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New markets in the energy transition: Energy efficiency of buildings and energy refurbishment

State of the art from existing and ongoing european R+D and demonstration projects. Potentials for new companies.

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Introduction

At the present, 75% of the stock of existing buildings in Europe are energy inefficient. Moreover, 90% of them will continue to remain so until 2050. This, together with the fact that 2/3 of the energy consumption in buildings is due to the residential sector, leads us to the conclusion that the residential sector is responsible for 27% of the energy consumption in the EU.

The building renovation rate of 1-2% on an annual basis in Europe is very low and this is the reason behind the importance of renovating the existing building stock. *(Figure 1)*

The European Commission has established a legislative framework to promote the energy performance of buildings, in particular through the Energy Performance of Buildings Directive 2010/31/EU (EPBD) and the Energy Efficiency Directive 2012/27/EU. In October 2020, the Commission launched its new Renovation Wave strategy as part of the European Green Deal, aiming at doubling the annual rate of energy renovation of buildings by 2030, to reach 3-4 %, and to promote deep renovation. Within this framework, the development of the market of deep modernization is a major challenge throughout Europe. It faces particular conditions in the Mediterranean region due to specific environmental and climatic factors, to the structure of the property and the built park, to socio-economic conditions, and the consequences of the economic crisis, that hit the European Mediterranean countries with a greater impact than the rest of the EU countries.

Figure 1. Example of energy building retroffiting. Source: https://sustaintrust.org.nz/

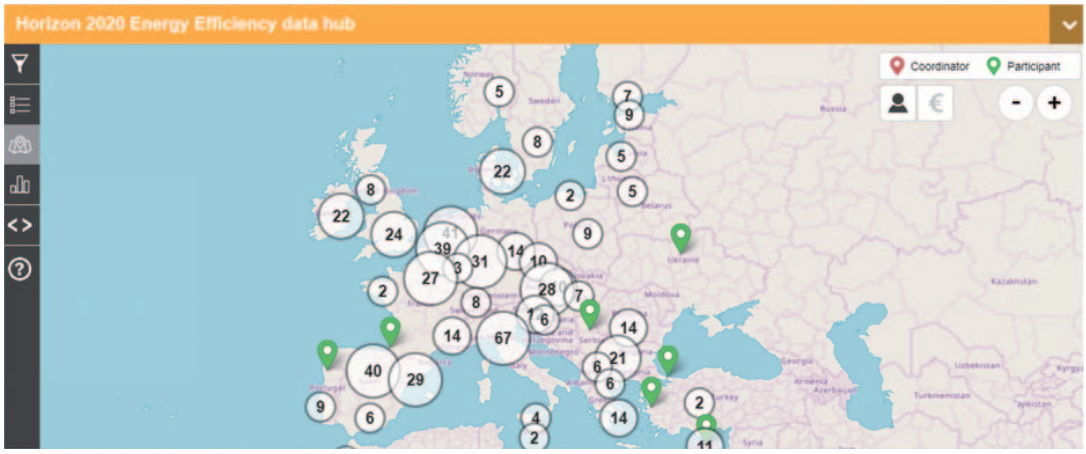

Figure 2. Participations in projects related to energy efficiency in buildings. Source: Own elaboration using EASME web tool

State of the art – Projects of reference

Next figure shows the number of participations in projects related to energy efficiency in buildings from 2016 to the present in EU countries. *(Figure 2)*

It is important to highlight that a very high number of research, development and dissemination have been dedicated to this topic. In this article we are going to coment the most representative projects which have been organized in a timeline in the next figure. *(Figure 3)*

The EASEE project developed a holistic approach to the energy-efficient renovation of the envelope of multi-storey, multi-owner, hollow-wall residential buildings built before 1975.

In the TUNRKEY project, a digital tool was developed, aimed at single-family and multi-family homes, while considering improvements in energy efficiency and interior comfort.

The EUCALC project's building calculation model includes calculations of a country's energy demand based on the proportion of single-family and multi-family buildings and their respective energy needs.

EmBuild project supported public authorities in South East European countries to prepare long-term strategies to mobilize investment in energy efficient renovations.

Present and ongoing projects

A2PBEER 2013-2018: The main objective of the project is to implement the latest rehabilitation technologies so that public buildings are more economically and energy efficient.

RIBuild 2015-2018: The main objective of the project is to provide a solution to the stock of historic buildings that must be energetically rehabilitated with structural limitations due to age and heritage protection. We highlight, from the project, the extensive report of case studies including detail of the historical and patrimonial structural typology.

ALDREN 2017-2020: The main objective of the project is to increase the number of energetically rehabilitated tertiary buildings with the help of a simple improvement guide, that in turn will increase quality and comfort.

TripleA-RENO 2018-2021: The main objective of the project is to involve homeowners and developers in energy rehabilitation. They receive information on improved buildings in Europe while at the same time filling out a survey on the housing situation, managing to highlight the types of possible improvements.

Med-ECOSURE 2019-22: The main objective of the project is to energetically rehabilitate the universities so that they become public Living-Labs. Thus, the owners of other buildings of this type will have first-hand information to carry out such improvements.

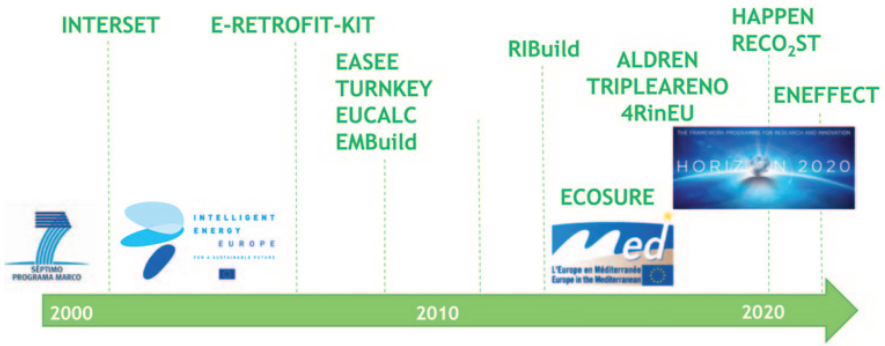

Figure 3. Timeline of energy efficiency project related to building renovation. Source: Own elaboration

4RinEU 2018-2021: The main objective of the project is to break the social barrier that undervalues investments in energy rehabilitation in the current housing stock in Europe.

ReCO2sT 2018-2022: The main objective of the project is to facilitate the systematic acquisition of information by the owners of the housing stock that needs to be rehabilitated. Within the project, the rehabilitation has been evaluated through different scenarios and the implementation of improvement measures in pilots.

HAPPEN 2018-2022: The main objective of the project is to promote an increase in the number of deep energy renovations in the current housing stock in Europe by creating a tool for optimal solutions, a network of pilots and the ZEB protocol applied to the regional Mediterranean climate.

GreenTecLab connections

Within the GreenTecLab Project, entrepreneurship in the area of energy efficiency in buildings and energy rehabilitation has been promoted from the following aspects:

1. Presentation of the potential of this in seminars and conferences in order to motivate young people to develop their own business ideas. These ideas can be innovative, but also more conservative, as the distribution of innovative products not easily available in one region could be a starting point to establish a business without the need to innovate.

2. Specific training in energy for all initiatives arising from La Janda and Seville within the support program.

The following initiatives arose from the Seville pitch:

1. Use of drones for the diagnosis and optimization of energy consumption in buildings.
2. Creation of an app to find the best energy rate for both residential buildings (domestic consumers) and industrial buildings.
3. Implementation of green roofs in buildings.
4. Creation of an app to optimize energy consumption in buildings
5. Creation of a software and/or an app for the environmental management of business and buildings. Calculation of the carbon footprint.

Conclusions

Due to a lack of information, there is a double risk for a new startup related to energy efficiency in buildings, of either offering an incomplete product when there is public information that would allow it to be improved, or of "reinventing the wheel".

As has been demonstrated above, the wealth of results, products and existing packages ranges from residential buildings to office buildings through to educational buildings and hotels or historic buildings. Likewise the improvement solutions range from AC system-based technologies to measures focused on the epidermis passing through to the local generation of energy. Whatever the building or the abacus of renovation measures, we are sure that the information on previous projects may be of great interest to you.

A lot of the initiatives introduced by the GreenTecLab project deal with energy efficiency in buildings, during the development of the project we have tried to support them in offering really "new" or innovative products without monition or shortcomings. Many are still on their way to become a consolidated idea, others have the maturity to be launched and tested in the real world.

In recent times, there have been many previous projects related to energy efficiency in buildings ranging from pure research to dissemination, so it is important for any entrepreneurial initiative related to the sector to collect existing information to improve the product offered to its clients by gathering all the knowledge, and the practical applications created previously and that are available to said entrepreneurs.

The GreenTecLab project has directly supported young entrepreneurs to realize their ideas providing them with the knowledge of the existing background in the energy efficiency field. The objective of the text in this article is to partially translate this knowledge to those who did not follow the program. We hope to have reached this goal.

References

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