermostat is fully turned on, there is air in the radiator which wastes unnecessary energy. By regular venting you save heating costs and consume less CO₂.

Details of the renovation Roadmap

Renovation Step 4

ENERGY CLASS	Measure
A	Improvement Current room: door at street, conventional single-paneled glass, well-drawn rooming, almost temper independent of interior and exterior temperature, well-drawn, well-drawn. At very low air currents at joints due to door at street. Not only heat gain, but also heat loss and current rooming and current rooming at street. Technical Details Current room: door at street, conventional single-paneled glass, well-drawn rooming, almost temper independent of interior and exterior temperature, well-drawn, well-drawn. At very low air currents at joints due to door at street. Not only heat gain, but also heat loss and current rooming and current rooming at street. Renovation Costs 10000 € Included Costs for Maintenance 10000 € Measure Substitution of the heating system by a heating pump Improvement Current room: door at street, conventional single-paneled glass, well-drawn rooming, almost temper independent of interior and exterior temperature, well-drawn, well-drawn. At very low air currents at joints due to door at street. Not only heat gain, but also heat loss and current rooming and current rooming at street. Technical Details Current room: door at street, conventional single-paneled glass, well-drawn rooming, almost temper independent of interior and exterior temperature, well-drawn, well-drawn. At very low air currents at joints due to door at street. Not only heat gain, but also heat loss and current rooming and current rooming at street. Renovation Costs 10000 € Included Costs for Maintenance 10000 € Home of incentives

Previous Steps Benefits

Aesthetics

- Refurbishment of the facade, thus optimal improvement of the building.

Health

- The renovation measures reduce the amount of moisture entering your room.

Noise Protection

- There will be new windows with better sound insulation.

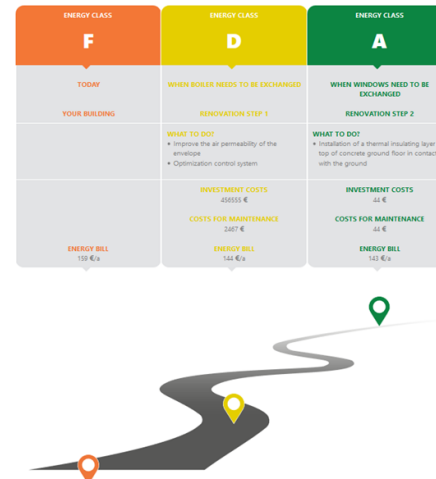
Thermal Comfort

- The temperature at the walls increases, so that they obtain a higher comfort.

Additional Benefits

- Regulated ventilation improves the quality of your indoor space.

Step by Step Plan



Detailed Renovation Roadmap

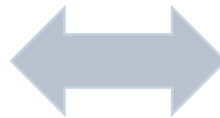
	ENERGY CLASS	ENERGY CLASS	ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
	G	E	D	B	A
	YOUR BUILDING	Renovation Step 1	Renovation Step 2	Renovation Step 3	Renovation Step 4
	When boiler needs to be exchanged	When boiler needs to be exchanged	When boiler needs to be exchanged	When boiler needs to be exchanged	When boiler needs to be exchanged
Measure	Measure • Add a thermal solar system	Measure • External wall insulation	Measure • Substitution of the old windows	Measure • Substitution of the old windows	Measure • Substitution of a heat recovery unit
Energy Use	Primary Energy Demand 250 000 kWh/a Main Energy Source Natural Gas Final Energy Demand 200 000 kWh/a	Primary Energy Demand 210 000 kWh/a Main Energy Source Natural Gas Final Energy Demand 170 000 kWh/a	Primary Energy Demand 180 000 kWh/a Main Energy Source Natural Gas Final Energy Demand 150 000 kWh/a	Primary Energy Demand 100 000 kWh/a Main Energy Source Natural Gas Final Energy Demand 80 000 kWh/a	Primary Energy Demand 100 000 kWh/a Main Energy Source Electricity Final Energy Demand 30 000 kWh/a
CO ₂	Carbon Emissions 40 kg CO ₂ /a	Carbon Emissions 30 kg CO ₂ /a	Carbon Emissions 20 kg CO ₂ /a	Carbon Emissions 10 kg CO ₂ /a	Carbon Emissions 5 kg CO ₂ /a
Costs	Investment Costs for Renovation Step 100000 € Included Costs for Maintenance 10000 € Home of incentives KfW	Investment Costs for Renovation Step 25000 € Included Costs for Maintenance 20000 € Home of incentives KfW	Investment Costs for Renovation Step 25000 € Included Costs for Maintenance 20000 € Home of incentives KfW	Investment Costs for Renovation Step 25000 € Included Costs for Maintenance 20000 € Home of incentives KfW	Investment Costs for Renovation Step 25000 € Included Costs for Maintenance 20000 € Home of incentives KfW
Comfort	Changed Comfort	Changed Comfort	Changed Comfort	Changed Comfort	Changed Comfort




iBRoad Plan

Step by Step Plan

ENERGY CLASS	ENERGY CLASS	ENERGY CLASS
F	D	A
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ENERGY BILL 150 €/a	ENERGY BILL 144 €/a	ENERGY BILL 143 €/a

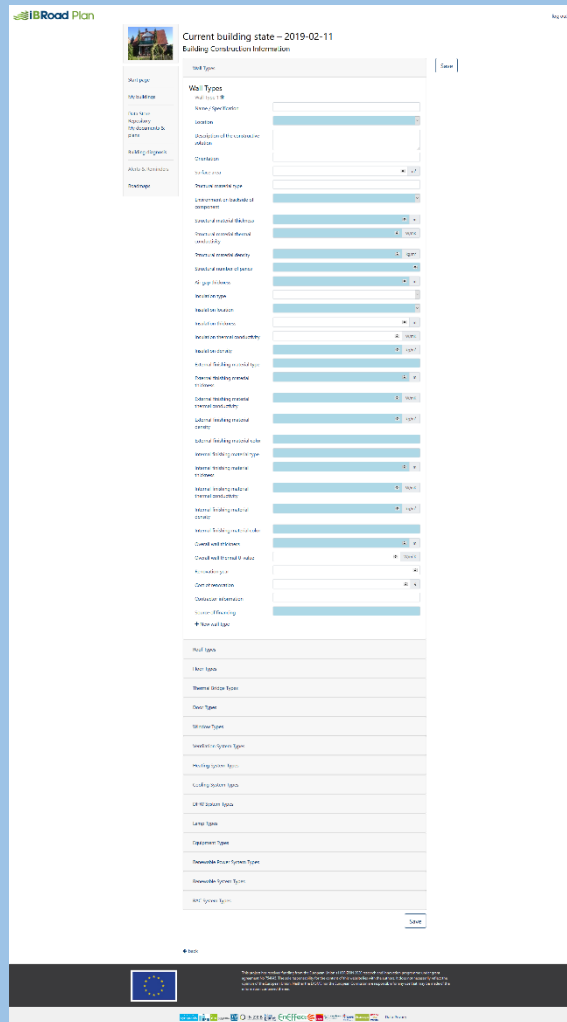


iBRoad Logbook

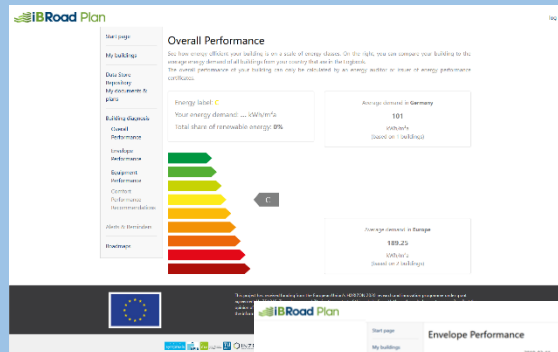
Start page		Envelope Performance					
My buildings			2019-02-11	2021-02-13	2027-02-13	2050	
Data Store	Repository		Walls				
My documents & plans							
Building diagnosis			Roof				
Overall Performance							
Envelope Performance			Windows				
Equipment Performance							
Comfort Performance			Floor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



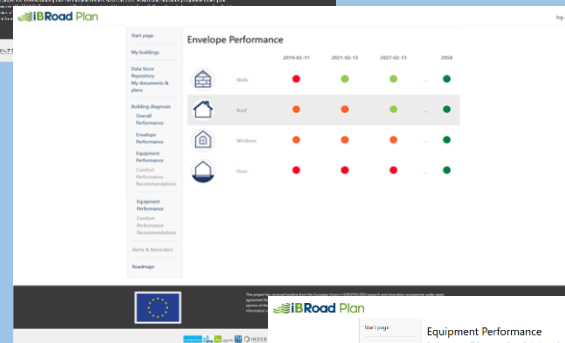
Data storage



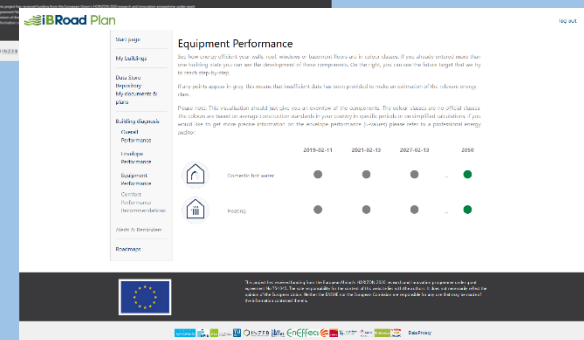
Building performance



Envelope performance

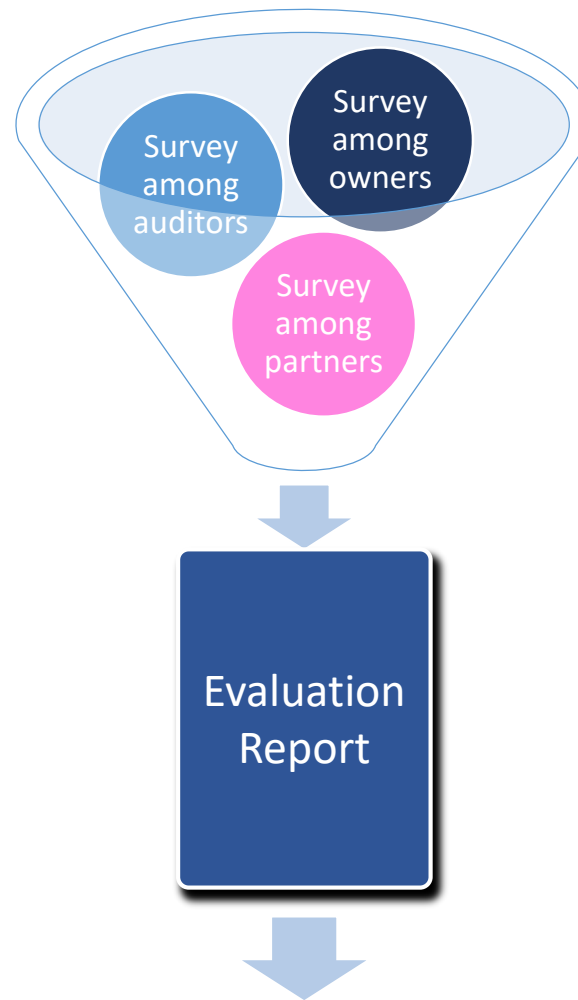


Equipment performance



Store data about the present building state





Improvement of iBRoad Tools

Topics

- Personal data
- Your building
- On-site visit
- Renovation Roadmap
- Logbook

1. To what extent do you agree with the following statement?	Completely agree	Rather agree	Agree less	Completely disagree
The iBRoad Renovation Roadmap is useful and informative for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap is easy to understand, clear, and transparent for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap looks appealing for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap takes into account my personal situation (such as preferences, financial capabilities).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap is providing me with a long-term renovation strategy for my building.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap will help me to avoid misinvestment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The iBRoad Renovation Roadmap enables and motivates me to realise concrete renovation measures in the near future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Topics

- Personal data
- On-site visit
- Planning and calculation renovation steps
- Roadmap Assistant
- Renovation Roadmap
- Handbook
- Logbook

1. Could you easily work with the Roadmap Assistant?	
The Roadmap Assistant did not work.	<input type="checkbox"/>
I could not work with the Roadmap Assistant because I did not understand it.	<input type="checkbox"/>
I could work with the Roadmap Assistant only after I got help from the hotline.	<input type="checkbox"/>
I could work with the Roadmap Assistant but it needed much time to understand.	<input type="checkbox"/>
I needed some time to get used to the Roadmap Assistant but had no major problems.	<input type="checkbox"/>
The Roadmap Assistant was easy to use.	<input type="checkbox"/>
Space for explanatory notes ----- ----- ----- ----- -----	

Home owners' questionnaires	Energy auditors' questionnaires
Participant information	
Building information	
On-site visit	On-site visit
	Planning and calculation of renovation steps and measures
	Roadmap Assistant
iBRoad Renovation Roadmap	iBRoad Renovation Roadmap
	Handbook for energy auditors
iBRoad Logbook	iBRoad Logbook

We recommend that you fill in the questionnaires in **parallel** to the work.

Advantages:

- Direct feedback of your experience
- No extra work after field test



- What are the required documents?
 - Questionnaire for energy auditors (one for each building) in paper form
 - iBRoad Renovation Roadmap in pdf-format
 - Log in data to the iBRoad Logbook
 - Email address
 - Password

Please submit the documents to the energy agency



Current building state



Detailed renovation step



Roadmap overview



Detailed Roadmap



Topics

- Experience with auditors
- Experience with homeowners
- Tools (data transfer, national adaption, ...)
- Next Steps