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SPEEDIER

SME Program for Energy Efficiency through Delivery and Implementation of EneRgy Audits

D4.2 FINAL ENERGY AUDITING TOOL FOR USE BY SPEEDIER EXPERTS

Lead Contractor: ITeC

Author(s): ITeC

Date: 30th September 2021

This document corresponds to D4.2 (M28) leaded by Institut de Tecnologia de la Construcció de Catalunya (ITeC). This document contains all relevant information of the tool developed that is able to identify opportunities for ECMs within SMEs to streamline the energy auditing process. It shows some of the key functionality and capabilities. This tool has been developed using previous information from SME characterization, SPEEDIER Experts will input information on the participating SME, and the tool will automatically suggest a number of suitable energy conservation measures (ECMs). The tool allows the SPEEDIER expert to use proficiency to include or exclude ECMs as appropriate and estimate the associated energy and cost savings.

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Document History

Date	Version	Name	Changes
17/09/2021	0.1	Diana Romeu	First document version.
17/09/2021	0.2	Licinio Alfaro	Internal review.
17/09/2021	0.3	Padraig Lyons	Review.
17/09/2021	0.4	Tom Flynn	Review and QA'd.
20/09/2021	0.5	Diana Romeu	Updates and final edits ready for closure.
30/09/2021	1.0	Padraig Lyons	Final review & submission.

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Abbreviations

Please include a table of all abbreviations used in the document, in alphabetical order:

BEDEC	ITeC database
ECM	Energy Conservation Measure
HVAC	Heating, ventilation, and air conditioning
ITeC	Institut de Tecnologia de la Construcció de Catalunya
SME	Small and Medium sized Enterprise

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Executive Summary

This report is a summary of the process we have followed in order to design and develop the SPEEDIER tool. This tool, which we have called SPEEDIER Energy Expert Support Tool, is an online tool that, through the characterization of SMEs and using the ITeC database, proposes Energy Conservation Measures (ECMs) and indicates their cost and economic return, also allows to monitor the application of the measures and finally, there is the Ranking to compare the projects with each other and see what measures are being applied and their results.

There are several tools on the market to carry out energy audits. The aim of this tool is not to create another tool with the same characteristics, but to create one that focuses on the measures to be applied and the monitoring that it is performed a posteriori of the application. The aim is to create a tool that is easy to use and attractive, so that SMEs understand the process and see clearly which ECMs and options they have and make a much smoother communication with SPEEDIER Expert.

Through this report we will first see the explanation of what the ITeC database is and what information it contains. Also, the premises that have been used to design the tool and the process it generates. Finally, the screenshot shows the final result of the tool.

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1 Introduction

This document addresses the SPEEDIER Energy Expert support tool for the SPEEDIER project. It was undertaken in line with the Grant agreement No. 847034 under the European Union's Horizon 2020 programme. It is not intended to be a detailed document, as the detail is contained on the tool itself and described in Section 4 of this deliverable.

1.1 Context of WP4

The objectives of WP4 are to:

- To build up a service of energy management for SMEs.
- To structure the content of the capacity building to be addressed to SMEs and experts (auditors, energy managers, etc.).
- Identification of the appropriate financing structure and contract with the specific cluster or SME.

1.2 Objective of Task 4.2

The main objective was to provide an advanced yet easy to use tool able to identify opportunities for ECMs within SMEs to streamline the energy auditing process. To avoid duplication of effort any existing tools were reviewed in Task 2.1 has been evaluated for their suitability for SPEEDIER by ITEC, LIT & IERC and the best solutions it was pretend to be further developed or modified to suit the SPEEDIER Service as required.

From the study of tools, which was done in WP2, that could be modified to include what SPEEDIER tool requirements, we did not find any that fit. It was decided to develop a specific tool, a new tool to incorporate the database of characteristics of non-cost, low, medium and high cost SMEs and ECMs, developed in WP3. The output is an online system where SPEEDIER Experts will input information on the participating SME, and the tool automatically suggest several suitable energy conservation measures (ECMs) in each cost category by accessing the database and selecting solutions that match the constraints set by the SPEEDIER Expert. The tool allows the SPEEDIER expert to use proficiency to include or exclude ECMs as appropriate and estimate the associated energy and cost savings.

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2 ITeC database (BEDEC)

2.1 Scope and contents

The ITeC database supplies technical, environmental, and economic information regarding all kind of elements used in every situation in the construction market.

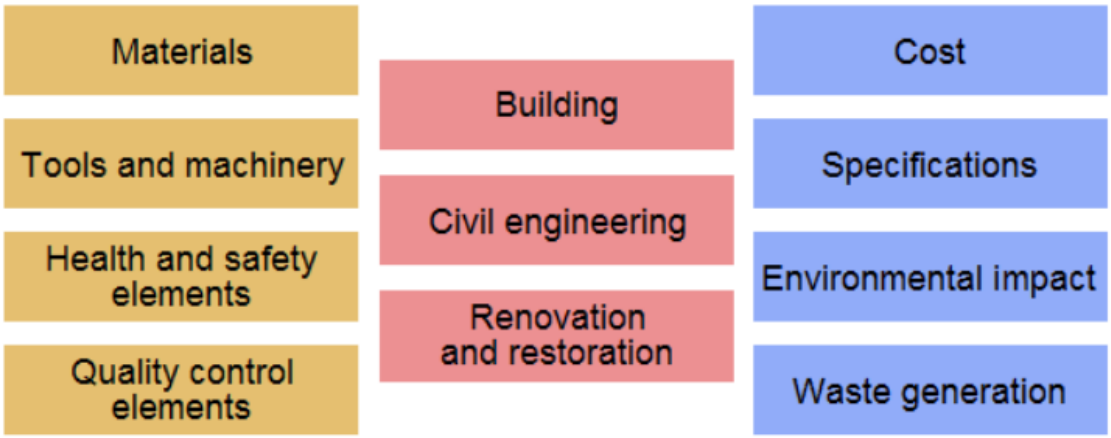

Figure 1 BEDEC's structure

2.2 Use of BEDEC in SPEEDIER Energy expert support tool

To create a specific data base for SPEEDIER, we have used BEDEC to associate with construction solutions (envelope and energy consuming elements), and ECM's that are used in the tool, to calculate energy and CO_2 savings, cost and economical return.

This BEDEC elements provide the energy and CO_2 consumptions and cost, but also in the energy consumption elements each HVAC systems BEDEC offers the power use for heating, cooling and electric circuit. So, it clues to establish the energy and CO_2 savings that the ECMs provides.

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3 Methodology for SPEEDIER Energy expert support tool

3.1 Input for the tool

The tool needs input to apply calculations, these inputs come from the energy audit performed before using the tool and are explained in the next

3.1.1 Characterization SME

The characterization to define SMEs comes from different factors.

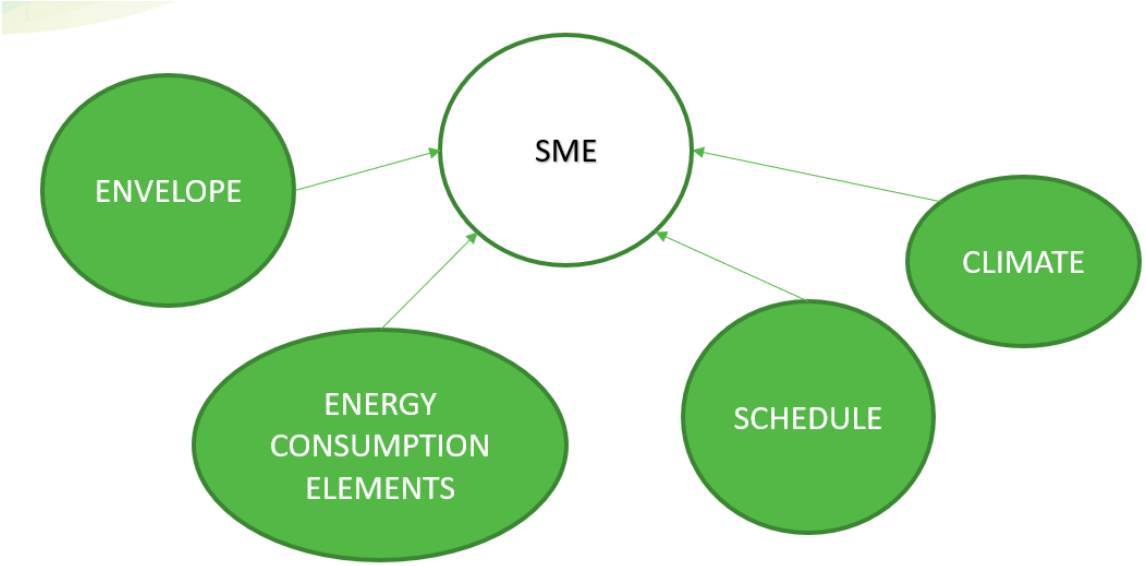

Figure 2 SMEs characterization

All these factors that define the SME are used to calculate the energy and CO_2 consumptions and then to propose ECMs and establish savings.

The envelope and the energy consumption elements inputs provide information about the building or place where the SME is located.

The schedule provides information that is used to establish the hours that the energy consumption elements are running.

Additionally, the climate it's also used to know the hours that the heating and cooling are used.

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3.1.2 Climate

The climate from each pilot site has been introduced in the tool. The Annual Heating and Cooling hours has been calculated for each country and region.

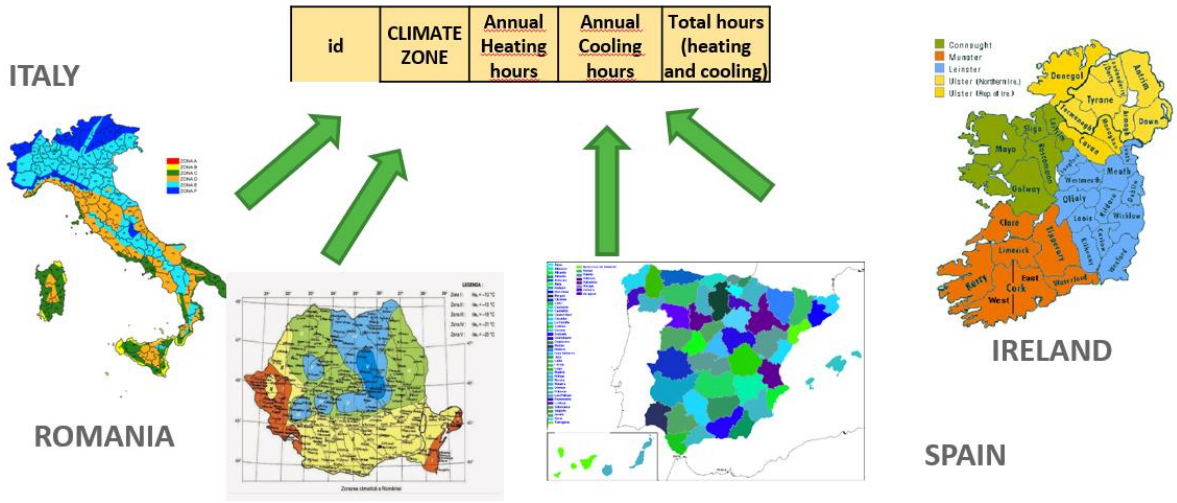

Figure 3 Climate zones for each pilot site country

3.2 Output of the tool

The principal output from the tool is the ECM's that could be applied in the SMEs. In the next point we explain how we have classified these ECM's.

3.2.1 ECM's families

The data base of ECMs has different categories in order to relate each family or measure with the different elements that comes from the characterization of SMEs.

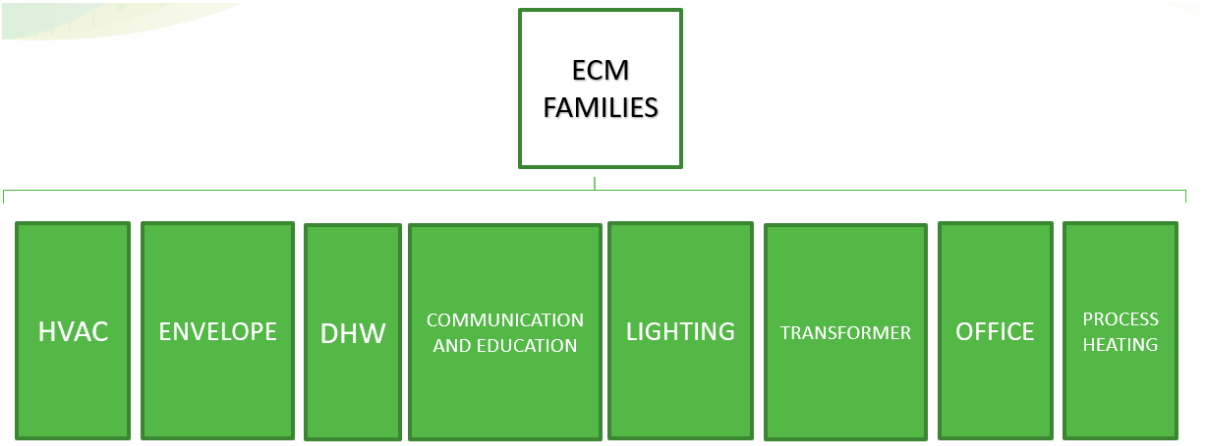

Figure 4 ECMs families

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3.2.2 ECM's classifications

The ECMs have been classified according to cost, thus establishing 4 categories. The following figure shows the four cost levels and some examples of the measures. The colours have also been designed in the tool in the same way.

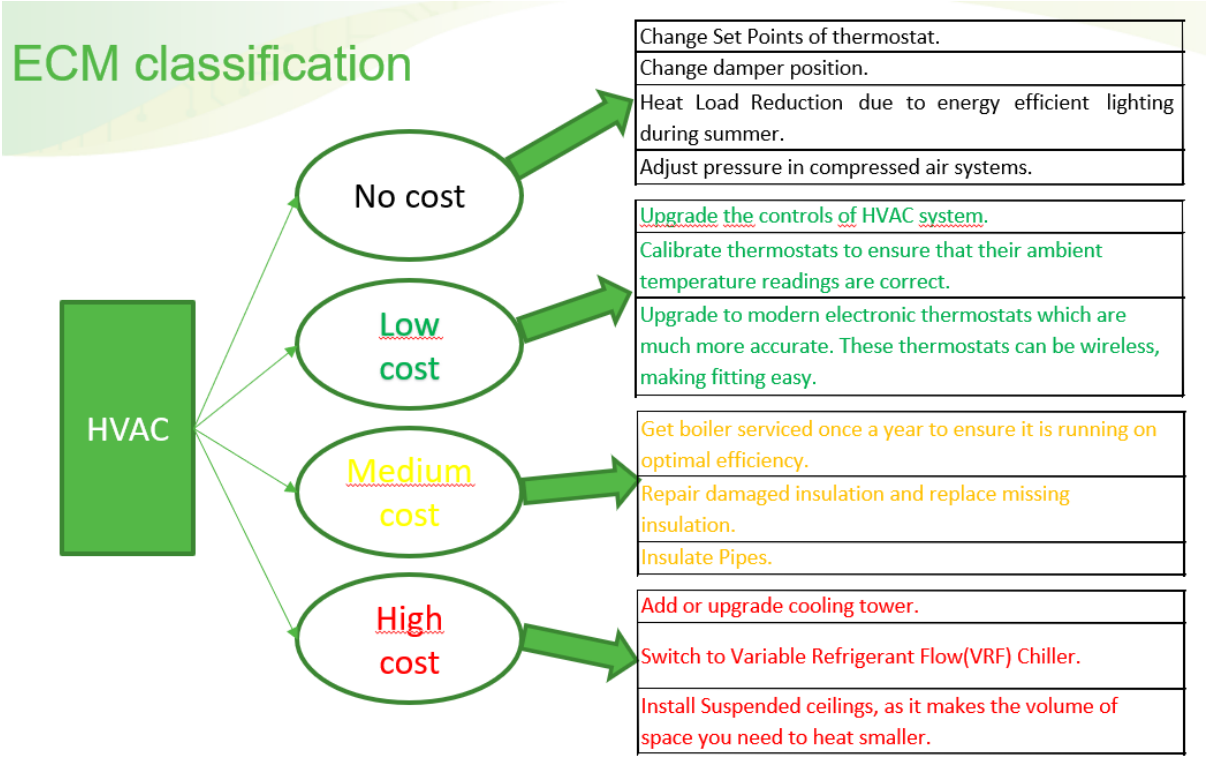

Figure 5 ECMs classification

3.2.3 ECM's prices

As BEDEC has Spain prices, in the tool depends on the Country a conversion is done based on the price level index for household final consumption expenditure (HFCE) 2018 (EU-28-100). This information in the tool is not blocked so that the user can change it, because it is only a proposal.

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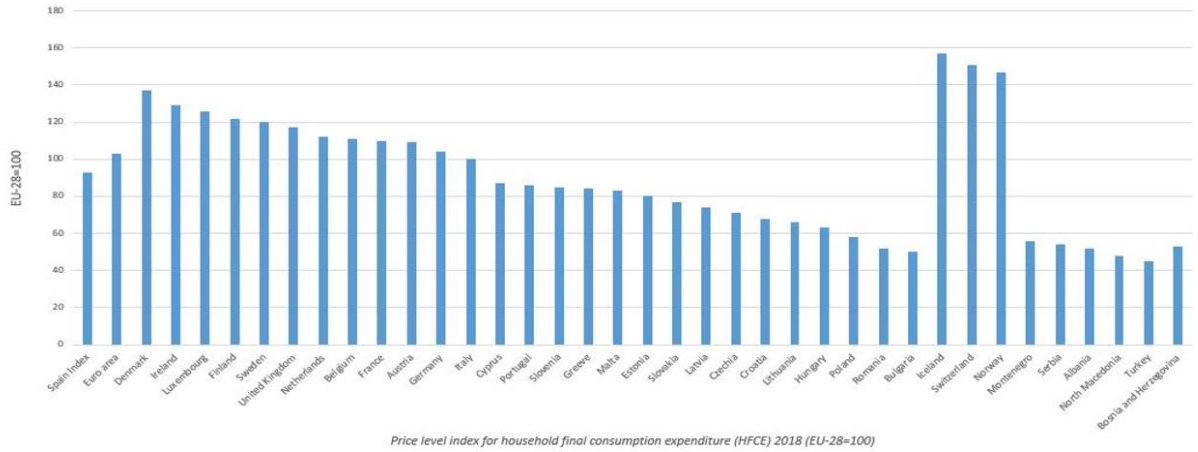

Figure 6 Price relation between countries

3.3 Methodology

The methodology is based in a circular system to learn from with real data.

The user enters the data on construction, use and situation of the SME in the tool and based on these data and associated calculations, the toll provides result as a proposal of measures with their savings details. The SPEEDIER Expert can propose different simulations where it applies in each simulation different measures and together with the SME, they decide which to apply. Once the measures are applied, the tool is monitored.

The information that the tool offers about savings is theoretical based on BEDEC or the data entered by the SPEEDIER Expert. But in the Periodic report the actual data of the savings are being produced is entered and therefore the tool is able to identify the ECMs applied and compare with the theoretical savings and thus make a continuous improvement of the data given.

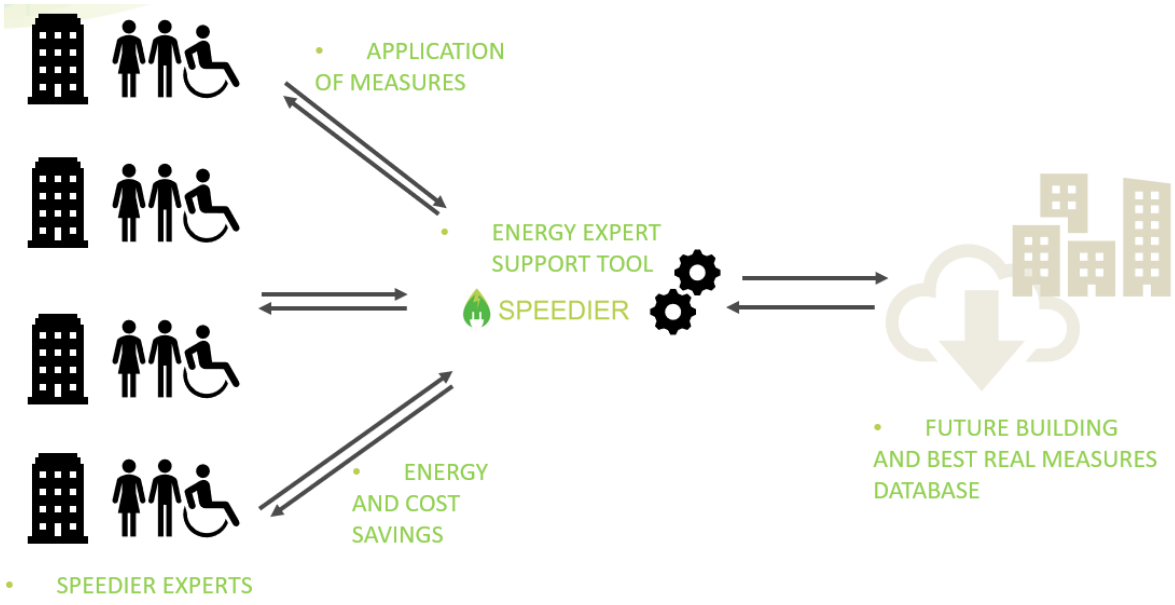

Figure 7 SPEEDIER Energy expert support tool system

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4 SPEEDIER Energy expert support tool

The result of this deliverable it's an online tool, that could be review in the next link: (https://tcqi.eu/v1/SPEEDIER/#/app/home/projectList).

In the next subsections there are descripted how to login in the tool, and screen capture of the main functionalities.

4.1 Login

In order to login to the SPEEDIER tool, first user needs to register in the ITeC website (https://en.itec.cat/).

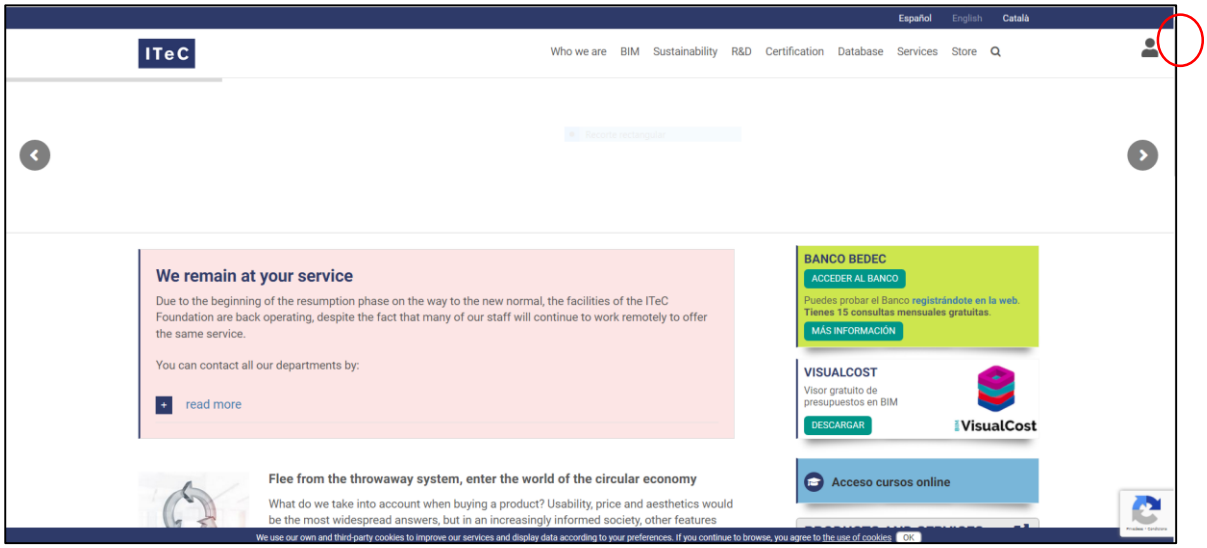

Figure 8 ITeC website

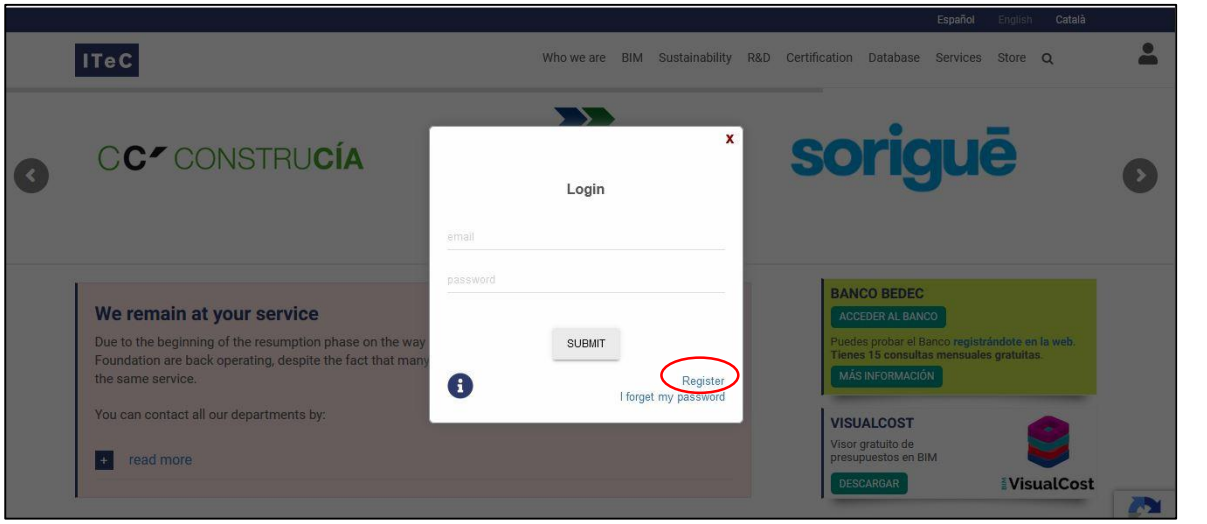

Figure 9 ITeC website register

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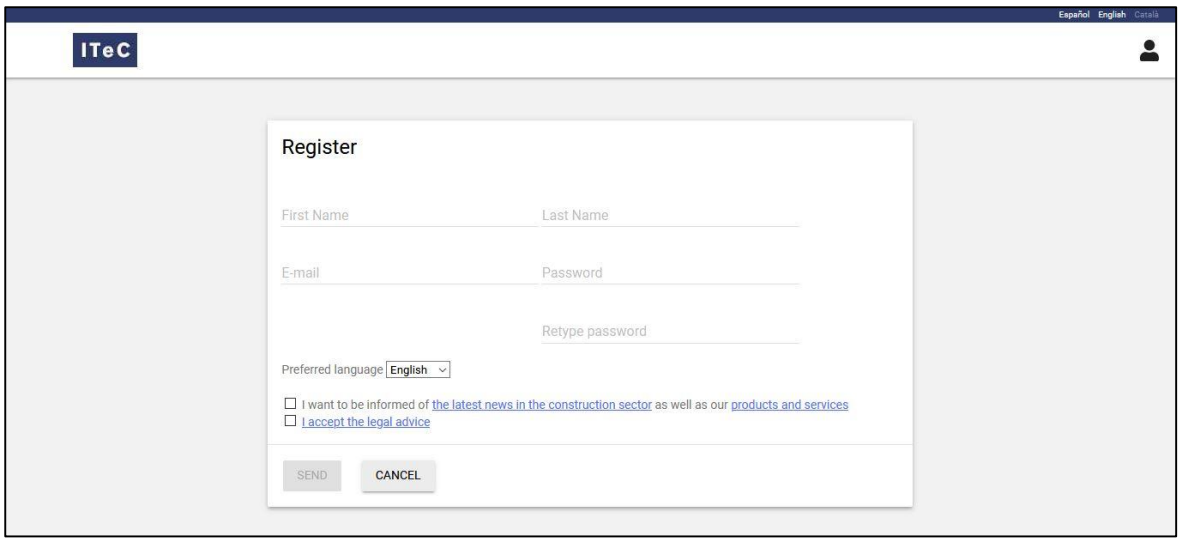

Figure 10 ItеC register formulary

Once registered on the ITeC website, it's possible to access the SPEEDIER tool (https://tcqi.eu/v1/SPEEDIER/#/app/home/projectList) and log in with the same email and password.

Figure 11 SPEEDIER tool log in

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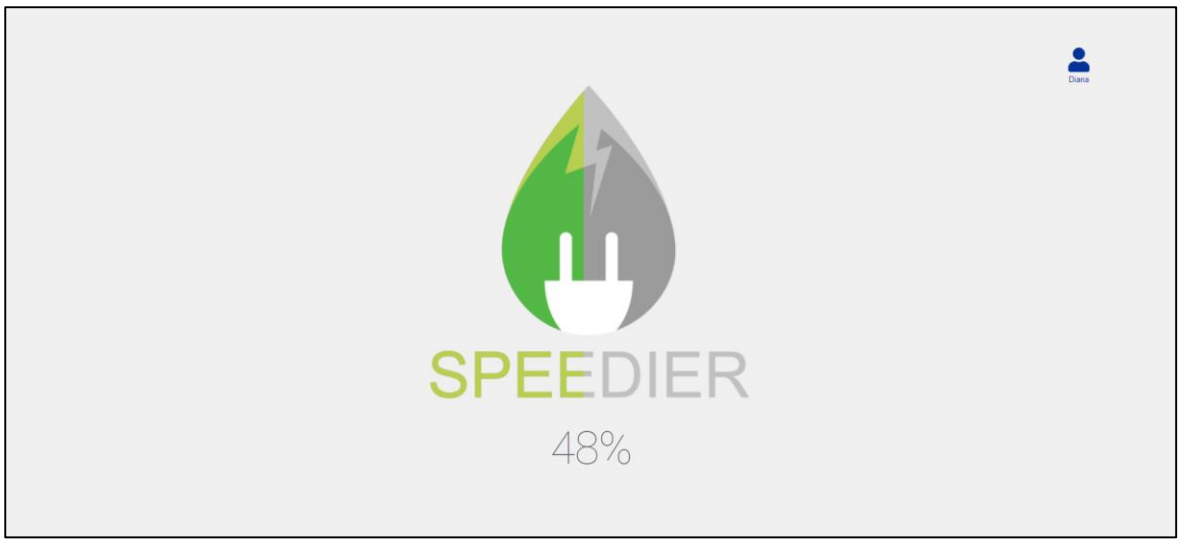

Figure 12 SPEEDIER tool loading

4.2 Menus

The first screen after login in SPEEDIER Tool is Project List, in there are all the projects and can be managed from there.

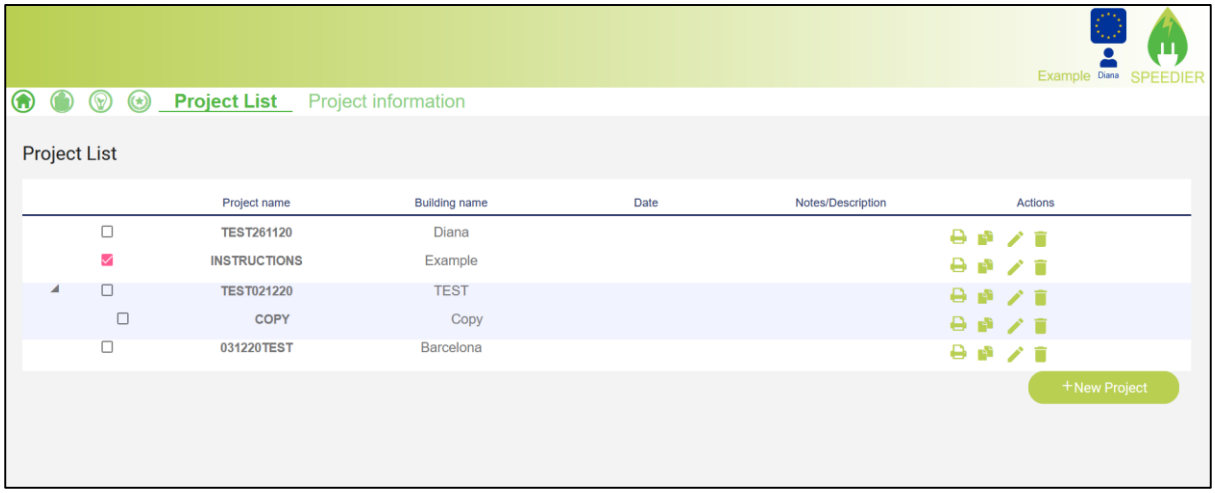

Figure 13 Project List

The tool is structured in four main menus and in each one there are different subsections. The menus and submenus are detailed below.

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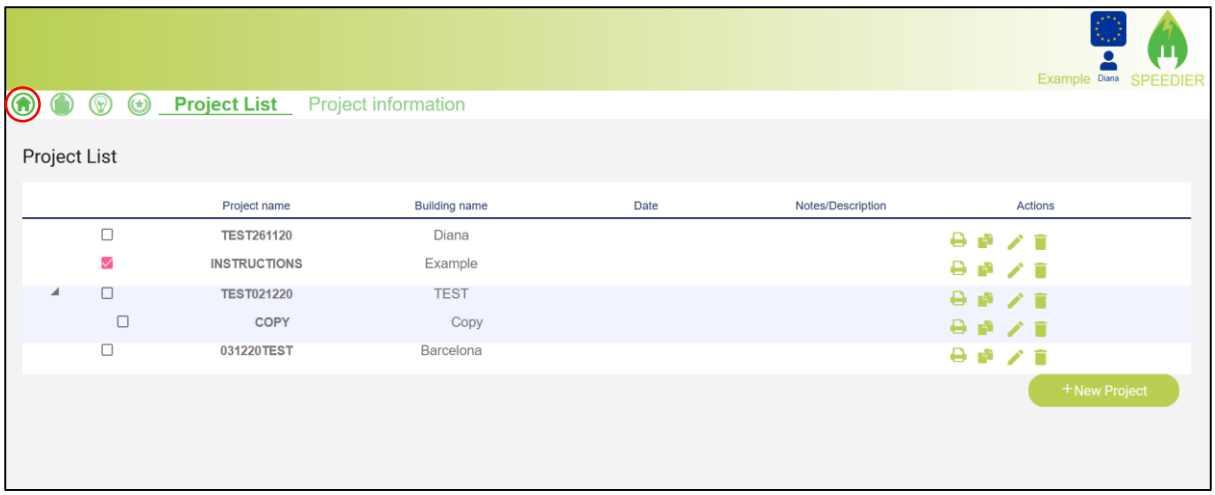

Figure 14 Project Home

The Project Home menu has two different submenus:

- Project List: where the user can manage all the projects.
- Project Information: where the user can create or modify a project.

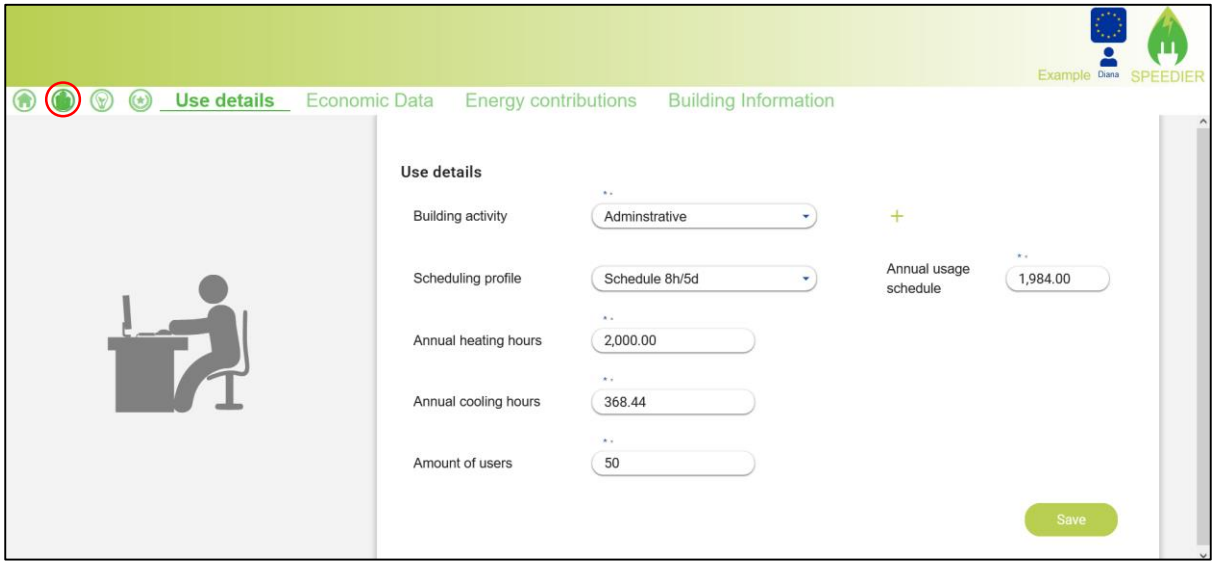

Figure 15 Building Information

The Building Information menu has four different submenus:

- Use details: where the user must define the schedule and amount of users
- Economic data: where the user must accept or modify the prices proposed and some other economic data
- Energy contributions: this submenu must be complete only if the project has some installation that is consuming energy

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- Building Information: where the user must define the envelope characteristics and the energy contribution elements.

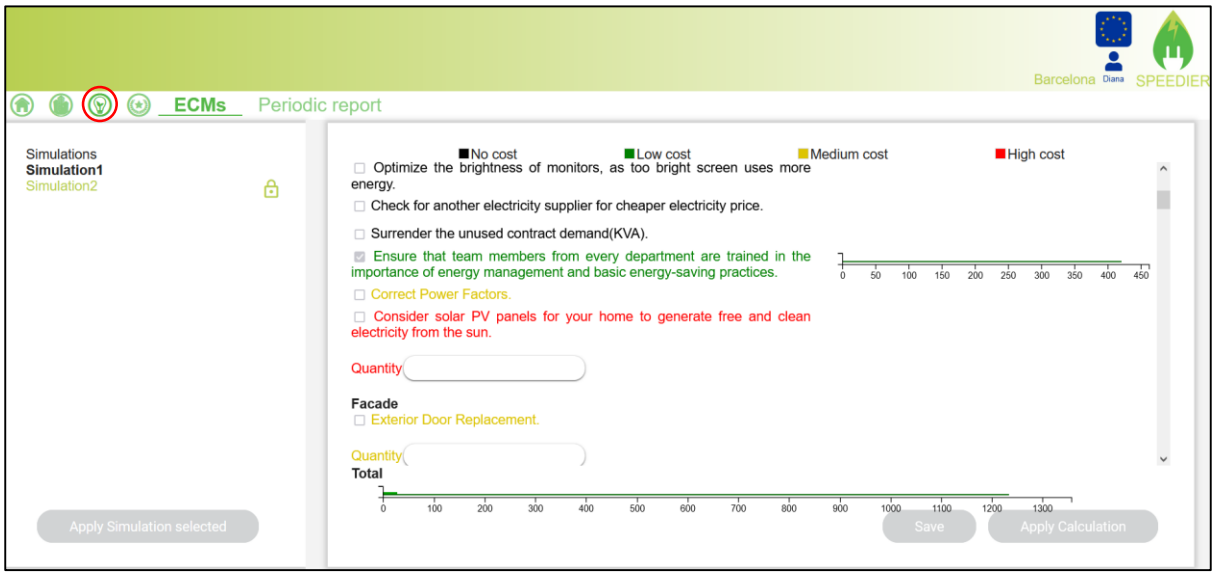
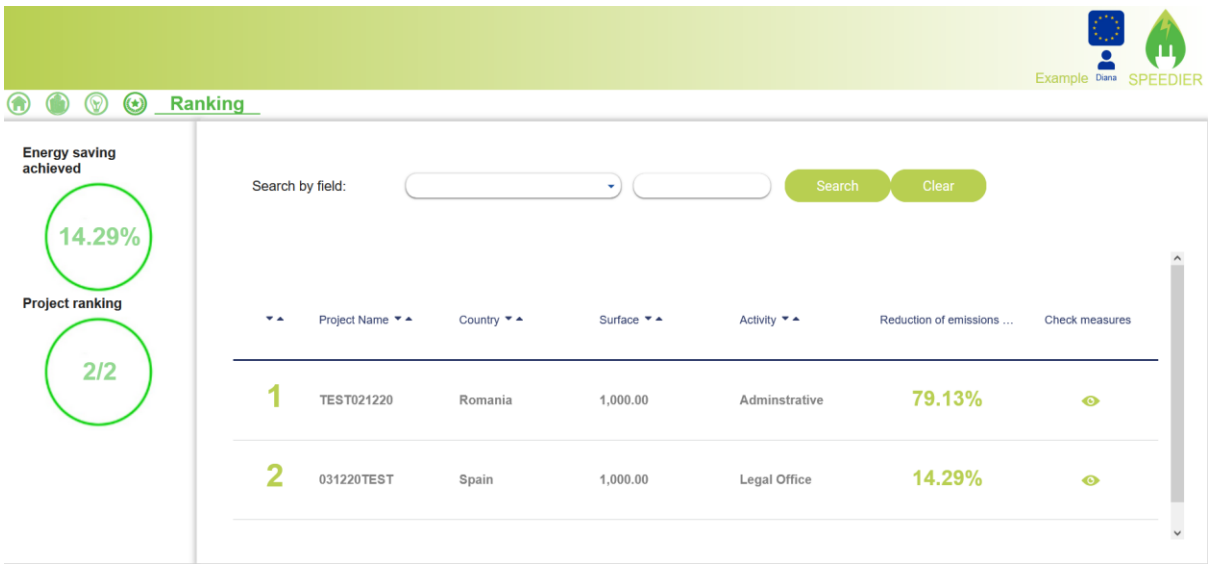


Figure 16 Saving Measures

The Saving Measures menu has two different submenus:

- Energy Conservation Measures: the tool will provide some measures with the energy savings and the cost.
- Periodic report: after applying one simulation the user can track the application of the measures in a period.



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The Ranking menu is used to compare the project with others and look to the measures that the most successful project has applied.

No personal data is showed and if the result of the filter is less than three project the information it's not showed because there's the possibility to identify it.

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5 Conclusions

This Deliverable describes the process and the result of the SPEEDIER Energy expert support tool, it's not an instructions manual of the tool because we explain the main content that includes the main menus. To check in deep all the functionalities and the possibilities that could apport this new online software it has to be check in:

https://tcqi.eu/v1/SPEEDIER/#/app/home/projectList.

In the first section we have focused on the process that leads to the design and development of a tool of these characteristics where both the energy calculation and the interface had to be linked to create an environment that is not so technical and more understandable for end customers, it is that is, SMEs, so that they can easily see the result of their energy audit and see what measures can be applied adjusting to their characteristics.

The final result of the entire process has been a tool that the SPEEDIER Expert can easily use after having carried out the energy audit and that SMEs can clearly understand the final result, serving to establish a point of communication between both that facilitates the SPEEDIER Service process. It also includes a very effective monitoring of the application of the ECMs to see the progress, and at the end a gamification where you can see what is happening at a global level and thus create a SPEEDIER community.

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