



Progress Report (*D4.1.6*)

Development of a guidance tool for key approaches to planning efficient energy renovation

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Project website: <http://www.enicbmed.eu/projects/med-ecosure>

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1.1 Contributors

Key contributors USE

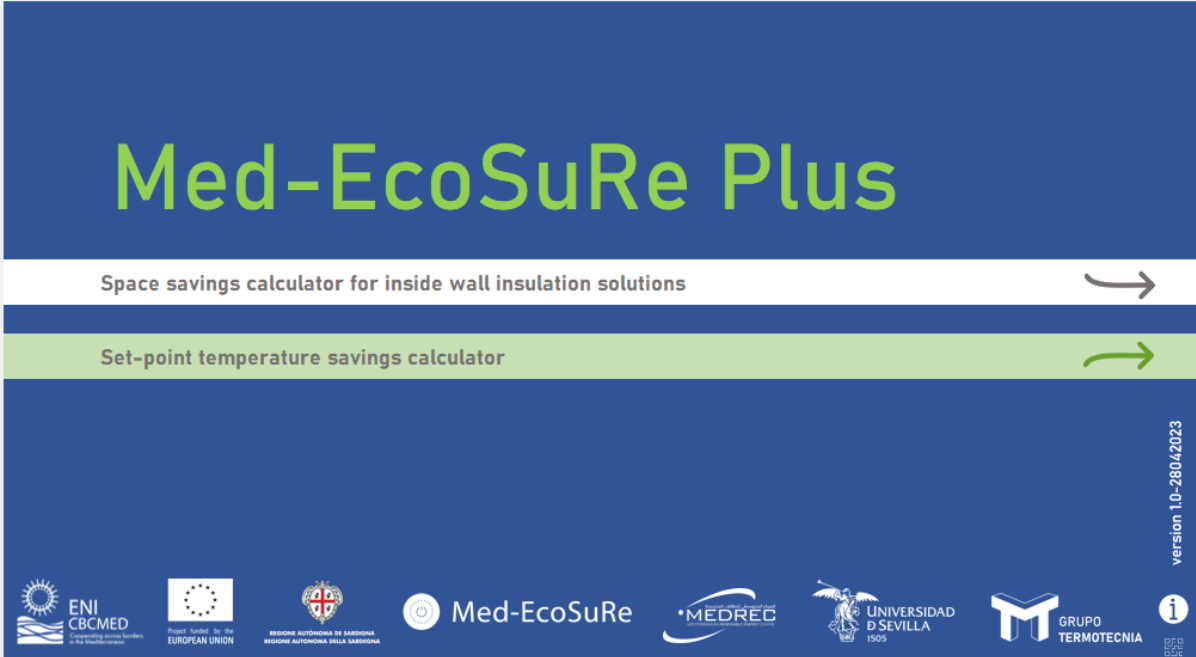
1.2 Summary

- The activity 4.1.6 “Development of a guidance tool for key approaches to planning efficient energy renovation” is an Excel Visor of the database

Procedure: an Excel visor for the most interesting measure studied in database of A4.1.4. User answers different questions to get the impact (Energy and economic) of different renovation plans

Results: an Excel file

Link: <http://tmt.us.es/MEDECOSURE/Med-EcoSuRePlus.xlsm>



The screenshot shows the Med-EcoSuRe Plus software interface. The main title is "Med-EcoSuRe Plus" in large green letters on a dark blue background. Below the title, there are two main sections: "Space savings calculator for inside wall insulation solutions" and "Set-point temperature savings calculator". The second section is highlighted in light green. At the bottom, there is a footer with logos for ENI CBCMED, European Union, Region of Sardinia, Med-EcoSuRe, MEDREC, Universidad de Sevilla, and Grupo Termotecnia. The version number "version 1.0-28042023" is displayed vertically on the right side.



Med-EcoSuRe

2 Content

1.1	Contributors	1
1.2	Summary	1
2	Content	2
3	Med-EcoSuRe Guidance Tool.....	3



3 Med-EcoSuRe Guidance Tool

Med-EcoSuRe Plus

USER GUIDE



VERSION: 1.0-12042023

START

SCREEN

Space savings calculator for inside wall insulation solutions

Set-point temperature savings calculator

version 1.0-2804/2023

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DESCRIPTION

- 1 Start button of the tool. The grey arrow gives access to the Space savings calculator for inside wall insulation solutions, on the other hand, the green arrow gives access to the tool that quantifies the energy saving by extending the set-point temperature.
- 2 Tool information and user guide download link.

SET-POINT TEMPERATURE SAVINGS CALCULATOR

SCREEN

Building ?

Building typology Select typology...
 Building type Select typology...
 State Select state...

1

2

Koppen-Geiger Climate

Climate Select Climate...
3

Set-point temperature extension ?

Heating Select value...
 Cooling Select value...
4

Note:
 The reference indoor range temperature is defined as 20-25°C, following the comfort range established in the Spanish version of the European Energy Performance Building Directive.

Results ?

	T _{set-point} (°C)	Demand (kWh/m ² -y)	Energy Savings	
			(kWh/m ² -y)	(%)
Heating	-	-	-	-
	-	-	-	-
Cooling	-	-	-	-
	-	-	-	-

5

Reset results

6

Return to Start

DESCRIPTION

- 1** Selecting the building typology (multifamily or single-family), the building type (attached, detached, etc..) and the state of the building (existing, renovated or new).
- 2** Building help. Shows a list of the building models used by the tool, where is presented all geometrical characteristics.
- 3** Climate list drop box. When clicked shows the nine Koppen-Geiger climate zones list considered by the tool for the Iberian Peninsula.
- 4** Set-point temperature extension. These two drop list presents the considered extension values for the heating and cooling set-point temperatures.
- 5** Button that returns to the start page.
- 6** Reset results. When pressed the restart button will reset all the defined inputs leaving the tool prepared for a new simulation.

NOTES

n/a

SPACE SAVINGS CALCULATOR STEP 1

SCREEN

Thermal conductivity of insulation materials

Insulation Material	PIR HFC	Mineral Fibre	XPS	Other 1	Other 2
Thermal Conductivity W/m K	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> press to insert a value	<input type="checkbox"/> press to insert a value

Energy and CO₂ Emissions cost, and conversion factors

Energy Source	Energy cost	CO ₂ emissions cost	CO ₂ emissions conversion factor	Primary Energy Conversion Factor	
	€/kWh	€/ton	kg/kWh	Total	Non-renewable
Electricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Natural Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4 Return to Start

5 Reference Data Load

- DESCRIPTION**
- 1** Input box value. If pressed the check box, is loaded a recommended value and the cell stays grey-coloured. For the PIR HFC, the Mineral Fibre and the XPS are necessary to define a conductivity value.
 - 2** Input box value. If pressed the check box the user will be able to define a name and thermal conductivity value. The tool will assume a default name “Other 1” or “Other 2” if the name box stays empty.
 - 3** Input box value. If pressed the check box, is loaded a recommended value and the cell stays grey-coloured.
 - 4** Button that returns to the start page. This button enables a restart button on the start page. When pressed the restart button will reset all the defined inputs leaving the tool prepared for a new simulation.
 - 5** Button that loads reference values. When pressed are loaded all the necessary Step 1 values to perform a simulation. The values loaded are recommended values by the developer team. The user can redefine the value by pressing the check box on the input box.

- NOTES**
- a. Defining the additional insulation materials is an optional feature.
 - b. On “Energy and CO₂ Emissions cost, and conversion factors” all the boxes must have a value. The CO₂ emissions cost is the only variable that can be null.
 - c. There are no recommended values for the optional insulation materials.

STEP 2

SCREEN

Climate

Koppen-Geiger Climate Zone 1 Select Climate... 4

Building typology 2 Select typology... 3

Building Elements

Avg. Roof U-value (W/m ² ·K)	Avg. Floor U-value (W/m ² ·K)	Avg. Window U-value (W/m ² ·K)	Windows g-value, winter season (-)	Windows g-value, summer season (-)	Thermal Bridges ΔU-value (W/m ² ·K)	Conditions
6 0.22	0.48	1.60	0.64	0.14	0.10	Recommended Value 5
6 3.98	10.0					User Values

Air Leakage Rate (h⁻¹) 6 Summer Night Ventilation Rate (h⁻¹) 6 Conditions 5


Save and Next Step 7

- DESCRIPTION**
- 1 Selecting the climate. When clicked shows the nine Koppen-Geiger climate zones list considered by the tool for the Iberian Peninsula.
 - 2 Selecting the building type: multifamily or single-family.
 - 3 Selecting the building type: attached, semi-attached, detached or perimeter block. When selected the urban constraint is presented in the “Building Elements” section the recommended values.
 - 4 Building help. Shows a list of the building models used by the tool, where is presented all geometrical characteristics.
 - 5 Check and input box. If selected the check box, an input box for each variable is enabled. If a name is not defined for the conditions, a default name is used.
 - 6 Input boxes. The user can define the value of each variable that seems more suitable for their case. No empty boxes are allowed.
 - 7 Button to step forward. When pressed moves to the next step and saves all the defined values. The tool will warn the user if a value/setting is missing or if a value is wrongly defined.

STEP 3

SCREEN

Med-EcoSuRe Plus



STEP 3: COMPARISON SCENARIO

Select insulation materials

Insulation Material	Conductivity W/m·K	Option
PIR HC	0.018	<input checked="" type="radio"/>
Mineral Fibre	0.035	<input type="radio"/>
XPS	0.032	<input type="radio"/>
Other 1	0.023	<input type="radio"/>
Other 2	0.045	<input type="radio"/>

Comparison value

Thermal Resistance (m²·K/W)

Note

Economical Data

Insulation Material	Material Cost (€/m ²)	Installation Cost (€/m ²)
Selec. insu.		
Selec. insu.		

Property value (€/m²)

← Previous Step

⚙️ Calculate Cases

DESCRIPTION

- 1 Selecting the insulation material. The user must select two of the listed insulation materials.
- 2 Inserting the thermal resistance value (R-value) of insulation material. This value will define the U-value of the renovated wall. The note box shows the minimum R-value that fulfils the Spanish version of the EPBD.
- 3 Help Insulation Material. If pressed is presented the thickness of each insulation material for the defined R-value.
- 4 Defining the costs of the material and installation. The cost is expressed in euros per square meter of insulated material. The material cost should be related to the defined R-value.
- 5 Defining the useful floor market value.
- 6 Button to return the previous step. The defined inputs in Step 3 are not saved.
- 7 Button to calculate the cases and present the results.

NOTES

Null values are not allowed.

RESULTS

SCREEN

Med-EcoSuRe Plus

RESULTS

Case Study

Building	Building Type	Orientation	Climate	Conditions	K_{lim} ($W/m^2 \cdot K$)	Roof U-value ($W/m^2 \cdot K$)	Floor U-value ($W/m^2 \cdot K$)	Windows U-value ($W/m^2 \cdot K$)	Thermal bridges ΔU -value ($W/m^2 \cdot K$)	Air Leakage Rate n_{50} (h^{-1})	Compactness (V/A)
	Detached Multifamily	South	A4	Recommended Values (Annex E of DB-HE)	0.89	0.44	0.80	2.70	0.11	4.6	2.0

Energy demand and costs

Insulation Material	Thickness (cm)	Thermal Resistance ($W/m^2 \cdot K$)	Wall U-value ($W/m^2 \cdot K$)	Heating Demand ($kWh/m^2/year$)	Cooling Demand ($kWh/m^2/year$)	Material Cost	Installation Cost	Installation
						($€/m^2$)	($€/m^2$)	Total Cost ($€/m^2$)
Other 1	4.60	2.00	0.38	2.21	2.92	25.00	5.00	30.00
Other 2	9.00					22.00	5.00	27.00

€ per m^2 of insulated surface

By using Other 1 insulation in comparison with Other 2 for the entire building:

- The additional investment required is: 3 468.00 €
- The additional useful floor area is: 21.77 m^2
- The net value of the usable floor gain is: 54 419.43 €
- **The total net saving of the wall renovation is: 50 951.43 €**

1
Previous Step

2
Additional Results

3
Print to PDF

DESCRIPTION

- 1 Button to return the previous step.
- 2 Button to show “Additional Results”. The Additional Results are shown below the “Energy demand and costs”.

Additional Results

Insulation Material	Primary Energy Use ($kWh/m^2/year$)		CO _{2eq} Emissions ($kg/m^2/year$)	OPEX ($€/m^2/year$)	Fulfills the U_{lim} ?	Fulfills the Primary Energy Use		Fulfills the Spanish EPBD?	Emission Class
	Total	No Ren.			Total?	No Ren.?			
XPS	2.11	2.01	0.41	0.38	Yes	Yes	Yes	Yes	A
Mineral Fibre									

- 3 Button to generate and export the simulation report. The tool uses the “Microsoft Print to PDF” printer by default. If this printer is not available on the user-operative system a PDF exporter is used, and the pdf file is saved in the same location of the tool.

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