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D3.2 Enabling energy rational behaviours mechanism

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IMPlementAtion Work and Actions To change the energy culTure

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1 Executive summary

The work described in this deliverable has been carried out as part of Work Package 3 activities. This Work Package focused on devising the energy behaviour framework, and enabling energy rational behaviour mechanisms building up the professional figure of the Energy Manager. This deliverable in particular describes the procedure for identifying motivational mechanisms for enabling behaviour change and choices. The work includes up to four real industry cases in each of the partner countries to understand the energy culture and guide towards change in energy behaviour.

The following sections describe the links between the Work Package tasks and how the collected information and material was used to create the energy culture survey and the maturity matrix, the latter being a key result of the project.

2 Introduction

2.1 The energy behaviour framework survey

One of the first steps to assist companies in improving their energy culture was to conduct a thorough investigation of the existing circumstances, discuss with the management, and reach viable conclusions regarding improvement. This work was completed as part of Task 3.1 and the groundwork information on the survey was provided in D3.1.

The energy behaviour framework survey aims to capture the Energy Manager and Employees' point of view while also assessing the status of energy efficiency within the organization.

The questions incorporated in the survey investigate five main pillars of energy behaviour framework:

1. Awareness of technologies identified in T1.2 and T2.1,
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class,
3. Current energy practices (activities and processes),
4. External factors such as, community thinking, EU and national regulatory framework in place, social network, forum discussion, and
5. Effect and perception of barriers mapped in T1.1

The survey has been divided in two: one survey for the Energy Manager and one for the Employee. The survey for the Energy Manager acts as a self-assessment tool and collects an understanding about the organization's commitment to energy efficiency, such as information about energy targets set by the organization. These aspects are covered by Pillars 1, 3, 4 and 5.

On the other hand, the survey for Employees gains an understanding about the personal lifestyle and habits, such as switching off lights, daily mode of transportation, and general awareness about energy consumption. These aspects are covered by Pillars 1, 2, and 3. The remaining two pillars are excluded as employees are not necessarily aware of regulations and barriers. The project partners carefully reviewed the survey and translated it into their local language. Figure 1 illustrates the survey structure.

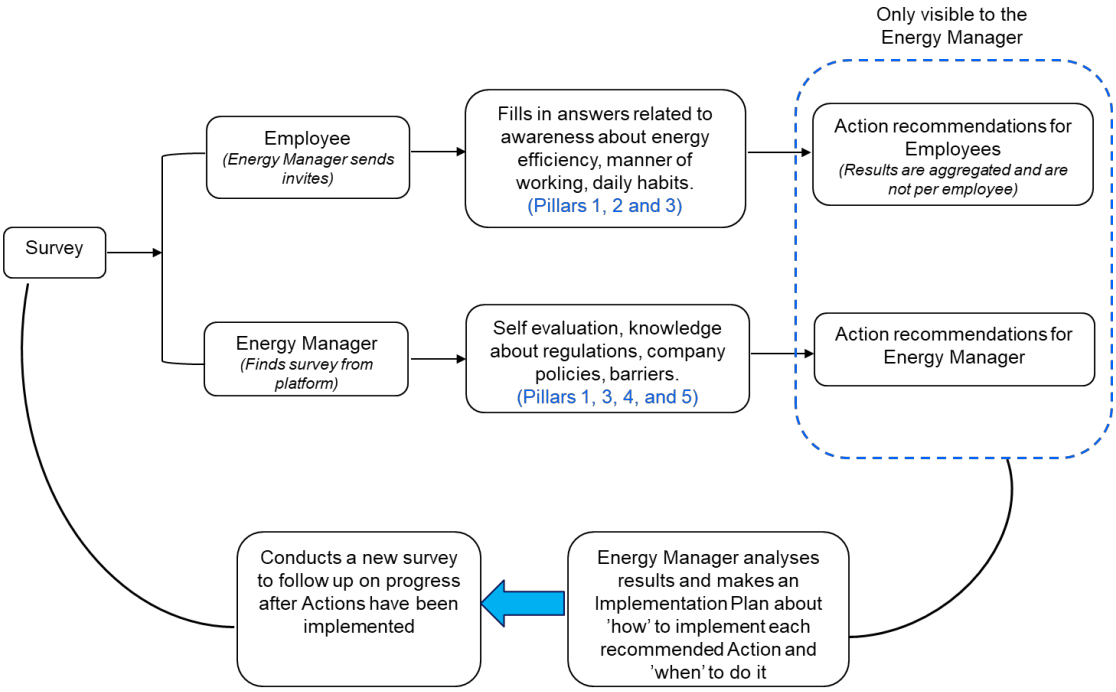

Figure 1: Structure of the energy behaviour framework for the Energy Manager and Employee

The project partners conducted a thorough study on energy culture focusing on residential, office and other sectors in order to establish a foundation for the method to enhance energy culture in industries. The developed approach strongly focuses on Mr./Ms. Energy Manager within the organization due to the fact that they have the best know how about the building operations and have the possibility to lead towards a change.

2.2 The maturity matrix

Creating the survey was one of the first steps. The next step required developing a method to assess and analyse the situation. The project partners had a strong focus on creating a simple method that is understandable and can be easily adapted according to the company's needs.

The assessment method is based on three conditions:

a. *capturing the current energy culture framework status in an individual company (Energy culture survey)* → This means finding out the status of the specific energy culture pillar to trigger the right motivational mechanism for enabling behavioural change.

b. *evaluating the energy culture framework maturity (Maturity matrix and evaluation of survey results)* → This will allow the person in charge of energy matters in a company to assess the situation within the organization and create a lean and neat procedure to be implemented.

c. *collecting tailored supporting material (actions and connection with maturity matrix)* → It is instrumental to generate exhaustive knowledge and practical materials on measures to improve energy culture and maintain a high level of maturity of energy culture pillars as this will collectively lead the corporate policy towards behavioural change.

Maturity matrices give an opportunity to understand the current state of performance, find out barriers and existing opportunities, and repeat the process again at a later stage to find out the progress achieved[1]. By utilizing the maturity matrix in the context of enhancing energy culture in industries, the experts along with the Mr./Ms. Energy Manager have the opportunity to gain an understanding of the status of energy efficiency and energy efficient behaviours in an organization from various perspectives. The

[1] Maturity Matrices. https://www.sustainsuccess.co.uk/maturity-matrices

maturity matrix is a valuable tool for Mr./Ms. Energy Manager as it provides a comprehensive and visual view of the existing situation and all progress of implemented measures can be effectively tracked.

IMPAWATT project partners designed a maturity matrix focusing on five pillars: 1) Awareness of technologies; 2) Specific cultural aspects; 3) Current energy practices in the company; 4) External factors (e.g. community thinking, EU and national regulatory framework in place) and 5) Effect and perception of barriers mapped. Figure 2 illustrates the maturity matrix developed in IMPAWATT.

Each pillar is assigned a set of specific questions. Each question includes a set of options for the respondent to choose from. In turn, each option has a score, and this could be either Low, Medium or High. These questions together make the survey. The Likert scale from 1 - 5 is used for scoring of the survey questions. The scoring allows to assess the maturity of each pillar, and hence, allow the Energy Manager to identify gaps and areas to improve in within the organization. Annex 1 shows the breakdown of questions per pillar and which answer options correspond to which scoring category.

In addition to enabling understanding of the different pillars, the maturity matrix also provides the Energy Manager with a set of action recommendations for each pillar, based on the score obtained. A low score in any pillar would give three action recommendations, a medium score will suggest two action recommendations, and a high score in a pillar would give one action recommendation. If the pillar receives a high score, the action recommendation mainly serves the purpose to maintain the high maturity level of the pillar.

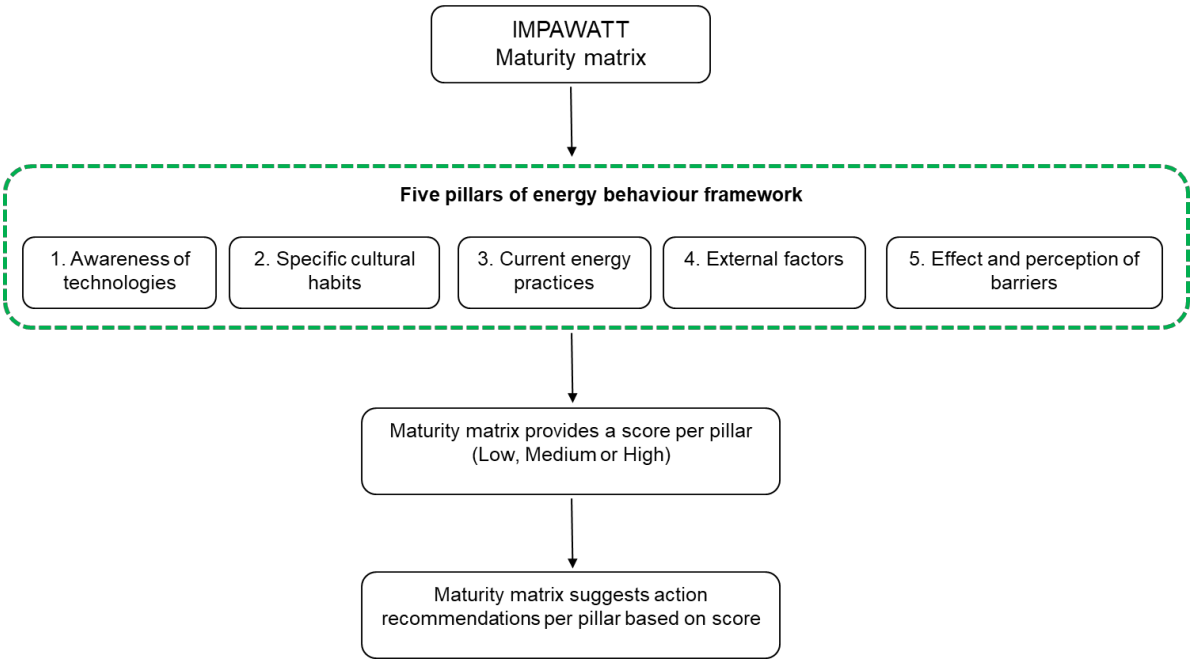

Figure 2: IMPAWATT maturity matrix

3 Action recommendations

In order to provide complete support in transforming the energy culture in industries, a set of action recommendations are given to the Mr./Ms Energy Manager once the surveys are completed. As shown in Figure 1, the survey results for both surveys are only visible to the Energy Manager. The results for the Employee survey are aggregated and shown to the Energy Manager.

Energy Manager actions

The Energy Manager survey is a self-assessment tool and collects information about the person's expertise, background qualification, and energy goals set by the management. IMPAWATT has

developed a set of 12 actions for the Energy Manager (Table 1). Based on the score per pillar, the maturity matrix provides suggestions for a variety of aspects. The Energy Manager may then choose the actions that are easiest to implement and decide which ones are not feasible to do (due to lack of resources or other reasons etc.). The Energy Manager may then make a 12 month timeline that highlights the starting and ending time of each planned action.

Table 1: Energy Manager actions (includes Pillar 1, 3, 4 and 5)

Pillars	IMPAWATT Actions for Energy Managers
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated
	3) Make sure that technical systems are correctly maintained, the settings are correct and removable parts such as filters are checked, cleaned and changed periodically.
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.

Employee actions

The Employee survey assesses the lifestyle of the employees' and awareness of energy matters, such as daily habits, and decisions related to purchasing products and modes of transportation. IMPAWATT has developed 9 action recommendation also for the employees. The Energy Manager invites the employees through email to take the survey. All results are aggregated and the Energy Manager may follow a similar procedure to create a timeline about which actions are easiest to do and which actions will take time to implement.

Table 2: Employee action recommendations (includes Pillar 1, 2 and 3)

Pillars	IMPAWATT Actions for Employees
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)
	(3) Allow easy ways to save energy (e.g. one button shutdown of electronic devices when not needed)
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy
	(5) Use visualization to inform about energy waste or increased energy consumption
	(10) Compare energy performance between similar groups in organization (normative feedback)
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)
	(9) Monitor energy consumption and show employees achievement of objectives and energy targets
	(16) Organize workshops where employees learn to know the energy targets of company and participate in finding the ways how to save energy in the workplace

4 VTT industry cases

VTT conducted interviews with various types of SMEs focusing on ICT, smart infrastructure, marketing and real estate development. The following tables describe the respective energy cultures and the recommendations provided by the online survey tool.

4.1.1 Case 1 → Industry sector: ICT, Company size: 30 employees, Location: Finland

Energy manager survey results

Table 3: Feedback on survey for Energy Manager for Case 1 Finland

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	In small sized companies, responsibilities are combined with everyday jobs.
2. Which actions can you choose for your company?	Only some of them are possible to do.
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	It's not generally needed in an SME. To do all actions, you probably need motivation and feel the need to do something more. We are 30 people in the company and it is well managed.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 4: Results for Energy Manager from Case 1 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	If there is option to purchase e.g. Energy star certified technology, we do so.
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Difficult to do	Employees are already shutting down their computers, a major change is not needed as such.
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Difficult to do	The managers are taking care of the energy needs. We use wind power for our building
	9) Systematically gather and track data from energy use across different parts of	Easy to do	We have relatively small office with no

	the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress		onsite servers or any other heavy tech that would consume a lot so not relevant.
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Difficult to do	Same as above. We generally are not consuming a lot of energy and act responsibly
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Easy to do	Basic common sense 'Turn of things' applies and buying e.g. Energy star certified laptops and other tech.
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Already being done?	We do not use that much that this would be relevant for us.
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	We have good internal communication and employees actively discuss topics
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.	Difficult to do	We are a small company and people easily talk to each other about all issues
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	Same as above. Employees discuss issues with each other and we are a small team, therefore there is not much consumption. Remote work is also allowed.

Table 5: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 1 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Energy Manager_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) When considering investments or refurbishments, find out about energy efficient											

alternatives that usually also have lower lifetime costs.									
2) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.									
3) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.									
4) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.									

Employees survey results

Table 6: Feedback on survey for Employees for Case 1 Finland

Case 1_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Employees are generally doing small actions such as switching off lights.
2. Which actions can you choose for your company?	The overall situation is good in the company
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We are a small company, people can communicate easily with each other and take care of things themselves.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 7: Results for Employees survey from Case 1 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy to do	All employees are given laptops
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Already being done	We don't have large equipment. We already have LED lights with sensors

2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	Same as above
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Difficult to do	We are well aware and have recently invested in a wind power park
	(9) Monitor energy consumption and show employees achievement of objectives and energy targets	Easy to do	Discussion amongst employees keeps everyone aware

Table 8: Timeline for implementing selected actions (M1 refers to Month 1) for Case 1 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Employees_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)											
9) Monitor energy consumption and show employees achievement of objectives and energy targets											
4) Support employees with information that gives advice on what is currently the most effective way to save energy											

4.1.2 Case 2 → Industry sector: ICT, Company size: 25 employees, Location: Finland

Energy Manager survey results

Table 9: Feedback on survey for Energy Manager Case 2 Finland

Case 2_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	We do as much as possible ourselves. The results seem quite accurate for our company situation.
2. Which actions can you choose for your company?	Only some of them are possible to do. We do not own the building.
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	A lot of more time and someone that actively takes responsibility for the tasks.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 10: Results for Energy Manager from Case 2 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	Case 2_Results for Energy Managers	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	We are using laptops and work remotely sometimes.
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	No drastic measure required	Generally employees are taking care of small things and the office is well take care of.
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Difficult to do	We do not own the building. Therefore, we can only follow the updates as they are communicated by the owner
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	Difficult to do	Same as above.
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Difficult to do	Same as above.
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Easy to do	We have a good team and could keep each other informed about interesting events.
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	We are not building owners.
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	This could be done, but in general employees actively talk to one another.
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the	Difficult to do	This person would have to be in contact

	organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.		with the building owner. Perhaps this is possible, but not entirely sure yet.

Table 11: Timeline for implementing selected actions (M1 refers to Month 1) Case 2 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Energy Manager_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.											
11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.											
13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.											

Employee survey results

Table 12: Feedback on survey for Employees for Case 2 Finland

Case 2_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Good results
2. Which actions can you choose for your company?	Overall situation is quite good. We can ensure our good ways in the future.
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	No drastic action needed from our side.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 13: Results for Employees survey from Case 2 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	**Case 2_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Already being done	Employees have laptops. We do not have a lot of energy consuming

			equipment. We use LED lights.
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	Overall the situation is good in our company. Employees are not careless.
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Difficult to do	We are not building owners. This could come from them, as needed.

Table 14: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 2 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Employees_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
(1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)											
(4) Support employees with information that gives advice on what is currently the most effective way to save energy											

4.1.3 Case 3 → Industry sector: Smart infrastructure, Company size: 200 employees, Location: Finland

Energy Manager survey results

Table 15: Feedback on survey for Energy Manager for Case 3 Finland

Case 3_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	As building owners, we are active and conscious of energy matters.
2. Which actions can you choose for your company?	Overall situation looks good
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We have an assigned Energy Manager, so anything critically important can be taken care of.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 16: Results for Energy Manager from Case 3 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	Case 3_Results for Energy Managers	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	Generally this is good at the moment.
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	Same as above
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Not needed as such	We own the building, therefore we are taking care of many things already.
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Easy to do	We are the building owners and we are ensuring good maintenance of all buildings.
5. Effect and perception of barriers	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Already being done	-

Table 17: Timeline for implementing selected actions (M1 refers to Month 1) for Case 3 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 3_Energy Manager_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.											
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated											
12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.											

Employee survey results

Table 18: Feedback on survey for Employees for Case 3 Finland

Case 3_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Good results
2. Which actions can you choose for your company?	The company situation looks good, there is no immediate action needed as such.
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We have a responsible Energy Manager assigned who stays updated with the building and other situations.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 19: Results for Employees survey from Case 3 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	**Case 3_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy/Already being done	Employees have the flexibility to work remotely and use laptops.
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Already being done	Perhaps this can be checked more.

2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	People do have the awareness in general.
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Will be good to have	In general the company is in a good situation.

Table 20: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 3 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 3_Employees_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
4) Support employees with information that gives advice on what is currently the most effective way to save energy											

4.1.4 Case 4: Industry sector: construction & real estate, Company size: 100 employees

Energy Manager survey results

Table 21: Feedback on survey for Energy Manager for Case 4 Finland

Case 4_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	As real estate owners, managing the energy matters is crucial.
2. Which actions can you choose for your company?	Overall situation looks good
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Currently no immediate measures required from our side
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 22: Results for Energy Manager from Case 4 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	**Case 4_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	This could be done in the long run

	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Already being done	Same as above
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Easy to do/Being done	We are active in these matters being real estate owners
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	Easy to do/Being done	Same as above
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Easy to do	This could be done in the long run
5. Effect and perception of barriers	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Easy to do	Same as above. We have in house experts in sustainability.

Table 23: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 4 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 4_Energy Manager_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.											
9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.											
15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.											

Employee survey results

Table 24: Feedback on survey for Employees for Case 4 Finland

Case 4_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	As real estate owners, managing the energy matters is crucial.
2. Which actions can you choose for your company?	Overall situation looks good
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Currently no immediate measures required from our side
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 25: Results for Employees survey from Case 4 Finland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Pillars	**Case 4_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy to do	Employees do this and work with laptops as well as remotely
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Easy to do	The company is continuously expanding and will be planning building operations even better in the future.
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	Employees are active and aware of current requirements
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Long term plan	We do take environmental performance into account, more for the future.

Table 26: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 4 Finland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 4_Employees_Finland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)											
(4) Support employees with information that gives advice on what is currently the most effective way to save energy											

5 PLA industry cases

5.1.1 Case 1 → Industry sector: Consulting, Company size: 110 employees, Location: Switzerland

Energy manager survey results

Table 27: Feedback on survey for Energy Manager for Case 1 Switzerland

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	They are all interesting, but each one would have to be analysed in more detail to see how it can be applied to our company.
2. Which actions can you choose for your company?	Most of these actions would have to be discussed with and validated by the management before they are implemented
3. Which action is the easiest to implement?	Communication to employees (action 13)
4. Which action is the most difficult to implement?	Monitoring (action 9)
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We need support from the management and a dedicated budget.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 28: Results for Energy Manager from Case 1 Switzerland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do
	3) Make sure that technical systems are correctly maintained, the settings are correct and removable	Difficult to do

	parts such as filters are checked, cleaned and changed periodically.	
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	Difficult to do
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Difficult to do
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Difficult to do
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Easy to do
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Difficult to do
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Easy to do

Table 29: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 1 Switzerland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Energy Manager_Switzerland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated											

10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.								
13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.								
15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.								

Employees survey results

Table 30: Feedback on survey for Employees for Case 1 Switzerland

Case 1_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	They are all interesting, but each one would have to be analysed in more detail to see how it can be applied to our company.
2. Which actions can you choose for your company?	Most of these actions would have to be discussed with and validated by the management before they are implemented
3. Which action is the easiest to implement?	Action 1) choose systems with low consumption
4. Which action is the most difficult to implement?	Action 5) Use visualisation requires a monitoring campaign which is time consuming
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We need support from the management and a dedicated budget.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 31: Results for Employees survey for Case 1 Switzerland. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy to do	Only when we change systems
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of	Difficult to do	We cannot select the settings for all PCs of all

	standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)		individual employees
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	
	(5) Use visualization to inform about energy waste or increased energy consumption	Difficult to do	Requires monitoring to be in place
3. Current energy practices (activities and processes)	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Easy to do	Needs support from management
	(9) Monitor energy consumption and show employees achievement of objectives and energy targets	Difficult to do	Requires monitoring to be in place

Table 32: Timeline for implementing selected actions (M1 refers to Month 1) for Case 1 Switzerland. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Employees_Swtizerland											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)											
(4) Support employees with information that gives advice on what is currently the most effective way to save energy											
(9) Monitor energy consumption and show employees achievement of objectives and energy targets											

6 AEA industry cases

6.1.1 Case 1 → Industry sector: Healthcare, Company Size: 180 employees; Location: Austria

Energy manager survey results

Table 33: Feedback on survey for Energy Manager for Case 1 Austria

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Sometimes good suggestions for measures, otherwise the suggestions are more aimed at an energy and / or environmental management system.
2. Which actions can you choose for your company?	We will certainly push the topic of commissioning management more strongly in the future.
3. Which action is the easiest to implement?	Integration of an useful benchmarking system
4. Which action is the most difficult to implement?	Measures in which there are many people involved. As they usually have little time for new topics.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	More time and additional financial support
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	This is very diverse and cannot be answered so generally.

Table 34: Results for Energy Manager from Case 1 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	2) Establish a common principle that all technical facilities are optimized before commissioning so that the settings are as energy-efficient as possible for the intended use, e.g. which functions are activated	Good suggestion, as this is not implemented yet. It is planned to include a separate point for commissioning in the tender.
3. Current energy practices (activities and processes)	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	There is a systemic recording of energy consumption. The evaluation and analysis of this data, however, requires a lot of time, which often does not exist. The main consumption values are frequently evaluated and communicated.
	Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts	External consultations are regularly used. The results from this are different. ESCO contracts are currently not an issue because it is not desirable to have other external companies in the health facilities.

	whereby they are paid in proportion to the energy conservation achieved.	
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	There is a benchmarking system that has already proven itself. Other hospitals have already been offered to participate in this key figure system
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	There is a communication plan that is incorporated into the company group's energy management system.
	Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	There is a central energy team for all hospitals in the company group. Separate decentralized energy teams in each hospital were not implemented due to a lack of interest.

Employees survey results

Table 35: Feedback on survey for Employees for Case 1 Austria

Case 1_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Often it is not possible to influence the suggestions. The purchase department is responsible for purchasing the devices.
2. Which actions can you choose for your company?	Everyone is responsible for the efficient use of energy in his or her own area.
3. Which action is the easiest to implement?	Turn off everything that is not needed
4. Which action is the most difficult to implement?	Detailed energy data management (a lot of data available - very time-consuming).
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Resources (time and financial)
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	1) Communication of energy related targets 2) Minimum requirements for purchase

Table 36: Results for Employees survey from Case 1 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 2

Survey Pillars	Case 1_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)
1. Awareness of technologies	1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)	Already implemented
	2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	It is done continuously anyway, but in some cases there is insufficient background knowledge of the people involved about the effects
2. Specific cultural aspects (motivation)	4) Support employees to pass on information to others (well-informed and motivated individuals could make others to learn energy efficient behaviours; "energy activist" defined in every team?)	Seasonal energy saving tips are communicated on regular basis.
	5) Use visualization to inform about energy waste or increased energy consumption.	Roughly available (main consumption). Continuous improvement is communicated annually.
3. Current energy practices (activities and processes) **[MEDIUM]**	9) Monitor energy consumption and show employees achievement of objectives and energy targets.	Easy to implement, in planning
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	implemented

6.1.2 Case 2 → Industry sector: Agro-Food, Company Size: 230 employees; Location: Austria

Energy manager survey results

Table 37: Feedback on survey for Energy Manager for Case 2 Austria

Case 2_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Partly covered by ISO 50.001. Remaining suggestions either general knowledge or not applicable.
2. Which actions can you choose for your company?	Daily practice in dealing with energy
3. Which action is the easiest to implement?	Daily practice in dealing with energy
4. Which action is the most difficult to implement?	External factors (e.g. community thinking, existing EU and national legal framework).
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	There is no benchmarking partner available
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	1. Daily practice in dealing with energy

Table 38: Results for Energy Manager from Case 2 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 2_Results for Energy Managers**	**Opinion** **(Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	2) Establish a common principle that all technical facilities are optimized before commissioning so that the settings are as energy-efficient as possible for the intended use, e.g. which functions are activated	Already addressed within the ISO 50.001 processes.
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Was considered, but rejected by CEO. Other external services are being evaluated.
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing	This is difficult. An energy certificate for buildings was conducted, but no results. Other benchmark partners are missing.

	contacts to share ideas and best practices.	
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Implemented within ISO 50.001.
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Implemented within ISO 50.001.

Employees survey results

Table 39: Feedback on survey for Employees for Case 2 Austria

Case 2_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Many suggestions are already being implemented within the framework of ISO 50.001, but can still be improved.
2. Which actions can you choose for your company?	Visualization of Energy Performance Indicator (EnPI), energy targets, integration of energy management in company vision.
3. Which action is the most difficult to implement?	Visualization of EnPI, energy targets
4. Which action is the most difficult to implement?	Optimizing the control and selecting the standard operation of devices / systems so that energy efficiency is achieved without having to carry out certain energy-saving measures
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	There are no detailed plans for the building services due to the continuous expansion of the plant.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Visualization of EnPI, then publication of the energy targets, then integration of EMS into company vision

Table 40: Results for Employees survey from Case 2 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 2

Survey Pillars	Case 2_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Already implemented	Requirements for purchasing already exist.
	2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Difficult to implement	In progress, due to the continuous growth of the plant, there is no uniform building control technology
2. Specific cultural aspects (motivation)	4) Support employees to pass on information to others (well-informed and motivated individuals could make others to learn energy efficient behaviours; "energy activist" defined in every team?)	Easy to implement	Will be implemented in the future via information monitors.
	5) Use visualization to inform about energy waste or increased energy consumption.	Already implemented	Via existing info monitors.
3. Current energy practices (activities and processes)	9) Monitor energy consumption and show employees achievement of objectives and energy targets.	Easy to implement	Will be implemented in the future via information monitors.
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Medium difficult to implement	Integration is desirable but not easy to implement because of the many parallel structures

6.1.3 Case 3 → Industry sector: Leisure culture & art, Company Size: 2500 employees; Location: Austria

Energy manager survey results

Table 41: Feedback on survey for Energy Manager for Case 3 Austria

Case 3_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	We have already implemented a large part of the proposals, which indicates that we are on the right track.
2. Which actions can you choose for your company?	Benchmarking with external energy data. Unfortunately, I have not yet succeeded as data from comparable venues are not available
3. Which action is the easiest to implement?	Systematically gather and track data from energy use.
4. Which action is the most difficult to implement?	Establish a common principle that all technical facilities are optimized before commissioning.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Implementing all measures in the shortest possible time does not make sense because valuable learning from the individually implemented projects cannot flow into further projects. In order to expedite the optimization process in a meaningful way, our energy management system needs more acceptance from the management as well as increased budgetary and time resources.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	1. We would like to see a sub-meter monitoring system implemented in the next 5 years.

Table 42: Results for Energy Manager from Case 3 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 3_Results for Energy Managers**	**Opinion** **(Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	2) Establish a common principle that all technical facilities are optimized before commissioning so that the settings are as energy-efficient as possible for the intended use, e.g. which functions are activated	Difficult to implement Extremely sensible, however, implementation is currently not possible because commissioning - due to the time pressure - is very compressed *Optimizations are carried out by specifically trained staff during ongoing operations.*
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide	Active process The involvement of service providers is coordinated by the specialist planners or the energy management team

	contracts whereby they are paid in proportion to the energy conservation achieved.	
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Easy to implement once budget is released The main meters are all read at least once a month and evaluated once a year. The introduction of sub-meter monitoring is currently still unsuccessful due to budgetary resources
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Active process Internal benchmarking is carried out External benchmarking is difficult to implement due to the lack of data from comparable venues
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Active process Communication takes place in the form of a monthly newsletter and management reviews.
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.	Active process Team meetings, workshops and presentations take place on an ongoing basis
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Active process The energy team has been working together since the management system was set up

Employees survey results

Table 43: Feedback on survey for Employees for Case 3 Austria

Case 3_Feedback on survey for Employees	
Questions	**Answers**
1 What did you think about the suggested actions?	We have already implemented a large part of the proposals, which indicates that we are on the right track.
2 Which actions can you choose for your company?	To provide colleagues with easily understandable and usable help in order to develop energy management with a broad impact.
3 Which action is the easiest to implement?	Support employees to pass on information to others.
4 Which action is the most difficult to implement?	Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions.
5 What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Implementing all measures in the shortest possible time does not make sense because valuable learning from the individually implemented projects cannot flow into further projects. In order to expedite the optimization process in a meaningful way, our energy management system needs more acceptance from the management as well as increased budgetary and time resources.
6 What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	1. We would like to see a sub-meter monitoring system implemented in the next 5 years.

Table 44: Results for Energy Manager from Case 3 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 3_Results for Employees**	**Opinion** **(Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Procurement usually takes the running costs into account	-
	2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Time consuming ongoing process The colleagues must be constantly motivated to optimize the systems.	*Energy optimization is partly a try and error process which is not accepted by the management.*

2. Specific cultural aspects (motivation)	4) Support employees to pass on information to others (well-informed and motivated individuals could make others to learn energy efficient behaviours; "energy activist" defined in every team?)	Easy to implement Support is provided on an ongoing basis	-
	5) Use visualization to inform about energy waste or increased energy consumption.	Active process The instrument of visualization is used on regular basis.	-
3. Current energy practices (activities and processes)	9) Monitor energy consumption and show employees achievement of objectives and energy targets.	Active process	-
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Energy policy established	-

6.1.4 Case 4 → Industry sector: Health Care, Company Size: approx. 7000 employees; Location: Austria

Energy manager survey results

Table 45: Feedback on survey for Energy Manager for Case 4 Austria

Case 4_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	The majority already implemented
2. Which actions can you choose for your company?	Possibly greater focus on optimization after trial year
3. Which action is the easiest to implement?	This one is already implemented
4. Which action is the most difficult to implement?	-
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	For the optimization of the resource topic, the project manager is already back on a new topic
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	1. greater focus on actual implementation

Table 46: Results for Energy Manager from Case 4 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 4_Results for Energy Managers**	**Opinion** **(Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	2) Establish a common principle that all technical facilities are optimized before	Currently probation year with readjustment

	commissioning so that the settings are as energy-efficient as possible for the intended use, e.g. which functions are activated	*(May not be carried out in full)*
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	In-house is ESCO contracting not desired
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Energy monitoring system in place
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Process started *Within a funded project*
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Active process Implemented in Energy management system
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Active process Energy team implemented

Employees survey results

Table 47: Feedback on survey for Employees for Case 4 Austria

Case 4_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	We have already been implemented or are in implementation process
2. Which actions can you choose for your company?	No new suggestions
3. Which action is the easiest to implement?	Everything implemented

4. Which action is the most difficult to implement?	*Marked in the table.*
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	The LED exchange is limited by the annual financial resources (currently>1,000 light points/a)
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	-

Table 48: Results for Energy Manager from Case 4 Austria. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1

Survey Pillars	**Case 4_Results for Employees**	**Opinion** **(Easy to do, Difficult to do, Already being done, or another suitable answer)**
1. Awareness of technologies	1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	LED installed as a replacement for years, laptops more and more in use Laptops for stationary workplaces not so ergonomic, for LED replacement annual instalments
2. Specific cultural aspects (motivation)	5) Use visualization to inform about energy waste or increased energy consumption.	Energy cockpit in intranet This covers 68% of the energy demand
	4) Support employees with information that gives advice on what is currently the most effective way to save energy	Intranet, campaigns
3. Current energy practices (activities and processes)	9) Monitor energy consumption and show employees achievement of objectives and energy targets.	Energy monitoring given, information in energy group and partly in employees magazine
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Implemented in energy policy

7 ENV industry cases

ENVIPARK conducted interviews with various types of SMEs focusing on wood processing (timber frames, sawmill), energy utilities and real estate management sectors. The following tables describe the respective energy cultures and the recommendations provided by the online survey tool.

7.1.1 Case 1 → Industry sector: wood processing (timber frames production) Company size: 36 employees, Location: Italy

Energy manager survey results

Table 49: Feedback on survey for Energy Manager Case 1 Italy

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Most of them are feasible in the mid-long term.
2. Which actions can you choose for your company?	Priority is for those that are easy to do
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Show to the property the opportunities associated to energy efficiency and funding schemes
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	I think we should start working on raising awareness of all the staff and on putting energy at the centre of the policies of the organisation Marked in the table

Table 50: Results for Energy Manager from Case 1 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	Not still done systematically
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	Feasible without big efforts
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	Difficult to do	High level management has been traditionally focused on different priorities
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency	Difficult to do	The potential energy improvements don't require the

	improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.		involvement of energy service providers
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Easy to do	A first energy consumption analysis has been initiated in the frame of EPD implementation
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Easy to do	The organisation is member of CLEVER cluster, providing support on this topic
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Difficult to do	The organisation lacks a pro-active approach and it's difficult to dedicate time to training
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	Difficult to get benchmarks in this sector, with a big variety of processes
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	The company is already active on dissemination and communication of product related sustainability aspects
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	The staff is limited in number and it's difficult to dedicate time to such activities

Table 51: Timeline for implementing the selected actions (M1 refers to Month 1) Case 1 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

<table>
<tr><th colspan="12">Case 1_Energy Manager_Italy</th></tr>
<tr><th>M1</th><th>M2</th><th>M3</th><th>M4</th><th>M5</th><th>M6</th><th>M7</th><th>M8</th><th>M9</th><th>M10</th><th>M11</th><th>M12</th></tr>
<tr><td colspan="3"></td><td colspan="6">2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated</td><td></td><td></td><td></td></tr>
<tr><td colspan="3">9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="9"></td><td colspan="3">1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.</td></tr>
<tr><td colspan="12">2) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.</td></tr>
<tr><td colspan="3">10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

7.1.2 Case 2 → Industry sector: Sawmill, Company size: 7 employees, Location: Italy

Energy manager survey results

Table 52: Feedback on survey for Energy Manager for Case 2 Italy

Case 2_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Most of them are feasible in the mid-long term.
2. Which actions can you choose for your company?	Priority is for those that are easy to do
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Lack of dedicated staff and resources

6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	One year could be the right timeline Marked in the table

Table 53: Results for Energy Manager from Case 2 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	Case 2_Results for Energy Managers	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	Easy to do	The sawmill has the "zero emission" target, with the specific aim to substitute LPG with renewable energy from wood waste valorization and procure only green energy
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Already being done	The company is supported by an energy consultant, both for the brokerage of the best energy contracts and for the identification of energy efficiency measures
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Difficult to do	Energy monitoring and measurement of individual equipment and plants is actually difficult to implement
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Easy to do	-
	11) Build capacity in the organization, yours and other key personnel, by	Easy to do	Possibility to integrate the

	providing and participating in training and events where successful practices and technologies can be shared and lessons learned.		existing training programs
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	Comparison and benchmarking are possible only for the office buildings, where different energy performance level are evident
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	The company level of investment in communication of sustainability is increasing
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.	Easy to do	
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	The staff is limited in number and it's difficult to dedicate time to such activities

Table 54: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 2 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Energy Manager_Italy											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
					11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.						
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.											
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated											
7) Decide with the management clear energy conservation											

emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.									
				2) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.					
10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.									

Employees survey results

Table 55: Feedback on survey for Employees for Case 2 Italy

Case 2_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	They suit with actual needs
2. Which actions can you choose for your company?	Actions based on internal communication
3. Which action is the easiest to implement?	Actions based on internal communication
4. Which action is the most difficult to implement?	Optimization of controls
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Adequate support in reporting about energy performance could help
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	One year is a reasonable timeline Marked in the table

Table 56: Results for Employees survey from Case 2 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	Case 2_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Already being done	
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Difficult to do	Limited possibility to integrate the building with BACS or similar solutions
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	Possibilities to use already implemented internal communication tools
	(5) Use visualization to inform about energy waste or increased energy consumption	Easy to do	Energy info already available
3. Current energy practices (activities and processes)	(9) Monitor energy consumption and show employees achievement of objectives and energy targets	Easy to do	Possibilities to use already implemented internal communication tools
	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Easy to do	

Table 57: Timeline for implementing selected actions (M1 refers to Month 1) for Case 2 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Employees_Italy											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
				(4) Support employees with information that gives advice on what is currently the most effective way to save energy							
(5) Use visualization to inform about energy waste or increased energy consumption											
(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)											

							(9) Monitor energy consumption and show employees achievement of objectives and energy targets

7.1.3 Case 3 → Industry sector: energy utility Company size: 8102 employees, Location: Italy

Energy manager survey results

Table 58: Feedback on survey for Energy Manager for Case 3 Italy

Case 3_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Most of them can be easily integrated in the ISO 50001 energy performance improvement plan
2. Which actions can you choose for your company?	All identified actions
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Integration of the energy culture action plan in the ISO 50001 targets
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	One year could be the right timeline Marked in the table

Table 59: Results for Energy Manager from Case 3 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 3_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	The company has ISO 50001 certification
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Easy to do	The company also operates as ESCO, it's easy to exploit the available competences for internal energy efficiency projects
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Easy to do	The organisation recently started with an energy audit on the fleet of vehicles

4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Easy to do	The extension of buldings and plants under the property and management of the company allows an effective internal benchmarking
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	The company has ISO 50001 certification
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Easy to do	The company has ISO 50001 certification

Table 60: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 3 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

<table>
<tr><th colspan="12">Case 3_Energy Manager_Italy</th></tr>
<tr><th>M1</th><th>M2</th><th>M3</th><th>M4</th><th>M5</th><th>M6</th><th>M7</th><th>M8</th><th>M9</th><th>M10</th><th>M11</th><th>M12</th></tr>
<tr><td colspan="5">2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5"></td><td colspan="7">8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.</td></tr>
<tr><td colspan="7">9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6"></td><td colspan="6">12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.</td></tr>
<tr><td colspan="12">13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.</td></tr>
</table>

15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.

7.1.4 Case 4 → Industry sector: real estate management Company size: 30 employees, Location: Italy

Energy manager survey results

Table 61: Feedback on survey for Energy Manager for Case 4 Italy

Case 4_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Suitable with the needs
2. Which actions can you choose for your company?	Priority is for those that are easy to do
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Check about resources to be planned
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	One year could be the right timeline Marked in the table

Table 62: Results for Energy Manager from Case 4 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 4_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	The company is working on an industrial plan including investments for energy efficiency
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	The company is ISO 14001 certified
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	Easy to do	Energy consumption and GHG emissions are already part of the set of internal environmental indicators
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor	Already being done	The ESCO approach for energy efficiency interventions is under evaluation

	conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.		
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Difficult to do	The articulation and layout of the spaces managed makes it difficult to investigate the different contributions to the baseline
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	The articulation and layout of the spaces managed makes it difficult the implementation of a benchmarking activity
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	The company is implementing a new approach to internal and external communication
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Easy to do	The company has access to adequate internal staff and skills

Table 63: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 4 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 4_Energy Manager_Italy											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
					1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.						
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated											
									7) Decide with the management clear energy conservation emissions		

									reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.
15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.									
				2) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.					

Employees survey results

Table 64: Feedback on survey for Employees for Case 4 Italy

Case 4_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	They suit with actual needs
2. Which actions can you choose for your company?	Actions based on internal communication
3. Which action is the easiest to implement?	Actions based on internal communication
4. Which action is the most difficult to implement?	Optimization of controls
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Nothing in particular
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	One year is a reasonable timeline Marked in the table

Table 65: Results for Employees survey from Case 4 Italy. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 4_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)	Easy to do	Measures on office equipment is already being done, further efforts are possible on lightning and climatization
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building	Difficult to do	Re-configuration of actual systems is difficult

	control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)		
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	Low average age of staff
	(5) Use visualization to inform about energy waste or increased energy consumption	Easy to do	Energy info already available
4. Current energy practices (activities and processes)	(9) Monitor energy consumption and show employees achievement of objectives and energy targets	Easy to do	Possibilities to use already implemented internal communication tools
	(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Easy to do	Environmental policy can be integrated

Table 66: Timeline for implementing selected actions (M1 refers to Month 1) Case 4 Italy. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 4_Employees_Italy											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
(1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)											
(4) Support employees with information that gives advice on what is currently the most effective way to save energy											
(5) Use visualization to inform about energy waste or increased energy consumption											
				(14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)							
							(9) Monitor energy consumption and show employees achievement of objectives and energy targets				

8 SEN industry cases

SEN conducted interviews with two types of SMEs, one office focusing on ICT and a glass construction company. The following tables describe the respective energy cultures and the recommendations provided by the online survey tool.

8.1.1 Case 1 → Service sector: ICT (Geographical Information Systems), Company size: 8 employees, Location: Germany

Energy manager survey results

Table 67: Feedback on survey for Energy Manager for Case 1 Germany

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	In small sized companies, responsibilities are combined with everyday jobs.
2. Which actions can you choose for your company?	Only some of them are reasonable to do.
3. Which action is the easiest to implement?	Marked in the table
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We are too small to implement all the actions.
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 68: Results for Energy Manager from Case 1 Germany. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	Common practice
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	Employees are aware of it and management is supervising it
3. Current energy practices (activities and processes)	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Difficult to do	The office is rented and we are dependent on the owner of the building who is dealing with the contractors
	9) Systematically gather and track data from energy use across different parts of the building and different technical	Easy to do	Was not implemented in the past, but could be

	systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress		an option in the future
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Difficult to do	Same as above. We are tenants and therefore not the target group for EE investments. EE for office devices is not funded.
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Easy to do	IT devices are purchased by the management but there could be a training workshop as reminder to use IT devices, kitchen appliances and lighting in an efficient way.
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	We are too small for benchmarking
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	We don't have different key audiences, so it is easy to develop and to communicate a plan.
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.	Easy to do	Same as above
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	As we are a small company the energy team would consist only of one person or perhaps one other colleague than the energy manager

Table 69: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 1 Germany. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Energy Manager_Germany											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**

1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.							
3) Make sure that technical systems are correctly maintained, the settings are correct and removable parts such as filters are checked, cleaned and changed periodically.							
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated							
13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.							
9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.							
11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.							

Employees survey results

Table 70: Feedback on survey for Employees for Case 1 Germany

Case 1_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Employees are generally doing small actions such as switching off lights.
2. Which actions can you choose for your company?	The overall situation is good in the company
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We have a team meeting each week where we can communicate energy efficiency targets and actions to employees (e.g energy training and vision)
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Buy a new PC and monitor energy consumption in comparison to old PC (could be difficult because of COVID-19 absences of staff) Other actions marked in the table.

Table 71: Results for Employees survey from Case 1 Germany. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	Case 2_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy for one option, difficult for the other	LED is easy but Laptops are difficult as high performance computers are required which are less expensive and better available as desk top than as laptop
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Not relevant	office is quite small
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	4) Support employees with information that informs them about what is currently the most effective way to save energy.	Easy to do	Same as above
3. Current energy practices (activities and processes)	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Easy to do	We are not planning an audit

Table 72: Timeline for implementing selected actions (M1 refers to Month 1) for Case 1 Germany. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_ICT_Employees_Germany											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)											
4) Support employees with information that gives advice on what is currently the most effective way to save energy											
14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)											

8.1.2 Case 2 → Service sector: Glass construction company, Company size: 100 employees, Location: Germany

Energy manager survey results

Table 73: Feedback on survey for Energy Manager for Case 2 Germany

Case 2_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Some are quite time-consuming and therefore difficult to be implemented.
2. Which actions can you choose for your company?	The energy efficient purchase and maintenance of equipment
3. Which action is the easiest to implement?	Energy efficient purchase
4. Which action is the most difficult to implement?	Energy team establishment
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Lack of personnel resources, staff is quite occupied, Covid-19 hinder internal meetings and visits
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 74: Results for Energy Manager from Case 2 Germany. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	Case 2_Results for Energy Managers	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Easy to do	Common practice
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Difficult to do	Lack of personnel resources, technical staff is in charge with rather low communication skills
	3) Ensure that technical systems are correctly maintained, that settings are correct and that removable parts such as filters are regularly checked, cleaned and replaced.	Easy to do	Common practice
3. Current energy practices (activities and processes)	4) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Could be an option medium difficult to be implemented	Energy has not a large share in the cost and staff guiding external consultants and gathering all information required is quite occupied at the moment

	5) Establish clear energy saving targets with management, with measurable objectives, after investigating the energy efficiency potential, e.g. through benchmarking or through separate potential assessments of the individual technical systems.	Difficult to do	Too occupied with daily business, external consultant would be required
	6) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress	Difficult to do	Too occupied with daily business, external consultant would be required
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	7) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Easy to do	Internet research and network of companies can be consulted
	8) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Difficult to do	Too occupied with daily business, external consultant would be required
	9) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	Too occupied with daily business, external consultant would be required
5. Effect and perception of barriers	10) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Difficult to do	We don't have different key audiences, so it is easy to develop and to communicate a plan.
	11) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	Staff is very occupied, a lot are working on construction sites and don't meet very frequently

Table 75: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 2 Germany. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Energy Manager_Germany											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.											
10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example											
9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.											
11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.											

Employees survey results

Table 76: Feedback on survey for Employees for Case 2 Germany

Case 2_Feedback on survey for Employees	
Questions	**Answers**
1. What did you think about the suggested actions?	Good ideas and not a big effort for most of the cases but a new field of action for our staff that is quite busy with daily tasks
2. Which actions can you choose for your company?	The overall situation is good in the company
3. Which action is the easiest to implement?	Marked in the table.
4. Which action is the most difficult to implement?	Marked in the table.
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	We have to open a new communication channel for informing our employees (online best at Covid-19 times), a barrier could be that a lot of employees are working externally on construction sites and that it is difficult to engage employees after spreading the information, so they are following new EE guidance and are aware of EE issues
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 77: Results for Employees survey from Case 2 Germany. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed.

Survey Pillars	Case 2_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Easy to do	-
	(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	More or less easy to do	Light sensors already installed, heating system maintenance by external pro
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	(3) Support employees with information that informs them about what is currently the most effective way to save energy.	Easy to do	Some guidelines can be spread through the intranet
	(4) Use graphical presentations and visualizations to inform about energy waste or increased energy consumption.	More or less difficult to do	Poster and intranet information with charts on consumption
3. Current energy practices (activities and processes)	(5) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Difficult to do	We are not planning an audit
	(6) Monitor energy consumption and show employees the achievement of corporate and energy goals.	More or less easy to do	Lack of personnel resources

Table 78: Timeline for implementing selected actions (M1 refers to Month 1) for Case 2 Germany. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_Employees_Germany											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)											
2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)											
4) Support employees with information that informs them about what is currently the most effective way to save energy.											

9) Monitor energy consumption and show employees the achievement of corporate and energy goals.				
(5) Use visualization to inform about energy waste or increased energy consumption				

9 CCI industry cases

CCI conducted interviews with various types of SMEs in the service and industry Sectors. The following tables describe the respective energy cultures and the recommendations provided by the online survey tool.

9.1.1 Case 1 → Services sector: Company size: 80 employees, Location: France

Energy manager survey results

Table 79: Feedback on survey for Energy Manager for Case 1 France

Case 1_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Yes they are good recommendations
2. Which actions can you choose for your company?	We are unable to implement any action
3. Which action is the easiest to implement?	We are unable to implement any action
4. Which action is the most difficult to implement?	We are unable to implement any action
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Management priorities are different
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 80: Results for Energy Manager from Case 1 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1.

Survey Pillars	**Case 1_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Already being done	Most Employees already have laptops
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Easy to do	Certain equipment are already optimized
	3) Make sure that technical systems are correctly maintained, the settings are correct and removable parts such as filters are checked, cleaned and changed periodically.	Easy to do	-
	7) Decide with the management clear energy conservation emissions reduction	Difficult to do	It is not the present priority

2. Current energy practices (activities and processes)	goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.		
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	Difficult to do	-
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	Difficult to do	-
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Easy to do	The concerned staff already follows courses and participate to such events
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Easy to do	The concerned staff already follows courses and participate to such events
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult	It is not so easy to benchmark with similar sectors
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Easy to do	-
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult	It is not the present priority of the management

Table 81: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 1 France. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 1_Energy Manager_France											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
3) Make sure that technical systems are correctly maintained, the settings are correct and removable parts such as filters are checked, cleaned and changed periodically.											
2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated											
11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.											

Employees survey results

Table 82: Results for Employees survey from Case 1 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 2

Survey Pillars	**Case 1_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Easy to do	-
	2) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Already being done for computer	Most employees are given laptops
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	5) Use visualization to inform about energy waste or increased energy consumption	Easy to do	-
	4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	-
3. Current energy practices (activities and processes)	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Difficult to do	-

9.1.2 Case 2 → Industry (boiler making) 32 persons, Location France

Energy manager survey results

Table 83: Feedback on survey for Energy Manager for Case France

Case 2_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Most of them are difficult to implement due to a lack of human resources
2. Which actions can you choose for your company?	-
3. Which action is the easiest to implement?	Energy Awareness raising actions of the personnel have started
4. Which action is the most difficult to implement?	Tracking of data, follow-up of the subcontractors, benchmarking actions…
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Time and human resources
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 84: Results for Energy Manager from Case 2 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1.

Survey Pillars	**Case 2_Results for Energy Managers**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Difficult to do	-
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	Work in progress	Some machines are already set-up
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	Difficult to do	It is not the present priority
	8) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	Difficult to do	There is not enough ressources to analyse such data

	9) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases.	Middle	Done with some subcontractors
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Difficult to do	There is not enough resources and time available
	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Middle	The company started to implement these actions
	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	There is not enough resources and time available
5. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Difficult to do	There is not enough resources and time available
	14) Include the different departments in energy efficiency improvements by e.g. organizing brainstorming sessions to identify ways they can contribute.	Middle	The company started to implement these actions
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Difficult to do	There is not enough resources and time available

Table 85: Timeline for implementing the selected actions (M1 refers to Month 1) for Case 2 France. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 2_ICT_Energy Manager											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.											

Employees survey results

Table 86: Results for Employees survey from Case 2 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 2

Survey Pillars	Case 2_Results for Employees	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies	1) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Done for some equipment	Detection for lighting, standby modes for computers
	2) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Not the choice of the employee	-
3. Current energy practices (activities and processes)	9) Monitor energy consumption and show employees achievement of objectives and energy targets	-	-
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Not the choice of the employee	-
5. Effect and perception of barriers	6) Support employees with information that gives advice on what is currently the most effective way to save energy	In progress in the company	-

9.1.3 Case 3 → Industry sector (insulation material): Company size: 20 employees, Location: France

Energy Manager survey results

Table 87: Feedback on survey for Energy Manager for Case 3 France

Case 3_Feedback on survey for Energy Manager	
Questions	**Answers**
1. What did you think about the suggested actions?	Most recommendations are not easy to implement
2. Which actions can you choose for your company?	We can only check the list, but will not be able to implement.
3. Which action is the easiest to implement?	Awareness raising actions for the staff, Process optimisation
4. Which action is the most difficult to implement?	Metering and benchmarking
5. What do you need to implement all the actions? Is something missing that could hinder an action from being completed?	Lack of Human and financial as well as of the impact of the actions
6. What would be the timeline for your selected actions, for example in a year? (which one can you do first, second…last)	Marked in the table

Table 88: Results for Energy Manager from Case 3 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 1.

Pillars	Case 3_Results for Energy Managers	Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)	Further comments
1. Awareness of technologies **Rating : low**	3) Make sure that technical systems are correctly maintained, the settings are correct and removable parts such as filters are checked, cleaned and changed periodically.	Already done	Regular Maintenance for Heating system, compressed air …
	1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs.	Difficult to do	The energy criteria are not a priority compared to the technical ones
	2) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated	To study for process	Already implemented on the heating system (reduction during the nights and WE)
3. Current energy practices (activities and processes)	7) Decide with the management clear energy conservation emissions reduction goals with measurable targets, after studying the energy efficiency potential with e.g. benchmarking or by estimating the potential of each technical system separately.	The Energy Manager is also the Site Manager	
	9) Systematically gather and track data from energy use across different parts of the building and different technical systems to develop perspective and context for future actions and decisions and to establish baselines for energy use to detect abnormal energy use and measure progress.	Difficult to do	Not planned yet
	8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved.	-	Not planned yet
4. External factors such as: community thinking, EU and national regulatory framework in place, social network, forum discussion	11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned.	Easy to do	To study
	10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example.	Difficult to do	Lack of time

	12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices.	Difficult to do	Lack of time
4. Effect and perception of barriers	13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.	Already done	Some awareness raising meetings have already been organized
	15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.	Not a priority yet	Not a priority yet

Table 89: Timeline for implementing selected actions (M1 refers to Month 1) for Case 3 France. It refers to anytime during the year when a certain 'Action' may be implemented, for example: May 2021 or August 2022)

Case 3_ICT_Energy Manager											
M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**	**M10**	**M11**	**M12**
13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.											
1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs**.**											

Employees survey results

Table 90: Results for Employees survey from Case 3 France. Actions that are possible to do are marked as 'Easy to do' or explained in an alternative way. Further comments are provided as needed. Full table available in Annex 2

Survey Pillars	**Case 3_Results for Employees**	**Opinion (Easy to do, Difficult to do, Already being done, or another suitable answer)**	**Further comments**
1. Awareness of technologies	2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)	Not aware of the situation on this regard	-

	1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC)	Already done	A part of the technical premises already have LED
3. Current energy practices (activities and processes)	9) Monitor energy consumption and show employees achievement of objectives and energy targets	Not aware of the situation on this regard	Interesting but it concerns the management and not the employees
	14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)	Difficult	
2. Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class	5) Use visualization to inform about energy waste or increased energy consumption.	Easy to do	
	4) Support employees with information that gives advice on what is currently the most effective way to save energy	Easy to do	

10 Discussion and Conclusion

Implementing changes in an organization demands time and dedication by the management and cooperation of all employees. The energy culture survey assesses the organizational environment from the perspective of both the Energy Manager and Employees with the help of five pillars: 1) Awareness of technologies 2) Specific cultural habits, user beliefs & aspirations, motivations, lifestyle and social class, 3) Current energy practices (activities and processes), 4) External factors such as, community thinking, EU and national regulatory framework in place, social network, forum discussion, and 5) Effect and perception of barriers.

The identified pillars allow the experts to collect as much information as possible on a variety of aspects such as regulatory, cultural and technical. In turn, the survey questions have been designed in a way that one question may cover one or two pillars (Annex 1). This signifies the dynamics and synergies between pillars and reduces the need to address each pillar individually with a question and prolong the survey. Consequently, this allows the experts to gain a holistic understanding of the organizational environment and recommend the most effective measures to improve energy culture in the organization on both the short and long term.

Gaining an understanding of the organization is not beneficial unless there is a way to assess and analyse it, and therefore, identify the gaps and opportunities for improvement. The key to this is the maturity matrix as it presents the situation in a visual manner which is easy to understand for both technical and non-technical audiences. Maturity matrices allow the management to see whether or not a change has had the desired impact, and in general, follow the progress.

The IMPAWATT maturity matrix works in two steps. Each response in the survey has an assigned score (low, medium or high), and this scoring signifies the maturity of each of the five identified pillars of the energy behaviour framework. As a second step, the maturity matrix provides the Energy Manager with a set of action recommendations for each pillar, based on the score obtained. Here exists the biggest opportunity that IMPAWATT caters to i.e. fulfilling gaps and raising the energy culture status. A low score suggests there several alternatives that can be adopted and more opportunities for improvement exist. It is also possible to plan the recommended actions in the form of a timeline, and follow the progress during the coming months. A medium or high score may prevent the organization from taking drastic measures to have positive changes. IMPAWATT could lead an organization with a low score to achieve extraordinary transformation and accomplish more than organizations with higher scores.

However, experts recognized lack of motivation to accomplish higher targets as a drawback during the visits. The general belief was the organization was taking care of energy matters well and no immediate action was necessary. Regarding the rebound effect and user engagement, the project partners ensured activity with the use of interactive quizzes and easy visuals.

Exemplary cases of Eco-feedback through easy animated visuals, incentives schemes, stand alone or social platform-based gaming options and social media strategy use are as follows:

- Gaming is first introduced with a brief introduction presentation *Introduce gaming solutions that make people learn energy efficient behaviours*. This can be combined with similar sessions on *Benefits on Energy Efficiency - How to convince management/employees* and *Energy Efficiency as a Strategic Decision* (WP2). In addition, a similar presentation was developed for companies on use of social medial and it was titled *Give employees a possibility to use a social platform to share their ideas on how to save energy in the workplace.* All materials are accessible through the platform.
- Activities to encourage positive energy behaviour may also be combined with the 15 interactive quizzes on various topics including office, lighting, and cooling (available by logging into the IMPAWATT portal). The quizzes are short and based on everyday topics of the workplace. They may be initiated by the Energy Manager as a staff activity or the Employee may take the quizzes himself/herself if they want to use the platform independently. Once the quizzes are completed, the user can check the correct and wrong answers.
- The project also created information packages and factsheets based on *Life cycle assessment, Environmental labels and declarations, Life cycle cost assessment, and Sustainability indicators*

(WP4). The factsheets have easy visuals and describe each topic for the company staff. All materials are easily accessible through the platform and may be accessed anytime.

- Within T2.3 "Best practice examples", a short report on existing financial incentives (from 6 partner countries) and a presentation of the existing financial incentives was created. All partner countries collected information about existing financial incentives for energy audits and investments in energy efficiency. The results were integrated in an Excel-database (in national languages) and summarized in a Word-File (English). Furthermore, a separate PowerPoint presentation was developed for each country in the national languages. The report summarizes the financial incentives in the 6 partner countries: Austria, France, Germany, Italy, and Switzerland.
- Webinars were also produced as part of the project and these have been made available for the companies to incorporate in their workplaces. The webinars are easily accessible through the LinkedIn page (link). Various topics have been discussed in the webinars and users have been directed how to use the platform and make use of the material in their own companies.

The use of the above material as regular practice was interweaved with the meetings and workshops held with the companies. The session was continued with carrying out the energy culture survey to identify opportunities through pillars. The survey results were thoroughly analysed and discussed with the company representatives. The final results and cases have been described in the previous chapter, and express the procedure for identifying energy rational behaviours enabling mechanisms.

To initiate further understanding of the project and ensure a wider uptake of the actions to nurture energy culture in companies, the efforts of T3.2 may also be combined with the material developed in T3.3 for the five energy knowledge management clusters focused on energy notions, energy efficiency technologies and measures, financial schemes and instrument and energy behaviours framework. The procedure for identifying energy rational behaviours can be synchronized with the recurring training events of the clusters Figure 3.

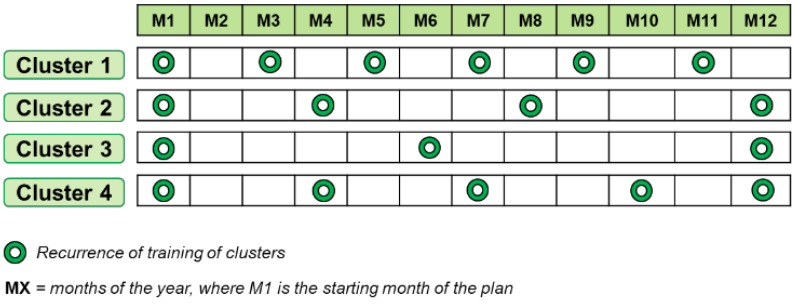

Figure 3: Training schedule of clusters

Figure 4 describes the links between different clusters and links to aspects belonging to each cluster to help in enhancing energy efficiency corporate policy. The last cluster gives a holistic view of the multidisciplinary aspects involved in pursuing certain energy efficiency measure for creating knowledge of cutting issues that might impede the successful deployment of a specific energy efficiency measure.

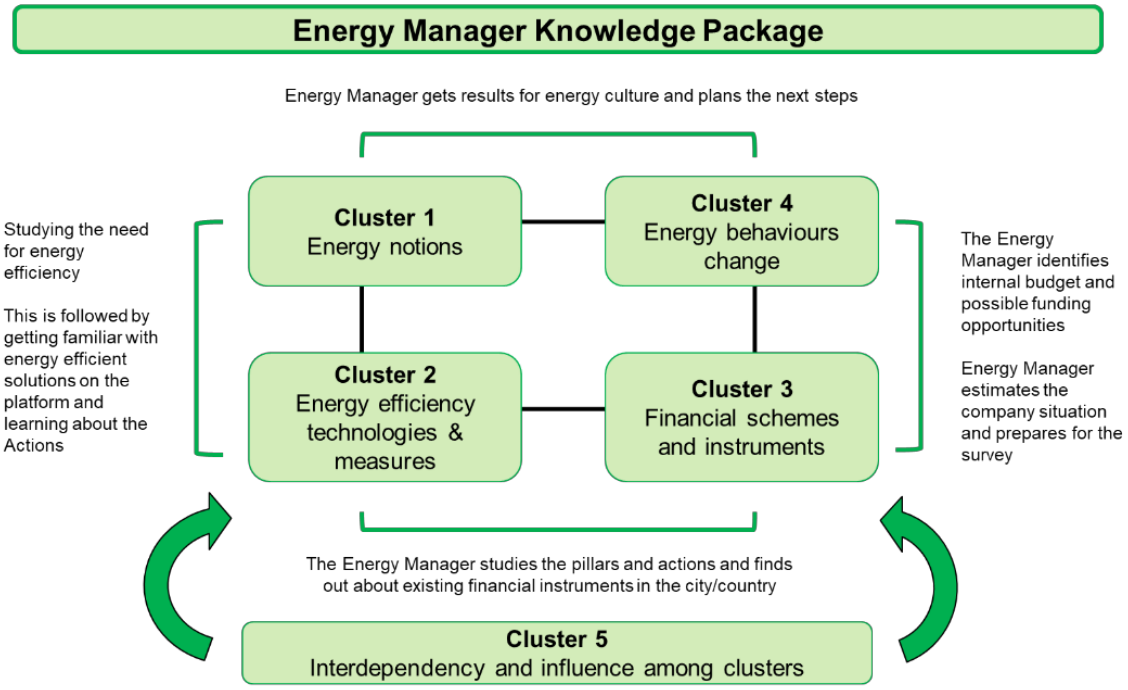

Figure 4: Energy Manager Knowledge Package and interconnections between clusters

The interconnections between the clusters is complex, however, it may be better explained with Figure 5. The material to help in understanding the background of each cluster is easily available on the portal.

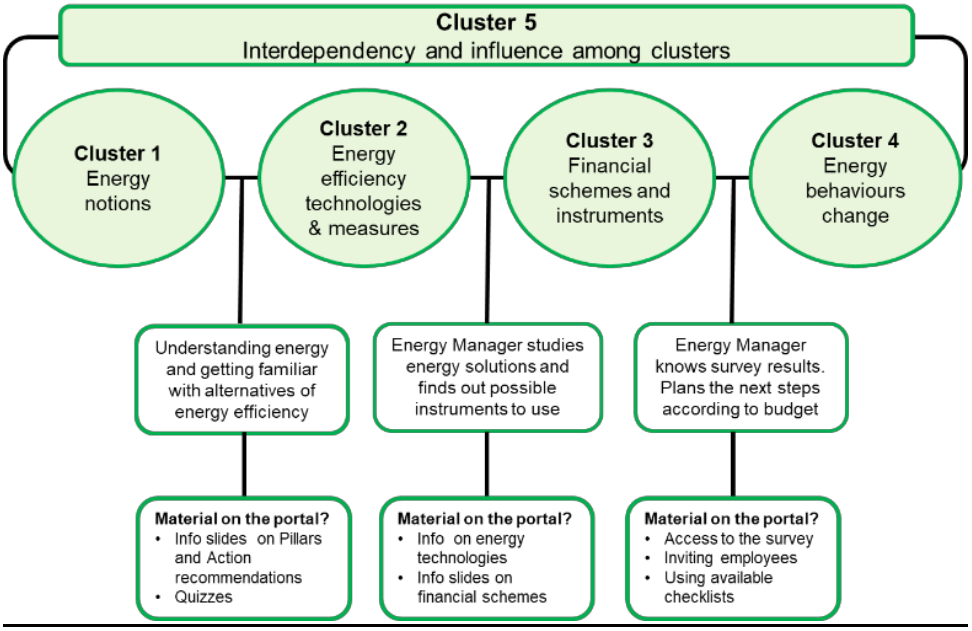

Figure 5: Survival diagram of clusters interconnections

The Energy Manager has access to an immense set of information material through the IMPAWATT portal. The material empowers the Energy Manager to understand energy rational behaviours, assess the status of the company energy culture internally and evaluate external sources of support, and lastly enhance energy efficiency corporate policy towards behavioural change.

Below are the results of the cases per partner that have been thoroughly studied to acquire knowledge about the energy culture within companies, gather views on the level of easiness and difficulty, and suggest recommendations on the next steps in terms of IMPAWATT Actions. The energy culture and energy efficiency situation in Finland may be described as being on a high level as employees are aware

of energy savings, actively discuss topics amongst themselves, and the market offers renewable energy for use in homes and offices. The survey did not reveal any extreme behaviours.

10.1 Finland

The results for the four cases in Finland show that the maturity matrix score remained between medium and high. The final results from the four cases were further divided into those identified as Easy and those identified as Difficult.

Energy Manager results: Although the Energy Managers had the opinion that they did not have a need to take an immediate action for their company, the Easy Actions are those that they would be able to do, if absolutely required. The most recommended Action was *1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs*. A few other recommendations were *11) Build capacity in the organization, yours and other key personnel, by providing and participating in training and events where successful practices and technologies can be shared and lessons learned* and *13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute.*

A few of the actions were identified as difficult, and this can be reasoned with that the companies already have a respectable level of operation and manage their energy consumption well, for example, purchasing certified green energy or they are building owners, in which case they manage their premises efficiently. The most difficult actions to do were identified as *8) Determine the degree to which consultants, service providers and other types of outsourcing will be used as in many cases energy efficiency improvements or improvements in indoor conditions justify such purchases, in some cases ESCO companies provide contracts whereby they are paid in proportion to the energy conservation achieved, 10) Find out what energy-related programmes and projects are running in your country or city and what benefits they could offer, be it funding opportunities for energy improvements or sharing of best practices for example,* and *15) Establish an energy team, formally or informally, that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices, its members being from operational areas that affect energy use such as engineering, operations and maintenance, facilities management, purchasing, real estate and leasing etc.*

Employee results: The results showed the overall situation in the companies in terms of its employees was relatively on a high level. The Energy Managers had the opinion that a few of the recommendations were already in place and that they do not need to take any drastic measures.

The actions identified as easiest to implement could be *(4) Support employees with information that gives advice on what is currently the most effective way to save energy* and *(1) Choose systems with low base consumption (e.g. LED lighting , laptop instead of ordinary PC).*

The action identified as being difficult to implement was (14*) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)*. However, the Energy Managers had the opinion that this was not needed as such as the company situation was already positive and it did not have resources to allocate to the identified actions.

10.2 Switzerland

The IMPAWATT survey was sent to different companies in French-speaking Switzerland which are already clients of PLA. In each company the survey was sent to the main contact of PLA, which is usually someone which can be associated with the 'Energy Manager' role. Additionally, PLA tested the survey on itself, as being an SME, it is also a target of the IMPAWATT platform and tools.

Unfortunately, to this date, no company has yet completed the survey, despite several reminders. Some companies were interested in the concept and were willing to test it on a reduced number of employees, but they did not reply on time (i.e. before this deliverable was due). We felt that this was due to the fact that it was not a priority task for them and we had no way to force them to do it. The main feedback

which we got from companies that were reluctant to take this survey was that it was seen as intrusive and time consuming for the staff if it is sent to all (or most) employees in a company. Indeed, the Energy Managers feared that the management would frown upon the initiative if they saw that all their employees are taking time from their day to day activity to fill in an external survey which they don't see the benefit of.

The results which we present below are therefore only based on PLA's survey.

Energy manager results: The results of the survey showed that the maturity matrix was low for 3 pillars (awareness of technologies, current energy practices and external factors), and medium for the last pillar (perceived barriers). The actions designed to alleviate the perceived barriers (pillar 4) are found to be the easiest, such as forming a dedicated energy team and setting up a communication plan. These actions are also the foundation for further implementation of actions identified in the employee survey.

Actions related to changing the current energy practices are considered to be the most difficult to implement as these usually require setting up some sort of monitoring which incurs comparatively large costs and human resources. Actions related to technologies (e.g. *1) When considering investments or refurbishments, find out about energy efficient alternatives that usually also have lower lifetime costs*), can only be taken into account at certain time intervals, when the time comes to replace the equipment.

Employee results: The results of the employee survey showed that the maturity matrix is medium for all three pillars. The most difficult actions to implement are those which require monitoring, for the same reasons explained above. It would however be necessary to calculate the energy savings and quantify the effect of the other actions. It is also a requirement for the implementation of other actions such as *9) Monitor energy consumption and show employees achievement of objectives and energy targets*.

The feedback on the survey identifies the low hanging fruits to be the following actions: *1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)*, *4) Support employees with information that gives advice on what is currently the most effective way to save energy* and *14) Integrate energy conservation and reduced emissions into the vision and operations of company with measurable targets (establish energy policy according to ISO 50001:2018, Section 5.2)*.

10.3 Austria

The four companies that gave feedback to the energy culture survey in Austria already have an energy management system (EnMS) according to the ISO 50001 standard implemented. One company recently started with the management system while others implemented it already some years ago. Therefore, many of the suggested measures were already implemented or at least considered for the list of planned measures.

The Energy Managers value the employees' awareness of the EnMS quite high. However, in some cases, the feedback of the employees show that the EnMS is not really an important part of the company culture so far.

Energy manager results: Energy Managers pointed out that some suggested measures are more aimed at an energy or environmental management system and not at energy culture. That indicates that the expectation of companies with EnMS for energy culture is everything "outside or additional" to the management system.

The measures, which are most difficult to implement, are those were many people have to be involved. To implement all actions the Energy Managers would need more time and additional financial support.

Energy Managers find the measure *2) Establish a common principle that all technical facilities are optimized before commissioning so that the settings are as energy-efficient as possible for the intended*

use, e.g. which functions are activated very important. One company will certainly push this topic, another company mentions that the implementation is currently not possible because the commissioning process is already quite time consuming and there is always time pressure.

Employee results: The actions, which are the easiest to implement for the employees, are *1) Choose systems with low base consumption (e.g. LED lighting, laptop instead of ordinary PC)* and *(3) Allow easy ways to save energy (e.g. one button shutdown of electronic devices when not needed)*.

The measure 2) Optimize control and choose default operation of devices/systems is very important but time consuming. The employees must be constantly motivated to optimize the systems. Moreover, energy optimization is partly a try and error process that is not accepted by the management.

10.4 Italy

The results for the four cases in Italy show that the maturity matrix score was clearly different between SMEs and large companies. The SMEs showed generally a low-medium score, while the large companies (real estate management and energy utility) remained for most of topics between medium and high.

Energy Manager results: Going through the suggested recommendations, the energy managers identified that the actions that were "easiest to do" were awareness of technologies and effect/perception of barriers. The most recommended Action were 2*) Establish together a policy that all technical equipment is optimized before starting to use them so that settings are as energy efficient as possible for the intended use considering e.g. which features are activated, 13) Create a communication plan to provide targeted information for key audiences about energy management and to generally raise awareness of energy goals and how everyone can contribute*, and *15) Establish an energy team that engages in energy efficiency activities across different parts of the organization and shares ideas and best practices…* In particular, such actions appear to be preferred for organizations already having ISO 14001 or ISO 50001 certified management system. The most "difficult to do" actions was identified as *12) Engage in benchmarking both internally (comparing similar buildings or sections of buildings under same ownership or tenancy) and externally (buildings of other owners) to find abnormal energy consumption patterns and estimate potential for efficiency improvements and establishing contacts to share ideas and best practices,* due the difficulties in comparison caused by the specificities of processes, spaces layout and building configuration.

Employee results: Not all the identified cases were able to provide answers at employees' level (only 2 out of 4). The results showed the overall situation in the companies in terms of its employees was on a medium level. The Energy Managers identified most of the recommendations as "easy to do" and they were related to improvement of cultural habits and current energy practices, motivating the choice with possibilities to integrate the suggested actions with existing communication tools, availability of tailored energy information or sometimes the young age of the staff as a positive factor.

The action identified as being difficult to implement was *(2) Optimize control and choose default operation of devices/systems so that energy efficiency is gained without performing specific energy-saving actions (e.g. occupant detection for lighting, use of standby modes, wisely chosen central building control settings, restrict access to the settings of energy systems only to those who have the necessary understanding of the effect of settings)*. In fact, this action could require sometimes the re-configuration of actual systems.

10.5 Germany

In Germany, the awareness on energy efficiency was medium for the industry and higher for the service company developing geographical information systems. For the glass construction company, it was difficult to initiate a new energy culture as not all employees are working in the main company location

but on external construction sites. This, as well as tight personnel resources are barriers for energy efficiency evaluations and communication tasks such as a communication plan that are rather new to the construction company. In times of Covid-19 online solutions for the communication are the best option and are now being part of daily business due to the pandemic restraints of the last months.

The technical awareness is quite high regarding purchasing and maintaining equipment for both companies, but data collection and assessment is more challenging due to tight personnel resources. It will be challenging for the construction company to engage employees. For the service company, which is a small company, it is easier as there are already established meetings that can be used to train and inform employees.

Energy manager results: As described above, the cases in Germany are quite different in size and staff. For both cases the purchase of energy efficient equipment is an easy task as well as light communication measures. An energy audit which was suggested is not planned for neither of the companies. A dedicated energy team as well was estimated to be difficult to be implemented because of tight personnel resources.

Employee results: Also regarding the employee results, they differ for both cases. Common results are that providing information for employees is an easy to do task whereas to optimize control and choose default operation of devices/systems is relevant and more or less easy to do for the construction company but not relevant for the GIS company as they are tenants of the office which is rather small and not offering a lot of possibilities for automated building systems. Only the IT can be optimized.

10.6 France

Energy Manager results: It is important to specify that for the French cases, there are no real 'Energy Managers' in the companies which participated in the surveys. The Energy Manager part was done for some cases with the CEO and for others with the Security and Quality Manager. It means that the subject of energy is not their main topic and that they are not so engaged as an Energy Manager. We note that for the proposed measures, the one without external costs are of course the easiest to implement, but that the ones which need some team engagement are also not so easy to implement. This is due mainly to a lack of available time available. It is also important to mention that the problems linked to the sanitary crisis are at the moment the principal priorities.

Employees results: The results of the employee survey showed that the maturity matrix is medium for the 3 cases for the first pillar "Awareness of technologies ", medium for two cases and high for one case for the second pillar "current energy practice" and Medium for 2 of them and high for one case for the third pillar "specific cultural habits". The easiest measures to implement are the specific cultural habits and the awareness of technologies with the optimization of devices/systems. Nevertheless, it should be noted that many actions within the companies may not be implemented by the employees but by the management.

In summary, the partner countries were able to find successful cases where the IMPAWATT survey was introduced and possible actions for the future were discussed. In some cases, the management was not eager on spending time on anything not work-related whereas in some cases the company felt confident that the staff is fully aware of energy efficiency and did not wish to pursue immediate changes. The Covid crisis did indeed create challenges as many companies chose to focus on their personnel and reallocate resources within the company to prevent major problems. Nonetheless, the project partners extended their network to the best of their abilities during these extraordinary times to achieve the targeted project impact.

Annex 1

The tables show the breakdown of answer options per pillar for each of the surveys.

Employee Survey Maturity Matrix			
	Low	Medium	High
1.Awareness of technologies	7a-b 10 a 1 10 b 1 10 c 1 10 d 1 10 e 1 10 f 1 10 g 1 11 a 1-2 11 b 1-2 11 c 1-2 11 d 1-2	7c 10 a 2 10 b 2 10 c 2 10 d 2 10 e 2 10 f 2 10 g 2 11 a 3 11 b 3 11 c 3 11 d 3	7 d-e 10 a 3 10 b 3 10 c 3 10 d 3 10 e 3 10 f 3 10 g 3 11 a 4-5 11 b 4-5 11 c 4-5 11 d 4-5
2. Specific cultural aspects	12 b 1-2 12 c 1-2 12 j 1-2	12b 3 12 c 3 12 j 3	12 b 4-5 12 c 4-5 12 j 4-5
3. Current energy practices in the company	8a 1-2 8b 1-2 8c 1-2 8d 1-2 9 a,b 12 a 1-2 12 d 1-2 12 e 1-2 12 f 1-2 12 g 1-2 12 h 1-2 12 i 1-2 12 k 1-2 12 l 1-2 12 m 1-2 12 n 1-2 12 o 1-2 12 p 1-2	8a3 8b3 8c3 8d 3 9 c,d 12 a 3 12 d 3 12 e 3 12 f 3 12 g 12 h 3 12 i 3 12 k 3 12 l 3 12 m 3 12 n 3 12 o 3 12 p 3	8a 4-5 8b 4-5 8c 4-5 8d 4-5 9 e,f 12 a 4-5 12 d 4-5 12 e 4-5 12 f 4-5 12 g 4-5 12 h 4-5 12 i 4-5 12 k 4-5 12 l 4-5 12 m 4-5 12 n 4-5 12 o 4-5 12 p 4-5
4. External factors (e.g. community thinking, EU and national regulatory framework in place)	-	-	-
5. Effect and perception of barriers mapped	-	-	-

Energy Manager Maturity Matrix			
	Low	Medium	High
1.Awareness of technologies	19 a, d 25 a-b	19 b 25 c	19 c 25 d, e
2. Specific cultural aspects	-	-	-
3. Current energy practices in the company	20 a, c 21 a, b 23 a, b 24 a, b	 21 c 23 c 24 c	20 b 21 d, e 23 d, e 24 d, e
4. External factors (e.g. community thinking, EU and national regulatory framework in place)	22 a, c		22b
5. Effect and perception of barriers mapped	26a 4-5 26 b 4-5 26 c 4-5 26 d 4-5 26 e 4-5 26 f 4-5 26 g 4-5 26 h 4-5 26 i 4-5 26 j 4-5 26 k 4-5 27 a 4-5 27 b 4-5 27 c 4-5 27 d 4-5 28 a 4-5 28 b 4-5 28 c 4-5 28 d 4-5 28 e 4-5	26 a 3 26 b 3 26 c 3 26 d 3 26 e 3 26 f 3 26 g 3 26 h 3 26 i 3 26 j 3 26 k 3 27 a 3 27 b 3 27 c 3 27 d 3 28 a 3 28 b 3 28 c 3 28 d 3 28 e 3	26 a 1-2 26 b 1-2 26 c 1-2 26 d 1-2 26 e 1-2 26 f 1-2 26 g 1-2 26 h 1-2 26 i 1-2 26 j 1-2 26 k 1-2 27 a 1-2 27 b 1-2 27 c 1-2 27 d 1-2 28 a 1-2 28 b 1-2 28 c 1-2 28 d 1-2 28 e 1-2