4RinEU

Reliable models for deep renovation

Sustainable Places Conference
Cagliari, 06.06.2019

Overview of 4RinEU project

The project 4RinEU

Robust&Reliable technology concepts and business models for triggering deep Renovation of Residential buildings in EU

4RinEU will develop cost-effective **deep renovation packages** based on three pillars:

- Robust Technologies
- Usable Methodologies
- Reliable Business Models

Field of Action: **Residential buildings**

Project Website: http://4rineu.eu/

Impact: to increase efficiency of whole deep renovation process

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The Consortium

DEMO OWNERS

IT eurac research — Applied Research Centres

NO SINTEF

NL WOONZORG NEDERLAND

NO BOLIGBYGG

ES Agència de l'Habitatge de Catalunya — Social housing agencies

CONSULTANCY

IT adermalocatelli group — WE ANCHOR BUILDING TO THE FUTURE — Energy audit

ES acciona Infraestructuras — Construction company

IT R2M SOLUTION — RESEARCH TO MARKET — Research to market

ES AIGUASOL

NL Trecodome — Engineering companies

TECHNOLOGY PARTNERS

DE gumpp & maier — solutions made of timber — Manufacturer - prefab timber facades

IT Thermics — Manufacturer - H&C + RES

UK IES — Software developer

Start date: 1 October 2016 - **Duration:** 48 months

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4RinEU technologies

TO REDUCE ENERGY DEMAND

Prefabricated Multifunctional facade

TO IMPROVE ENERGY EFFICIENCY
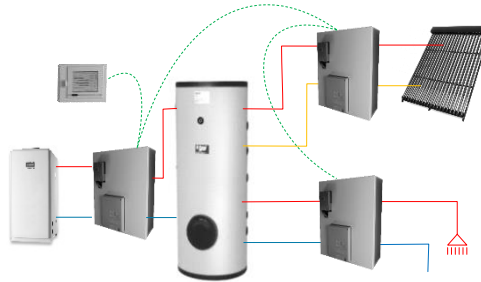
Plug&Play Energy Hub
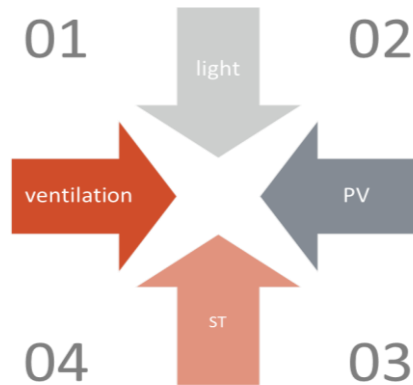
TO IMPROVE OPERATION
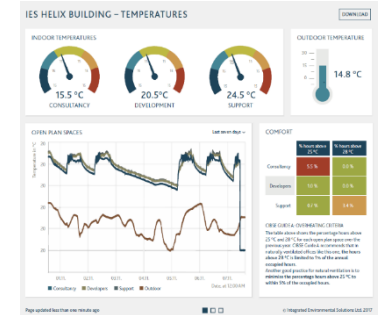
Sensible Data Handler

Comfort ceiling fan operation

Early Reno

Component end of life

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4RinEU methodologies

To support the stakeholders along the **whole renovation process**, helping to understand renovation issues and associated potentials, to ensure an effective and **participated design**, to manage the construction site and **reduce the working time and the associated failures**.

TO ACCURATELY UNDERSTAND THE

TO ENSURE EFFECTIVE AND PARTICIPATED

TO REDUCE CONSTRUCTION TIME

Cost-Optimal Energy Audit

Investor and user-oriented design platform

Deep renovation implementation management

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4RinEU business models

Fed with the technologies and the methodologies.
They will drive the investors in deep renovation, supporting them to identify the **level of risk of renovation process** and enable **well-founded investments** supported by tailor-made financial tools.

**TO IDENTIFY THE LEVEL OF RISKS AND TO ENABLE WELL-FOUNDED INVESTMENTS**

Cost-Effective rating system

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4RinEU geoclusters

Reference from previous projects
(FP7 Inspire, H2020 More-Connect)
→ fine-tuning according to the needs

- National boundaries → minimum requirements for the renovation

- Features of the building stock: single/multi family → evaluation of the impact on the bui stock

- Climate conditions → tailored renovation packages
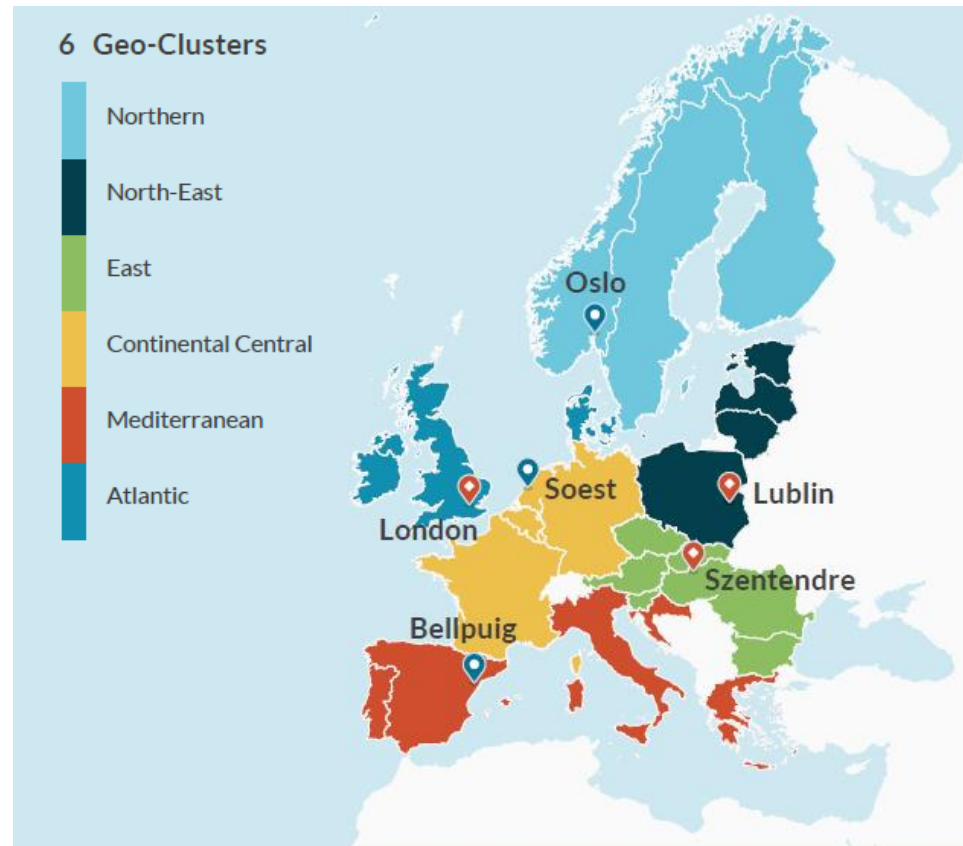
- **6 geoclusters**

- **6 reference countries**: Norway, Spain, The Netherlands, Poland, Hungary and UK.

- **6 Reference cities**: Oslo, Lleida, Amsterdam, Lubiana, Budapest, London

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Performance assessment of the project results

- 3 levels of implementation:

- Demo Cases

- Early Adopters

- Building Archetypes

Implemented all the phases of the renovation process:

1. Audit

2. Renovation concept definition

3. Performance assessment

4. Detailed design

5. Installation of the renovation packages

6. Monitoring the performances pre and post renovation

DEMO CASES

HAUGERUDSENTERET Oslo - Norway

MARIËNheuvel Soest – The Netherlands

Bellpuig - Spain

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Performance assessment of the project results

Identification o a set of Key Performance Incicators dealing with 5 thematic areas:

- Energy
- Environment
- Comfort & IAQ
- Economic issues
- Building site management

KPIs	
Energy	
Energy demand for heating/cooling/ventilation/DHW production	$[kWh/m^2]$
Energy produced via PV system	$[kWh/m^2 PV\ surface]$
Electricity self-consumption	$[kWh/m^2]$:
Energy produced via ST systems	$[kWh/m^2]$ - $[kWh/m^2 ST\ surface]$
ST energy balance	$[kWh/m^2]$ - $[kWh/m^2 ST\ surface]$
Environment	
Co_2 Emissions	kg CO_2/year
Comfort & IAQ	
Number of hours category IV cold/IV hot	[h]
Overheating Degree Hours	[°C]
N. hours where CO2 concentration is higher than limits Category I	[h]
Economic issues	
Net Present Value of the renovation (25 years)	$[€/m^2]$
Investment cost for the renovation	$[€/m^2]$
Energy Costs (Before/After Renovation)	$[€/m^2]$
Building site management	
Total work duration /Task duration	[d], [h]

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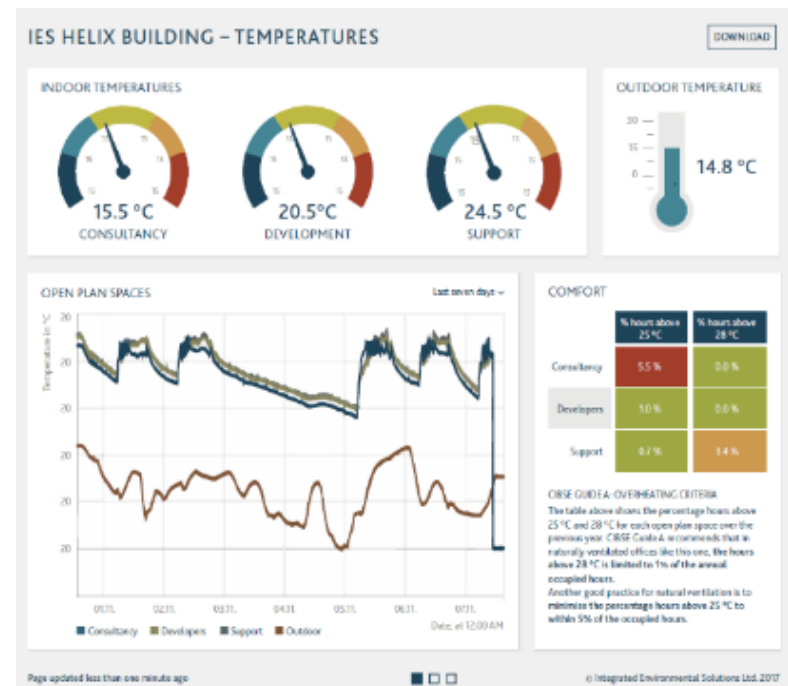
Sensible building data handler

Web App for collecting/analyse/display building features and operational data

Data flows during:
1. Audit
2. Monitoring pre&post renovation

Strategic tool for

- Identification of the renovation needs

- Inputs for the design&construction team

- Assessment of the operation

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THANK YOU!

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