SmartBuilt4EU
The European Smart Buildings Community

January 2023

Smart Buildings Future Technologies

Introduction

The SmartBuilt4EU project supports and consolidates the Smart Building Innovation Community. In our 'Smart Buildings EU-funded Innovations' Brochure (latest release in January 2023), we are introducing several research projects in the field of Smart Buildings. Through these projects, the European Commission has been supporting innovation and market uptake of Smart Building Technologies and Services as they can not only complement renovations focusing on the building envelope or technical installations but can also step in where deep renovation cannot be contemplated.

So many research projects, so little time!

The various projects related to Smart Buildings, all contribute to innovation and market uptake of smart building technologies but have different focus points. This brochure tends to give an overview of their main take-aways in the form of Key Exploitable Results. This should allow the reader to keep up to date on the most important ongoing developments in the field of Smart Buildings at this moment, without having to read through all different project reports and newsletters.

What is a Key Exploitable Result?

A Key Exploitable Result (KER) is an identified main interesting result with a high potential to be exploited. KERs can be of different nature: it can be a set of data, a publication, a tool, … but they all have in common that stakeholders can benefit from them, thus supporting further innovation and market uptake.

Target audiences addressed and the needs the specific KER feeds into, are listed for each of the project results in this brochure.

Classification

To provide some structure in the amount of KERs presented in this document, a classification system was set up. Furthermore, all KERs mention the Sustainable Development Goals they contribute to.

For the classification of the KERs, the definition of smartness of a building[1] is the main source:

> Smartness of a building refers to the ability of a building or its systems to sense, interpret, communicate and actively respond in an efficient manner to changing conditions in relation to the operation of technical building systems or the external environment (including energy grids) and to demands from building occupants.

In this definition, three aspects can be determined:

- Readiness to adapt in response to the needs of the occupant;
- Readiness to facilitate maintenance and efficient operation;
- Readiness to adapt in response to the situation of the energy grid.

As some of the KERs identified apply for several of these aspects, also a fourth overarching category is in place on data-management and other cross-cutting issues.

Readiness to adapt in response to the needs of the occupant

Smart Buildings do not only concern the buildings, but also the users of those buildings. As they are the main stakeholder of the building, interaction with its users is key, including the ability to adapt the building's operation based on the needs of the occupant. The readiness to adapt in response to the needs of occupants relates to following aspects[2] : **comfort, convenience, information to occupants, health & wellbeing**.
When thinking about comfort in buildings, mostly thermal comfort comes to mind, i.e. making sure it has the right temperature for the building users. But this also relates to other aspects, like acoustic comfort, or visual comfort, ensuring enough (day)light is available, without having hindering glare for example.
Convenience has to do with making things easy for the building users, and thus mainly relates on how the building user can control several services.
Information to occupants deals with keeping them informed on how the building is operating, ensuring also a certain level of involvement of the user with the building.
A healthy indoor environment in the building is amongst other related to ventilation and helps to ensure a feeling of wellbeing for the building users.

Readiness to facilitate maintenance and efficient operation

In this category project results are included that help ensure an efficient building operation. This does not only concern the energy efficiency performance of the building, but also facilitation of maintenance. The latter relates amongst others to automated fault prediction and diagnosis. For example, by monitoring several aspects of building streams (e.g. energy, water), it will become clear if there is a problem at hand that is otherwise not visible. Being able to intervene sooner, ensures a more efficient building operation.

Readiness to adapt in response to the situation of the energy grid

Some of the presented Key Exploitable Results influence the ability of the building to response to the situation of the energy grid. Demand-response is a known concept related to the electricity grid, e.g. when charging an electric vehicle at a moment when there is no other peak in electricity demand, of course taking into account the owner's needs. However, responsiveness to the grid can also apply to district heating and cooling networks.

Data management and Crosscutting issues

The aspects contributing to the smartness of buildings, often involve data to be processed. Therefore, data management is an important crosscutting issue. Data protection, with the GDPR regulations as a strict minimum is a critical factor of such data management, taking into account also issues on cyber-security.
Another important crosscutting aspect is interoperability, with sufficient interaction between the various systems present in a building. An example for this is to avoid energy annihilation when for example both heating and cooling systems are working at the same time.
Other crosscutting aspects could include financing and business models of new services and education on integrating Smart Building innovations.

[2] Aspects mentioned here relate directly to the impact criteria of the Smart Readiness Indicator

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Readiness to adapt in response to the needs of the occupant

Owner for exploitation

CSTB, All

Results contributors

Centre Scientifique et Technique du Bâtiment (CSTB)
DEMO Consultants
Fundación CARTIF
Universitá Politecnica Delle Marche
CYPE SOFT SL
METABUILD
Van Berkel & BOS U.N. STUDIO B.V., Planen-Bauen 4.0
Technische Universität Berlin
Architectural Spies EOOD
HOCHTIEF VICON GMBH
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BIM-SPEED
Harmonised Building Information Speedway for Energy-Efficient Renovation

The BIM-SPEED technical solution enables maximizing economic, environmental, and social impact. It provides tools for more energy-efficient and smarter renovation. The key exploitable results identified in the project facilitate as addon tools that can be used during different stages of renovation and construction projects. The toolkit of the innovative BIM technical solution enables more environmentally friendly living for the future as costs are saved in energy consumption and CO_2-emissions are minimized.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Energy
- Environment

Result description

- Within the BIM-SPEED toolkit, the "Comfort Eye" is an innovative IEQ monitoring system for assessing building performance. It communicates in real time and, it provides a measure of thermal comfort (according to ISO7730 and ISO7726), IAQ, visual comfort, and thermal images of the indoor environment. Thermal and acoustic comfort are important quantitative parameters that are linked to the wellness of inhabitants. The knowledge of those levels is important, especially for the inhabitants. Additionally, the identification of rooms with bad thermal comfort can be connected also to the lack of energy saving.

Result Maturity

●●●●●○○○○ Demonstration - System Launch and Operations (TRL8-9)

Product positionning

Unique Value Proposition

The key value proposition of the BIM-SPEED technical solution is the way it enables maximizing economic, environmental, and social impact while preserving privacy. The platform offers tools and methodologies to reduce the average duration of energy-related construction works by more than 20% compared to current national standard practices.

Target audience

- Other Actors who can help us fullfill our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

SUSTAINABLE DEVELOPMENT G**O**ALS

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

So far, the solutions developed during the BIM-SPEED project have been succesfully demonstrated in 12 real cases that cover all of Europe's climatic geo-clusters and varying levels of BIM experience in different countries. Currently a comprehensive exploitation plan that covers the potential commercialization of the platform is being developed.

Our needs

- Business Plan development
- Expanding to more markets /finding new customers

Owner for exploitation

ADVANTICSYS

Results contributors

ADVANTICSYS

Contact

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Cultural-E
Cloud-based House Management System
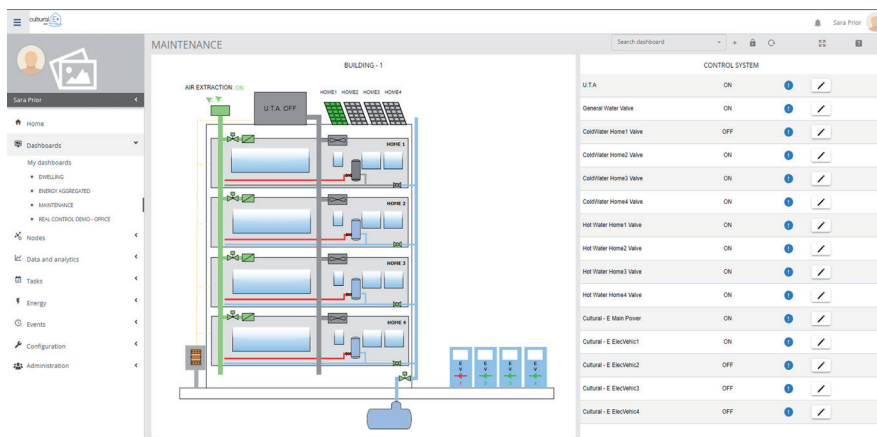
The Cultural-E (Climate and cultural-based solutions for Plus Energy Buildings) online cloud platform is able to improve building energy efficiency and indoor comfort by running advanced algorithms without user intervention. It offers seamless integration with existing equipment. The platform adapts to the building.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

- Improved operation of the building integrating energy generation, consumption and storage components in a same place
- 24/7 cloud platform for energy management
- Non-intrusive system to achieve energy savings while keeping indoor comfort
- Seamless integration with existing equipment
- Cost-effective solution with no maintenance

Result Maturity

●●●●●○○○○○ R&D Technology Demonstration (TRL5-6)

Product positionning

Unique Value Proposition

Our House Management System is an 24/7 online cloud platform able to improve building energy efficiency and indoor comfort by running advanced algorithms without user intervention. Its seamless integration with existing equipment makes it the ideal solution for any kind of building. It brings SCADA control boards to the cloud level enabling not only tenants or end users but also owners and facility managers to be in full control of its building and subsystems.

Target audience

- Public or private funding institutions
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

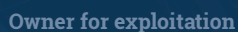The solution has been developed during the last 2 years and now is ready to be deployed in an operational building.

Our needs

- Business partners

We specifically need

Local engineering companies and product distributors to reach commercialisation agreements.

Owner for exploitation & Results contributors

Centre for Research and Technology Hellas [CERTH]
Kaunas Technical University- Centre for Smart Cities and Infrastructure [KTU]
Geosystems Hellas SA [GSH]
Cleopa GmbH [CLEO]
SEnerCon GmbH [SEC]
Spanish Association for Standardization [UNE]
DEMO Consultants bv [DMO]
SGS TECNOS S.A [SGS]
HYPERTECH [HYP]
Austrian Standards International [ASI]
Frederick Research Center [FRC]
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Contact

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D^2EPC

D^2EPC Web Platform & additional services

D^2EPC Web Platform is a holistic digital solution delivering the next generation EPCs for the operational and regular assessment of buildings energy performance through a set of cutting-edge digital design and monitoring tools and services that will also extend EPCs applications and usability.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Climate Action
- Consumers
- Energy
- Environment
- Research and Innovation

Result description

D^2EPC Web platform will utilize a multi-sensorial framework to collect multi-modal data from the buildings related to energy consumption profiling and occupancy, indoor environmental conditions, and air quality. The input data streams will be aggregated and processed for calculating the necessary human-centric indicators in the dynamic EPC for the assessment of the buildings actual energy performance. It subsequently builds upon actual data and the 'digital twin' concept to calculate energy, environmental, financial and human comfort indicators and through them the EPC classification of the building in question.

Added value services include the provision of customised recommendations for energy performance upgrade, the provision of performance forecasting in order to coordinate the operation of building's assets in the optimal comfort and efficient way as well as the provision of notifications and alerts to avoid the risk of performance downgrade. The platform also enables comparing buildings with the performance of other buildings in more than one normalised metrics as well as verifying the credibility of the data collection and processing.

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

The D^2EPC Web Platform is introducing the concept of next generation dynamic EPCs. It will enable enhanced multi-parameter building performance assessment (energy, smart readiness-SRI, sustainability, human comfort, financial); introduce BIM-based Digital Twins coupled with a state-of-the-art IoT ecosystem for the near-real time asset and operational energy assessment; provide AI-driven recommendations towards energy efficiency, optimal comfort and energy saving consciousness.

Target audience

- EU and Member State Policy-makers
- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The D^2EPC Web Platform is currently under development and functionalities concerning the EPC assessment and BIM parsing are already available and tested in project's pilot buildings. The overall framework is described in deliverable D5.1 D^2EPC Manual, available on the project's website.

Our needs

- Actors involved in the delivery of EPCs (Building industry, ESCOs)
- Those who determine the framework and context of EPCs (State/ Governmental department/ Public Bodies, EU Policy instruments)
- Those who are affected by the EPC assessment (tenants/ owners/ facility managers)

We specifically need

The D^2EPC Web Platform deploys a holistic framework for strengthening and improving the quality and application of EPCs, by introducing novel and cost-effective approaches of assessing the energy performance of building envelope and systems. We aim to raise awareness and interest of potential users and ensure a broad applicability of the project results as well as boost the exploitation of our innovations and the realization of the long term impact, affect EPC applications on the market and obtain key feedback to enhance exploitation opportunities.

Owner for exploitation

Denvelops (DEN)

Results contributors

Denvelops (DEN)
BERGAMO TECNOLOGIE
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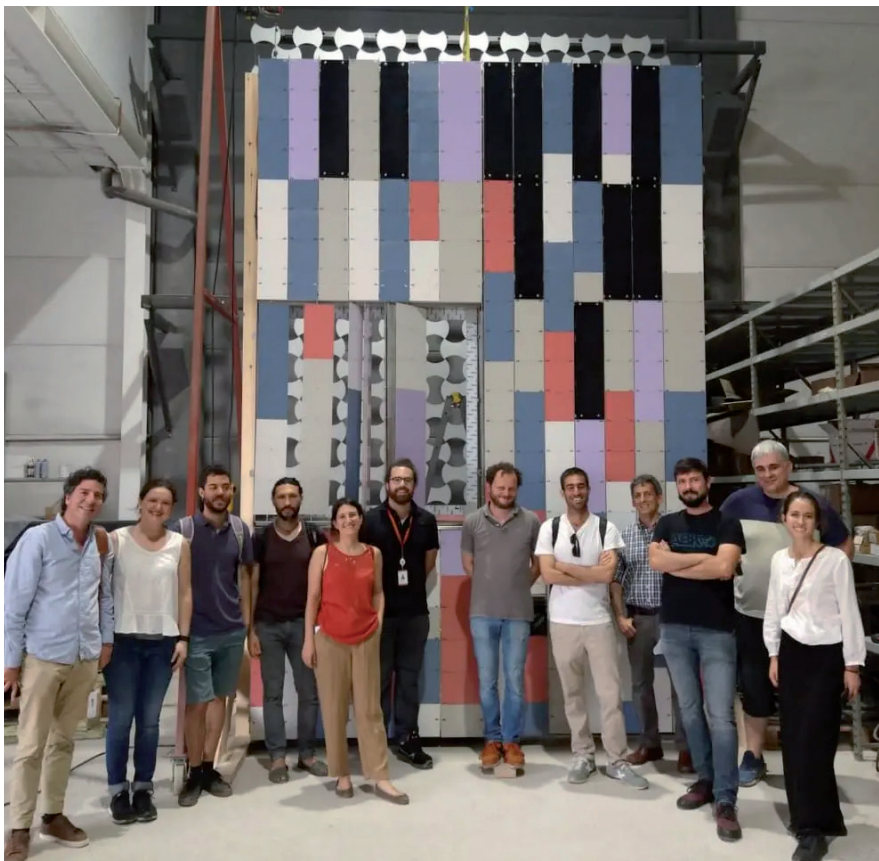
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PLURAL

HybridWall: Denvelops Prefabricated Plug-and-Use Façade Modules for Building Renovation

Conception, design, production, and installation of an integrated multifunctional system for buildings' retrofitting that includes insulation, ventilation, windows louvers and PV energy in a ventilated facade.

Our result

Result type	Scientific or Technological R&D Result including ICT Hardware
Business Sector(s) / EC Policy Areas	• Energy • Environment
Result description	Versatile, lightweight, prefabricated ventilated façade to preinstall, transport and place in its final position the components that add new functionalities, such as insulation, unit ventilation system, windows and louvers and PV panels. All under a heterogenic but totally modulable ventilated façade that allows endless aesthetic possibilities. This is one of the core PLURAL components which are then combined with control strategies to create the innovative PnU ('Plug-and-Use') kits.
Result Maturity	●●●●●●●○○○ Demonstration - System Development (TRL6-8)

Product positionning

A prefabricated structure had been never used before to transport and guide the installation of elements that will finally be anchored to the pre-existing wall. Plus, the Denvelops Ventilated façade already is a solution by itself without the additional components/functionalities.

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

7 AFFORDABLE AND CLEAN ENERGY

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

SUSTAINABLE DEVELOPMENT GOALS

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

The main conception and design have been defined. Currently working on the optimization of the components involved in the integration of the functionalities. Mechanical studies for the DEN solution and components have been performed. Detection and optimization of the possible thermal bridges. Election of the appropriate insulation materials. Integration optimization of the unit ventilation. Definition of production and installation procedures. Quality test procedure definition and certification requirements. Design and construction of a prototype. Design of the Perimeter finishing of the façade. Aesthetical solution for the PV installation on the roof, so that it follows the same aesthetics as the façade and it can be connected continuously.

- Expanding to more markets
- Finding new customers

The company will launch the new product in the market using the demonstration on the PLURAL project building, manufacturing documentation, presentation on the fair and exhibitions, direct contacts with potential customers.
Customers: 1) Many professions in the area of building renovation and building façade: architects, mechanical engineers, constructors, heating and cooling professionals etc. 2) Building owners

PLURAL

SmartWall: Adaptive Dynamic Multifunctional prefabricated building Modules

Conception, design, production, and installation of an integrated multifunctional system for buildings' retrofitting that includes insulation, heating and cooling, ventilation, smart windows, energy harvesting and storage.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Energy
- Environment

Result description

The SmartWall PnU kit is a multifunctional wall system that combines active with passive technologies, including fully prefabricated walls, high-performance windows, balcony doors, slim-type fan coil for heating and cooling, split units, air ducting systems, radiators and convectors, PV panels, batteries, and control and fire protection systems. It is a compact versatile prefabricated kit which can be installed externally or internally (in case there are space or aesthetic restrictions) in existing building envelopes, introducing an innovative, dynamic, and flexible retrofitting solution reducing installation time and construction faults. The SmartWall is easily adjustable to any dimension up to 4m of height per module and can be decorated with any kind of finishing material. It is appropriate for all building types and climatic conditions, while it is more effective for climates with a significant cooling demand.
This is one of the core PLURAL components which are then combined with control strategies to create the innovative PnU ('Plug-and-Use') kits.

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL6-8)

Product positionning

Versatile, prefabricated all-in-one wall panel that can be installed externally or internally in existing building envelopes suggesting a feasible, adaptable, and cost-effective solution for deep retrofitting that combines thermal insulation and HVAC systems. These combined properties do not exist in the market at the moment.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

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# Go-to-market strategy and needs

Current stage description

Structural, electromechanical, and hydraulic studies for the Smart wall system have been performed. Calculation of thermal bridges. Calculation of materials U-value and election of the appropriate insulation materials. Integration of the fan coil unit. Design and construction of 2 prototypes.

Our needs

- Expanding to more markets
- Finding new customers

We specifically need

To reach TRL9, the eWHC should be installed and monitored in different climatic zones and on different building types. Heating and cooling cases should be realized. Customers: 1) Many professions in the area of building renovation and building façade: architects, mechanical engineers, constructors, heating and cooling professionals etc. 2) Building owners

Owner for exploitation

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Results contributors

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PLURAL
Air Handling Unit with Heating and Cooling for Integration

Ventilation unit for fresh air supply of flats in apartment buildings with a double heat recovery system. The second of the heat recovery exchangers is the so-called active exchanger with thermoelectric modules. It is dedicated to increase the overall efficiency of heat/cold recovery from the exhaust air and at the same time control the temperature of the supplied air without the necessary support of other HVAC systems (heating and cooling).

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Energy
- Environment

Result description

This innovative air-handling unit incorporates two-stage heat recovery, the first being a plate heat exchanger, the second is an active heat exchanger with thermoelectric modules and provides supply air temperature control. The unit is connected with the interior space via supply and extract channels. Due to maintenance reasons, the ventilation unit must be located next to a window side. In the PLURAL project, this innovative HVAC component is integrated in the HybridWall (also presented in this brochure) in vertical position.
This is one of the core PLURAL components which are then combined with control strategies to create the innovative PnU ('Plug-and-Use') kits.

Result Maturity

●●●●●○○○○ Demonstration - System Development (TRL6-8)

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Product positionning

Unique Value Proposition

Air handling combined with cooling and heating device, compressor-less, unique configuration of the thermoelectric heat exchanger.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

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Go-to-market strategy and needs

Current stage description

Prototypes finished, 3D models, test results for efficiency in various operational modes.

Our needs

- Expanding to more markets
- Finding new customers

We specifically need

Demonstration on the PLURAL project building, manufacturing documentation, presentation on the fair and exhibitions, direct contacts with potential customers
Customers: Construction companies, developers, façade panel manufacturers, individual investors

Owner for exploitation

Manni Group SpA (and its
business unit Isopan SpA)
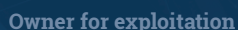
Results contributors

Manni Group SpA
Fundacio Eurecat
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Contact

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StepUp project

Prefabricated Plug&Play Envelope Modular System for retrofitting of existing façades

The Plug&Play Envelope System is a solution that consists on prefabricated façade modules that aim to improve the passive behaviour of the building by dismissing the energy demand while minimizing the on-site installation time. P&P Envelope System ensures flexible installation potential, it is pre-assembled before onsite delivery requiring minimal works on site, as well as minimising embodied energy, while ensuring high comfort and IEQ.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Climate action
- Energy
- Research and Innovation

Result description

The Plug&Play Envelope System is a solution based on a prefabricated façade modules that aim to improve the passive behaviour of the building by dismissing the energy demand while minimizing the on-site installation time. The solution is developed from existing components on the market further developed to reach the aim of the project and by providing the solution with a very high degree of industrialization. Modularity and non-disruptive installation procedures are the key factors which allow an off-site approach to the retrofitting process, providing a solution which is suitable to a wide range of existing building. The final solution offers an improvement of the final wall U-value, with a lightweight pre-assembled panel that can be attached to the existing façade of the building without affecting its structural balance. Further, this solution is reducing the time on site compared with the traditional construction method. The P&P module brings solutions such as full customized and modular panels, thermal insulation improvements, minimisation of time on site, reduction of the performance gap, and it makes the renovation more attractive and reliable, optimizing the renovation investment and accelerating the renovation market.

Result Maturity

●●●●●●○○○ Demonstration - System Development (TRL6-8)

Product positionning

Unique Value Proposition

The P&P module aims to offer a full customized façade solution for deep energy renovation to achieve the EU goals for decarbonization of the building stock in Europe in 2050. The system provides a time-saving in the on-site construction, cost-effectiveness and sustainable solution with a high thermal insulation in order to make the energy performance of the building reliable.

Target audience

- Public or private funding institutions
- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities
- Private Investors

Contribution to Sustainable Development
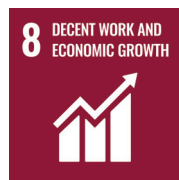
UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The P&P module has been developed during the past 2 years. At this time, the solution is mature enough to be tested in a pilot. It is envisaged that in a March 2023 the pilot will be built, and we will be able to collect its preliminary results through sensors in order to validate its energy performance.

Our needs

- Business plan development
- Expanding to more markets /finding new customers

We specifically need

P&P module is a full customized prefabricated panel appropriate for deep renovation and new construction. The key stakeholders are the architects, engineers, construction companies and all the possible stakeholders that are interested to achieve the EU goals about the decarbonization of the EU building stock. Moreover, the P&P module has the capability to include different technologies from other industry clusters (i.e. solar protection, windows and potentially other product). Therefore, the needs are primarily focused on development of the suitable business plan for offering the service in the diverse EU markets with local stakeholders.

Homes4Life
The European Certification for Ageing in Place

Homes4Life is a European certification scheme based on an inspirational and realistic vision of people's needs and requirements in a life-course approach. The certificate builds both on the potential of well-designed construction and digital smart building solutions, for more resilient dwellings.

Our result

Result type

Services

Business Sector(s) / EC Policy Areas

- Digital economy and society
- Public health
- Consumers

Result description

Age-friendly housing is relevant for all citizens as it impacts on our health and wellbeing, our social interactions and capacity to participate in community life. Homes4Life supports the vision of a society where people have the opportunity to pick the place they want to live in and grow older. A society where age-friendly housing is available, accessible and affordable to all.
Homes4Life Certification Scheme is underpinned by a comprehensive evaluation framework designed around 6 strategic clusters. The 6 clusters cover an in-depth and holistic analysis of what a home and its components need to fulfil to create and maintain an age-friendly environment that is enabling, fit for purpose, flexible and resilient: 1) Physical (including digital and smart building readiness); 2) Economic; 3) Personal; 4) Social; 5) Outdoor access; 6) Management.
Homes4Life can be applied both at design, construction and in-use phases.

Result Maturity

● ● ● ● ● ● ○ ○ ○ ○   Market Deployment

Product positionning

Unique Value Proposition

The certification is expected to have a direct impact on the market value of our properties. Do you want your building to be recognised as age-friendly housing supporting health and well-being ? Do you want to invest with confidence into a certified age-friendly home ? Are you interested to work with us to manage and deliver the Homes4Life certification? Then contact us !

Target audience

- EU and Member State Policy-makers
- Private investors
- Other Actors who can help us fulfill our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The Homes4Life certification scheme has already been tested on 11 pilot buildings across Europe (France, Spain, Italy, Ireland, Poland and The Netherlands), both in Design and Operational phase. We are looking for 1) Property developers 2) Health and Social Care Providers and 3) Homeowners willing to test and implement the Homes4Life Certification Scheme.

Our needs

- To raise awareness and possibly influence policy
- Expanding to more markets/finding new customers

We specifically need

Are you interested in developing age-friendly housing? In refurbishing homes so that they better support health and well-being over the life course? Whether you are a residential property developer, a public authority, a social housing organisation or a committed citizen,
Homes4Life is designed for you. The certifcation scheme is inclusive in its design and can be applied to both new and existing buildings (be it detached houses, multi-residential buildings, or individual fats) and regardless of the tenureship model.

Owner for exploitation & results contributor

LIST

Contact

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Digital Twindow
Digital Twins for Improved Indoor Air Quality

Twindow is a Digital Twin system enabling a live data connection from the digital twin to the physical components. It recommends actions to building's occupants based on a real-time monitoring of Indoor Air Quality, contextualized with BIM, and on the assessment of the impacts on human health. Coupled with Life Cycle Assessment, the system enables operational management of buildings optimising the trade-off amongst energy efficiency and health impacts.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Energy
- Research and Innovation
- Consumers

Result description

The Digital Twindow implements the Digital Twin vision, by providing a virtual environment for gathering building's data, analysing, simulating and optimising, and a feedback to building occupants in the physical world, in the form of usage recommandations.
It relies on a BIM model in which various Indoor Air Quality sensors are defined, and a Digital Twin system mapping the static BIM to dynamic datasets provided by the networks of sensors deployed in the building. An optimisation engine runs real-time monitoring and simulation and provides recommendations back to the users of the spaces.
The technology comprises visualisation devices called Kniwwelino (https://www.kniwwelino.lu) indicating the recommendations in a visual form to the users.

Result Maturity

●●●●●●○○○○ R&D Tech development

Product positionning

Unique Value Proposition

The Digital Twindow implements a true digital twin system for building management enabling interaction with the occupants. It relies on BIM and open standards to handle static and dynamic building's data, and optimise the operation.
The system helps achieving efficient management by optimising the trade-off amongst energy consumption and health impacts, while ensuring a constant feedback to the occupants.

Target audience

- Other actions who can help us fulfill our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The Digital Twindow is under development in the context of the SemanticLCA research project. It reuses some opensource components. Collaboration with Smart Building technologies developers are foreseen (especially for integration with sensors, as well as potentially BMS interfaces).

Our needs

- Technology Transfer Expertise
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

- Collaboration with building sensor/devices developers.
- Collaboration with BEMS developers and window manufacturers.

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Readiness to facilitate maintenance and efficient operation
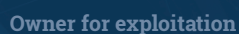
ASHVIN
Real-time as-built vs as-designed comparison
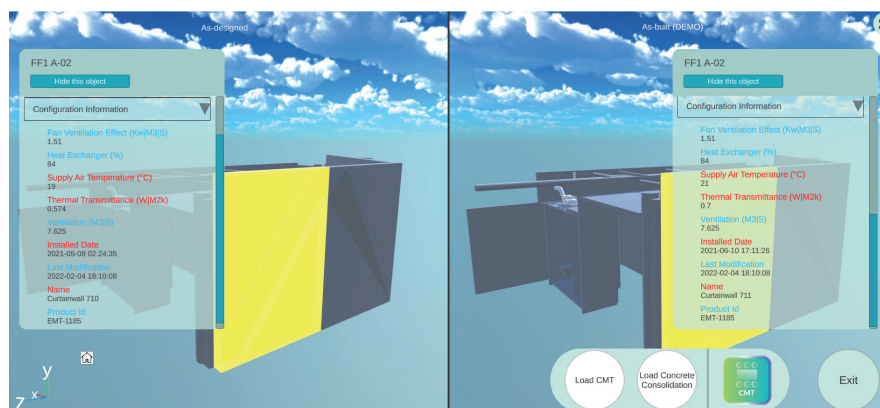
Real time digital twin that represents behaviour: the solution currently offers split-screen comparison of two 3D BIM models and associated meta-data from the same construction site.

In the future, the solution will offer automated reconstruction of geometry based on point cloud scans for progress monitoring; as well as automated construction analysis for QA/QC process and possibility to integrate with DT Dashboard to facilitate decision making.

Our result

Result type

ICT software digital design solution

Business Sector(s) / EC Policy Areas

- Energy
- Research and Innovation

Result description

With a real time digital twin that can actually represent behaviour (for example, structural or energy related), it is possible to track changes in as built model- daily and hourly.
Early detection of potential discrepancies with regards to initial design intent can be migrated. This will allow more reliable constructions, less rework and higher quality.

Result Maturity

●●●●●●○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

Construction progress monitoring among other applications; Automatic quantitative comparison between the 3D as-built model reconstructed using Lidar point cloud scans and the 3D as-designed model; Used for automated QA/QC based on reliable comparison of BIM model and scans based on tolerances. Therefore improving production in the construction process and early detection of issues.

Target audience

- Public or private funding institutions
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

# Go-to-market strategy and needs

Current stage description

Current: Split screen comparison of two 3D BIM models and associated meta-data of the same construction site.
Future: Automated reconstruction of geometry based on point cloud scans for progress monitoring. Automated construction analysis for QA/QC process and possibility to integrate with DT Dashboard to facilitate decision making.

Our needs

- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

We are targeting the following audiences:
- Construction managers.
- Subcontractors,
- QA/QC team.

Auto-DAN
Live Self-Energy Assessment Framework (LSEAF)

The Live Self-Energy Assessment Framework is a new methodology for generating an actual energy performance evaluation derived from monitoring of the energy consumption at building level and disaggregated monitoring at an appliance/system level. It incorporates in the assessment the energy performance of all building products, systems and appliances, as well as existing EU energy regulations, providing a complete analysis. The users and the building' facility and energy managers can understand how the operation of technical systems and user behaviors impact on the energy consumption. This approach allows: to improve energy efficiency and to make our homes more sustainable and comfortable through direct involvement and active participation of the users; to increase energy transparency and reduce the impact of energy cost on business activity; as well as to offer a new device, applicable to a lot of building typologies, that provides energy savings with enhanced connectivity.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

The LSEAF allows to link together different aspects of the building that were previously independent, like the energy class of appliances and the building energy performance. The main output of this methodology is to define the complete list of KPIs that will be determined within the live self-energy assessment. This set of KPIs will allow to consider the energy consumptions of the appliances in the building's performance, together with the implementation of schemes for the demand response. The result of this assessment will be then provided to the user through an interactive dashboard that will show the live performance of the building, giving also the possibility to the user to act directly on the system to pursue a better management of the building itself. In this way this product guarantees a complete assessment of the energy performance of the building, providing the user with both key advice to improve energy efficiency of the building, information about the actual operation of the building compared to the best one and suggestion for the replacement of old appliances.

Result Maturity

●●●●●○○○○○   Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

This new methodology will unlock the potential of "live" energy audits, making these documents accurate in terms of real monitoring data. The so produced audit will be dynamic and continuous (as the user interacts with its building and make changes in the "live" audit, these will be represented). An ongoing assessment that is reactive to occupational/physical changes will be also provided.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The LSEAF has been in development for 2 years. The solution is mature enough to be implemented in a tool/dedicated software. It is envisaged that another year will be needed for its complete implementation in the auto-DAN system for being fully exploited at the demo-sites as well as to be market-ready. The product guarantees a holistic assessment of the energy performance of the building.

Our needs

- Business partners - SMEs, Entrepreneurs, Large Corporations
- Expanding to more markets /finding new customers

We specifically need

The Live Self-Energy Assessment Framework can satisfy different needs for the different kind of business companies: Real Estate Funds, Companies with shares listed on the stock exchange, Companies with branches or offices distributed throughout the territory. The monitoring system can be linked to an intelligence dashboard to provide energy consumption awareness and enable energy managers and facility managers to improve and demonstrate the effectiveness of their energy efficiency measures. The needs are primarily focused on the development of a new product for the energy monitoring market.

**Owner for exploitation
& Results contributors**
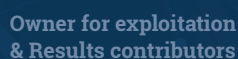
IDP Ingeniería y
Arquitectura Iberia S.L.U.
(IDP)
COMSA Instalaciones y
Sistemas Industriales S.A.
(COMSA)
Fundació Eurecat
(EURECAT)
Master Builders Solutions
Deutschland (MBSD)
Empresarios Agrupados
Internacional S.A. (EAI)
Teknologian
Tutkimuskeskus VTT OY
(VTT)

Contact

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SPHERE

BIM-based Digital Twin (DTwin) Platform to optimise the building lifecycle, reduce costs and improve energy efficiency in residential buildings
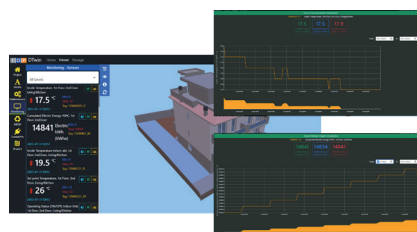
A Digital Twin PaaS/SaaS integrating BIM and IoT data with Energy Efficiency Simulation, Predictive Maintenance, Sustainability and LCA/LCC models & algorithms based on webAPI. The DTwin Platform concentrates on the needs of certain stakeholders, namely: Energy service companies (ESCO) or aggregators, which provide a broad range of energy solutions to consumers and Facility Managers or dwelling occupants/end users, who are responsible for the operation of the HVAC systems within a facility. Building Owners and Tenants which can own a Digital Twin of their buildings and/or assets with real-time data from IoT and the capability to simulate improvements on the building.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Energy
- Environment
- Research and innovation

Result description

The goal of this innovation is to provide a integrated solution that combines:
1. Human Thermal Model (HTM) for optimized control of heating/cooling in buildings based on temperature and humidity.
2. IPredict + IMAN tool that provides facility Managers with a predictive maintenance tool to know if the HVAC thermal energy consumption was in line with the predicted value.
3. Software in the Loop (SIL) Libraries which aim to make it easier for EcosimPro simulation software' users to build exportable simulations of complete HVAC systems.
4. SIMBOT (Simulation Bot), a standalone software to create a HVAC digital twin to analyse historical data of the real system, validate the current data of sensors and equipment and anticipate the future to optimise energy management.
5. Life-Cycle Cost Concrete Assessment Tool (LCCCA) which allows to compare different solutions of repair and coating of concrete structures on the basis of Life Cycle Costs (LCC).
6. Concrete Management Tool (CMT) which allows quick calculations of environmental indicators and cost impacts for real concrete mix designs.
7. Online Planning Tool (OPT) which is an innovative specification tool designed to support construction professionals to find the right solutions for their projects in a safe, fast and efficient way.

Result Maturity

●●●●●●○○○○ Demonstration - System Launch and Operations (TRL8-9)

Product positionning

Unique Value Proposition

DTwin Platform aims to offer Facility Manager, ESCOs, Building Owners & Tenants, etc. with a user-friendly platform based on BIM models that improves energy efficiency and sustainability throughout the entire lifecycle of a building, facility, asset, etc. integrating stakeholders of every stage, from an early design/planning stage to the O&M. BIM data can be used as well as real-time and historical timeseries from IoT sensors collecting data from weather, energy/water consumption, etc.

Target audience

- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The DTwin PaaS/SaaS has been in development for the past 3 to 4 years. At this time, the solution is mature enough to be deployed at a wide scale level for demonstration and evaluation purposes. Current works consist in properly defining modelling needs depending on specific Use Cases and regarding BIM modelling needs, Energy modelling, etc.

Our needs

- Technology Transfer Expertise
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

DTwin PaaS/SaaS is an integrated platform for optimization of buildings' O&M including energy efficiency and sustainability. It depends on the installation of appropriate infrastructure for real-time and remote monitoring, metering and control. The key stakeholders are either energy suppliers, service companies or aggregators that aim to offer this service as a bundle to their portfolio of customers, or building managers and prosumers that want to optimally manage their assets directly.

PVSITES

Roofing tiles with CIGS solar module

With the latest trends and regulations about energy efficiency in buildings, the architects designing job has become more complicated and they need to provide solutions that not only consider the aesthetics and costs, which remains very important aspects, but also the electrical and thermal performance of the building. In doing so, new materials such as BIPV modules must help them in achieving the following goals.

Our result

Result type	Scientific or Technological R&D Result including ICT Hardware
Business Sector(s) / EC Policy Areas	• Energy • Enviroment • Climate action
Result description	• Lightweight, thin • Design flexibility (size, backsheet material, curvature) • Advantages of CIGS technology (better energy yield in low light, unbreakable film) • Aesthetically pleasing, uniform black panels • Unique integration possibilities – directly laminate on building elements instead of attachment
Result Maturity	●●●●●●○○○○ Demonstration - System Launch and Operations (TRL 8-9)

Product positionning

Unique Value Proposition

The CIGS portfolio developed in the PVSITES project offer a high efficiency, flexible, lightweight solutions that can be integrated into residential, commercial and industrial buildings.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Currently at TRL8 - Envisioned product sales through own network and sales capacity..

Our needs

- Business partners
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

Large obstacle: certification of BIPV building elements in different countries, which may make the time to market far too long.

Owner for exploitation & results contributor

ONYX SOLAR

Contact

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PVSITES

Glass-glass products with back contact cells and glazed products with hidden busbars

With the latest trends and regulations about energy efficiency in buildings, the architects designing job has become more complicated and they need to provide solutions that not only consider the aesthetics and costs, which remains very important aspects, but also the electrical and thermal performance of the building. In doing so, new materials such as BIPV modules must help them in achieving the following goals.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Energy
- Environment
- Climate action

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

The glass/glass modules with back contact cells and the glazed products with hidden bus bar are developed to address two of the main needs in the BIPV market, the efficiency and the aesthetics. The back-contact solar cells offer efficiencies as high as 22%, and thereby, efficiency per module can be 160W/m2 (16%) even at cells densities offering 35% of light transmission. For improving the aesthetics fully opaque glazing/ glazing BIPV units with hidden busbars implementing black conductive ribbons are developed.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

These panels are already commercially available.

Our needs

- Business partners
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

Large obstacle: certification of BIPV building elements in different countries, which may make the time to market far too long.

CHESS-SETUP

Combined HEat SyStem by using Solar Energy and heaT pUmPs
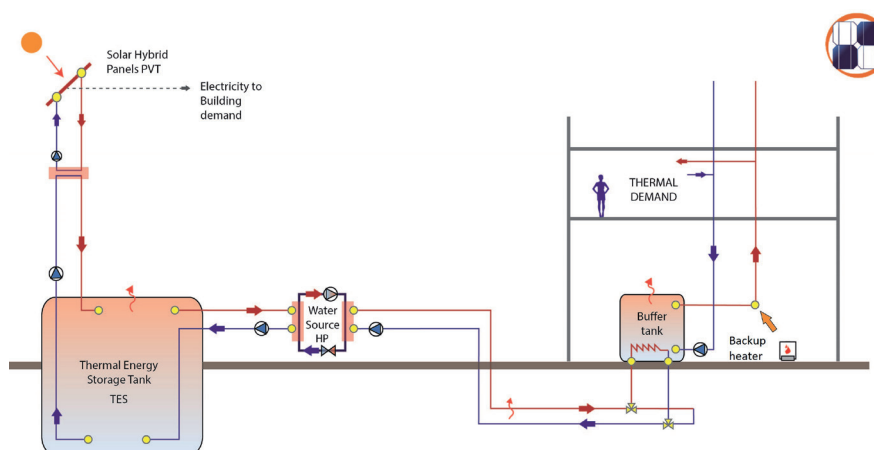
A reliable and efficient seasonal energy storage system able to supply heating and DHW in buildings mainly from renewable energy sources, increasing the self-sufficiency of the building and reducing its emissions. The optimal combination of the three different elements (energy production, storage and a highly efficient heat pump) in a single system managed by an intelligent monitoring and control system, is a novel solution with a clear focus on energy efficiency and CO_2 reduction.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

- Hybrid solar panels
- Energy savings
- Energy efficient buildings

Business Sector(s) / EC Policy Areas

Result description

Technical solution that can be implemented into the wider market benefiting from the project results: a reliable and efficient seasonal energy storage system able to supply heating and domestic hot water in buildings mainly from renewable energy sources, increasing the self-sufficiency of the building and reducing its emissions.
The optimal combination of the three different elements of mature technologies (energy production, storage and a highly efficient heat pump) in a single system managed by an intelligent monitoring and control system, is a novel solution with a clear focus on energy efficiency and CO_2 reduction.

Result Maturity

●●●●●○○○○ Market deployment

Product positionning

Unique Value Proposition

CHESS SETUP system supply heat and hot water to new and existing buildings mainly from renewable sources, offering an innovative solution in the upcoming energy services market. The system enables users to benefit from a heating and DHW system in an efficient way with savings in energy consumption (kWh / year), economic operating savings (€ / year) and has reduced CO_2 emissions (tCO2 / year).

Target audience

- Public or private funding institutions
- Other Actors who can help us fulfil our market potential
- Private investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Identification of business opportunities in the area of the heat integration systems for new and existing buildings. Possible early adopters: public administrations, industries and services companies with sustainability policies would be the primary customers in a first phase as they should lead the deployment of the CHESS SETUP system in their buildings (news and renovated) in order to open the path to the further implementation of this solution in every customer segment.

Our needs

- Business partners - SMEs, Entrepreuners, Large Corporations
- Legal / IPR advise
- Expanding to more markets / finding new customers

We specifically need

The use model of CHESS SETUP is to provide consulting services by hiring experienced and qualified people (company members of the same consortium partners) and having them assigned on client's projects, following the consulting business model. The consulting company could require the active participation of different companies like the following:

- Providers (solar panels, heat pumps, thermal energy storage, accessories)
- Installers
- Other third parties interested in exploitation

Owner for exploitation
& results contributor
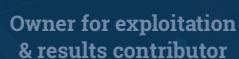
HYPERTECH

Contact

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DRIMPAC
Customer Energy Manager (CEM)

Customer Energy Manager is an integrated cloud-based platform that operates as an energy management system for residential buildings and small prosumers while supporting their participation in future demand response services. It is capable to perform data collection per building, activate the proper control actions to the building assets according to the context of the received demand response messages and support add-on software modules.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and innovation

Result description

The purpose of the Customer Energy Management System is to provide a framework of price-based, grid-friendly, human centric Demand Response optimization engines. These data-driven optimization engines rely on data collected directly from the buildings through an IoT-based monitoring and control system. CEM will receive DR signals from the market actor and decompose the requests into device control actions for flexibility dispatching while maintaining occupant comfort. In addition, CEM will optimize building energy costs according to dynamic tariffs offered to the end-users and leverage local generation and storage capabilities in order to amplify self-consumption and increase their savings. Finally, CEM demands the coexistence of several software technologies for data transfer and storage and for the execution of the optimization and machine learning algorithms. During DRIMPAC demonstration and evaluation activities more than 500 DR signals were executed by CEM within the pilot sites resulting in flexibility dispatching mainly from heating & cooling systems.

Result Maturity

●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

DRIMPAC CEM offers to the energy prosumers a cost-efficient solution for participating in demand respose programs, while providing several monitoring and control options over their building assets. The system will execute load dispatching according to the demand flexibility calculations in a way that will not violate occupants' comfort. In addition, end-users will be able to monitor their power consumption and indoor ambient conditions while remotely controling their building assets (i.e. HVAC systems, lights, DHWs).

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

DRIMPAC CEM is being developed for the past 3 years. At this time, the solution is mature enough to be deployed at a wide scale level for demonstration and evaluation purposes. It is envisaged that another 2 or 3 years of further research and development will be enough for ultimately offering this product (service) to the market actors and keep up with the regulations and policies of EU energy markets.

Our needs

- Technology Transfer Expertise
- Expanding to more markets /finding new customers
- Venture Capital

We specifically need

Customer Energy Manager is a cloud-based platform that performs optimization strategies over power-consuming building assets (i.e. HVAC systems) for price-based and human-centric flexibility extraction. It depends on the installation of proper equipment for real-time monitoring, metering and remote control inside each building. The key stakeholders for the CEM are the aggregators that opt to benefit from the untapped flexibility offered by small prosumers by engaging them to explicit Demand Response programs and the energy retailers and ESCOs that aim to offer this service as a bundle to their portfolio of customers, or building managers and prosumers that want to participate in implicit Demand Response programs. The needs are primarily focused on the development of a business plan for offering this service to diverse EU energy markets.
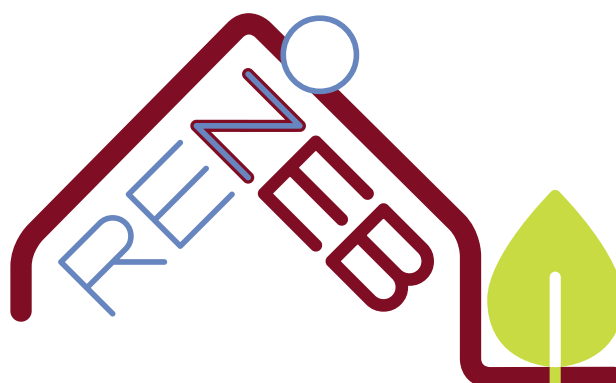
**Owner for exploitation
& results contributor**

HIT

Contact

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RenoZEB
Real time building performance monitoring and assessment module

A web-based visualization app appropriately designed for occupant, building/ facility managers, architercts, building owners for building's energy performance evaluation and automated controls for energy performance optimization. The Collaborative Platform could be used for the management of all the retrofitting steps (Design, Plan, Manifacturing) by all the retrofitting

Our result

Result type	Scientific or Technological R&D Result including ICT Hardware
Business Sector(s) / EC Policy Areas	• Consumers • Energy • Research and innovation
Result description	The RenoZEB Platform is a Common Data Environment (CDE) where different actors and software tools can work together in a renovation project, sharing the data and the BIM models, centralizing the files, assigning tasks and issues. It provides tailored functionalities for building renovation decision-making, e.g. setting targets and KPI objectives and scoring different renovation scenarios according to this. An Open API is provided for 3rd party tools connection (such as CYPE) for importing KPI results which cannot be directly calculated in the platform. Additionally, it is possible to visually query/filter IFC models and generate colored views according to user-defined criteria and supports BIM/GIS integration (Cesium viewer).
Result Maturity	●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

Deployment of a building energy management front end solution with automated human-centric control scenarios and visualization of building performance assessment based on different KPIs derived from normalized sensing data.

- Other Actors who can help us fullfill our market potential
- Private investor

Target audience

We have 6-30 CUSTOMERS from various different backgrounds such as Individuals and from various BUSINESS SECTORS such as Consumers.

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The solution has been in development for the past 3 years. At this time, the solution is mature enough to be deployed at a wide scale level for demonstration and evaluation purposes. Improvement could be done in terms of portable devices included into the experiment.

Our needs

- Technology Transfer Expertise
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

Building deep retrofitting stakeholders involved into the retrofitting process

Readiness to adapt in response to the situation of the energy grid

Owner for exploitation

REENGEN ENERJI
TEKNOLOJILERI ANONIM
SIRKETI

Results contributors

CENTRO DE ESTUDIOS DE
MATERIALES Y CONTROL
DE OBRA SA
INNOVATIONS FOR
HIGH PERFORMANCE
MICROELECTRONICS
OSRODEK
PRZETWARZANIA
INFORMACJI
PANSTWOWY INSTYTUT
BADAWCZY
UNIVERSIDAD DE
MALAGA
SOFTWARE FOR CRITICAL
SYSTEMS S.L.
REENGEN ENERJI
TEKNOLOJILERI ANONIM
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MAGNUMCAP

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ebalance-plus
Energy Mobile App
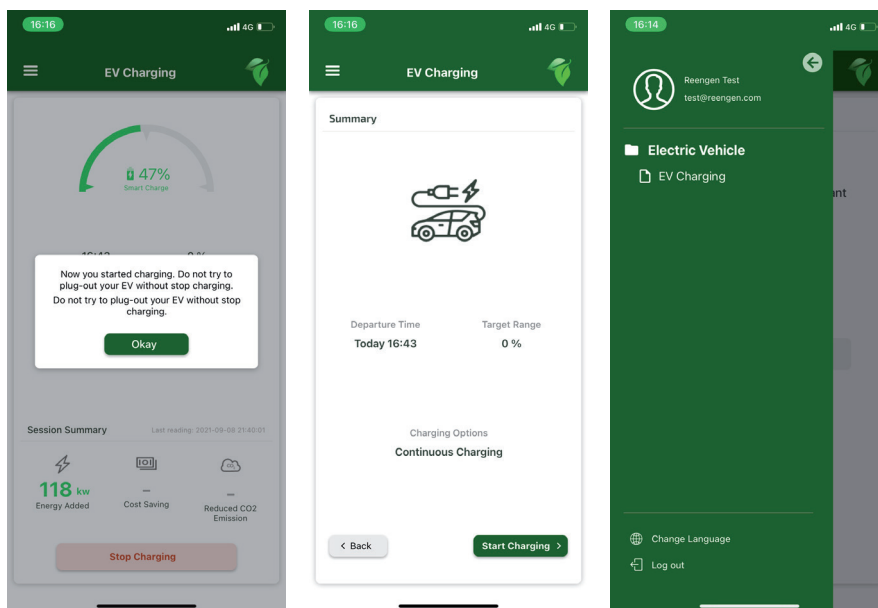
The Energy Mobility app is a mobile application developed to allow residential electricity consumers and electric vehicle users to track and manage their energy sources. Through the mobile application, users are able to manage their flexible loads such as electric heating systems and electric vehicles (EVs) in an incentivized, demand-response manner based on grid dynamics. This allows users to not only participate in flexibility applications, but also to reduce their bills and increase their comfort levels.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

The Energy Mobility app allows users to track their energy usage and gain insights on energy efficiency. They can also learn about flexibility options and manage their flexible energy loads in a demand-response manner through the mobile app, in order to control comfort conditions (such as adjusting thermostat settings). The app also enables smart charging for electric vehicles, allowing users to take advantage of lower pricing through applications like V2G and reduce their carbon emissions.

Result Maturity

●●●●●●○○○   Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

The Energy Mobility app, developed as part of the e balanceplus project, offers users engagement tools and smart charging and flexible appliance solutions as part of the project's solutions. Users can experience and participate in advanced applications like bidirectional charging through the mobile app.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Our solution includes multiple services and products. As a result of the project, reengen now has its own mobile app. In the short term, the app will also be made available to customers using the reengen energy management web solution. In the medium term (2 years), the smart charging application will be offered to charging operators in the TR and EMEA regions..

Our needs

- Dissemination & Exploitation Plan
- Expanding to global markets /finding new customers

We specifically need

The ebalance+ mobile app is a platform that provide control capability on distributed energy sources, monitoring existing energy sources and runs specific algorithms for data analysis and bundle up all these features within a single application. Our app specifically targets energy end-users (prosumers), exploitation managers of Distributed Energy Resources (DER) and energy operators (e.g. energy aggregators and DSOs).

Owner for exploitation

AMPERE POWER ENERGY SL

Results contributors

AMPERE POWER ENERGY SL

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ebalance-plus
Smart Energy Storage System
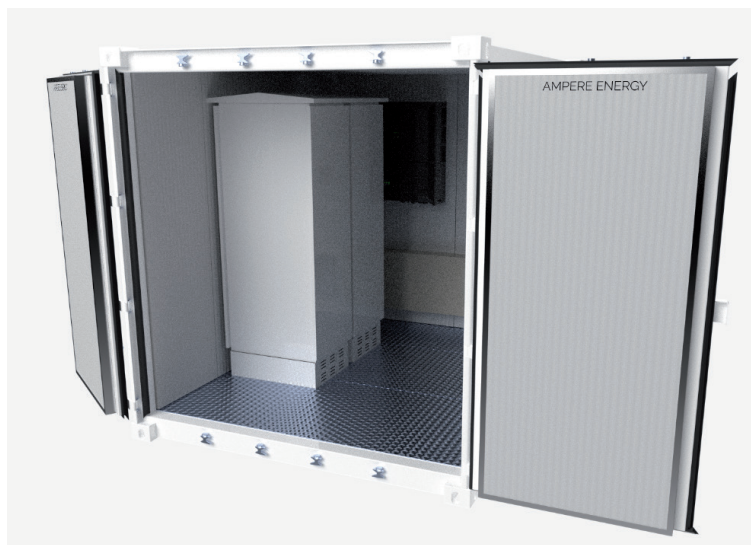
Hardware, intelligent energy management and tracking software - all in one package. Ampere´s flexible user interface and algorithms support a range of functionalities which allows our energy storage system to be used for various applications, including but not limited to:

- as a cost-saving tool for large consumers
- in generation + storage applications
- as a ready-to-go part of an energy community
- as a power back-up
- as a remotely controlled part of third party projects

This last functionality is based on trivial to use control through API requests and was tested both for eBalance+ project and beyond. All system parameters can be tracked and configured via Ampere´s portal, API or simply through a free-to-download app.

(The system itself can range from 60kWh to 240kWh and from 50kW to 100kW)

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Consumers
- Digital economy and society
- Energy

Result description

Ampere has developed a flexible smart battery storage solution that supports a great variety of use cases. Thanks to its state of the art Energy Management System, it learns and estimates the consumption and generation patterns and uses these estimations to optimally plan charge and discharge through the day in order to get the most economic savings and self-consumption to the prosumer. It can also peak-shave, act as a reliable back-up or even follow commands sent to it by authorised parties. This last functionality renders the device easy to integrate into any third party software, as being demonstrated in the ebalance-plus project.

Result Maturity

●●●●●○○○ Market Deployment

Product positionning

Unique Value Proposition

We have managed to create a true plug-n-play battery system. To our knowledge there is no other system that is just as ready to be deployed at the premises of a large consumer for their energy cost reduction as it is to be integrated into a VPP or an energy community. Providing additional power to EV charging parks? Covered. Back-up? Covered! Our biggest strength is the wide range of use cases our one-of-a-kind battery control can offer.

Target audience

- Public or private funding institutions
- Other Actors who can help us fulfil our market potential
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The solution has matured and is ready to be deployed in a wide range of projects that require energy storage - large consumer energy cost reduction, integration into VPPs or energy communities, providing additional power to EV charging parks, etc. We are hence seeking for business partners interested in developing such projects - both pilots and on the commercial scale.

Our needs

- Business partners - SMEs, Entrepreneurs, Large Corporations
- Expanding to more markets /finding new customers
- Venture Capital

We specifically need

Business partners in deploying energy storage solutions, especially in the field of energy communities.

Smart2B

Holistic solution enhancing the smartness of existing buildings through coordinated control of legacy equipment and smart appliances

Smart2B solution will create a smart building system, consisting of the Smart2B devices, platform and services, that places citizens, building users and CECs at the heart of the building energy transition, by enabling smart buildings to interact with their occupants and the grid in real-time to untap energy efficiency and local flexibility. This approach will transform the existing building stock into interconnected active elements of the energy system by upgrading existing building equipments, individual buildings and entire building blocks to higher smartness levels.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

Smart2B solution relies on 4 main pillars:
1) Devices & building interfaces: Allow for seamless connection of complex and heterogeneous building energy systems comprising not-yet-connected devices, smart appliances and upgraded legacy appliances as well as IoT interfaces and gateways.
2) Platform & APIs: A community-enabled smart readiness platform that serves as the middle layer of the Smart2B system that enables seamless integration, knowledge extraction and control.
3) Management & transversal services: AI and machine learning algorithms are used to analyse and prepare the building and user data collected from the Smart2B devices, consolidating and optimizing the various Smart2B objectives through newly developed, modular APIs
4) User interaction, client engagement & social innovation: Involves and engages the multiple stakeholders (occupants, building managers, communities, system operators) through mobile apps and web-based applications as well as gamification.

Result Maturity

●●●●●○○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

We propose to foster the creation and growth of citizen energy communities (CECs) that encourage and allow a diverse demographic of citizens (i.e. vulnerable communities) to collectively invest in energy and technological innovations at the building-level, deploying community-enabled smartness upgrades. At the same time, business models involving ESCOs are viable with the Smart2B technology.

Target audience

- Public or private funding institutions
- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

We are now in the process of integrating the key components of the system architecture (next 12-18 months) to pave the way to the execution of the field tests with real users

Our needs

- Use of research Infrastructure
- Collaboration

We specifically need

We plan to involve additional potential end-users and customer in the validation of the platform. To this end, we are looking to partner with:
-Energy Service Companies
-Energy Communities
-Investors operating in energy efficiency projects

TRI-HP
Advanced Energy Management Control (AEMC)
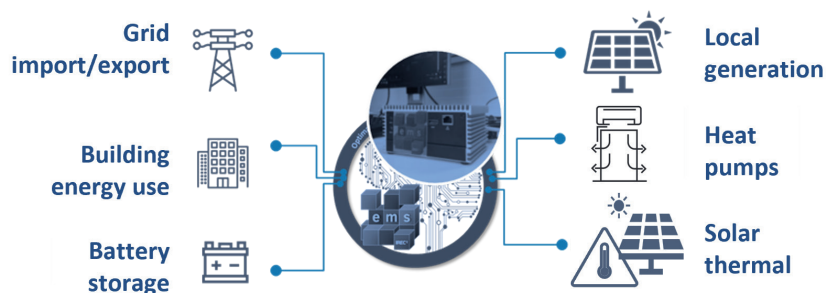
The TRI-HP Advanced Energy Managment Control is a software module connected to an existing energy management product designed by IREC. This registered product ensures that the heating (& cooling) systems developed within TRI-HP work at optimal efficiency to minimize energy costs, consumption peaks and emissions, all autonomously and automatically. These innovative software modules keep track of forecasts and real-time price dynamics. The AEMC has been designed alongside the two trigeneration systems developed within TRI-HP, which are heat pumps based on natural refrigerants coupled with photovoltaics to provide heating, cooling and electricity to new and refurbished multi-family residential buildings.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Climate action
- Energy
- Research and Innovation

Result description

TRI-HP systems includes advanced controls that manage electricity, heat and cold with optimal efficiency. This AEMC is based on the development of a model predictive control that can lead to 15-20% energy savings when the heat pumps are integrated into a smart grid. The advanced energy management is able to reduce the operational costs because it has two main features:
-Access to forecasts of different variables in the near future, like weather or electricity prices
-It can have access to thermal and electrical devices, which enables it to test different behaviors of the heat pump systems by taking the forecast into consideration and choose the optimal behavior.
The AEMC makes smarter and more informed decisions than a standard control, which leads to reducing the energy costs by up to 15% and increasing the share of renewables up to 80%, depending on the season.

Result Maturity

●●●●●●○○○ R&D Technology Development (TRL3-5)

Product positionning

Unique Value Proposition

The AEMC allows heating and cooling systems to perform at optimal efficiency by making use of dynamic price signalling and keeping track of weather and occupancy forecasts with a 24 hours horizon. This allows to manage the energy flows through real-time optimisation and reduce energy costs up to 20%. The AEMC has been successfully validated on the TRI-HP systems, which includes heat pumps, solar PV and ice-slurry storage. In a next step it will be tested in other systems and incooperate other components such as EVs.

Target audience

- Public or private funding institutions
- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Within TRI-HP we have successfully validated the AEMC in combination with heat pumps based on natural refrigerant using a concise cycle test. We have proof of the increased efficiency and the reduction of cost and environmental impact. The test conducted was a necessary step before bringing the technology to a real building for demonstration.

Our needs

- Demonstration in real buildings.
- Testing on different heating & cooling systems.

We specifically need

AEMC will contribute to make smart-buildings an active player in the new distributed energy resources framework, as it brings together both electrical and thermal energy management (including management of heat pumps, heat exchangers, thermal devices for heating water, etc.) allowing optimal operation of the system, lowering energy costs and energy consumption peaks, etc. Resources are needed to bridge the investment needed to increase TRL and ensure uptake of the results. Further development required for instance through new public funded research projects.
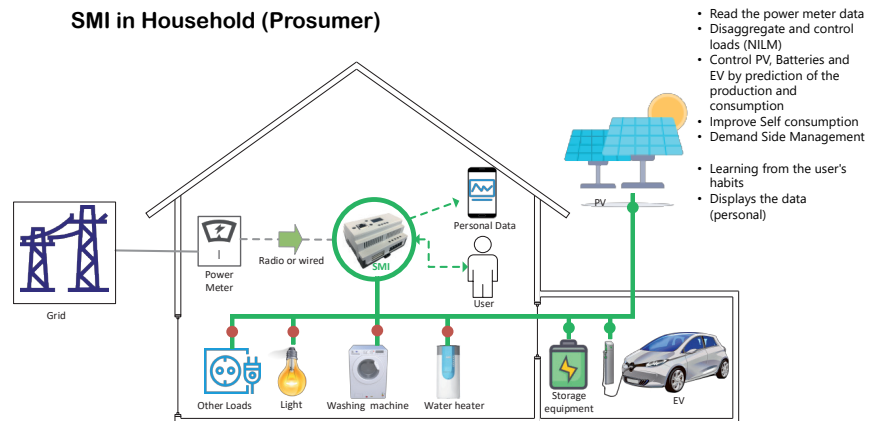
Owner for exploitation & results contributor

UNIVERSITÉ DE HAUTE-ALSACE

Contact

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SMI (Smart Meter Inclusif)

Artificial intelligence to support the proactive management of energy consumption by end users

SMI in Household (Prosumer)

- Read the power meter data
- Disaggregate and control loads (NILM)
- Control PV, Batteries and EV by prediction of the production and consumption
- Improve Self consumption
- Demand Side Management

- Learning from the user's habits
- Displays the data (personal)

The Smart Meter Inclusif project is part of a perspective linking artificial intelligence and micro-societal analysis.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and innovation

Result description

Mapping smart meters and their types in order to have a clear and precise understanding of the existing potential in the Upper Rhine.
Undertake a general public survey to understand what are the barriers for smart meter deployment, how they are being accepted in society and what main features are required for an AI-enabled meter.
Design a new AI-enabled and secure smart meter that will enhance our understanding of how energy consumers in Upper Rhein consume energy and empower these consumers to take action to reduce energy costs and emissions.
Improve the security level of the smart meter.
Modification and harmonization of the current legal framework for smart meters for a compatible cross-sectoral legal framework.
The elaboration of a white paper in 3 languages (French, German and English) about Smart Meters, showing beyond the state of the art also the prospects for future development.

Result Maturity

●●●●●●○○○○   R&D Technology Development (TRL 3-5)

Product positionning

Unique Value Proposition

One of the objectives of the project is to design a new intelligent tool that is more efficient, safe and better accepted by consumers. Thus, users of this intelligent tool will be able to collect and predict the consumption of their electrical appliances. At the same time, the consumption information is anonymized before being relayed to the energy supplier.

Target audience

- Public or private funding institutions
- Other Actors who can help us fullfill our market potential
- Academia/Universities

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The 3rd version of the SMI device is developed. It's tested in the Lab.

Our needs

- Grants and Subsidies
- Technology Transfer Expertise
- Collaboration

We specifically need

The SMI device needs to be tested in real building infrastructures in order to improve the learning AI algorithm.

HYBUILD

Smart Building Energy Management System (Smart BEMS)
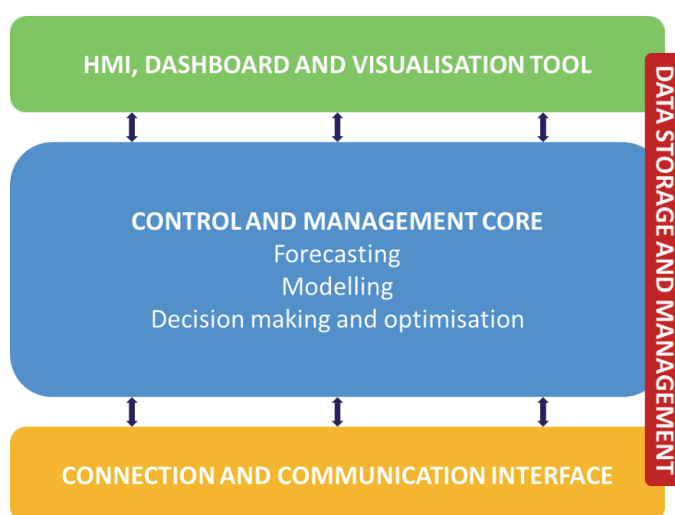
The Smart Building Energy Management System (Smart BEMS) is developed to control a hybrid (electrical and thermal) storage system for residential buildings. It enables to: 1) define goals, requirements, and constraints for the optimisation of the residential building in different climate areas; 2) select and, if necessary, adapt proper algorithms for the identification of the optimised configurations that the low (device) level control will translate in commands including the hybrid storage; 3) integrate the system with a simulated high-level representation of a possible aggregator or energy retailer by developing a DR component (customised openADR client).

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Digital economy and society
- Energy
- Research and Innovation

Result description

The Smart BEMS developed by ENG is innovative because it addresses the energy management problem as an optimisation one (e.g. performed by genetic algorithms, such as NSGA-II) with the definition of tailored objective functions and constraints not commonly used in all commercial BEMS. This solution is particularly suitable in the BEMS domain, which is multi-carrier by definition, and in the HYBUILD project since it expects the usage of a hybrid storage.

Result Maturity

●●●●●○○○○ R&D Technology Demonstration (TRL 5-6)

Product positionning

Unique Value Proposition

The Smart BEMS implements a unique combination between the optimization techniques (coming from academia) and the experimental tools from ENG, which may be provided as software suites developed for the Energy & Utilities sector and public authorities.

Target audience

- Other actions who can help us fulfill our market potential
- Research and Technology Organisations

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Smart BEMS has been tested at the three demo sites of the HYBUILD project: the system is comprensively described in its public deliverable D4.3 (HYBUILD optimised building management system). This project was a first opportunity for ENGINEERING R&D labs to explore the 'buildings' sector. Further R&D collaboration after the end of HYBUILD is looked after.

Our needs

- Expanding to more markets/finding new customers
- Collaboration

We specifically need

The research on Smart BEMS conducted in HYBUILD is used by ENG business units, which include a specific division dedicated to the Energy & Utilities market. It is the largest and recognized Competence Center serving this market. ENG is looking at collaborating with public structures (building owners) for further experimentation of the system developed.

Data-management and other cross-cutting issues

BENEFFICE

Person-centered, incentivisation and engagement system for Energy Efficiency addressed to residential consumers
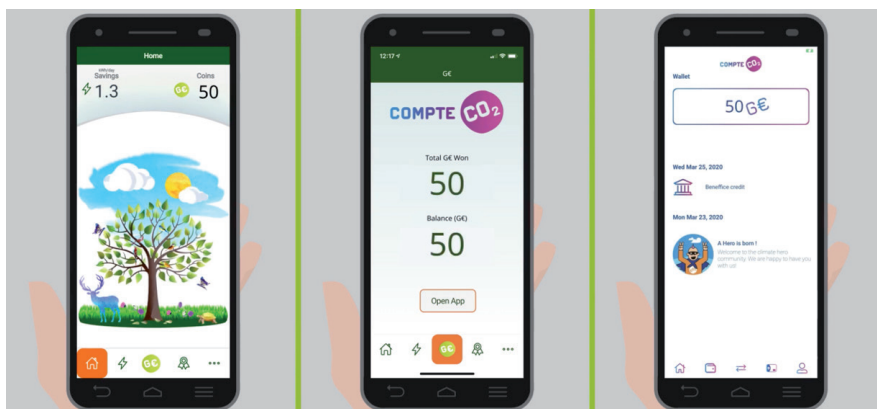
Hardware and software captures consumption, mobile app engages households and rewards achieved behaviours.

Our result

Result type

Software and hardware solution, including mobile apps.

Business Sector(s) / EC Policy Areas

- Energy Efficiency,
- Citizen engagement,
- Monetary policy

Result description

The BENEFFICE complete system (integrated solution) brings together various technologies to provide the "person-centered, incentivisation and engagement system for Energy Efficiency addressed to residential consumers". BENEFFICE ecosystem leverages on:
a. hardware devices and software to capture consumption data, energy disaggregation;
b. a mobile app: analysis and triggers to engage households in energy efficient behaviours;
c. a neobanking app: monetary rewards for achieved savings and desired behaviours therefore changing the landscape from top-down (policies with limited effect) to bottom-up initiatives (with potential for wide scale take-up).

Result Maturity

● ● ● ● ● ● ● ● ● ●   Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

- Affordable Energy Consumption monitoring at Home, in real time. Low installation costs and short payback period based on the energy bills savings
- Monetary rewards for desired behaviour and ACHIEVED savings
- Person-centered recommendations
- Shifting to a modern European Green Deal economy fuelled by Green Euros

Target audience

- EU and Member State Policy-makers
- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations

Contribution to Sustainable Development

UN Sustainable Development Goals

SUSTAINABLE DEVELOPMENT GOALS

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

BENEFFICE pilots involved 100 participants, in 4 countries: Austria, France, Greece, and Spain, for a period of 9 months, starting in August 2020, ending in April 2021. BENEFFICE hardware components are currently installed in 100 houses.

Our needs

- Expanding to more markets applications and wider adoption (B2C)

We specifically need

More testing and use cases:Households in Europe that wish to save Euros on their energy bill by adopting a more energy efficient behaviour.
Households in Europe that wish to live in a carbon-free economy with the Green-Euro
B2B: Utilities and Retailers who want to contribute to Green Deal by adopting Green Euro.

BEYOND
Big Data platform
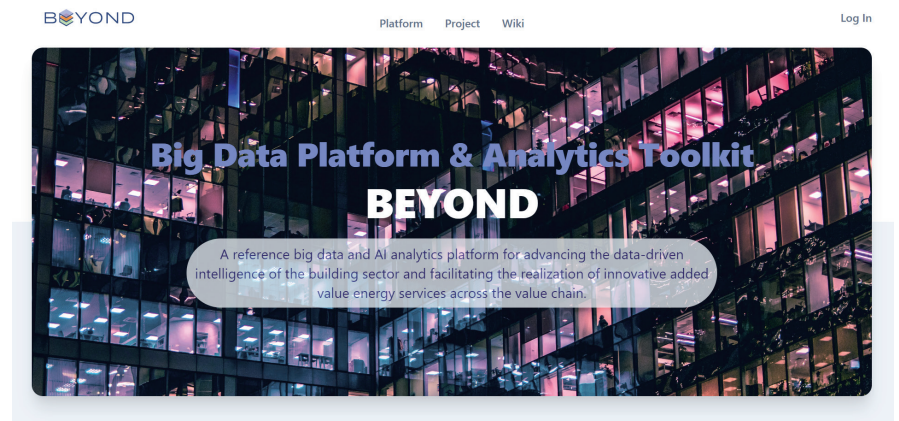
The BEYOND Big Data platform offers energy actors the data they need for optimizing buildings energy efficiency. The platform offers various services including data collection and exploration, data retrieval, creation of analytics workflows and data exchange through a dedicated marketplace.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

The BEYOND Big Data platform has been designed to utilize and exploit the data coming from smart buildings. Towards this scope, the following functionalities have been developed:

- Storage of data: Data assets providers can create, configure and execute a data check-in job so that it can be successfully stored in the platform.
- Data exploration: Users can search for a data asset of their interest residing in the platform and browse through/edit/delete it.
- Data retrieval: Users can retrieve in a configurable manner the data assets
- Data trade: Users can share or purchase other users' data assets, prepare the appropriate contracts and if needed negotiate on the contract's terms, and retrieve them based on the applicable terms.
- Data analytics: Users can design and execute data analytics functions to their owned data assets and receive the corresponding results.

Result Maturity

●●●●●●○○○○   System Prototype / Demonstration in operational environment

Product positionning

Unique Value Proposition

The BEYOND Big Data Platform allows users to search, find and utilize data generated by buildings. This data can be used for the design and implementation of solutions directed to optimization of buildings' energy performance and lower energy costs. Eventually, the platform can be used by all the energy actors to create new business models and services that can lead to financial benefits.

Target audience

- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Academia/Universities
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

At this time, the Big Data platform is being tested internally and externally with specific users and the based on the feedback and the validation, the second release of the platform will be available in the upcoming months.

Our needs

- Business Plan development
- Identification of investors and customers

We specifically need

Our needs comprise the utilization of the platform by specific actors, such as data providers data consumers, ESCOs, energy retailers, aggregators, Network operators and city authorities, who can benefit from the data sharing among different actors, analyze the different data assets and benefit in different levels.

BIMprove

Autonomous, robotic data capture request based on BIM, 4D BIM and BCF
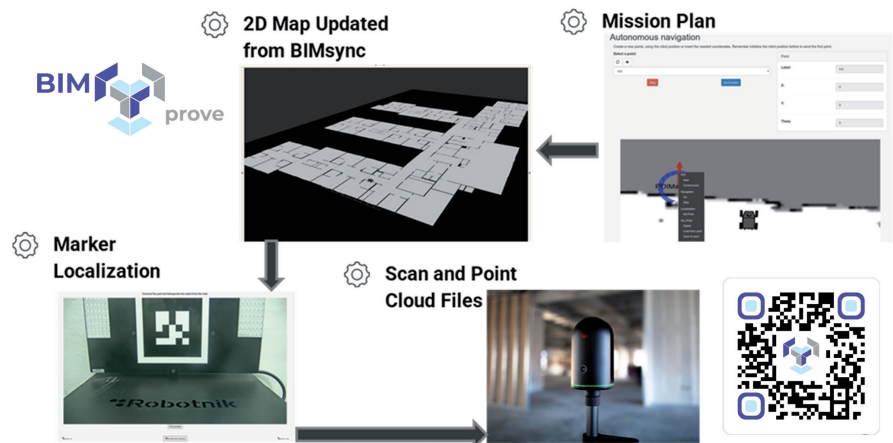
Documentation (both in picture and point-cloud), quality assurance, deviation detection cannot be done easier.
Create an IfcTask or BCF issue (BIM Collaboration Format) to execute an autonomous data capture:
1) store a rich pointcloud with 360 imaging on the spot
2) thermal or rgb detailed pictures of a specific point of interest
The operation can be scheduled so that 1) and/or 2) are recorded in some or every generated waypoint of the mission.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Research and innovation
- Business and industry
- Consumers

Result description

Data capturing autonomous mobile robot: The rover can navigate autonomously within a known map (where the map and the reference system comes from the existing as-planned BIM model)
Extendable mission planning tool. The robot HMI is able to schedule the mission and command the needed actions in different points of interest without further user involvement. It can also accept missions created through machine-readable code that could be automatically generated.
Robot- Sensor payload integration. The robot can trigger and offer data captured by mounted sensors, as well as provide different options from such sensors without the need of additional interfaces.

Result Maturity

●●●●●●○○○ Demonstration - System Development (TRL6-8)

Product positionning

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Unique Value Proposition

This innovation enables using BIM and 4D BIM to request data capture missions with support for progress monitoring, scheduling, safety and quality assurance based on BIM.

- Increased productivity: autonomous execution.
- Flexible and agile operation: robots will be used as a tool, to ensure progress and quality of the work that was executed.
- Improve worker safety: detection of safety hazards automatically.
- Provide better control of building constructions: immediate overview of tasks, scheduling and deviation detection.
- Easy-to-use: user interface developed together with industry actors.

Target audience

- Research and Technology Organisations
- Private Investors
- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

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UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

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Current stage description

In the current stage a prototype system is built up and validation of the system is carried out in 3 pilot sites (Norway, Switzerland, Spain).
Further validation and tests are needed to create a viable product (1-2 years).
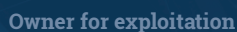The system test are executed as part of the BIMprove research project and will need futher funding for up-scaling.

Our needs

- Technology Transfer Expertise
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

Every construction site is different and such complex system must adapt to continous changes.
The more pilot sites the system is applied to/verified, the more robust system will be.
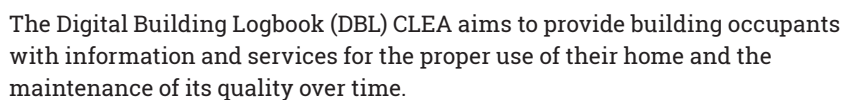We are looking at appropriate reference projects to showcase the added values.

Demo-BLOG
CLEA augmented Digital Building Logbook

The Digital Building Logbook (DBL) CLEA aims to provide building occupants with information and services for the proper use of their home and the maintenance of its quality over time.

- To individuals: CLEA offers information, advice and services to help you take charge of your home and ensure its proper use, as well as to assist you with your renovation projects.
- To professionals: CLEA is the digital solution that simplifies your life and improves your relationship with your customers. Set up at the start of the project, CLEA offers a digital repository for all project documents, a predefined and customizable equipment guide, a module for monitoring consumption and the possibility of publishing news throughout the project.

Thanks to a connection with the French National Database of Buildings (BDNB), CLEA is going to be augmented with a home renovation support functionality which will provide automatic renovation advice to users, with a strong focus on UX design and inclusivity.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Digital economy and society
- Energy

Result description

CLEA will be connected to the new BDNB - French National database of Buildings which aggregates data from the French cadastre, GIS data from IGN, as well as risk data for 21 million buildings. From the address of the building, it is possible to retrieve up to 260 datasets from the BDNB related to risks, energy performance certificates (managed by ADEME), and more parameters. This new connection will make it possible to improve several existing functionalities offered by CLEA (e.g. pre-filled content in the DBL that currently requires manual input, etc.).
This will enable the development and application of a renovation decision support tool within CLEA. It will provide tailor-made solutions using the building characteristics from BDNB and building owner/occupant input data. The financial and environmental benefits and the achieved energy performance certificate will be presented for these houses through CLEA. Together with the stakeholders and end-users, an interface and interactive prototype will be co-created and tested during in order to evaluate the UX (User eXperience).

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

CLEA, augmented with the renovation module, will help homeowners who want to comply with the French regulation (which makes DBL mandatory) and to upgrade the energy performance of their home, by providing them tailored renovation advice including various renovation scenarios, costs and benefits assessments, and a list of qualified building professionals they can refer to.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

CLEA currently offers basic and generic (non-tailored) advice to stimulate homeowners to refurbish their home. Within the DemoBLog project, an automated renovation advice with a strong focus on UX design and inclusivity (e.g. PDF export functionality of key content from the DBL for older persons) will be demonstrated by connecting to the upcoming French National Database of Buildings (BDNB).

Our needs

- Business partners - SMEs, Entrepreneurs, Large Corporations
- Expanding to more markets /finding new customers

We specifically need

We are looking for residential real-estate residential portfolio developers and managers who are interested to deploy and test our Digital Building Logbook solution and its new home renovation functionality, in order to help us make it more reliable, efficient and accurate.

FRESCO
IoT Management System for any energy asset

The Energy Box is the device between the sensors, actuators and the online infrastructure. It allows collection and aggregation of data streams and communication with sensors and smart ready devices through a range of communication protocols, aggregating and forwarding this information on via an internet connection. The reverse is also true for smart ready devices and actuators, the smart Energy Box can transfer online signals to act on a device.

Our result

Result type

ICT Hardware and Software solution

Business Sector(s) / EC Policy Areas

- Energy
- Consumers
- Research and Innovation

Result description

The Energy Box is a multi-use data gateway, reconfigurable and capable of using many different communication protocols to receive data from and to control various devices. It can act as the gateway for data flow and communication between the onsite devices such as sensors, smart equipment, actuators, and the cloud services provided by other analytic tools and data infrastructures. It can be used in many environments where monitoring and control are needed. The primary stakeholders can vary between Energy Service providers, such as ESCOs or Aggregators, as well as final energy consumers (households, commercial or even industrial buildings). The Energy Box provides a stable and economic solution for the continuous monitoring of energy consumption, production (in case of DERs) and control on the energy consuming equipment.

Result Maturity

● ● ● ● ● ○ ○ ○ ○   Demonstration - System Launch and Operations (TRL8-9)

Product positionning

Unique Value Proposition

Compact and silent equipment, for use in offices and living rooms. Services processed remotely and locally. Security and efficiency. Low power consumption, lightweight OS. Benefits include autonomous real-time management, protocol interoperability, adaptability to use cases, variety of physical comms interfaces (Ethernet, ZigBee, Wi-Fi).

Target audience

- Other Actors who can help us fulfil our market potential
- Research and Technology Organisations
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The Energy Box has been incrementally developed since 2015. It has already reached TRL 8 in various functional environments. Within the context of frESCO (Business models for ESCOs and Aggregators) it will be deployed in relevant applications and installations. The Energy Box is expected to be adjusted and calibrated for Service Providers as an integral part of their Business Models and provide a reliable market offer within the next 2 years.

Our needs

- Business plan development
- Expanding to more markets /finding new customers
- Collaboration

We specifically need

Specific needs revolve around finding the appropriate business partners or investors that will incorporate the Energy Box as a Business as usual component and thus facilitate mass production and market deployment (involving marketing and supply chains). The utilisation of the Energy Box in various applications can also enhance its own characteristics through further improvement. The Energy Box can also play a role in research as a reliable infrastructure.

Owner for exploitation

Wuppertal Institute,
Germany (Lead)
CRES, Greece
DENA, Germany
EAP, Bulgaria
EKODOMA, Latvia
ENERGIAKLUB, Hungary
EPC, Germany
FEDARENE, Belgium
ESCAN, Spain
CIT, Sweden

Results contributors

Wuppertal Institute,
Germany (Lead)
CRES, Greece
DENA, Germany
EAP, Bulgaria
EKODOMA, Latvia
ENERGIAKLUB, Hungary
EPC, Germany
FEDARENE, Belgium
ESCAN, Spain
CIT, Sweden

Contact

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Result type

Business Sector(s) / EC
Policy Areas

Result description

Result Maturity

QualDeEPC

Enhanced EPC scheme, recommendations and online tool for deep renovation, and deep renovation network platform

QualDeEPC has been working on EU-wide convergence of the assessment and the issuance, design, and the use of quality-enhanced energy performance certificates (EPCs) for buildings as well as their recommendations for renovation. The enhanced EPC and Deep renovation recommendations are enabling a specific focus on the potential of smart building technologies to improve the energy performance of buildings. During the project period, the project partners have been closely working the stakeholders to create consensus in their countries to implement, as many as possible, EPC enhancements and policy proposals by QualDeEPC. Beyond the partner countries, the results have been disseminated to a broad EU-wide stakeholders. Key stakeholders include EPC certification bodies, energy agencies, building sector and certification professionals, building owners, and other relevant organisations.

Our result

Policy related result

- Energy
- Better regulation

EPCs' enhancements proposed by QualDeEPC include:
• A toolbox to drive deep energy renovations: this includes an online tool to compare current EPC recommendations with deep energy renovation recommendations. QualDeEPC' improved recommendations demonstrated on average 50% more energy savings than current EPCs. The project also created Deep Renovation Network Platforms (DRNP): these are One-Stop Shops plus networking and joint communication of supply-side actors that facilitate deep energy renovations, such as financial institutions, energy assessors, building services and smart building consultants and technicians.
• Recommendations and policy proposals to improve user friendliness, usefulness and quality of EPCs, taking into account the full potential of smart buildings technologies to drive energy performance of buildings. This includes: an enhanced EPC template that aims to achieve high user-friendliness; guidelines for advertising EPCs during the sale and rental of buildings; EU level policy recommendations that can be considered in the revision of EPBD and national level policy recommendations; guidelines for regular mandatory EPC assessor training (on assessment and renovation recommendations) required for certification/accreditation and registry.

●●●●●●○○○ R&D Technology Development (TRL3-5)

Product positionning

Unique Value Proposition

Building owners' trust in the EPCs and their usefulness are enhanced through the measures to improve user friendliness, usefulness and quality of EPCs. Furthermore, the online tool and Deep Renovation Network Platforms (DRNP) provides them with sufficient information to plan and implement deep energy renovation. In addition, the enhanced EPC scheme and policy proposals facilitate the implementation of deep energy renovation by bridging the information gap between financial institutions, building owners, and consultants and technicians, while promoting the nearly-zero energy building stock targets by the policy makers.

Target audience

- EU and Member State Policy-makers
- Academia/Universities
- Public or private funding institutions

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

QualDeEPC project has already developed an enhanced EPC scheme and EPC template, a set of improved recommendations, an online tool and a Deep Renovation Network Platform (DRNP), guidelines for regular mandatory EPC assessor training and advertising guidelines for EPCs. Currently, national partners are working with relevant stakeholders to adapt these tools and proposals in their countries. EU-wide and national level policy recommendations are being disseminated by conducting national stakeholder workshops, and at other relevant events and platforms.

Our needs

- To raise awareness and possibly influence policy collaboration

We specifically need

We are interested to disseminate our project results to a wider EU audience beyond the project partner countries

BuiltHub
Buildings Information Platform
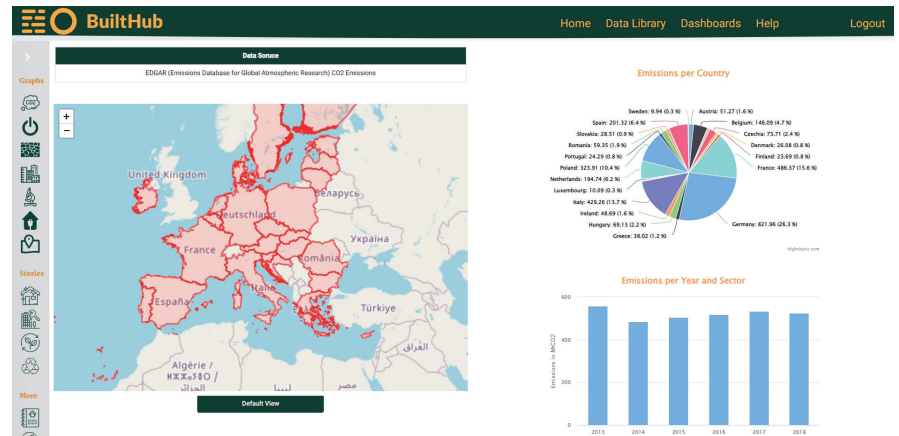
The BuiltHub Buildings Information Platform aims to serve as a web-based building stock data hub. It comprises a data repository and an information exchange platform that supports utilisation and update by an active network of users from all over Europe. These users – and their data – are driving the energy transition and building stock transformation forward.

The BuiltHub web-based platform has been built as a Cloud Native solution and uses a Graph Database, where the data model is based on multidimensional relationships among the different data entities. This facilitates the creation of a flexible schema and scalable data model. In addition, it allows the use of semantics, which facilitates the interoperability and understanding of datasets. These features enable the BuiltHub platform to be highly versatile and scalable, to collect a large number of heterogeneous datasets, and to be fully interoperable, therefore achieving its goal of making access to building-related information easier for all stakeholders.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Business and industry
- Climate & Environment
- Consumers

Result description

The BuiltHub Buildings Information Platform brings together three core elements:

- A flexible database infrastructure allowing import/storage of existing data and linking to external databases
- Analysis and other data-processing modules allowing a multitude of added-value services on the available data
- A client-centric system allowing provision of data and data services to BuiltHub's community of users

Result Maturity

●●●●●●○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

BuiltHub's platform aims to provide high-quality data, metadata, knowledge, and services about the European building stock. To achieve this goal, the BuiltHub project:

- Builds and engages a community for sustained data collection, exchanges, and data-to-knowledge processes
- Develops a roadmap for sustained dataflow to the Building Stock Observatory (BSO) supported by the BuiltHub community and the European Commission
- Collects and provides high-quality data and metadata to the BSO, closing current gaps
- Coordinates actions among related projects
- Standardises data governance and services

The first version of the platform has been available since September 2021

Target audience

- Public or private funding institutions
- EU and Member State Policy-makers
- Other Actors who can help us fullfill our market potential
- Research and Technology Organisations
- Academia / Universities

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Our needs

- EU and Member State policy-makers: raise awareness and possibly influence policy
- Public or private funding institutions: provision of grants and subsidies
- Other actors who can help us fulfil our market potential: expand to additional markets/find more customers
- Research and technology organisations: collaboration
- Academia/universities: collaboration

We specifically need

BuiltHub is interested in establishing data provision relationships with organisations from Europe and beyond who can contribute authoritative building information on specific fields.

In addition, given that BuiltHub's datasets, analysis and insights can support high level decision-taking and policy-making, BuiltHub is looking for additional funding to ensure the platform's long-term sustainable expansion.

Owner for exploitation
& results contributor
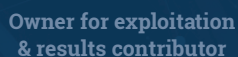
NOBATEK/INEF4

Contact

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HIT2GAP

BEMServer, The World's premier Open Source Building EnergyManagement Platform

BEMServer is an open source solution enabling building stakeholders to deploy a modular, scalable and secure Building Energy Management System by downloading the code directly or working with the BEMServer community.

BEMServer has an existing set of services via its modules and new modules can be developed by 3rd party developers anytime. For building owners and managers through BEMServer, building data gain meaning and empower building actors with new services to optimize energy consumption and comfort.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Energy
- Environment
- Research and Innovation

Result description

The emergence of the smart building concept transforms the needs expressed by building owners, managers and occupants. BEMServer is a solution to transform your monitored building into a platform of services.
In the essence, BEMServer is a building data aggregator and acts as a gateway between the hardware level of a building (sensors, BMS…) and the data-oriented services.
By design, BEMServer is modular and interoperable and includes:
-a connectivity module allowing agile data collection from the field level of a building (sensors infrastructure, Building Management System),
-a management middleware ensuring a coherent information platform by providing a semantic interoperability (through the use of formal ontologies) to unify and normalize the data between all the components of the platform,
-several advanced data processing modules based on data mining techniques and energy management approach to interpret data and identify issues or non-optimised functioning, and to deliver recommendations and decision support,
-information display modules targeting different typologies of end-users and needs and presenting key results in a user-friendly manner, tailored for these various audiences.

Result Maturity

●●●●●●○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

Target audience

End users: You are facility managers, building owners, energy managers, Energy efficiency consultants, or ESCos, you are direct end-users of the BEMServer solution. Install BEMServer to gather all your data in one central solution: BMS data, weather, occupants' feedbacks, building descriptive data, contextual data. Choose the right module that fits to your need to assist you in your daily job.

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

BEMServer has been deployed in four pilot sites for evaluation during the HIT2GAP project. BEMServer is currently being further improved and extended in the frame of new EU projects (extension to the residential buildings) and additional services and modules related with buildings energy performance and optimisation are curenlty being developed.

Our needs

- Business partners - SMEs, Entrepreneurs, Large corporations
- Expanding to more markets/finding new customers

We specifically need

The key stakeholders are either end-users (energy managers, facility managers, buildignowners), module developers (building monitoring data-based services developers) or contributors to the development of BEMServer.

Owners for exploitation

WATT AND VOLT ANONIMI
ETAIRIA EKMETALLEYSIS
ENALLAKTIKON MORFON
ENERGEIAS

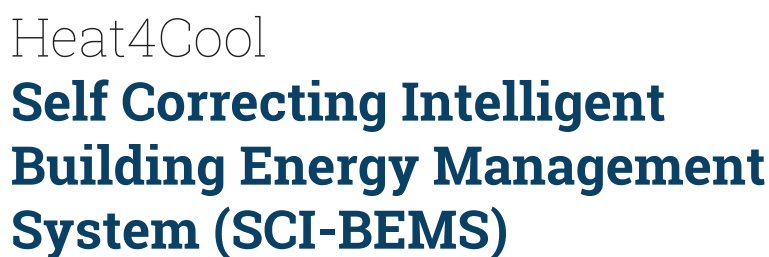**Results contributors**

FUNDACION TECNALIA
RESEARCH & INNOVATION

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Heat4Cool

Self Correcting Intelligent Building Energy Management System (SCI-BEMS)
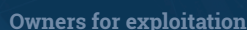
SCI-BEMS is an integrated energy management platform for monitoring and optimizing the operation of HVAC equipment at the building and apartment level. The envisioned end product allows profitable interaction between the energy systems balancing user comfort, energy efficiency and services to the grid.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and innovation

Result description

The SCI-BEMS concentrates on the needs of certain stakeholders, namely:
Energy service companies (ESCO) or aggregators, which provide a broad range of energy solutions to consumers and Facility Managers or dwelling occupants/end users, who are responsible for the operation of the HVAC systems within a facility.

The goal of this KER is to provide the above stakeholders a solution that combines:
1. An energy efficiency module that enables optimal handling of HVAC operation taking into account indoor and outdoor environmental conditions.
2. A cost efficiency framework, which will incorporate retail pricing information to the aforementioned energy efficiency schema.
3. A comfort preserving framework, which incorporates building occupants comfort/discomfort boundaries at the decision making process.

Result Maturity

●●●●●○○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

The SCI-BEMS platform aims to offer energy consumers with a smart, unobtrusive and cost efficient solution for monitoring of environmental and indoor conditions, realtime metering and HVAC automation services. The system balances user preferences with energy efficiency to reduce energy costs without impacting negatively on the occupants' comfort.

Target audience

- Other Actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The SCI-BEMS has been in development for the past 3 to 4 years. At this time, the solution is mature enough to be deployed at at a wide scale level for demonstration and evaluation purposes. It is envisaged that another 2 or 3 years of further research, along with the develoment of a suitable and flexible business plan capturing the varied needs of different EU markets, will be necessary before offering the product (services) to the market.

Our needs

- Technology Transfer Expertise
- Business plan development
- Expanding to more markets / finding new customers

We specifically need

SCI-BEMS is an integrated platform for optimization of HVAC systems. It depends on the installation of appropriate infrastructure for realtime and remote monitoring, metering and control. The key stakeholders are either energy suppliers, service companies or aggregators that aim to offer this service as a bundle to their portfolio of customers, or building managers and prosumers that want to optimally namage their resources directly. The needs are primarily focused on development of the suitable business plan for offering the service in the diverse EU markets.

Owners for exploitation & results contributors

FOCCHI
UNIVPM
FRAUNHOFER

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RenoZEB

RenoZEB modular "plug and play" system for nZEB integral renovation of buildings

Modular, easy and fast to install, standardized and pre manufactured components and solution for deep residential and non residential retrofitting. The units are highly customizable in terms of materials to be used, they are also sensorized to be able to communicate and actuate with the interior environment.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and innovation

Result description

1. Stand-alone module that operates the façade elements (rollers, shutter, blinds, window openings, …) to optimize the indoor comfort conditions according to the external environmental conditions and the use of the room.
2. Sensing solution to be embedded into the Facade for the real-time monitoring of the outdoor conditions.
3. The work done about the design adaption for the energy systems for their integration in the envelope will produce a knowledge useful for future works for the integration of renewable systems in facades.
4. Shading controller for the optimal management of incoming light and solar radiation through windows.

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

RenoZEB modular plug and play facade is easy to install and has standard measurement that could be used inside the European building park to be retrofitted and improve easily their energy efficiency. Components have been tested according to the EU standards to be used in different climates as well. There are several modules (opaque, window, PV systems, Thermal panel) that could be interchanged according to the needs.

Target audience

- Other Actors who can help us fullfill our market potential
- Private investor

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The solution has been in development for the past 3 years. At this time, the solution is mature enough to be deployed at a wide scale level for demonstration and evaluation purposes. Possible extended investigation could be needed to integrate more components and increase the catalogue of material / bio-materials to be used as well. Circularity should be also addressed.

Our needs

- Technology Transfer Expertise
- Business Plan development
- Expanding to more markets /finding new customers

We specifically need

Building deep retrofitting stakeholders involved in design and planning the working activities.

PHOENIX

Internet of Things Energy Platform for the intelligent supervision of energy use (IoTEnergySupervisor)

A unified and secure platform to easily connect any IoT sensor, to enable and manage various IoT streams (scalability aspects) and to easily manage, analyse, connect and reuse the data/ streams and resulting analytics in 3rd party applications for energy optimization.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and innovation

Result description

The solution concentrates on the creation of a comprehensive platform able to absorb data from a large number of devices of different types and smartness level. With this, it is possible to enhance or to generate the smartness of the buildings, and with it, make possible the intelligent management of energy use.
IoTEnergySupervisor modular IoT platform, offers an All-in-One solution for the ease of use with plug in functionalities and privacy mechanisms.
The goal of the KER is to offer a solution that provides:
1. A connection layer capable of integrating a variety of devices including legacy and smart devices.
2. An integration layer and an intelligence layer that valorise the data and make the necessary data processing for creating valuable knowledge.
3. A layer of services that allow to integrate high level functionalities that the different stakeholders will use for the better management of the energy use.

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

This is an Easy to use unified platform in which there is no need for experts to integrate IoT sensors and that allows to easily manage the data sources and streams. The platform is aligned with open standards and it has interoperability capabilities (open interfaces for external service and applications). It is customizable and offers a wide variety of energy and behavioural analytics, offering valuable insights for optimizing building energy performance.

Target audience

- Large telecommunication companies, Energy utilities, Home automation companies,

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

Prototype testing in the real world: Solution has been tested in its "final" version with a pilot/demonstration project in Entropy pilot sites, in real life conditions.

Our needs

- Funding providing stakeholders
- Strengthened links with policy makers and public institutions
- Business plan creation

We specifically need

The platform here presented needs to start penetrating on real market experiences under the supervision of the innovators. It needs to integrate a series of lessons learnt in the real market on the body of knowledge, and jump with them to the following versions. For this it will be necessary to involve the relevant stakeholders that can go from building managers to building households or aggregators. A market analysis will also help on steering the strengthening of certain facets of the solution to unsure that the position is strong for future deployments.

Partners we are looking for

- Large telecommunication companies
- Energy utilities
- Building services companies

4RinEU

4RinEU Strategy towards Deep Renovation

A set of 10 main results consisting of prefab technology solutions, optimization tools and practical strategies to encourage and drive deep renovation process while increasing smart readiness of existing buildings, fostering the use of renewable energies, transforming data into usable information and knowledge and providing reliable business models to support their applications.

Our result

Result type

Scientific or Technological R&D Result including ICT Hardware

Business Sector(s) / EC Policy Areas

- Consumers
- Energy
- Research and Innovation

Result description

The 4RinEU deep renovation strategy is based on 3 pillars:
- Technologies - driven by robustness - to decrease net primary energy use (60 to 70% compared to pre-renovation), allowing a reduction of life cycle costs over 30 years (15% compared to a typical renovation);
- Methodologies - driven by usability - to support the design and implementation of the technologies, encouraging all stakeholders' involvement and ensuring the reduction of the renovation time;
- Business models - driven by reliability - to enhance the level of confidence of deep renovation investors, increasing the EU building stock transformation rate.

https://4rineu.eu/media/

Result Maturity

●●●●●○○○○ Market Deployment

Product positionning

Unique Value Proposition

Provide a real, robust and comprehensive set of solutions to boost the deep renovation of large stocks of buildings, addressing the needs of all the stages of the refurbishment process, from the pre-design to the post occupancy monitoring.

Target audience

- Public or private funding institutions
- EU and Member State Policy-makers
- Private Investors

Contribution to Sustainable Development

UN Sustainable Development Goals

SUSTAINABLE DEVELOPMENT G⚙ALS

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The great part of the products developed are already on the market or are integrated in solutions available on the market.

Our needs

- To raise awareness and possibly influence policy
- Other type if Investment

We specifically need

The set of solutions is suitable for deep renovation interventions in buildings and building stocks owned by public or private organizations. They could be private owners, housing associations, public agencies for housing or managing public buildings stocks.

U-CERT

U-CERT Smart Readiness Indicator (SRI) digital tool
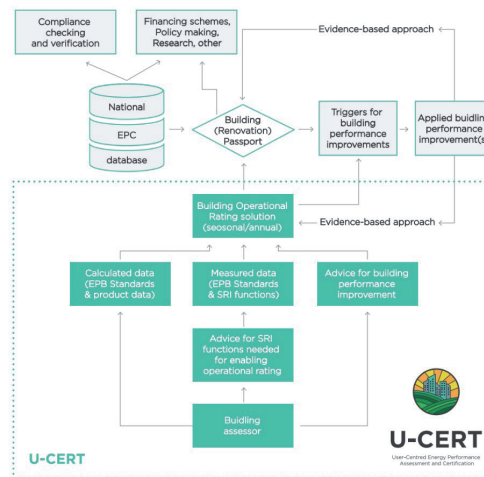
U-CERT SRI digital tool brings the latest version of the official SRI assessment spreadsheet in a cloud web environment (as component of the U-CERT digital toolset) improving the user experience both on the data input side (most notably the SRI assessor) and also on the results interactive visualization side (most notably the building performance improvement decision-makers). The main aim on one hand is to simplify and streamline the entire assessment process and on the other hand make salient the added value and benefits brought by smart building technology thus nudge towards the right decisions.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Climate action, Consumers, Energy, Digital economy and society, Environment, Public health, Research and innovation

Result description

The ultima added value of the U-CERT SRI digital tool would be its easy accessibility via any web browser and the visually stimulating support for raising awareness and understanding and for ensuring easy knowledge transfer from the SRI assessor to the SRI beneficiary leading to a well-informed and evidence based decision making process vis-a-vis building performance improvement actions. Which would be enhanced by the subscription based integrated service including training (and certification) process for SRI assessors via a Learning Management System and support, including technical for practical use.

All the SRI assessment data would be stored in a secure and GDPR compliant cloud repository with different data depth access rights (e.g. aggregated data <-> detailed SRI assessment data) depending on the user type. This would make possible the implementation of the «input data only once» principle and catalyze the integration of all building performance related instruments (Digital Building Logbooks, EPCertificates, Building Renovation Passports, Level(s) etc.) in one platform or hub making use of APIs if/as needed.

Result Maturity

●●●●●●○○○○ Demonstration - System Development (TRL 6-8)

Product positionning

Unique Value Proposition

The U-CERT SRI digital tool provides forward looking support to the ongoing and upcoming SRI activities at both EU and national levels across the value chain from policy making to research and standardisation and all the way to training and building performance assessment and management practices.

Target audience

- EU and Member State Policy-makers
- Public or private funding institutions
- Other Actors who can help us fulfill our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The U-CERT SRI digital tool is developed and tested leveraging the 16 case studies of U-CERT spread across 11 EU Member States.
It is available for use at https://sri.u-certproject.eu/

Our needs

- To raise awareness and possibly influence policy
- Grants and Subsidies
- Business partners
- Marketing Mentoring or Coaching
- Investor readiness training
- Investor introductions
- Business plan development
- Expanding to more markets/finding new customers

We specifically need

The U-CERT SRI digital tool is foreseen to be offered as a subscription based cloud service including training and support whilst the standalone tool would be public. A prospective customer is anyone who sees value in having alternative indicators for building performance assessment and management processes (EU Member State -> building professional). This is a tool to «open the eyes of the customers and the end-users» thus creating hands-on added value from the next generation (operational) EPCs because they recognize that this makes them more market competitive. The needs are primarily focused on development of the suitable business plan for offering the service in the diverse EU markets.

MATRYCS

Modular Big Data Applications for holistic energy services in buildings
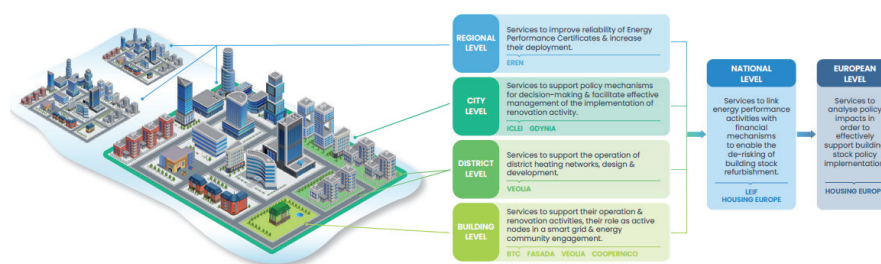
The MATRYCS Toolbox enables reliable and effective policymaking, as well as supports the creation and exploitation of innovative services through the utilisation of a wide variety of data, for the safe and effective operation of buildings. The MATRYCS Toolbox performs analytics such as statistical analysis, data visualisation, business intelligence and predictive modelling using AI-based ML and DL algorithms/models.

Our result

Result type

ICT Software Digital solution

Business Sector(s) / EC Policy Areas

- Climate Action
- Research and Innovation
- Energy

Result description

- MATRYCS is the first holistic marketplace for big data in the building sector. It supports AI-based cross-sector analytics for smart energy-efficient buildings, based on data information knowledge exchange under respective sovereignty and regulatory principles. Overall, the MATRYCS Toolbox consists of three main pillars: i) the MATRYCS-GOVERNANCE encompassing modules related to data collection, semantic annotation and distributed storage, ii) the MATRYCS-PROCESSING including ML and DL models and iii) the MATRYCS-ANALYTICS providing a set of analytical tools as a service.

Result Maturity

●●●●●○○○○ R&D Technology Demonstration

Product positionning

Unique Value Proposition

The MATRYCS Toolbox supports the business and operation of actors whose work pertains to the building energy value chain, as well as the development and testing of cutting-edge technologies. It is a holistic, state-of-the-art AI-powered framework for decision-support models, data analytics and visualisations for both Digital Building Twins and real-life application.

Target audience

- EU and Member State Policy-makers
- Research and Technology Organisations
- Other actors who can help us fulfil our market potential

Contribution to Sustainable Development

UN Sustainable Development Goals

The European Commission supports the Sustainable Development Goals

Go-to-market strategy and needs

Current stage description

The MATRYCS Toolbox has been in development since 2022 and has been partially available since July 2022. It is envisaged that throughout the next year, user feedback will guide the final developmental steps of the Toolbox. A flexible business plan that targets the building value chain will also be developed. Upon completion of these steps, the MATRYCS Toolbox will be publicly released.

Our needs

- Raise awareness and possibly influence policy
- Help technical expertise & collaboration
- Technology transfer, Business Plan development

We specifically need

MATRYCS aims to work with stakeholders across the buildings' value chain in order to increase the capacity of buildings to take on new innovations, and to better support the development and implementation of energy efficiency projects. Key stakeholders are those that can help MATRYCS fulfil its market potential, specifically those with technical expertise or knowledge of the buildings' value chain, as well as interest in collaboration. They include:
-Business partners - SMEs, Entrepreneurs and Large Corporations
-Industry Associations and Technology Clusters
-Buildings' value chain stakeholders

Funding Acknowledge-ment

The innovations presented in this brochure are the outcomes of projects that have received funding from the European Union's Horizon research and innovation programme. Their Grant Agreement numbers are summarised in the table below :

Project acronym	Grant Agreement number
4RinEU	723829
ASHVIN	958161
AutoDan	101000169
BENEFFICE	768774
BEYOND	957020
BIM-SPEED	820553
BIMPROVE	958450
BuiltHub	957026
CHESS-SETUP	680556
CULTURAL-E	870072
D^2EPC	892984
Demo-BLOG	101091749
DRIMPAC	768559
eBalancePlus	864283
FRESCO	101035029
Heat4Cool	723925
HIT2GAP	680708
Homes4Life	826295
HYBUILD	768824
MATRYCS	101000158
PHOENIX	893079
PLURAL	958218
PVSITES	691768
QualDeEPC	847100
RenoZEB	768718
Smart2B	101023666
SPHERE	820805
StepUp	847053
TRI-HP	814888
U-CERT	839937

About SB4EU

SmartBuilt4EU (SB4EU) is an EC-funded project that aims to support the innovation ecosystem in the smart building value chain through concrete networking and communication actions:

- Reference and promote the key innovators and innovations in the sector
- Propose collaborative work to identify barriers, opportunities and best practices for the take up of smart buildings
- Consolidate these findings into a Strategic Research & Innovation Agenda that will feed the design of future Horizon Europe calls on smart buildings
- Provide recommendations to policy makers
- Develop tools to support the deployment of the Smart Readiness Indicator, a common scheme for rating the smart readiness of buildings

Join the SB4EU Community and benefit from several advantages:

INCREASE THE VISIBILITY OF YOUR INNOVATION OR R&D PROJECT	**CONTRIBUTE** DEFINING THE FUTURE EC-FUNDING CALLS ON SMART BUILDINGS	**NETWORK** WITH STAKEHOLDERS FROM ALL OVER EUROPE

Project partners

The project is coordinated by ECTP, the European Construction, built environment and energy efficient building Technology Platform.
It brings together five partners and five linked third parties throughout Europe.

Notes

For more information about SmartBuilt4EU
Website : smartbuilt4eu.eu
Email: contact@smartbuilt4eu.eu