

ENvelope meSh aNd  
digitAl framework  
for building  
Renovation

# Newsletter

## September 2021

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We are ENSNARE

*The future of building  
renovation*

# HELLO WORLD!



# ENSNARE

## OUR MISSION

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To boost the implementation of NZEB renovation packages in Europe, with a focus on residential buildings.

### Introduction

The building sector shows poor performance in terms of energy efficiency. Aiming to drastically improve the situation, the EU has defined ambitious targets of 15 – 65 kWh/m<sup>2</sup> for Nearly Zero Energy Buildings (nZEB), although the average consumption of the building stock in 2013 still was 201 kWh/m<sup>2</sup>. Over forthcoming years, the development of new modern buildings equipped with the latest technologies should contribute to a reduction in that gap, but the renovation sector will be playing a main role to improve the situation. Approximately 97% of EU buildings must be renovated to achieve the 2050 decarbonisation goals, but just an average of 1% of the buildings are renovated each year and, in most of the interventions the result is not a NZEB.

The overall contribution of ENSNARE is to provide a systemic methodology combining products, systems and solutions that will boost the adoption of novel and advanced technologies in the renovation sector looking to achieve high energy efficiency standards for buildings.

# Key facts about ENSNARE

The building sector is one of the main contributors to GHG emissions, being 40% of the energy consumption in the EU associated with building needs, mainly for heating, cooling and domestic hot water purposes. In order to achieve 2050 decarbonisation goals, a significant increase in the low renovation rate is needed. ENSNARE provides a systemic methodology combining products, systems and solutions that will facilitate and boost the adoption of novel and advanced technologies during renovation.

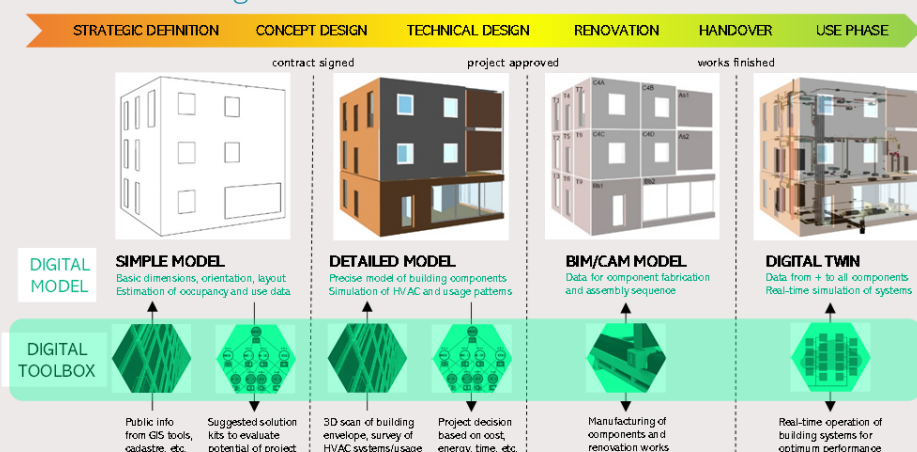
This improved renovation process must leverage advances in **ICT, digitalization, industrialization and automation** of industry to overcome the lack of a comprehensive approach to encompass current technologies and to facilitate communication between potential users and technology developers.

To accomplish our aim, ENSNARE develops 2 main structures:

1. **Envelope mesh**, fully modular and based on industrialized principles, enables fast assembly and interconnection of all components and energy/data networks, including technologies for energy harvesting, storage and distribution.
2. **Digital platform** provides a framework to stakeholders with a clear structure and access to a wide range of technologies for deep renovation of buildings. It supports all stages of the renovation, from early decision making and data acquisition to the manufacturing, construction, and the operation and maintenance of the implemented system. The platform makes use of a set of digital toolboxes linked to a digital model of the buildings, which in its final stage becomes a Digital Twin allowing real-time control, simulation and operation of building components.

## Methodology

The methodology is based on the incorporation of developed building components to the digital workflow in different stages as shown in the figure below.



## Technology Spotlight

Within a comprehensive systemic approach and the above 2 pillars, ENSNARE will develop:

- **Modular adaptable components** to be integrated within the system, including an active window for ventilation and heat recovery, solar harvesting devices (thermal collectors, PV and hybrid panels with advanced technologies such as roll-bonding), heat pumps and energy batteries.
- A set of **digital toolboxes** that will connect to the digital platform to support and accelerate all stages for a more efficient and automated renovation process: automated data acquisition, LCA/LCC analysis and decision support, digital BIM model and computer-assisted manufacturing (CAM), and a smart building management system (sBMS) for optimised operation and maintenance.

## ENSNARE coordinator

### What is ENSNARE, its aims, objectives and approach?

The main aim of ENSNARE is to demonstrate that current renovation activities for buildings through its' envelope upgrading, can significantly be improved making the process faster and more efficient. Compared with current renovation practises, that are focused on solutions that mainly increase the insulation capabilities of the envelope, ENSNARE will enable the incorporation of solar harvesting technologies under a systemic and integrated approach.

A systematic approach is proposed, combining, methodologies, industrialization principles, digital solutions and innovative building components incorporating renewables.

The concept relies in the necessary R&D of innovative solutions, but also, an important effort for integrating an adapting currently available technologies under holistic concepts is also considered as a priority.

The ultimate goal of ENSNARE is to make these renovation solutions more accessible for the market, boosting the implementation of renovation packages for envelope renovation with energy efficiency purposes and thus, accelerating current retrofitting rates and supporting the transformation of the European building stock into a highly efficient and technologically advanced built environment.

### What problems and barriers does ENSNARE tackle and how does it help solving it?

In order to achieve 2050 decarbonisation goals, a significant increase in the low building renovation rates is needed. In parallel, the contribution of renewable energy needs to be drastically increased, promoting onsite solar generation concepts that cover the demand of those renovated buildings. ENSNARE provides a systemic methodology combining products, systems and solutions that will facilitate and boost the adoption of novel and advanced technologies during renovation.

The building envelope is a fundamental element since, typically at least 75% of heat losses occur through the envelope comprising façade, roof and windows. Therefore, improving the envelope represents the basic requirement when undergoing a renovation project and, to achieve NZEB targets, advanced functionalities are required for this element that should go beyond current passive thermal barrier to become an active element (integrating energy harvesting, storage and distribution technologies).



PhD and Industrial Engineer with 14-year experience in Tecnalia, with technical and overall project management skills in R&D projects in EU, national and regional research programs as well as with direct contracts with Europe's building industry.

Regarding technical development he has effectively contributed in the fields of energy efficiency systems and in the design of innovative façade solutions, where he has developed his Phd Thesis for steel based solar façades.

With a previous 3 year experience in construction companies and in the automotive industry as production engineer, he has specialized his career in the fields of technical product development for the design of innovative systems and solutions for building products. Experienced in designs guided by industrialized, modular concepts for manufacturing, guarantying competitive and reliable performance in order to progress towards a more sustainable and efficient construction industry based on innovative technologies.

He is co-inventor of 4 International or European patents, all of them related with the design of advanced and industrial envelope solutions. Author or coauthor of 14 papers for indexed journals and 23 papers or communications for international conferences, 6 books and 2 chapter of books. Member of the organization committee and edition of proceedings for 4 International conferences, 3 of them for consecutive editions of the "International Congress on Architectural Envelopes" organized by Tecnalia in years 2012, 2015 and 2018.



# Interview with

ENSNARE coordinator

## What makes ENSNARE special?

The specific combination of digital technologies (software) and building components (hardware) under a common approach is a novelty itself since the necessary understanding of both worlds is key to achieve highly competitive results. Solutions can be independently developed, but to get synergetic benefits boosting the sector, the systems must communicate and interact between them. In ENSNARE the industrialization acts as the main catalyst to combine, adapt and integrate compatible technologies, thus, the integration and interrelation of the different systems is probably the main challenge of ENSNARE project.

The wide representation of the building renovation value chain participating in ENSNARE will support the development of technologies that cover most of the process, activities and stakeholders involved. The high involvement of SMEs in the consortium, with a total of 11 partners, will also allow to design solutions oriented to this typology of companies that represent, in first person, the construction sector in Europe.

## Can you please describe your organisation (TECNALIA) and its role in the project?

TECNALIA is the largest centre of applied research and technological development in Spain, a benchmark in Europe and a member of the Basque Research and Technology Alliance. It employs around 1,450 people (18% PhD).

The wide experience of Tecnalía in the EU programs, with a participation on more than 450 projects coordinating 68 of them, gives us the experience and confidence to coordinate ENSNARE providing the necessary framework and governing structure with the aim to achieve the ambitious objectives expected for ENSNARE.

Additionally, we are highly involved in the development of technical solutions within ENSNARE, thanks to our wide experience both, in the development of solar façade systems based on different technologies (PV, PVT and solar thermal), as well as, in the design, programming and implementation of digital tools for the building industry.



# About Us

## Identity - Consortium

Our logo is composed of a modular envelope represented by the main body of the graphic which is defragmented, representing the digitization process of the information, this logo reading can also be done in reverse, where the digital fragments are reconstituted in the modular envelope. On the other hand, at the bottom, we can find the ENSNARE acronym built from the title of the project ENvelope meSh aNd digitAl framework for building RENovation "ENSNARE".

In the English language, the word "ensnare" is a verb that means "to catch or control something or someone". In line with this and the fact that one of the main objectives of the project is to develop an envelope mesh capable of "ensnare" information on the energy behavior of the building.

### Who we are?

ENSNARE is Horizon 2020 EU funded project carried out by 19 partners from 12 European countries: 11 SMEs, 5 institutes of research, 2 Corporation, 1 public body.

