4RinEU

Reliable models for deep renovation

BRUXELLES 25/10/2017

Experience from a current H2020 project

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723829

EE10-2016: Supporting accelerated and cost-effective deep renovation of buildings

Specific challenges:

- Inefficiency of the EU building stock
- Few amount of buildings under deep renovation

Needs:

- Comprehensive deep renovation packages
- Reduction of time and cost of renovation
- Viable business approach

Expected impacts:

- **60%** Net primary energy saving
- **15%** Cost reduction (compared with a typical renovation)
- **-50%** time for deep renovation

Steps to prepare 4RinEU proposal

Preparatory activities

- Call scope and expected results → focus on energy, time, costs
- Background from past research works to find → key technologies, and support tools for developing a robust&reliable deep renovation approach
- Outlines drafting → main ideas, possible impacts, exploitable results, needed skills and expertise (prepared by the coordinators)

Consortium

- Contacts and interactions to shape the best possible partnerships: to perform research, to develop technologies/tools, to demonstrate results
- Definition of roles and responsibilities

Steps to prepare 4RinEU proposal

Proposal

- Detailing excellence section: **key points** to actually trigger building deep renovation market (simulation, industrialization, structured approach)
- Quantitative analysis to define **potential impacts** on EU building stock, while drafting exploitation plan for project results
- Overall approach and **methodology** for (1) RTD (2) demonstration establishing local demo-cases working groups (*issues*: timing synchronization, procurement procedures, local technology providers, early adopters to test replication potential), (3) exploitation and (4) dissemination
- Project&**risks management** (issue: size of consortium and different working approaches)
- **Budget** finalization (*issue*: size of demonstration actions)

The project 4RinEU (Oct 2016 – Sep 2020)

NEEDS

Technical | **Credibility** | **Social** | **Financial**

do not allow the targeted 3% renovation rate

ANSWER S

RELIABLE BUSINESS MODELS

Cost-Effective Rating System

ROBUST TECHNOLOGIES

- Sensible Data Handler
- Comfort Ceiling Fan operation
- Early Reno
- Strategies for End of Life
- PPEH
- PMF

USABLE METHODOLOGIES

- Cost-optimal energy audit
- Deep renovation implementation management
- Collaborative design platform

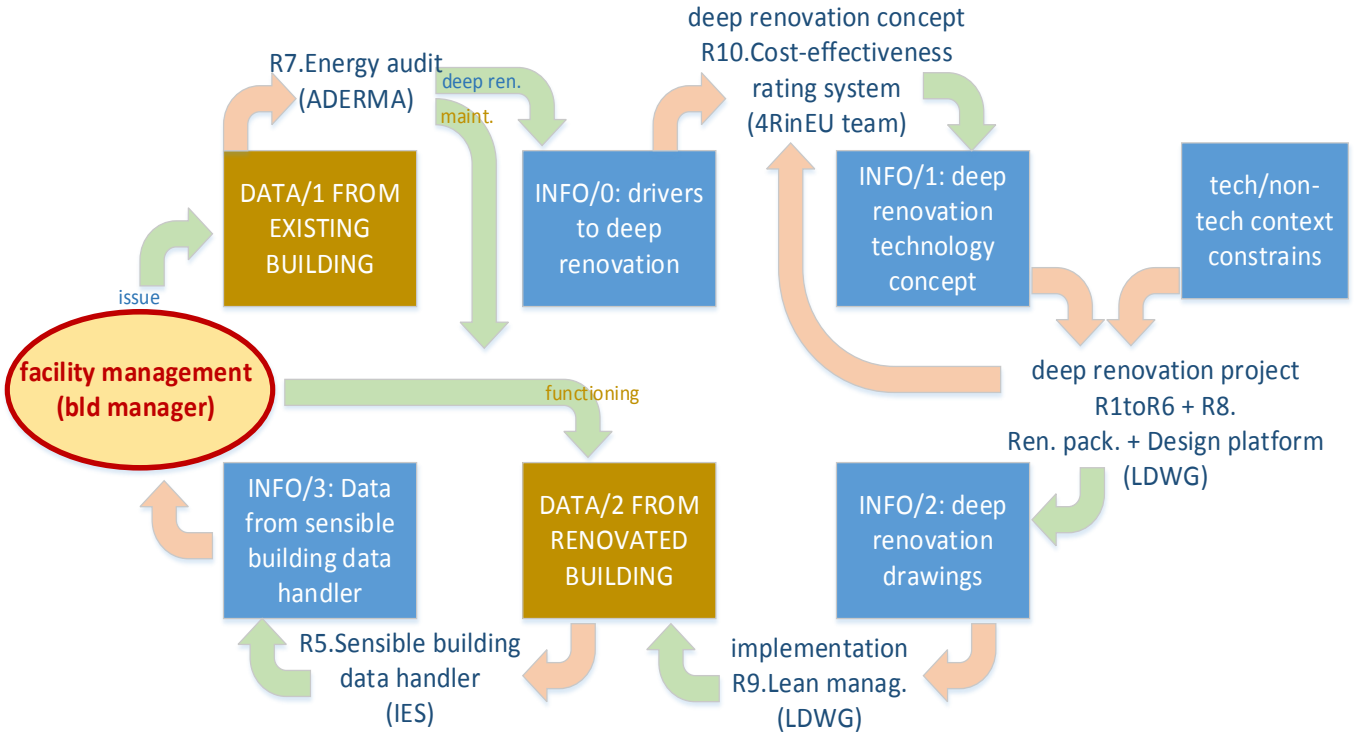
to increase efficiency of whole deep renovation process

4RinEU

The project 4RinEU

We are trying to **cover all the phases of a deep renovation process**:

- Auditing
- Design
- Implementation
- Commissioning
- Managing
- Maintenance
- Dismantling



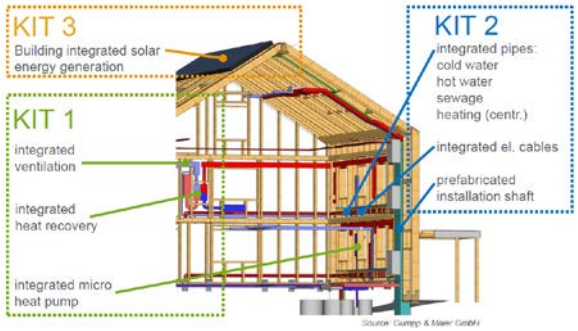
4RinEU enables to manage complexity improving the key elements of deep renovation process, by transforming data in effective information for different players, and rating the possible alternatives in terms of: energy, comfort, renovation time and costs, environmental impact.

The project 4RinEU

Technical ROBUST TECHNOLOGIES

TO REDUCE ENERGY DEMAND

Prefabricated Multifunctional Façade

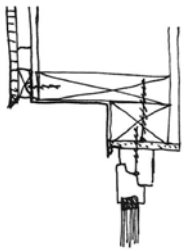


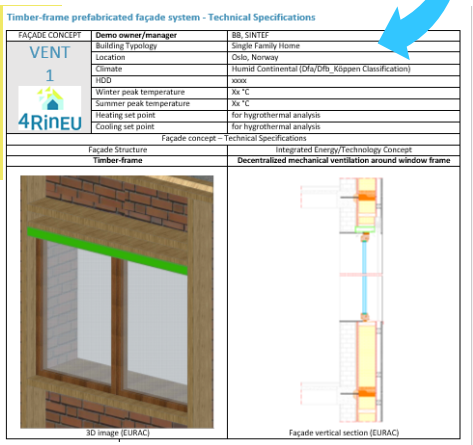
From a **concept** …

eurac research

gumpp & maier
solutions made of timber

to technical details and specifications (**bill of materials**)




Timber-frame prefabricated façade system - Technical Specifications

FAÇADE CONCEPT	Demo owner/manager	BB, SINTEF
VENT 1	Building Typology	Single Family Home
	Location	Oslo, Norway
	Climate	Humid Continental (Dfa/Dfb_Köppen Classification)
	HDD	xxxx
	Winter peak temperature	Xx °C
	Summer peak temperature	Xx °C
	Heating set point	for hygrothermal analysis
	Cooling set point	for hygrothermal analysis
Façade concept – Technical Specifications		
Façade Structure		Integrated Energy/Technology Concept
Timber-frame		Decentralized mechanical ventilation around window frame

3D image (EURAC) | Façade vertical section (EURAC)

Sources: Gumpp&maier, eurac research

TO IMPROVE ENERGY EFFICIENCY

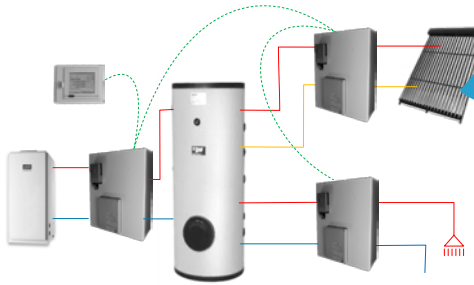
Plug and Play Energy Hub

From a **prototype**…

…to a **product**…

eurac research

Thermics



…through **industrialisation**…

Sources: Thermics, eurac research

4RinEU

The project 4RinEU

Financial

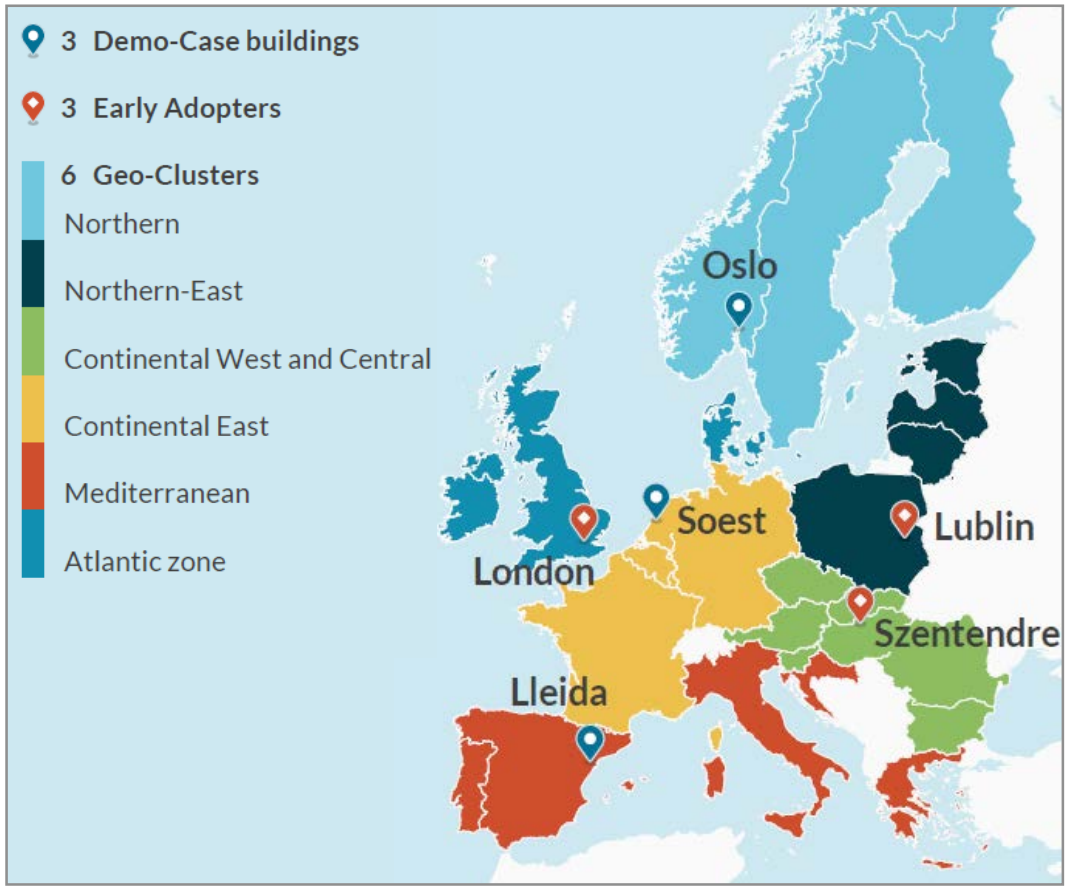
RELIABLE BUSINESS MODELS

Cost-Effective Rating System

Fed with the Technologies and the methodologies.
The 4RinEU Rating System:

- **drives the investors** in deep renovation
- **identifies the level of risk** of renovation process (by analysing potential failures)
- enables **conscious investments** ranking possible deep renovation packages depending on investors priorities and available financial support schemes

Demo cases and early adopters



Source: eurac research

3 Demo cases:

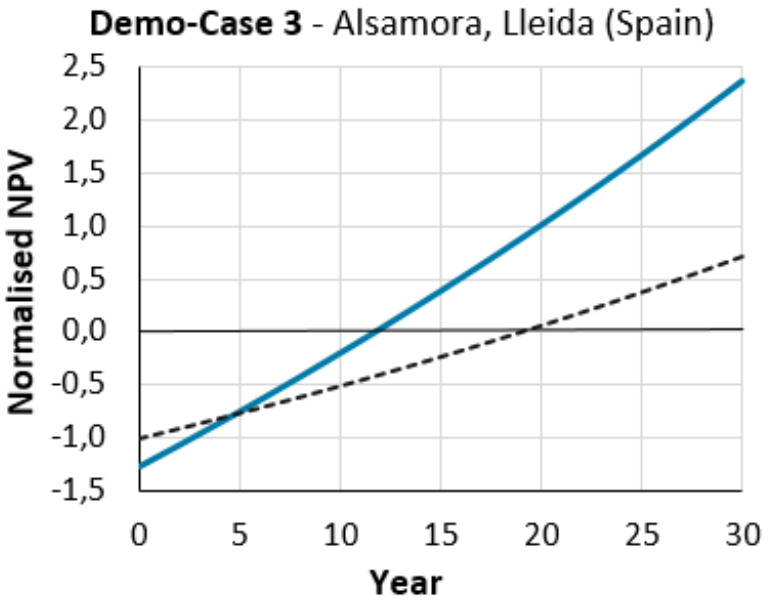
HAUGERUDSENTERET
Oslo - Norway

MARIËNBURG
Soest – The Netherlands

ALSAMORA 6
Lleida - Spain

Specific target: residential social housing
Identified with the partners the main renovation drivers → demo cases rapresentative of the renovation needs

Demonstration of the impact



Renovation package Demo case 3:

- PFM + integration of ventilation
- New heating system + PPEH
- Optimisation of RES with Early Reno
- Installation of ceiling fans

Expected energy savings **>70%**

Life Cycle cost reduction **>15%** due to:

- Reliable savings estimated by 4RinEU audit
- Higher durability and reduced maintenance of 4RinEU technologies
- Failures reduction during the construction

Demonstration of the impact

TRADITIONAL RENOVATION VS 4RinEU RENOVATION

Renovation time on the building site reduced up to **50%** thanks to:

Prefabricated envelope

- Action shifted during the industrial process **- 32%**
- Actions on the building site non necessary for 4RinEU deep renovation packages **- 16%**

Plug&play HVAC management system

Deep renovation implementation management

- Actions improved through Lean management of the building site **- 5%**
- Reduction of the failures

The project consortium

R&D

eurac research
SINTEF

Applied Research Centres

Public institutions

WOONZORG NEDERLAND
BOLIGBYGG
Agència de l'Habitatge de Catalunya

Social housing agency

Consultancy

adermalocatelli
acciona Infraestructuras
R2M RESEARCH TO MARKET SOLUTION
AIGUASOL
Trecodome

Manufacturer of H&C systems integrating RES
Construction company
Research to market
Engineering companies

Technology partners

gumpp & maier solutions made of timber
Thermics
IES

Manufacturer of prefabricated timber construction elements
Manufacturer of H&C systems integrating RES
Software developers (support to the design&assessment)

The project consortium

eurac research

Project coordinator

ROBUST TECHNOLOGIES

gumpp & maier solutions made of timber

IES INTEGRATED ENVIRONMENTAL SOLUTIONS

Thermics

eurac research

acciona Infraestructuras

Companies dealing with technology development:

- Envelope
- HVAC
- RES
- Comfort
- Data into information
- End-of-life

R2M RESEARCH TO MARKET SOLUTION

Support to develop strategies and implement specific plan for the market penetration

The project consortium

USABLE METHODOLOGIES

acciona Infraestructuras	Construction site management
adermalocatelli WE ANCHOR BUILDING TO THE FUTURE	Auditing methodology
SINTEF	Participative design, cost-effective rating system
IES	Collaborative design platform

RELIABLE BUSINESS MODELS

eurac research SINTEF	Cost-Effective Rating system based on: 1. Energy 2. Environmental impact 3. Comfort 4. Time 5. LC Costs

The project consortium

3 Demo-Case buildings

BOLIGBYGG

Agència de l'Habitatge de Catalunya

Demo case owners

SINTEF

AIGUASOL

Trecodome

Local demo advisor

EE1 2018/2019

2020 Decarbonisation of the EU building stock

Natural follow up for 4RinEU → user needs driven approach, optimizing process, technologies and RES exploitation

Rationale (why?):

- Rates of renovation → too low
- Renovation projects → more reliable, and more cost-effective
- Renovation implementation → less time-consuming, and less cumbersome for the occupants

Key issues (how?):

- Faster & cheaper renovation
- high energy performance standards
- less disruption with holistic solutions
- high levels of occupant comfort.
- *Decisions to renovate may sometimes coincide with structural repairs.*

Expected impact:

- 15% cost reduction compared with typical renovation
- Demonstrate the effectiveness of the proposed solutions
- Reduce time needed for renovation by half compared with typical renovation

THANK YOU!

http://4rineu.eu/

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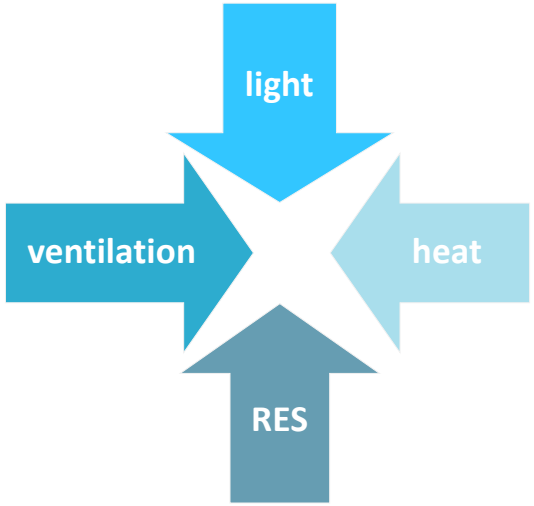
The project 4RinEU

Technical

ROBUST TECHNOLOGIES

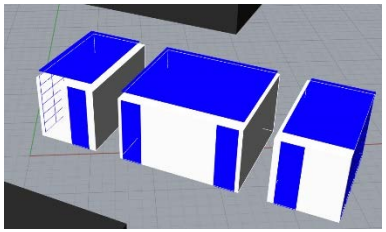
Early Reno

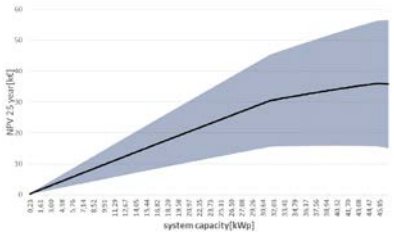
Existing separate modules



eurac research

Integrated optimisation tool





Source: eurac research

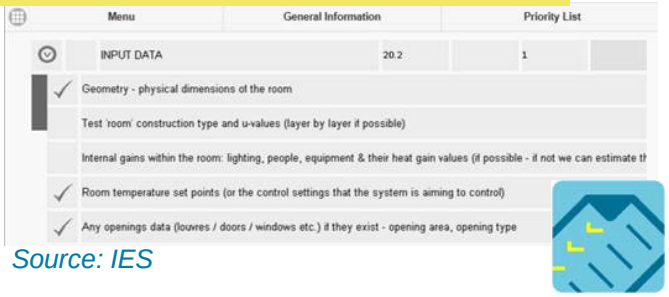
TO IMPROVE BUILDING OPERATION

Sensible Data Handler

From a user need

IES

Towards a usable App



Source: IES

Comfort Ceiling Fan operation

TO REDUCE CONSTRUCTION WASTE

Strategies for component End of Life

The project 4RinEU

Credibility **Social**

USABLE METHODOLOGIES

To support the stakeholders along the whole renovation process:

- Help to **understand renovation issues** and associated **potentials**,
- **Ensure an effective and participated design**,
- Manage the construction site and **reduce the working time** and the associated **failures**.

TO ACCURATELY UNDERSTAND RENOVATION ISSUES AND POTENTIALS

TO ENSURE AN EFFECTIVE AND PARTICIPATED DESIGN

TO REDUCE CONSTRUCTION TIME AND FAILURES

Cost-optimal energy audit

Collaborative design platform

Deep renovation implementation management