SPEEDIER

SME PROGRAM FOR ENERGY EFFICIENCY THROUGH DELIVERY AND IMPLEMENTATION OF ENERGY AUDITS

D3.1 - REPORT ON THE CHARACTERISATION OF SMES AND OPPORTUNITIES

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This document is the report corresponding to D3.1 Report on the characterisation of SMEs and opportunities, led by Institut Tecnològic de la Construcció de Catalunya (ITeC). This document contains the particular parameters associated with each business that will assist in the process of identifying appropriate energy management solutions. This information and all the data from each country will be used in the analysis and will be transferred to the main on line database that will be used in the future SPEEDIER tool for SPEEDIER Experts.

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02/03/2020	0.5	Diana Romeu	All changes from partners included.
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03/06/2020	0.7	Diana Romeu	Updates and final edits ready for closure
03/03/2020	1.0	Jo Southernwood	Final version for submission

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Abbreviations

ECM	Energy Conservation Measure.
SME	Small or Medium Sized Enterprise.

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1 Introduction

1.1 Background

SPEEDIER is a highly innovative *one-stop-shop solution* that applies an integrated approach to energy management, providing information, advice, capacity building, energy auditing, financing, as well as implementation of energy efficiency solutions and monitoring of impacts. As part of the project, the SPEEDIER team, (led by partner, ITEC), will develop a SPEEDIER Tool for Experts that will assist them to quickly carry out an assessment of the energy saving opportunities available to SMEs that participate in the SPEEDIER Service.

1.2 Purpose of the document

The first step in developing the SPEEDIER Tool for Experts is to determine the current requirements of SMEs taking into account the technical characteristics that can cause barriers to implementation of energy efficiency measures. This includes characterising the particular parameters associated with SMEs that will assist in the process of identifying appropriate energy management solutions. For example; a business that does not own the building that they occupy is unlikely to be able to make building fabric upgrades; a small SME with low energy bills is unlikely to invest in high cost ECMs; different ECMs will be appropriate for an SME in the manufacturing sector, compared to an SME in the hospitality sector. The categorisation can therefore be used to allow the SPEEDIER Tool for Experts to automatically narrow down the range of possible ECMs that could be applied to each SME based on simple data collected by the SPEEDIER Expert.

This Deliverable describes the steps that were taken to characterize SMEs and includes an analysis of the information that was gathered during the online surveys undertaken during Work Package 2 in order to classify the SMEs into appropriate groups. All this information will be fed into the future database that the SPEEDIER tool for Experts will need for accessibility reasons in order to be able to recommend the most appropriate package of ECMs for each type of SME. It is important to specify the values that will define the SMEs in order design the most efficient energy tool possible. The purpose of this document is therefore, to establish the first criteria for the development of a robust tool.

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2 Characterisation of SME categories

2.1 Description of the task

This task characterises the particular parameters associated with each business that will assist in the process of identifying appropriate ECMs. The characterisation will take into account the following parameters; climatic conditions, number of employees and their comfort, business sector, building age, building form, dimensions, isolation, orientation, glazing, building ownership, proximity to other businesses, local regulations/policies. All the data from each country partner will be collated by ITEC into a needs analysis report and this information will be transferred to the main on-line database developed in Task 4.2.

2.2 Methodology

As a general procedure, some easily obtained general information about the SME is required in order to begin the SPEEDIER Project calculations. As the procedure progresses, this information can then be refined to increase accuracy and suitability of the proposed ECMs, and will be used to a greater or lesser extent later in the energy saving calculations depending on how much other information is available.

The general information required is broadly described in Task 3.1 of the Grant Agreement, and was refined by the project team into a simple set of survey questions that should be completed by the SPEEDIER Expert in as much detail as possible at the start of the process. The proposed survey questions are given in Table 2-1. Most of the information requested can be easily gathered by the SPEEDIER Expert during initial discussions with each SME. In order to make it easy to enter the data, where possible answers have been standardised so that the SPEEDIER Expert needs only select the answer from the available options (see Table 2-2). Depending on the answers given, the SPEEDIER Expert will be able to use the tool to determine the initial approach strategy for energy efficiency intervention and an overall set of possible ECMs.

Table 2-1 : Proposed initial survey

1	Enterprise data
1.1	Which is the country and city of the SME?
1.2	How many workers has the SME?
1.3	Which is the annual turnover rate?
1.4	What sector does the SME work in?
1.5	How many buildings has the SME?
1.6	Do you share your building with another enterprise?
2	Building data (for each SME building)
2.1	What is the year of construction?
2.2	How many floors has the building?
2.3	What type of window do you have?
2.4	Where is the building?
2.5	What kind of surroundings does the building have?
3	Building facilities data
3.1	Do you feel cold in winter?

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3.2	Do you feel hot in summer?
3.3	Is there enough ventilation in the building?
3.4	Do you know what kind of energy facilities has the building?
3.5	How many hours do people work in that building?
3.6	How much does the monthly and annually electricity bill cost approximately?
3.7	How much does the monthly and annually gas bill cost approximately?

Table 2-2 : Available answers to questions in Table 2-1

OPTIONS or UNITS						
1	**Enterprise data**					
1.1	List of EU 28					
1.2	0-50	51-200	>200			
1.3	0-500.000€	500.001-10.000.000€	10.000.001-50.000.000€			
1.4	Construction	Educational	Health	Comercial	Others	
1.5	1	2-5	>5			
1.6	YES	NO				
2	**Building data (for each SME building)**					
2.1						
2.2						
2.3	simple glass window with aluminum frame	doble glass window with aluminum frame	simple glass window with wood frame	doble glass window with wood frame	simple glass window with polyvinyl chloride frame	double glass window with polyvinyl chloride frame
2.4	Building between party walls	Isolated	Between a building and air	Other		
2.5	Urban	Rural	Urban-rural	Other		
3	**Building facilities data**					
3.1	Yes	No				
3.2	Yes	No				
3.3	Yes	No				
3.4	Electrical	Gas	Gasoil	Solar	Others	
3.5						
3.6						
3.7						

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This quantification of the possible answers can be adapted according to the evolution of the results achieved in the pilot sites, and may be subject to change depending on the calculation models that will be carried out in the future.

2.3 Link to Task 2.3

In Task 2.3, an online questionnaire for SMEs was defined, which included questions on the location, activity and disposition of each company. It is anticipated that many of those that answered this online survey will participate in the SPEEDIER Service themselves or be similar to the SMEs that will eventually participate. The full survey as given in Annex 1 for reference. Over 90 SMEs from the four pilot regions (i.e. Ireland, Italy, Spain and Romania) completed the online survey and the answers received have been used to categorise the SMEs accordingly.

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3 Survey results

Based on the online survey developed in Task 2.3, SMEs were profiled to take into account the statistical majority of answers received, based on country and sector. The objective of this characterization is to anticipate what are likely to be the most viable ECMs with the highest impact and to begin to identify a long-lost of the most appropriate opportunities.

It is important to state that these profiles have been assumed according subjective results from the surveys undertaken in Work Package 2, and therefore, do not necessarily correspond to the wider situation in each country. In addition, many of the results would require more detailed analysis, as many answers do not rely directly on numerical factors, such as economic values, or environmental parameters, but can also be influenced by social and cultural factors. The priorities of SMEs in terms of energy management may also vary according to each sector and activity.

Extended detail on the results of these surveys can be found in Deliverable *2.3 Report on findings from businesses participating in SPEEDIER.*

The following tables presents the results based on the most common answers to each question per country, and focuses in particular on economics and business administration and the current energy management policies of SMEs.

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3.1 Characterisation based on survey responses from Ireland

Parameter	Ireland	Characterisation	How characterisation is reflected in SPEEDIER Tool
Main business operating sector	Manufacturing (55%)	Main focus in consumption based on industrial equipment and internal processes. Other kind of equipment to be reviewed (compressed air, refrigeration, industrial ovens, venting, etc.).	If 'Manufacturing' is selected as the sector, ECMs relating to improving the efficiency of industrial equipment will also be suggested by the tool.
Number of employees	45% - 0 to 25 employees	The majority of participants in SPEEDIER are likely to be at the smaller end of the SME size scale and the SPEEDIER Service will need to be tailored accordingly to their needs.	For smaller SMEs the tool should prioritise no-cost and low cost ECMs (including switching energy supplier).
Previous year turnover	30% - 0M to 1M 35% - 1M to 10M		
Building occupancy	50% Owner	More than 50% of the respondents are the owners of the building that their business occupies. That means they have control over their buildings.	If SME owns the building, include ECMs that involve major changes to the building e.g. building fabric upgrades and insulation improvements.
Unit cost of energy (optional)	35% No answer 25% 0.10-0.15 €/kWh	The lack of information regarding energy and gas costs may be an opportunity for SPEEDIER training and capacity building program for organizations.	If unit cost of energy is unknown or greater than the cheapest nationally available energy tariff, ECMs should include advice on switching to a cheaper tariff.
Unit cost of gas (optional)	55% No answer		
Annual energy cost	25% - 5000€ to 10000€ 20% - More than 10000€ 20% - Don't know	In general, the annual energy cost seems to correlate with the previous year turnover, stating the size of the SME.	If annual cost of energy is unknown, ECMs should include staff awareness and energy monitoring. If annual energy cost is less than €5000 per year, restrict ECMs to no and low cost ECMs
Annual cost of gas	45% No answer 25% Don't know	This indicates an opportunity for the SPEEDIER training and capacity building program for organisations.	
Uses of energy	Lighting HVAC Office equipment Industrial processes	Check later table of ECMs with different uses and costs.	ECMs should be selected that relate to the uses of energy identified.
Energy Manager?	No (65%)		

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Energy policy?	No (65%)	This presents a great opportunity for SPEEDIER as it shows that there is a gap in the knowledge and resources of SMEs in terms of energy management which could be filled by a SPEEDIER Expert.	ECMs should include recommendation to set up energy policy for the organisation.
Energy consumption targets?	No (65%)	The SPEEDIER program needs to be able to cover this requirement for setting energy consumption targets and monitoring progress against targets.	ECMs should include recommendation to set a target for energy reduction for the organisation. The tool should include the ability to track energy consumption over time to assess progress against targets.
Energy consumption tracking	Paper bills Spreadsheet 0% Software	Data on historical energy consumption will need to be entered manually into the tool if only paper bills are available.	SPEEDIER Expert can recommend that the SPEEDIER Tool for Experts is used to track energy consumption.
Which ECM's did you implement	LED lights Lighting controls HVAC controls Adjust HVAC controls Replace equipment	In all countries the most commonly installed ECM was LED lights. This is one of the least disruptive ECMs to install and often has a very fast payback period. Instances of installations of other ECMS are much lower, indicating that SMEs may need additional support, information or finance to take action to implement these measures.	The tool will not recommend ECMs that have already been implemented or ones that are incompatible with existing equipment.
Challenges or barriers to ECMs	Don't know which ECMs apply Lack of time	The main challenge is their lack of knowledge on which measures are the most appropriate for their business and how to procure them.	ECMs should include a recommendation to deliver staff training and awareness.
Dedicated funds for investing?	NO – 55%	If the company has their own funds, these can be added to any savings generated by other ECMs or used to fund low/medium or high cost ECMs.	No and low cost ECMs should be prioritised for organisations that do not have dedicated funds to invest in energy efficiency.

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Have you received any financial support to ECMs?	No Don't know	Either there are no government incentive schemes available in these countries, or that SMEs are simply not aware that any incentive schemes might exist. SPEEDIER Experts will also have specialist knowledge of the financing instruments and other support mechanisms.	SPEEDIER Tool could signpost to more information about the available local or national support schemes based on the country selected.
Would you outsource Energy Management?	35% - Yes – Free 35% - No	SPEEDIER Service will need to be presented differently to clients according to their country of origin.	The SPEEDIER Expert should use this information to determine the best way of structuring their business offering.

3.2 Characterisation based on survey responses from Italy

Parameter	Italy	Characterisation	How characterisation is reflected in SPEEDIER Tool
Business operating sector	Manufacturing (30%) Services (25%)	Consumption may vary between industrial equipment and other office equipment.	The tool should recommend ECMs that are appropriate to the sector of the SME. For manufacturing sector, ECMs relating to industrial equipment should be included.
Number of employees	25% - 0 to 25 employees 25% - 51 to 100 employees 25% - more than 250	There is not a prevailing SME size in Italy. ECMs may also be different depending on the size of each company. In bigger companies there may be the possibility of starting directly from medium cost to most expensive measures.	In small SMEs the tool should prioritise no and low cost ECMs. For medium sized SMEs the tool should include medium cost ECMs in addition to no and low cost ECMs. For larger SMEs the tool should include all ECMs.
Previous year turnover	35% - More than 50M 20% - 0M to 1M 20% - 10M to 25M		
Building occupancy	60% Owner	Being owners of the building means they have control over the construction measures.	If SME owns the building, include ECMs that involve major changes to the building e.g. building fabric upgrades and insulation improvements.
Unit cost of energy (optional)	30% 0.10 – 0.15 €/KWh 25% No answer	Whilst most respondents know the unit cost of electricity, the range of prices is large. Most	If unit cost of energy is unknown or greater than the cheapest nationally available energy tariff,

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Unit cost of gas (optional)	75% No answer	respondents do not know the price of gas. This may be an opportunity for SPEEDIER training and capacity building program for organizations.	ECMs should include advice on switching to a cheaper tariff.
Annual energy cost	55% - More than €10.000	The level of annual spending on electricity also seems to correlate somewhat to the turnover of the businesses that responded in each country.	If annual cost of energy is unknown, ECMs should include staff awareness and energy monitoring. If annual energy cost is less than €5000 per year, restrict ECMs to no and low cost ECMs
Annual cost of gas	60% No answer		
Uses of energy	Lighting HVAC Industrial processes Office equipment	Check later table of ECMs with different uses and costs.	ECMs should be selected that relate to the uses of energy identified.
Energy Manager?	No (70%)	This presents a great opportunity for SPEEDIER as it shows that there is a gap in the knowledge and resources of SMEs in terms of energy management which could be filled by a SPEEDIER Expert.	
Energy policy?	No (60%)		ECMs should include recommendation to set up energy policy for the organisation.
Energy consumption targets?	No (60%)	The SPEEDIER program needs to be able to cover this requirement for setting energy consumption targets and monitoring progress against targets.	ECMs should include recommendation to set a target for energy reduction for the organisation. The tool should include the ability to track energy consumption over time to assess progress against targets.
Energy consumption tracking	Paper bills Spreadsheet No tracking 0% Software	Data on historical energy consumption will need to be entered manually into the tool if only paper bills are available.	SPEEDIER Expert can recommend that the SPEEDIER Tool for Experts is used to track energy consumption.
Which ECM's did you implement	LED lights Lighting controls HVAC upgrades	In all countries the most commonly installed ECM was LED lights. This is one of the least disruptive ECMs to install and often has a very	The tool will not recommend ECMs that have already been implemented or ones that are incompatible with existing equipment.

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	Adjust HVAC controls Solar PV Staff awareness programme	fast payback period. Instances of installations of other ECMS are much lower indicating that SMEs may need additional support, information or finance to take action to implement these measures.	
Challenges or barriers to ECMs	Lack of finance Lack of time	SMEs lack of finance is perceived as the main barrier. There is an opportunity for SPEEDIER Experts to assist with this and guide SMEs through the implementation of a package of more complex ECMs	No and low cost ECMs should be prioritised for organisations that do not have dedicated funds to invest in energy efficiency or where lack of finance is the main barrier.
Dedicated funds for investing?	No – 55%		
Have you received any financial support to ECMs?	No Don't know	This could indicate that either there are no government incentive schemes available in these countries, or that SMEs are simply not aware that any incentive schemes might exist	SPEEDIER Tool could signpost to more information about the available local or national support schemes based on the country selected.
Would you outsource Energy Management?	50% - Yes – Free 20% - Yes Paid 30% - No	In Italy , most businesses stated that they would be happy to outsource energy management and most respondents would prefer the service to be free of charge	The SPEEDIER Expert should use this information to determine the best way of structuring their business offering.

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3.3 Characterisation based on survey responses from Spain

Parameter	Spain	Characterisation	How characterisation is reflected in SPEEDIER Tool
Business operating sector	Others (57%) Aerospace, telecommunications, agriculture, building automation, sports management	There is not a prevailing sector or activity. The wide range of business sectors imply that the SPEEDIER service will need to be tailored accordingly to their needs.	The tool should recommend ECMs that are appropriate to the sector of the SME.
Number of employees	71% - 0 to 25 employees	The majority of participants in SPEEDIER in Spain are likely to be at the smaller end of the SME size scale.	In small SMEs the tool should prioritise no and low cost ECMs.
Previous year turnover	52% - 0€ to 1M 38% - 1M to 10M		
Building occupancy	76% Part rent	Spain is the most particular case where most of the SMEs surveyed do not have ownership of the building they occupy. This may redirect the ECMs to onsite equipment and its control.	If the SME does not own the building they occupy the tool should recommend ECMs that relate to upgrading equipment, ensuring good control of onsite equipment and staff behaviour.
Unit cost of energy (optional)	57% No answer 33% 0.05-0.10 €/kWh	Most respondents lack knowledge of the unit price of electricity or gas. The level of annual spending on electricity also seems to correlate somewhat to the turnover of the businesses that responded in each country.	If unit cost of energy is unknown or greater than the cheapest nationally available energy tariff, ECMs should include advice on switching to a cheaper tariff.
Unit cost of gas (optional)	71% No answer		
Annual energy cost	43% Don't know 33% More than €10.000	The level of annual spending on electricity also seems to correlate somewhat to the turnover of the businesses that responded.	If annual cost of energy is unknown, ECMs should include staff awareness and energy monitoring. If annual energy cost is less than €5000 per year, restrict ECMs to no and low cost ECMs.
Annual cost of gas	38% No answer 33% Don't use		
Uses of energy	Lighting HVAC Office equipment	Check later table of ECMs with different uses and costs.	ECMs should be selected that relate to the uses of energy identified.
Energy Manager?	No (71%)		

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Energy policy?	No (67%)	This presents a great opportunity for SPEEDIER as it shows that there is a gap in the knowledge and resources of SMEs in terms of energy management which could be filled by a SPEEDIER Expert.	ECMs should include recommendation to set up energy policy for the organisation
Energy consumption targets?	No (52%)	The SPEEDIER program needs to be able to cover this requirement for setting energy consumption targets and monitoring progress against targets.	ECMs should include recommendation to set a target for energy reduction for the organisation. The tool should include the ability to track energy consumption over time to assess progress against targets.
Energy consumption tracking	Paper bills Spreadsheet No tracking 0% Software	Data on historical energy consumption will need to be entered manually into the tool if only paper bills are available.	SPEEDIER Expert can recommend that the SPEEDIER Tool for Experts is used to track energy consumption.
Which ECM's did you implement	LED lights Adjust HVAC controls Heat recovery	In all countries the most commonly installed ECM was LED lights. This is one of the least disruptive ECMs to install and often has a very fast payback period. Instances of installations of other ECMS are much lower indicating that SMEs may need additional support, information or finance to take action to implement these measures.	The tool will not recommend ECMs that have already been implemented or ones that are incompatible with existing equipment.
Challenges or barriers to ECMs	Lack of finance No control building Don't know which ECMS	SMEs lack of finance is perceived as the main barrier. Having no control over the building to enable the implementation of ECMs is also a significant challenge, reflecting the fact that in Spain, many businesses are renting their premises.	No cost and low cost ECMs should be recommended for SMEs that identified lack of finance as the main barrier. If the SME does not own the building they occupy the tool should recommend ECMs that relate to upgrading equipment, ensuring good control of onsite equipment and staff behaviour.

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Dedicated funds for investing?	No – 71%	If the company has their own funds, these can be added to any savings generated by other ECMs or used to fund low/medium or high cost ECMs.	No and low cost ECMs should be prioritised for organisations that do not have dedicated funds to invest in energy efficiency or where lack of finance is the main barrier.
Have you received any financial support to ECMs?	No Don't Know	This could indicate that either there are no government incentive schemes available in these countries, or that SMEs are simply not aware that any incentive schemes might exist	SPEEDIER Tool could signpost to more information about the available local or national support schemes based on the country selected.
Would you outsource Energy Management?	43% - No	A significant proportion of Spanish respondents would not be happy to outsource energy management. The reason for this is unclear, but the results show that the SPEEDIER Service will need to be presented differently to clients according to their country of origin.	The SPEEDIER Expert should use this information to determine the best way of structuring their business offering. In Spain a more effective approach may be to use the tool to signpost SMEs to local SPEEDIER Experts who can assist with energy management.

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3.4 Characterisation based on survey responses from Romania

Parameter	Romania	Characterisation	How characterisation is reflected in SPEEDIER Tool
Business operating sector	Hospitality (61%)	The main business-operating sector in the Romanian pilot region is hospitality, and the average size of the SME's is slightly bigger than that of the other pilot regions. This may result in more specialized ECMs, and it could be possible to start from medium-cost measures.	ECMs that relate to hospitality sector should be included in the tool e.g. signage for hotel guests regarding efficient use of equipment.
Number of employees	44% - 0 to 25 employees 43% - 26 to 50 employees	SMEs range in size in this region and sector from small to medium sized.	For smaller SMEs the tool should prioritise no-cost and low cost ECMs (including switching energy supplier). For medium sized organisations medium cost measures could also be considered.
Previous year turnover	65% 1M to 10M		
Building occupancy	57% Owner	Being owners of the building means they have control over the building construction and all equipment in it.	If SME owns the building, include ECMs that involve major changes to the building e.g. building fabric upgrades and insulation improvements.
Unit cost of energy (optional)	91% No answer	While most SMEs have control over their annual costs of gas and energy, they also lack knowledge of the unit cost.	If unit cost of energy is unknown or greater than the cheapest nationally available energy tariff, ECMs should include advice on switching to a cheaper tariff and staff training and capacity building.
Unit cost of gas (optional)	100% No answer		
Annual energy cost	44% - 5000 to 10000€ 39% - 1001 to 5000€	In general, the annual energy cost seems to correlate with the previous year turnover, stating the size of the SME.	If annual cost of energy is unknown, ECMs should include staff awareness and energy monitoring. If annual energy cost is less than €5000 per year, restrict ECMs to no and low cost ECMs
Annual cost of gas	35% €5001-€10000€ 35% More than 10000€		

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Uses of energy	Lighting HVAC Office equipment Food preparation	Check later table of ECMs with different uses and costs.	ECMs should be selected that relate to the uses of energy identified.
Energy Manager?	No (91%)	The majority of respondents do not have an Energy Manager in their organisation. This presents a great opportunity for SPEEDIER as it shows that there is a gap in the knowledge and resources of SMEs in terms of energy management which could be filled by a SPEEDIER Expert.	ECMs should include recommendation to set up energy policy for the organisation.
Energy policy?	No (61%)		
Energy consumption targets?	No (56%)	The SPEEDIER program needs to be able to cover this requirement for setting energy consumption targets and monitoring progress against targets.	ECMs should include recommendation to set a target for energy reduction for the organisation. The tool should include the ability to track energy consumption over time to assess progress against targets.
Energy consumption tracking	Own accounting system 0% Software	Romania is the only country where most of their SMEs have stated that they track energy consumption using their accounting system, but they do not use any particular program. This may be an opportunity to research which accounting system they use, and how could SPEEDIER supplement any requirements.	SPEEDIER Expert can recommend that the SPEEDIER Tool for Experts is used to track energy consumption or if possible, allow the SPEEDIER tool to import data from the accounting system.
Which ECM's did you implement	LED lights Don't know None	Romania is also the country where there have been fewer ECMS implemented, other than lighting. There may be greater opportunity here to implement a wider range of ECMs.	The tool will not recommend ECMs that have already been implemented or ones that are incompatible with existing equipment.
Challenges or barriers to ECMs	Lack of finance Don't know which ECMs No control of building	SMEs lack of finance is perceived as the main barrier. In many cases, having no control over the building to enable the implementation of ECMs is also a significant challenge for Romanian SMEs.	No cost and low cost ECMs should be recommended for SMEs that identified lack of finance as the main barrier. If the SME does not own the building they occupy the tool should recommend ECMs that relate to

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			upgrading equipment, ensuring good control of onsite equipment and staff behaviour.
Dedicated funds for investing?	No – 52%	If the company has their own funds, these can be added to any savings generated by other ECMs or used to fund low/medium or high cost ECMs.	No and low cost ECMs should be prioritised for organisations that do not have dedicated funds to invest in energy efficiency.
Have you received any financial support to ECMs?	No	This could indicate that either there are no government incentive schemes available in these countries, or that SMEs are simply not aware that any incentive schemes might exist.	SPEEDIER Tool could signpost to more information about the available local or national support schemes based on the country selected.
Would you outsource Energy Management?	74% - Yes - paid	Most businesses stated that they would be happy to outsource energy management and most respondents would be happy to pay for the service.	The SPEEDIER Expert should use this information to determine the best way of structuring their business offering.

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4 Specific parameters for calculations

Once the first profile of each SME participating in SPEEDIER has been determined from the answers provided for the initial questions described in Table 2-1, the SPEEDIER Expert will be able to anticipate the first indicative ECMs that may be suitable for the SME. This will allow them to anticipate which further data and/or parameters they will need to gather in order to calculate and quantify the potential energy and cost savings associated with these possible ECMs.

In this section, the involvement of each of the variables necessary for the proper calculation of energy and cost savings from the proposed ECMs and their relationship to the data entered by the user, will be explained in more detail.

4.1 Parameters not related to the building configuration

4.1.1 Location

The location of the building will enable the weather conditions of the general environment to be determined, which allows some general hypotheses regarding temperature and comfort to be made, prior to gathering full details about the building fabric specification. In order to achieve these first hypotheses, it is necessary to establish a direct relationship between the location input from the SPEEDIER platform user and the associated climatic conditions. There are three possible ways to define the location inputs:

(a) Input location from database: The user chooses an approximate location based on a list of cities and countries in Europe. Each city is already associated with predetermined climatic condition. In an exceptional case, the SPEEDIER Expert will be able to override the weather conditions if they do not agree with the default general weather conditions for the specified location. This is the easiest and most direct option for tool programming.

(b) Input location from map: The user can specify the physical address of the project building on a map, so the interface becomes more graphical and fluid. This option can be particularly useful in projects that are within the limits of climatic areas, and does not require the user to know all the details of each climatic zone.

(c) Download a specialized climate file: Currently, there are specialised public file libraries available for each climatic condition, from which guidance measures can be directly extrapolated, prior to knowing all details of the building. These files enable the option to display the climatic information with more specific parameters and hourly detail throughout the year. Also, there is the possibility to display the information on the weather conditions with a more graphical and fluid workflow. This may be the most complete option for obtaining information, but it is extremely complex to program, so ITeC cannot guarantee its viability for the SPEEDIER platform.

Examples of the types of graphical display that are possible are shown in **Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.**.

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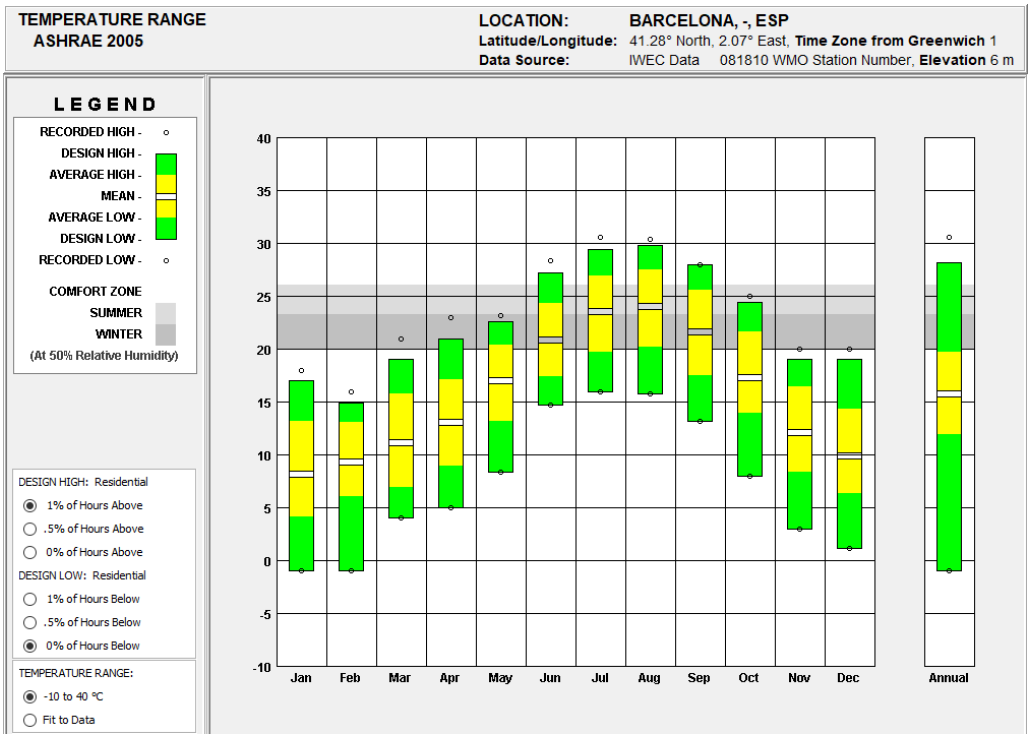

Figure 4-1: Display of the monthly average temperature range related to comfort

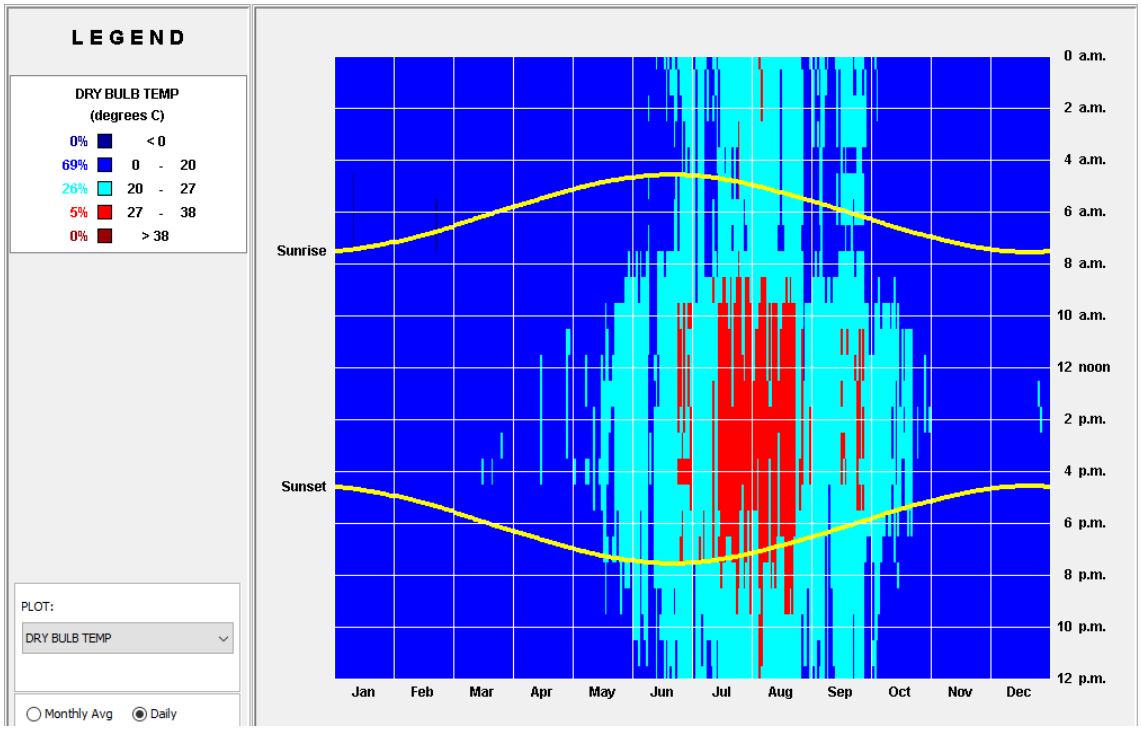

Figure 4-2: Display of each hourly average temperature along one year

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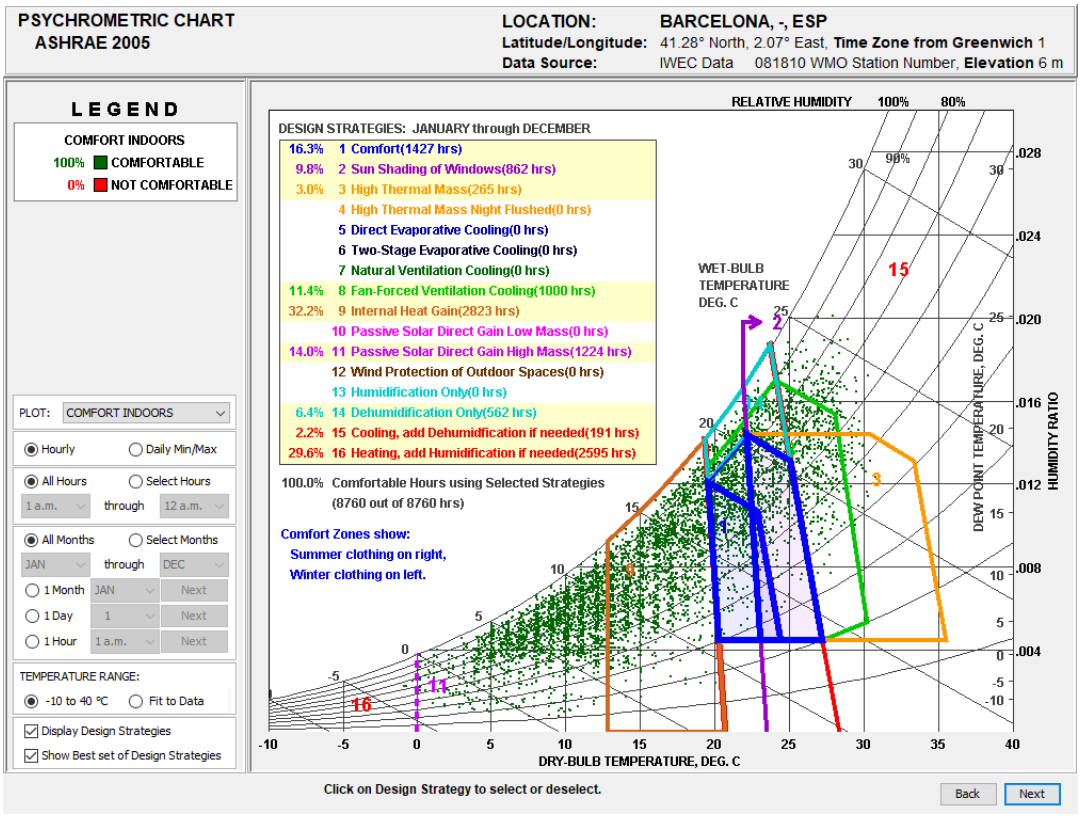

Figure 4-3: Display of a psychrometric chart and possible design strategies accordingly

4.1.2 Use and comfort conditions of the building

This information is necessary to define the difference between the external weather conditions, and the comfort conditions required inside the building. The weather conditions will usually change through the year, so it is necessary to know the degree of adaptation of the inhabitants of the building during regular use. These parameters may be found in the international regulations EN ISO 7730:2005 - Ergonomics of the thermal environment — Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria.

On the SPEEDIER platform, the Expert can determine the desired comfort profiles. The four most used comfort models according the *ANSI/ASHRAE Comfort Standards* are:

(a) For the purpose of sizing residential heating and cooling systems the indoor dry Bulb Design Conditions should be between 20°C to 23.9°C. 80% Relative Humidity and 18.9°C Wet Bulb is used for the upper limit and 2.8°C Dew Point is used for the lower limit.

(b) Thermal comfort is based on dry bulb temperature, clothing level (clo), metabolic activity (met), air velocity, humidity, and mean radiant temperature. Indoors, it is assumed that mean radiant temperature is close to the dry bulb temperature. The zone in which most people are comfortable is calculated using the PMV (Predicted Mean Vote) model. In residential settings people adapt their clothing to match the season and feel comfortable in higher air velocities and so have a wider comfort range than in buildings with centralized HVAC systems.

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(c) For people dressed in normal winter clothes, effective temperatures of 20°C to 23.3°C (measured at 50% relative humidity), which means the temperatures decrease slightly as humidity rises. The upper humidity limit is 17.8°C wet bulb and a lower dew point 2.2°C. If people are dressed in light weight summer clothes then this comfort zone shifts to 2.8°C warmer.

(d) In naturally ventilated spaces where occupants can open and close windows, their thermal response will depend in part on the outdoor climate, and may have a wider comfort range than in buildings with centralized HVAC systems. This model assumes occupants adapt their clothing to thermal conditions, and are sedentary (1.0 to 1.3 met). There must be no mechanical cooling system, but this method does not apply if a mechanical heating system is in operation.

Models prepared from ASHRAE Comfort Standards

These comfort profiles can also be extrapolated from the building activity specified previously by each SME in the questions related to the business sector (see Section 2.2). In this way, the SPEEDIER Expert can save time by reducing the number of complex measurements and required calculations.

4.1.3 Annual schedule profile

By default, the typical hours of use of the building can be anticipated based on the economic activity. ITeC has already configured more than 14 profiles of yearly activity for the SPEEDIER Expert to choose the most appropriate option.

4.1.4 Number of employees

The number of regular employees in the building impacts directly on the calculation of usage parameters such as the need for domestic hot water, or the quantity of necessary work equipment and the building energy consumption.

4.1.5 Building ownership

The ownership of the building will determine the type of ECMs that can be implemented. In general, only SMEs that own the building they occupy will be able to apply ECMs related to the building fabric and construction system.

4.2 Parameters related with the building configuration

4.2.1 Dimension

The shape and size of the building will affect the energy demand if the aforementioned comfort conditions are to be achieved (see section 0 for comfort conditions).

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4.2.2 Construction system

The SPEEDIER platform will allow the introduction of hypothetical construction systems based on general models, so other parameters can be anticipated, such as air tightness or thermal resistance.

4.2.3 Glazing

Likewise, openings may be introduced in each of the orientations and parameters associated with the main glass facades.

4.2.4 Orientation

To define the orientation, the SPEEDIER Expert can directly enter each of the facade surfaces, define its orientation, and associate them with the construction systems mentioned above.

4.2.5 Building age

In case the detail if the building fabric and construction system is unknown, the year of construction may provide guidance measures by default.

4.2.6 Building form, orientation, proximity to other businesses

It is also necessary to know the layout of the building and its surroundings, whether all the façades are isolated, or if the building shares any of the partitions with other thermally conditioned buildings. This detail will impact greatly on the energy demand required for indoor air volume conditioning.

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5 Further considerations

The purpose of this study is to gain an understanding of the market before energy auditing of SMEs begins, that will allow the characterisation of SMEs based on general parameters such as location, size, sector and building occupancy. Thanks to an introductory questionnaire and using data about the SME, the building itself and its parameters, the SPEEDIER Experts will have the necessary tools to start creating an energy auditing plan. Furthermore, the classification of ECMs according to their cost will help to tailor a specialised plan according the needs of every SME and to determine the best strategy in each case.

From this point, it will be key to monitor the progress of the achieved energy cost savings to enable the SME to progress through the implementation of low cost or no-cost measures, towards medium and high cost (and higher impact) measures.

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Annex 1 – Online survey for SMEs

The relevant questions from the online survey for SMEs that was undertaken as part of Task 2.3 if included for reference below.

Section 2: Company Information (All questions mandatory to answer in section-2)

1. In which country is your business located? (Multiple Choice)

- ☐ Austria
- ☐ Belgium
- ☐ Bulgaria
- ☐ Croatia
- ☐ Cyprus
- ☐ Czechia
- ☐ Denmark
- ☐ Estonia
- ☐ Finland
- ☐ France
- ☐ Germany
- ☐ Greece
- ☐ Hungary
- ☐ Ireland
- ☐ Italy
- ☐ Latvia
- ☐ Lithuania
- ☐ Luxembourg
- ☐ Malta
- ☐ Netherland
- ☐ Poland
- ☐ Portugal
- ☐ Romania
- ☐ Slovakia
- ☐ Slovenia
- ☐ Spain
- ☐ Sweden
- ☐ United Kingdom
- ☐ Others (Please Specify)

2. In which sector does your business operate? (Multiple Choice)

- ☐ Hospitality
- ☐ Education
- ☐ Manufacturing
- ☐ Commercial
- ☐ Retail
- ☐ Services
- ☐ Energy
- ☐ Research
- ☐ Other (please specify)

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3. Approximate number of employees (Multiple Choice)

- ☐ 0-25
- ☐ 25-50
- ☐ 50-100
- ☐ 100-250
- ☐ More than 250

4. Approximate turnover (in Euros) of your business last year (Multiple Choice)

- ☐ 0-1 million euros
- ☐ 1-10 million euros
- ☐ 10-25 million euros
- ☐ 25-50 million euros
- ☐ More than 50 million euros

5. Which of these best describes the ownership of your business premises? (Multiple Choice)

- ☐ We own and occupy the building(s) (owner occupier)
- ☐ We rent an entire building that is owned by someone else (tenant)
- ☐ Other (please specify)

Section 3: Energy consumption

6. If you know it, please tell us how much you pay per kWh of energy consumed for electricity.(om average) (Multiple Choice)

- ☐ 5-10 cents/kWh
- ☐ 10-15 cents/kWh
- ☐ 15-20 cents/kWh
- ☐ 20-25 cents/kWh

7. If you know it, please tell us how much you pay per kWh of energy consumed for natural gas. (Multiple Choice)

- ☐ 0-2 cents/kWh
- ☐ 2-4 cents/kWh
- ☐ 4-6 cents/kWh
- ☐ 6-8 cents/kWh

8. If you know it, please tell us the approximate amount that your business spends annually on the types of energy listed below (Please select all that apply) (Multiple Choice Table

	Don't know	Don't Use	€0-€1k	€1k-€5k	€5k-€10k	More than €10k
Electricity	☐	☐	☐	☐	☐	☐
Natural Gas	☐	☐	☐	☐	☐	☐
LPG	☐	☐	☐		☐	☐
Oil	☐	☐	☐	☐	☐	☐
Other (please specify)	☐	☐		☐		☐

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9. What are the main uses of energy use within your business (please select all that apply) (Check Box)

- ☐ Lighting
- ☐ Heating/Cooling/Ventilation
- ☐ Office Equipment
- ☐ Water Treatment
- ☐ Industrial Process
- ☐ Food preparation
- ☐ I don't know
- ☐ Other (please specify)

Section 4: Energy Management

10. Does your organisation have an Energy Manager? (Multiple Choice)

- ☐ Yes - dedicated energy manager,
- ☐ Yes, combined with another role (e.g. Health & Safety)
- ☐ No
- ☐ I don't know

11. Does your organisation have an energy policy? (Multiple Choice)

- ☐ Yes
- ☐ No
- ☐ I don't know

12. Have you set any targets for reducing energy consumption in your organisation? (Multiple Choice)

- ☐ Yes
- ☐ No
- ☐ I don't know

13. How do you track the energy usage of your organisation? (Check Box)

- ☐ We look at paper or e-Bills
- ☐ We track energy consumption using a spreadsheet
- ☐ We track energy consumption using other software that we pay for
- ☐ We track energy consumption using our accounting system
- ☐ We don't track energy consumption
- ☐ I don't know
- ☐ Other (please specify)

14. Has your business had an energy audit in the last 5 years? (Multiple Choice)

- ☐ Yes – the audit was carried out internally by a member of staff
- ☐ Yes – the audit was carried out free of charge by an external consultant

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☐ Yes – we paid an external consultant to do the audit

☐ No

☐ I don't know

*** If yes, complete question 15. If no or I don't know, go straight to question 18.

Section 5: Energy Audit

15. Did you implement any of the energy conservation measures recommended by the energy audit? (Multiple Choice)

☐ Yes

☐ No

☐ I don't know

*** If yes go to question 16. If no or I don't know go to question 18.

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