



DEESME

National schemes for energy efficiency in SMEs

Deliverable 3.3

Training Documents on DEESME approach for Energy Auditing and Energy Management

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About

Improving energy efficiency is increasingly understood as the most cost-effective way to reduce energy-related greenhouse gas emissions, improve economic competitiveness and increase energy security. In the European Union, several pieces of legislation aimed at guiding states and companies, regardless of their size, on ways to improve their energy efficiency: one of them is the Energy Efficiency Directive, establishing a common framework of measures and requirements with the goal to remove market barriers and promote a more efficient use of energy in supply and demand. Article 8 of the Directive offers ways to achieve this, requiring Member States to promote and facilitate the implementation of energy audits and energy management systems. The audits are compulsory for large companies and recommended for small and medium enterprises (SMEs). National authorities should encourage both to implement the resulting recommendations.

Member States have all chosen different approaches to transpose the requirements into national laws and to support companies (trainings, websites, helplines and funding support schemes). SMEs have less workforce, technical and financial capacity to perform energy audits, and therefore rarely do so: making them aware of the multiple benefits that can derive from improving their energy efficiency and accompany them in the energy transition, with knowledge and funding from both the public and private sectors, is key. That is what DEESME, a Horizon 2020-funded project (September 2020 – September 2023), aims at.

DEESME enables companies, especially SMEs to manage the energy transition by taking profit of multiple benefits from energy management and audit approaches and provides national authorities with guidelines and recommendations to empower their schemes under article 8, using the multiple benefits' approach.

The project identifies and shares good practices from national schemes, EU projects, and other initiatives with national authorities and support them in developing more effective schemes dealing with energy audits and energy management systems. It assists SMEs to develop and test the technical DEESME solutions by organizing information and training initiatives, realising energy audits, and implementing energy management systems starting from international standard and adding the multiple benefits energy efficiency approach.

The project is built on a consortium of academics, research organizations, consultancies and government offices from Belgium, Bulgaria, Germany, Italy, the Netherlands and Poland, namely: IEECP (NL, coordinator), FIRE (IT), SOGESCA (IT), Fraunhofer ISI (DE), CLEOPA (DE), SEDA (BG), ECQ (BG), KAPE (PL), EEIP (BE).

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Executive Summary / Foreword / Summary of findings

This deliverable describes the training documents (training material) that will be used to raise the awareness and the interest of business managers and energy managers in the DEESME approach for multiple benefits and to support the training of energy managers and energy experts for the implementation of the DEESME approach for multiple benefits.

The deliverable describes the training objectives, the target groups for training and the training procedures. In addition, it presents the training material, that includes presentations of the DEESME multiple benefits approach, the use of the DEESME tool for multiple benefits analysis and the development of energy management system models that support the DEESME multiple benefits approach. The training material has the form of presentation slides, which are annexed at the end of the deliverable.

Keywords: DEESME approach, multiple benefits, non-energy benefits, energy management system, energy efficiency, training, energy expert, energy manager.



1. Introduction

The DEESME project aims to promote the EU Energy Efficiency Directive (EED) by supporting companies and particularly SMEs in the implementation of energy saving measures in order to take advantage of low-carbon technologies, improve materials/resources efficiency and develop renewable energy schemes. To this end the project takes the following approaches:

- It seeks to remove barriers for SMEs in implementing energy saving measures and low carbon technologies, which are mostly related to lack of awareness, difficulty to access financing, doubts around actual saving potential and the lack of technical human resources.
- It seeks to promote a “multiple benefits” mindset that expands the scope of energy savings, relates energy management to business management and looks for additional business benefits that promote business development and improvement.

The DEESME project suggests approaching energy efficiency investments from a strategic perspective and emphasizes on the multiple business and the non-energy benefits that can derive additionally from energy efficiency investments. In the DEESME multiple benefits approach (deliverable D.3.1), the recognition of the multiple benefits that go along with energy efficiency is based on the analysis of the business model. The business model analysis serves as a diagnostic tool for the description and understanding of the current business situation, practices and objectives and provides the basis for the multiple benefits analysis. The business model analysis is used also to conclude the DEESME multiple benefits approach with the advancement of the sustainability of the business model - through the lens of the energy efficiency analysis and the multiple benefits identification that have been preceded.

This deliverable completes T3.1 (“Developing energy audit and management system models integrated with the multiple benefits approach”) and follows through the other two deliverables of T3.1 that focus on the development of the DEESME multiple benefits approach (D.3.1) and the development of energy management system models that support the DEESME multiple benefits approach (D.3.2). The objective of this deliverable is to develop training material for raising the awareness and the interest of business managers and energy managers on the DEESME multiple benefits approach and also for developing the necessary knowledge and skills for the implementation of the DEESME multiple benefits approach.

This deliverable describes the training objectives, the target groups for training and the training procedures. In addition, it presents the training material, that includes presentations of the DEESME multiple benefits approach, the use of the DEESME tool for multiple benefits analysis and the development of energy management system models that support the DEESME multiple benefits approach. The training material has the form of presentation slides, which are annexed at the end of the deliverable.



2. Training objectives and procedures

2.1. Training objectives

The project will develop training campaigns for raising the awareness of SMEs and for developing the capacity of business managers and energy experts to use the DEESME multiple benefits approach as a method for considering energy efficiency investments from a strategic perspective.

The training objectives of these training campaigns include:

- Raising **awareness** of the DEESME multiple benefits approach and increasing the interest of business managers and energy managers.
- Developing **understanding** of the DEESME multiple benefits approach as a method for considering energy efficiency investments from a strategic perspective.
- **Explaining** how to take profit of energy efficiency by assessing the multiple benefits that can derive from energy efficiency.
- **Developing the capacity/ skills** for the implementation of the DEESME multiple benefits approach.
- **Achieving preparedness** for the implementation of the DEESME multiple benefits approach.

2.2. Target groups

The main target group for the training campaign is the business managers in SMEs who will decide for the adoption of the multiple benefits concept and the implementation of the DEESME multiple benefits approach. This group involves three sub-groups with particular interests and requirements from the training campaign:

- **Business owners and strategy managers:** They are interested in the business growth, the competitive improvement and the strategic advancement of the company. The training campaign for them aims to develop their awareness and increase their interest in the multiple benefits concept. Once they are motivated, they may decide to learn more and implement the DEESME multiple benefits approach. The training campaign for this group is focused on the business benefits and the strategic advantages that can emerge from the DEESME multiple benefits approach.
- **Business managers** in charge of the basic functions in business companies, such as operations/ production, accounting, finance, marketing, human resources management, quality management, logistics, etc. They are interested in the particular benefits that energy efficiency can bring directly and indirectly, though non-energy and general business benefits, to their domain. In addition, they need to be trained in the identification and evaluation of the multiple benefits concept and the implementation of the DEESME approach.
- **Energy managers and energy experts**, such as energy analysis and consultants. They have the key role in the implementation of the DEESME approach for multiple benefits and therefore they are interested in the technical requirements of the procedure. They can be staff of the company or they can be professional hired to perform or support the performance of the energy audit, develop the energy management system and implement the DEESME approach for



multiple benefits. Notice that the DEESME project partners will serve as energy experts as well for the support of the SMEs that will participate in the testing procedures of the DEESME multiple benefits approach.

2.3. Training Procedures

The DEESME project plans three types of training campaigns that address the different objectives of the training activities and the different target groups. In particular, we plan:

- Training campaigns for **raising the awareness** of the DEESME multiple benefits approach and increasing the interest of energy managers and business managers,
- Training campaigns for **developing the capacity/ skills** for the implementation of the DEESME multiple benefits approach, and
- Training campaigns for **increasing the preparedness** of SMEs and energy experts/ analysts for the implementation of the DEESME multiple benefits approach.

Further details for the structure and the organisation of the training campaigns can be found in the deliverable with title “Guidelines for Organising and Conducting Training Activities with Companies” as a part of T3.2: Mobilizing Companies: Training Activities and Energy Auditing.

A. DEESME Approach Basics

This is a short training campaign that aims to present an overview of the DEESME multiple benefits approach to business managers with the aim to raise awareness among companies regarding the DEESME approach and its advantages for the SMEs. The key target group is the business owners and the strategic managers; however the participation of other business managers (functional managers) is also encouraged, especially when SMEs participate with a broader management team, in order to increase their awareness and interest.

The duration of the training session is 2 hours in total. In the first part the training will present an overview of the DEESME multiple benefits approach that will cover the following topics:

- Presentation of the DEESME project idea.
- Discussion about energy efficiency and its implications for the business competitiveness.
- Introduction to concept of multiple benefits.
- Overview of the DEESME multiple benefits approach.

The presentation that will be used for this type of training session is named “Introduction to DEESME multiple benefits approach” (included in the Appendix).

The rest of the session will be devoted to discussion with the business managers. The training campaign is designed to be interactive and encourages the active participation of the business managers in order to motivate them to learn more about the DEESME multiple benefits approach and adopt and implement it in their business.



B. DEESME Approach Advanced

This training campaign targets at business managers and energy managers that have already developed an initial interest and possibly an initial intention to implement the DEESME multiple benefits approach. The objective of this training campaign is to demonstrate the details of the DEESME multiple benefits approach, both at conceptual level and implementation level, provide knowledge and develop the capacity for the implementation of the DEESME multiple benefits approach.

This training campaign is planned to take place in two sessions lasting between 2 and 4 hours each, depending on the background, the interest and the training needs of the participants.

The presentation that will be used is named “The DEESME multiple benefits approach: Total”. It includes the introduction to DEESME multiple benefits approach, presentations of the 4 stages (7 steps) of the approach and a presentation of the requirements of the development of the energy management system. After the end of each presentation will follow discussion with and questions from the participants.

These training campaign will serve also to the preparedness of the participating SMEs in DEESME project for the implementation of the DEESME multiple benefits approach. Hence, the DEESME partners (who will serve as trainers) will have the opportunity to explain the procedures and the requirements for the implementation of the DEESME multiple benefits approach, especially with regard to the commitment of the owner/ the management board, the formation of the management team that will participate in the procedures, the human resources required, the information/ data required and the potential data sources, etc.

C. DEESME Approach in Practice

This training campaigns target exclusively the SMEs that will implement the DEESME multiple benefits approach and they will take place on an individual basis for each SME. It aims to train and prepare the management team for practical issues of the implementation of the DEESME multiple benefits approach. The number and the duration of the training sessions will be determined according to the particular situation and the requirements of each participating SME. Similarly, the training material will be prepared according to the particular requirements of each SME.

3. Training material

3.1. Introduction to DEESME Multiple Benefits Approach

The DEESME approach for multiple benefits wishes to integrate business model analysis with energy auditing and the development of energy management systems in order to achieve a dual objective:

- expand the scope of energy decisions and initiatives beyond energy efficiency and relate them to the attainment of the general business objectives, and
- introduce concepts of energy efficiency in business model analysis.

The DEESME approach for multiple benefits takes place in 4 stages that include 7 steps in total:

1. Stage 1: Business Analysis
 - Step 1: Business Model Analysis
 - Step 2: Cost Structure Analysis
2. Stage 2: Energy Analysis
 - Step 3: Energy Auditing
 - Step 4: Carbon Footprint Estimation
3. Stage 3: Multiple Benefits Analysis
 - Step 5: Multiple Benefits Identification
 - Step 6: Multiple Benefits Evaluation
4. Stage 4 (step 7): Business Model Advancement

The methodology of the DEESME multiple benefits approach is depicted in figure 1.

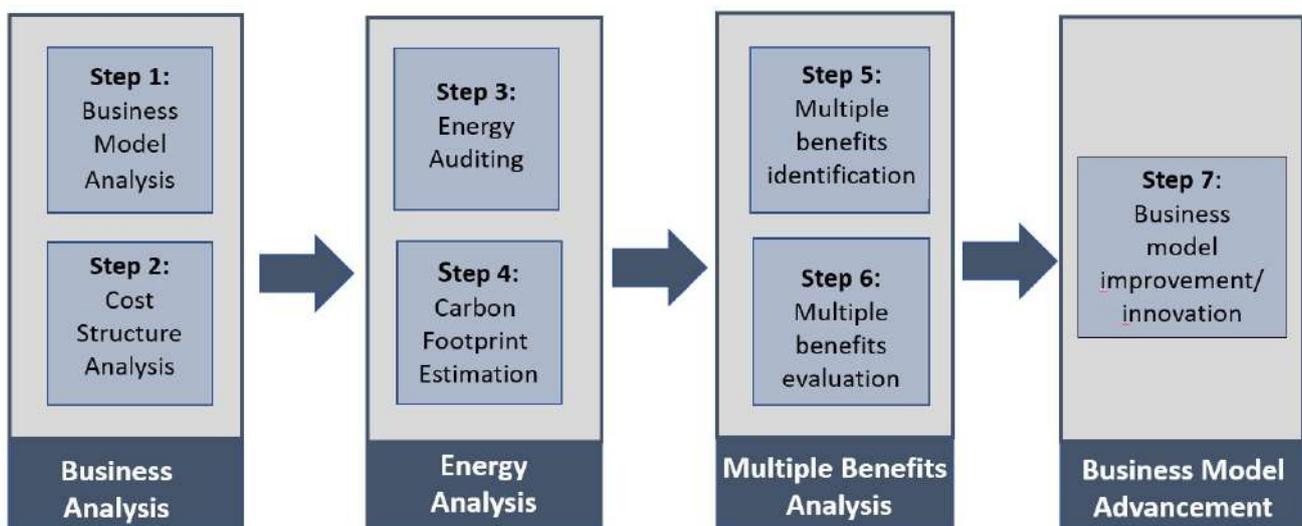


Figure 1: Methodology for the DEESME multiple benefits approach



The DEESME multiple benefits approach is accompanied by a tool (spreadsheet file) that supports the energy manager in the implementation of the approach. The aim is to help energy experts and business managers that participate in the task to identify, categorize and evaluate potential energy and non-energy benefits related to energy efficiency. The tool contains six sections (spreadsheets) that support the steps of the DEESME multiple benefits approach (steps 5 and 6 are implemented on the same spreadsheet).

National schemes for energy efficiency in SMEs

Tool for the implementation of the Multiple Benefits (MB) approach

DEESME is an EU Horizon 2020-funded project that aims to guide SMEs and national authorities through the energy transition by taking advantage of **multiple benefits** and **energy management** approaches. The **Multiple Benefits (MB)** approach regards energy efficiency measures and decisions in the wider context of business management and highlights the multiple business and non-energy benefits that can derive complementarily from the development of energy audits and energy management systems.

Version: 1.0

Aim: This file contains the tool for the implementation of the **Multiple Benefits (MB)** approach. It consists of 6 steps, each of which is being developed in a separate sheet:

Step 1	Business model analysis
Step 2	Cost structure analysis
Step 3	Energy audit
Step 4	Carbon footprint calculation
Step 5	Multiple Benefits identification & evaluation
Step 6	Business Model Sustainability Advancement

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Figure 2: The DEESME Tool for Multiple Benefits Analysis (cover page)

3.2. Stage 1: Business Analysis

In order to introduce energy efficiency decisions in the wider business context we must understand the overall business rationale and the business priorities and objectives. The business analysis provides the starting point for the implementation of the DEESME approach for multiple benefits. In this stage the energy auditor/ consultant will acquire a better view for the company and will develop a common understating with the management team of the company about the business requirements and the way that energy efficiency decisions can fit in the business rationale and support the strategic priorities and objectives of the company. The business analysis includes two steps:

- Step 1: Business Model Analysis
- Step 1: Cost Structure Analysis

Step 1: Business Model Analysis

The business model analysis is a method to define and communicate easily and quickly a business idea or concept. It will be used to provide the overall description of the business and contribute to a better understanding of its objectives and operations.

The Business Model Canvas employed is the Business Model Canvas method, which has become one of the most used frameworks among entrepreneurs to analyze and create/visualize business models in a simplified way. The template is designed by Business Model Foundry AG, but the one we use is an adapted version of the Business Model Canvas provided by Neos Chronos in order to meet the objectives of the DEESME project. It consists of nine building key blocks which represent the main dimensions of a company's business model. The left side of the canvas is focused on value creation internally and externally (key activities, key resources, key partnerships and costs), while the right side emphasizes choosing, delivering and capturing value (customer segments, value proposition, channels, customer relationships and revenue streams). For each single block the user will copy and paste a post-it (which can be found on the right side of the sheet) in the corresponding block. This way the Business Model Canvas allows the company to represent visually how it creates, distributes and captures value for its customers.

The Business Model Canvas				
Designed for: _____		Designed by: _____		Date: _____
Version: _____		Documentation: Read Instructions Watch YouTube video		
Understand the business context and rationale				
<p>Key Partners</p> <p>Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</p> <p>Defines the network of suppliers and partners necessary for the functioning of the corporate business model.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Key Activities</p> <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships?</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Value Propositions</p> <p>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</p> <p>Defines the package of products and services that represents a value (benefits that the customer has from the use of the product or service provided by the company) for a specific customer segment.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Customer Relationships</p> <p>What type of relationship does each of our Customer Segments expect us to establish and maintain? How do we interact with our Customer Segments? How do we deliver our Value Propositions to each Customer Segment?</p> <p>Defines the type of relationship that the company establishes with each customer segment.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Customer Segments</p> <p>For whom are we creating value? Who are our most important customers?</p> <p>Defines the community of customers or businesses that the company is aiming to sell its product or services to.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>
<p>Key Resources</p> <p>What Key Resources do our Value Propositions require? Physical, intellectual, human, financial? Our Distribution Channels? Customer Relationships? Revenue Streams?</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Channels</p> <p>Through which Channels do our Customer Segments want to be reached? How are we reaching them now? How are our Channels being used? Which ones are most effective? How are we interacting with our Customer Segments? How do we deliver our Value Propositions to each Customer Segment?</p> <p>Defines how the company communicates, distributes and provides its value proposition to each customer segment.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Cost Structure</p> <p>What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</p> <p>Defines the costs that the company will have to incur to create, distribute and provide its value proposition.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>Revenue Streams</p> <p>For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to our overall revenue?</p> <p>Defines the revenue streams that the company generates from each customer segment. How the company captures value from the customer segment.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>	<p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p> <p>This is a post-it! Copy and paste it to the canvas.</p>
<p>Designed by: Business Model Foundry AG (www.businessmodelgeneration.com/canvas)</p> <p>This is an adapted version of the Business Model Canvas provided by Neos Chronos in order to meet the objectives of the DEESME project</p> <p>The original version of the Business Model Canvas can be found here: Neos Chronos Limited (https://neoschronos.com/)</p>				

Figure 3: Business Model Analysis

Step 2: Cost Structure Analysis

The cost structure analysis enables the energy auditor to identify the cost centres, review cost behaviour and examine all types of cost that are necessary in the business operations. Cost structure analysis is critical for the improvement of business efficiency and can explain how energy efficiency measures can contribute to the business objectives.

The Cost Structure analysis is based on the “energetic structure” that is commonly used for energy audits and it helps to identify the cost centres (a cost centre is an area of business activity, process or plant that can be metered effectively and where there is an opportunity to reduce energy consumption) and their necessary cost to complete the production process.

This sheet contains two tables:

- In the first table the user must insert the cost centres applicable to the operations of the company that are subject of the audit (processes, auxiliaries and general). For each cost centre the user will then identify and evaluate the benefits the company produce, namely associated to energy consumption, maintenance costs, personnel costs, health & safety, water consumption, waste disposal, others “environmental” related, or others.
- The second table calculates automatically the scores based on the information inserted in the first table. As a result, the user will get the cost centres needed to evaluate in the Multiple Benefits analysis.

WEIGHTS		E			E		E		E		E	
BENEFITS	ENERGY CONSUMPTION (insert annual consumption in €)			MAINTENANCE COSTS	PERSONNEL COSTS	HEALTH&SAFETY	WATER CONSUMPTION	WASTE DISPOSAL	OTHERS "ENVIRONMENTAL" RELATED	OTHERS (SPECIFY)	...add more columns here if needed...	
	Electricity	Natural gas	Other	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR
PROCESSES	Process unit/line 1											
	Process unit/line 2											
	Process unit/line 3											
	Process unit/line 4											
	Process unit/line 5											
...add a row above here if needed...												
AUXILIARIES	Cold production (chillers, drycoolers, ...)											
	Boilers											
	Air compressors											
	Heat recovery											
	Power plants											
	Cogeneration plant											
	Renewable energy (PV, solar systems, ...)											
	Fans & blowers											
	Pumps											
	AHUs											
Product handling												
...add a row above here if needed...												
GENERAL	Lighting											
	Offices conditioning											
	Ventilation											
IT equipment												
...add a row above here if needed...												
TOTAL		0	0	0	0	0	0	0	0	0	0	0

Figure 4: Cost Structure Analysis

3.3. Stage 2: Energy Analysis

It aims to evaluate and introduce energy efficiency improvements that promote the business rationale and support the strategic priorities and objectives. In this respect, the main technical standards for energy auditing and energy management (e.g. EN 16247 and EN ISO 50001) can serve as business management tools for the identification of business opportunities for improved efficiency and value creation. Energy analysis includes two steps:

- Step 3: Energy Auditing
- Step 4: Carbon Footprint Estimation

Step 3: Energy Auditing

An energy audit is a systematic inspection and analysis of energy use and energy consumption of a site, building, system or organization with the objective of identifying energy flows and the potential of energy efficiency improvements and reporting them. Energy audits lead companies to identify and implement energy saving and efficiency measures.

The Energy Auditing sheet is based on the energy audit process carried out by the energy auditor and the energy managers of the company. It does not include the entire energy audit procedure, but only the main outcomes (observation/findings and recommendations envisioned for each key business area) of the energy audit report. It consists of one table with three different columns categorized as A, B or C, being those the recommended actions to be implemented in the short, mid and long term.

The energy auditing										
Identify and evaluate the energy flows and the potential of energy efficiency improvements										
This section is aimed to collect the main outcomes (observations/findings and recommendations envisioned for each key business area) of the energy audit report. The recommendations are categorized with A being the most urgent and feasible, B being actions to be carried out in the following 1-2 months and C being those actions that depend on other factors and plan to take more time. You can provide one recommendation or more recommendations in the relative column:										
Key Area	Observations/findings	Recommendations			Recommendations based on general observations/findings carried out during the energy audit					
		A	B	C	A	B	C			
Operations	E.g. Failures in certain appliances	Remove any faulty appliances located in the building.	Replace faulty appliances with new ones with more innovative technologies	Make use of conservation and efficiency mechanisms to reduce the energy consumption.	A	Most urgent where immediate actions to foster energy efficiency are needed to be executed	B	To be implemented 1-2 months after received the report.	C	To be implemented after more than 2 months after received the report (i.e. will depend on the availability of funds)

Figure 5: Energy Audit Recommendations

Step 4: Carbon Footprint Calculation

The carbon footprint enables the evaluation of the greenhouse gas emissions (as well as non-energy related GHG emissions) caused by the business operations for producing, delivering and using a



product/service. This analysis will support companies to estimate the carbon footprint of their major operations/ products and will provide guidelines on how to improve it.

3.4. Stage 3: Multiple Benefits Analysis

The multiple benefits analysis follows the energy analysis aiming at expanding its scope beyond energy savings. It highlights the various non-energy benefits, i.e. the business and strategic benefits that are related to the energy efficiency measures and decisions that were identified through the energy audits and energy management systems. The multiple benefits analysis is performed in two steps:

- Step 5: Multiple Benefits Identification
- Step 6: Multiple Benefits Evaluation

Step 5: Multiple Benefits Identification

The identification of multiple benefits is based on the business model concept, aiming to corroborate the relationship between energy efficiency benefits and the wider business benefits.

The Multiple Benefits is based on a set of basic multiple benefits that are related to the elements of the Business Model Canvas. We use a template which contains a table with seven columns. The first column determines the benefit type, according to five out of nine of the Business Model Canvas blocks (value proposition, activities, resources, customers and partners). Each block contains some suggested benefits and the option to add any other benefits not mentioned. The second column refers to the type of indicator associated to each benefit and it classifies them as “Main” or “Alternative”. In the third column are listed all the indicators that will be used to measure/calculate the benefits. Main indicators are the most adequate to measure the benefit associated. However, we propose some alternatives that can fit better depending on the needs and availability of data of the company.

The last four columns in green are the ones the user needs to fill in by establishing the level of significance of each benefit, the type of impact/contribution they have in the business model and the exploitation proposal/plan (the answers are given in the form of dropdown menu and the user selects the right option). In this last step, the energy auditor/consultant and the business managers will decide how the company can take advantage of the multiple benefits that have the greatest significance and impact on the business model and will prepare a detailed action plan.

BENEFIT TYPE	McMain / Ac/Alternative	INDICATOR	SIGNIFICANCE	IMPACT on waste creation	IMPACT on efficiency	Exploitation proposal
Value proposition						
Improved product/service efficiency	M	Energy cost per unit of product/service				
	A	Unit cost				
	A	Return on Assets (ROA) = Net income/Avg. total assets				
..Add any other benefit		..Add any other indicator				
Introduction of new products/services	M	Nº of new 'green' products/services introduced in the market in the period of a year				
	A	Nº of new products/services (in general) introduced in the market in the period of a year				
	A	New Product Introduction Rate				
..Add any other benefit		..Add any other indicator				
Development or innovations	M	Total R&D expenses for 'energy efficiency' initiatives in a year				
	A	Total R&D expenses (in general)				
	A	Production of intellectual property (e.g. nº of patents)				
..Add any other benefit		..Add any other indicator				
Activities						
	M	Value of output items / Value of input items				
	A	Workforce productivity = total output / total nº of employees				
Increased productivity	A	Reduced production cycle = process start time - process end time				
	A	Increased production yields = outputs (nº of finished products) / inputs (time, materials and energy) in a certain period of time				
	A	Increased productivity of machinery = total nº of products produced / total of machines used in a certain period of time				
	A	Overall Equipment Effectiveness (%): availability (total run time of an asset / total planned production time of an asset) x performance (actual system throughput / maximum possible throughput) x quality (nº of usable units produced / total units started)				
	..Add any other benefit		..Add any other indicator			
Increased utilization	M	Capacity utilization				
	A	Asset utilization: (actual output / maximum capacity) x 100				
	A	Workforce utilization: (actual output/maximum workforce capacity) x 100				
..Add any other benefit		..Add any other indicator				
Improved maintenance	M	Maintenance Unit Cost = total maintenance costs / standard units produced				
	A	Maintenance Cost per Machine (over a period of time)				
	A	Malfunction rate = nº of malfunctions or breakdowns of machinery and equipment in a certain period of time				
	A	Longer Equipment Life (due to reduced wear and tear) = cost of equipment - delayed spending for replacement				

Figure 6: Multiple Benefits Analysis

Step 6: Multiple Benefits Evaluation

The companies evaluate the impact of the multiple benefits identified previously in their operation and their business model in order to decide how they can take advantage of these multiple benefits to improve their energy efficiency measures and their business model. The multiple benefits evaluation takes place on the same spreadsheet with the multiple benefits analysis (the columns in green colour at the right part of the template).

3.5. Stage 4: Business Model Sustainability Advancement

The company will review the business model that was initially drafted in stage 1 through the lens of multiple benefits approach in order to identify opportunities for the advancement of business model sustainability. The outcome outlines the opportunities that can derive from the adoption of energy efficiency measures and the development of sustainable business practices and ideas.

For the last step we employ again the Business Model Canvas in order to design the improvement that can derive through the opportunities of energy efficiency measures the multiple benefits analysis. The template used the similar as in spreadsheet 1. The user has to fill in the nine building blocks using the coloured post-it on the right side.

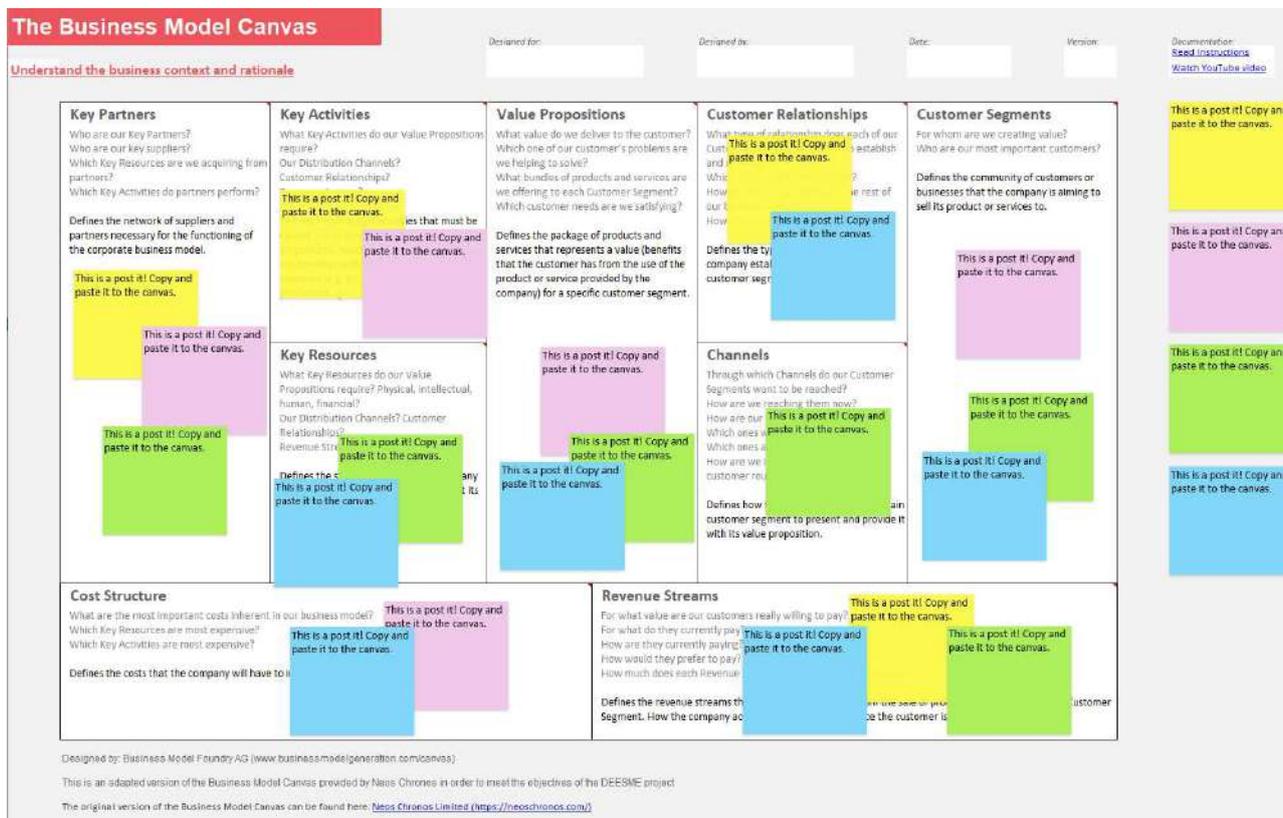


Figure 7: Business Model Sustainability Advancement

3.6. The Energy Management System

Based on the indications provided by the energy audit, it's possible to design and implement a management system that allows the company to improve energy performance.

The Energy Management System (EnMS) is designed and applied according to the international standard ISO 50001. Typically, ISO 50001 (like the energy audit) focuses attention on energy savings as such; on the basis of these, the company develops the economic / financial evaluations which are therefore also focused only on the cost of energy, interest rates and other economic-financial parameters.

In this way, however, the management of the company does not take into consideration many other aspects and benefits (e.g. better environmental performance, greater safety at work, greater production efficiency, etc.), of a different nature, thus losing the opportunity to pursue a broader improvement.

Therefore an energy management system (called Extended EnMS) that also considers these aspects is proposed, thus leading to the maximization of multiple benefits.

A re-reading of ISO 50001 in its current version (2018) is then proposed, highlighting, chapter by chapter, what it means to apply the multiple benefits approach and how it can develop in accordance with the requirements of the standard.

Managerial and operational solutions are suggested to keep the multiple aspects under the management control and improve them over time to achieve Multiple Benefits.



4. Conclusions

This deliverable describes the training documents (training material) that will be used to raise the awareness and the interest of business managers and energy managers in the DEESME approach for multiple benefits and to support the training of energy managers and energy experts for the implementation of the DEESME approach for multiple benefits.

The deliverable describes the training objectives that refer to raising awareness and the interest for the DEESME multiple benefits approach, developing understanding of the procedures, developing the capacity and skills and achieving preparedness for the implementation of the DEESME multiple benefits approach. The main target group for the training campaign is the business managers in SMEs who will decide for the adoption of the multiple benefits concept and the implementation of the DEESME multiple benefits approach.

There are three types of training campaigns that address the different objectives and the different target groups. In particular, we plan: a) training campaigns for raising awareness and increasing the interest of business managers and energy managers, b) training campaigns for developing the capacity/ skills for the implementation of the DEESME multiple benefits approach, and c) training campaigns for increasing the preparedness of SMEs and energy experts/ analysts for the implementation of the DEESME multiple benefits approach.

The deliverable outlines the training material, that includes presentations of the DEESME multiple benefits approach, the use of the DEESME tool for multiple benefits analysis and the development of energy management system models that support the DEESME multiple benefits approach. The training material has the form of presentation slides, which are annexed at the end of the deliverable.



APPENDIX: Training Material

In the printable version of the deliverable, the Appendix contains all the presentations that will be used for the training sessions of the target audience.



DEESME

National schemes for energy efficiency in SMEs

Deliverable 3.3

Training documents on DEESME approach for energy auditing and energy management
Authors: Gary Fragidis, Laura Martínez and Detlef Olschewski - Cleopa GmbH



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- 01_ Introduction
- 02_ Training objectives
- 03_ Methodology for the DEESME Multiple Benefits approach
- 04_ Role of the energy auditor and energy manager
- 05_ The Tool
- 06_ The DEESME Multiple Benefits approach
 - Business Model Canvas
 - Cost structure analysis
 - Energy audit
 - Carbon footprint estimation
 - Multiple Benefits identification & evaluation
 - Business Model Sustainability

01_Introduction

The **DEESME project** aims to promote the EU Energy Efficiency Directive (EED) by supporting companies and particularly SMEs in the implementation of energy saving measures in order to take advantage of low-carbon technologies, improve materials/resources efficiency and develop renewable energy schemes. DEESME aims to spread the concept of **multiple benefits**, which has already been shaped in the MBenefits H2020 European project, and support SMEs in becoming aware of the multiple benefits that derive from energy audits and energy management systems.

The DEESME approach for Multiple Benefits aims to relate energy efficiency measures with non-energy and general business benefits. Hence, energy efficiency management can be related to the business management and the strategic objectives of the companies.

In a series of presentations (slides) we provide step a by step training guide for the implementation of the **DEESME approach for Multiple Benefits** and the use of a supportive tool for the execution of multiple benefits analysis in business companies.

02_Training objectives

The **training materials** aim to mobilize and qualify the energy auditors/ consultants and the business managers to adopt the **integrated multiple benefits approach** as part of the implementation of **energy auditing** and **energy management systems**.

These materials are intended to be used to **train professionals** (mainly energy experts) in a way that they are able to identify, categorize, evaluate and quantify potential improvement opportunities and energy and non-energy benefits of energy efficiency which can be beneficial for the overall business strategy.

03_Methodology for the DEESME Multiple Benefits approach

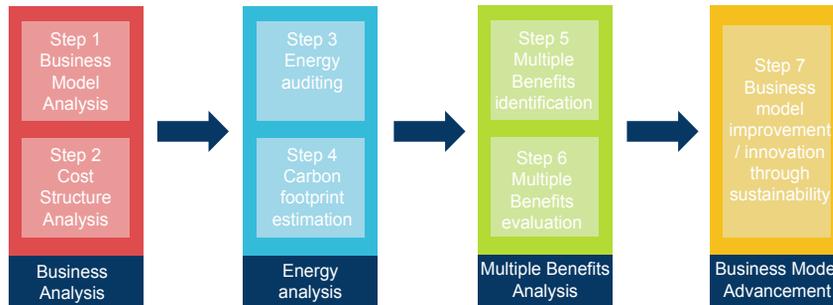
The DEESME Multiple Benefits approach has **four stages**:

Stage 1 – Business Analysis: demonstrates the underlying business logic and the business priorities for the creation of value and the improvement of business efficiency;

Stage 2 – Energy Analysis: reveals the opportunities for energy efficiency and reduced emissions;

Stage 3 – Multiple Benefits Analysis: recognizes and evaluates business benefits that expand the scope of energy management and relate energy efficiency decisions to business development;

Stage 4 – Business Model Advancement: searches for opportunities for business model innovation and improvement by enhancing energy efficiency.



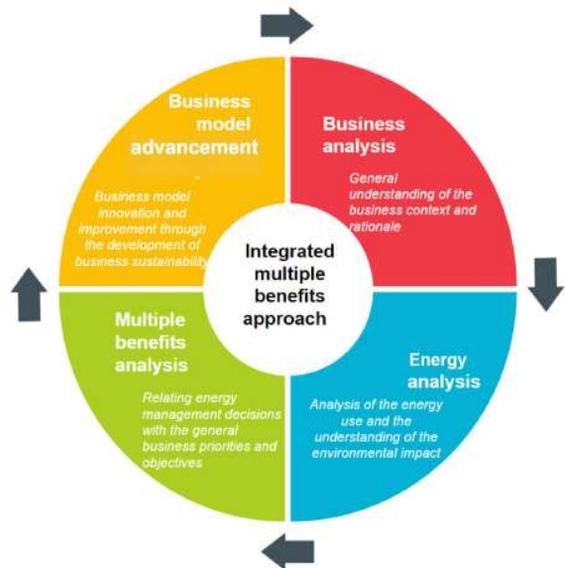
03_Methodology for the DEESME Multiple Benefits approach

The methodology can be seen as a life cycle that begins and ends with the business model analysis as a diagnostic and as a strategic tool, respectively.

Each iteration of the cycle leads to improved levels of energy efficiency and business model sustainability through improvement and innovation.

The implementation of the DEESME Multiple Benefits approach is guided by the energy auditor/consultant, who has been trained specifically for this process.

It should be performed in close collaboration with the company's management team because it connects the energy analysis results with the strategic and operational decisions of the company, seen from a multiple benefits perspective.



03_Roles of the energy auditor and energy managers

The **Energy Auditor** and the **Energy Manager/s** perform the following tasks:

Stage 1: Business Analysis

- **Business Model Analysis:** the energy auditor/consultant and the business managers analyze the underlying business model to develop a better understanding about the business operations and business priorities. This way they develop a common understanding on how energy efficiency decisions can support the business requirements and the strategic goals of the company.
- **Cost structure analysis:** the energy auditor and the business managers analyze the cost structure to understand the cost behaviour and the impact of energy efficiency on the resources and the activities of the company.

Stage 2: Energy analysis

- **Energy audit:** the auditors/energy consultants perform the energy audit and together with the company's managers decide for the measures for improved energy efficiency.
- **Carbon footprint:** the auditors/energy consultants perform the carbon footprint analysis and together with the company's managers decide for the measures for improved carbon footprint.

Stage 3: Multiple Benefits analysis

- **Multiple Benefits Identification & Evaluation:** the auditors/energy consultants identify and assess the multiple benefits that can be related to energy efficiency measures; together with the business managers they decide for the relevance and the significance of the multiple benefits identified and they propose an exploitation plan.

Stage 4: Business Model Sustainability Advancement

- **Business Model improvement:** the energy auditor/consultant and the business managers review the business model developed in the first stage in order to find opportunities for the advancement of business model sustainability.

04_Role of the energy auditor

An **Energy Auditor** is the person appointed by the company to perform the energy audit. According to the European Standard EN 16247 the energy auditor shall:

- Be suitable qualified and experienced for the type of work and the agreed scope, aim and thoroughness.
- Treat as confidential all information provided by the organization during the energy audit.
- Act in an objective manner.
- Disclose any conflict of interests within the company in a transparent way.

The overall DEESME multiple benefits approach requires that the energy auditor should:

- Start by understanding what is crucial for the company, whether it includes energy and non-energy aspects, in order to be aware of its strategic priorities and decision-making culture.
- Perform energy analysis for the company (energy audit and carbon footprint analysis)
- Look for ways in which energy efficiency investments can be aligned with the strategic priorities and business goals.
- Provide suggestions for the advancement of the business model sustainability.

* The energy audit is a timely study, a systematic one-time procedure, which helps to immediately identify the improvements that need to be made in order to increase energy efficiency.

04_Role of the business manager

The team of managers that have an important role in the DEESME multiple benefits analysis include*:

- An executive manager (e.g. business strategy manager),
- An operations/ production manager, and
- A financial/ accounting manager.

The business managers have a supportive role in stage 1 and stage 2.

Their role becomes decisive in:

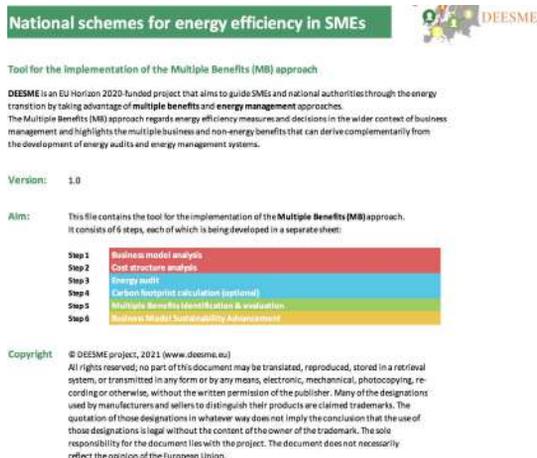
- Stage 3, Multiple Benefits Analysis, especially in the evaluation of the relevant multiple benefits and the development of an exploitation plan.
- Stage 4, Business Model Sustainability Advancement.

* If an SME does not have these functions explicitly described in the organisational structure, then managers with these or similar responsibilities (i.e. business strategy, operations/ production management, financial/ accounting management) should be included in the team.

* The energy management involves a long-term strategy dedicated to continuous improvement and energy efficiency by monitoring energy over time.

05_The Tool

The implementation of the DEESME Multiple Benefits approach is supported by a tool in the form of a spreadsheet file that guides the analytical procedure; each step of the procedure will be developed in a separate section of the spreadsheet file.



National schemes for energy efficiency in SMEs 

Tool for the implementation of the Multiple Benefits (MB) approach

DEESME is an EU Horizon 2020 funded project that aims to guide SMEs and national authorities through the energy transition by taking advantage of **multiple benefits** and **energy management** approaches. The Multiple Benefits (MB) approach regards energy efficiency measures and decisions in the wider context of business management and highlights the multiple business and non-energy benefits that can derive complementarily from the development of energy audits and energy management systems.

Version: 1.0

Aim: This file contains the tool for the implementation of the **Multiple Benefits (MB)** approach. It consists of 6 steps, each of which is being developed in a separate sheet:

- Step 1** Business model analysis
- Step 2** Cost structure analysis
- Step 3** Energy audit
- Step 4** Carbon footprint calculation (optional)
- Step 5** Multiple Benefits Identification & evaluation
- Step 6** Business Model Sustainability Advancement

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The methodology for the implementation of the DEESME Multiple Benefits approach

Note that each step of the procedure will be developed in a separate sheet of the spreadsheet file

1. Business Model Canvas

- **Goal of the BMC:** provide a general understanding of the business logic with regard to the value proposition, the customer, the business procedures, partnerships and the cost structure.
- **Data:** needed from the company.
- **Building blocks:** 5 out of the 9 building blocks will become the categories of benefits that can be related to the energy efficiency measures.

- Value proposition
- Activities
- Resources
- Customers
- Partners

<p>Key Partners</p> <p>Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</p> <p>Defines the network of suppliers and partners necessary for the functioning of the corporate business model.</p>	<p>Key Activities</p> <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue streams?</p> <p>Defines the strategic activities that must be carried out to create and support value propositions, reach customers, maintain relationships with them and generate revenues (e.g. purchase of raw materials, production...)</p>	<p>Value Propositions</p> <p>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</p> <p>Defines the package of products and services that represents a value (benefits that the customer has from the use of the product or service provided by the company) for a specific customer segment.</p>	<p>Customer Relationships</p> <p>What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</p> <p>Defines the type of relationship that the company establishes with the different customer segments.</p>	<p>Customer Segments</p> <p>For whom are we creating value? Who are our most important customers?</p> <p>Defines the community of customers or businesses that the company is aiming to sell its product or services to.</p>
<p>Cost Structure</p> <p>What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</p> <p>Defines the costs that the company will have to incur to make its business model operational.</p>		<p>Revenue Streams</p> <p>For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?</p> <p>Defines the revenue streams that the company obtains from the sale of products/services to a specific Customer Segment. How the company acquires value from the practice the customer is willing to pay.</p>		

4. Carbon footprint estimation (optional)

- **Goal of the carbon footprint estimation:** support companies to estimate the carbon footprint of their major operations/products and provide guidelines on how to improve them.
- **Data:** the energy auditor and energy consultants will identify and analyse the business operations and calculate their carbon footprint. They have to identify the GHG sources, select the quantification methodology and select and collect activity data related to GHGs.
- **Note:** the company can choose the scope of the carbon footprint analysis taking into account:
 - Scope 1: Direct GHG emissions
 - Scope 2: Indirect GHG emissions
 - Scope 3: Other indirect GHG emissions

GREENHOUSE GAS PROTOCOL

Welcome to the GHG Emissions Calculation Tool
A calculation tool for estimating GHG emissions based on the GHG Protocol

How to use this tool:

1. Enter company and facility information in the "Parameters" sheet. Also, identify a custom emission factor (see user manual for details).
2. The tool uses default emission factors, which vary by country. These are from one and only by facility, and the tool includes links of where to obtain them. Currently, separate emission factors are available for the UK and US. Location-based Scope 2 emission factors are also available for the UK, Canada and Australia, with the rest of the world's emission factors available for the US. Contact us if you require other data.
3. In the "Parameters" tab, you can load custom emission factors, adjust the default global warming potential and choose whether to use radiative forcing factor for air travel.
4. The maximum carbon footprint is 100,000 tCO₂e. Additional data cannot be added to the tool.
5. Use each of the sheets to input activity data for the relevant activities. Make sure to choose custom emission factors, if any, and to select the proper units.
6. If the results are not correct, please double-check that all the relevant input data has been selected and that the correct emission factors have been chosen.
7. The unit conversion table and the "GHG Emissions Calculation" sheet, the GHG Emissions Calculation sheet, will help you to check the unit conversion.
8. The GHG emissions need to be well within the upper limit provided in the "GHG Emissions" sheet, with an option to print the results.

Data entry fields are color-coded as follows in this tool:

- Light blue: Input data (required or not depending on input selection)
- Light green: Input data (optional)
- Light purple: Input data that is calculated by the tool
- Light yellow: Input data that should not be used as it is an error (shown for the sake of transparency)

Disclaimer: the tool does not necessarily cover all measurement to the user

Introduction | Introduction | Parameters | Emission Factors | GHG Emissions Calculation | GHG Emissions Calculation | GHG Emissions Calculation | GHG Emissions Calculation | GHG Emissions Calculation

* Reference tool

5. Multiple Benefits identification

- **Goal of the multiple benefits identification:** identify the benefits that are relevant for the company, depending on its sector and particular activities.
- **Data:** proposed list of major multiple benefits covering all domains of the Business Model Canvas. Additional multiple benefits can be related to each basic type of multiple benefits.
- **Note:** this list only serves as a guideline and it is not complete, since each company is different and have particular business logic and objectives.

DOMAIN	BENEFIT TYPE	INDICATOR
Value Proposition	1. Improved product/ service efficiency	Energy cost per unit of product/ service
	2. Introduction of new products/ services	N° of new 'green' products/ services
	3. Development of innovations	Total R&D expenses for 'energy efficiency' initiatives
Activities	4. Increased productivity	Value of output: items/ Value of input items
	5. Increased utilization	Capacity utilization
	6. Improved maintenance	Maintenance Unit Cost
	7. Reduced carbon footprint	Total GHG emissions per year
Resources	8. Improved quality	Right First Time
	9. Improved Safety	Incidence Rate
	10. reduced energy consumption	Total energy consumption per year
	11. Improved raw materials consumption	Quantity of raw materials purchased
	12. Increased recycling	Percentage of total waste that is recycled
	13. Reduced waste	Waste reduction rate
	14. Increased employee satisfaction	Employee Satisfaction Index
Customers	15. Acquisition of 'green' customers	'Green' customers share
	16. Acquisition of new customers	New customers share
	17. Increased customer satisfaction	Satisfied customers share
	18. Increased customer loyalty	Loyal customers rate
Partners	19. Improved supply chain relationships	Total n° of suppliers with ISO certification for energy or environmental management
	20. Improved stakeholder relationships	Total n° of stakeholders involved in decision making
	21. Reduced litigation risks	Total amount of expenses and fines related to environmental law violations
	22. Increased regulatory compliance	N° of EU and national energy policies adopted

6. Multiple Benefits evaluation

→ **Goal of the multiple benefits evaluation:** evaluate the impact of the multiple benefits identified previously in order to decide how to take advantage of them and improve the company's business model.

→ **Data:** the evaluation is qualitative and it is based on the knowledge and experience of the energy auditor/consultant and the managers who assist the integrated multiple benefits analysis.

→ **Note:** the evaluation will be based on:

- The significance for the company.
- The type of impact/contribution to the business model, in terms of value creation and business efficiency.
- The exploitation proposal and the action plan to be implemented.

BENEFIT	SIGNIFICANCE	IMPACT		EXPLOIT. PROPOSAL
		Value Creation	Efficiency	
1. New Products/ Services	Major	High	High	
2. Innovations	Major	High	High	
3. Market value	Minor	Low	Low	
4. Productivity	Minor	Low	High	
5. Utilisation	None	--	--	--
5. Maintenance	None	--	--	--
6. Carbon footprint	Minor	Low	High	
7. Quality	Major	High	High	
9. Safety	Major	Low	High	
10. Energy consumption	Minor	Low	High	
11. Raw material consumption	None	--	--	--
12. Recycling	Minor	Low	High	
13. Waste	None	--	--	--
14. Employee satisfaction	High	High	High	
15. 'Green customers' share	Major	High	Low	
16. New customers	Minor	High	Low	
17. Customer satisfaction	Major	High	Low	
18. Customer loyalty	Major	High	Low	
19. Supply chain relationships	Minor	High	Low	
20. Stakeholder relationships	Minor	High	Low	
21. Litigation risks	Minor	Low	Low	
22. Regulatory compliance	High	Low	High	

7. Business Model Sustainability

→ **Goal of the business model sustainability:** describe the opportunities that can be provided by the adoption of energy efficiency measures that the multiple benefits approach can offer.

→ **Data:** needed from the company

→ **Note:** there are two major cases of business sustainability advancement:

- Through business model innovation
- Through business model improvement

Key Partners  <p>- Can we choose partners with compelling sustainability certifications and social reports?</p> <p>- How can we collaborate with stakeholders for the advancement of business model sustainability?</p>	Key Activities  <p>- How can we improve the energy efficiency of the key activities?</p> <p>- How can we develop 'green' and sustainable practices (e.g. recycling) in the performance of the key activities?</p>	Value Proposition  <p>- How can we better respond to customers' lookout for energy savings/ sustainability?</p> <p>- What are the opportunities for 'green' solutions in our market?</p>	Customer Relationships  <p>- How can we cultivate the values of energy savings and sustainability with customers?</p>	Customer Segments  <p>- What are the social and market trends with regard to energy efficiency/ sustainability?</p> <p>- What are the needs of each customer/ customer segment related to energy savings, resource efficiency and sustainability?</p>
	Key Resources  <p>- How can we achieve energy and resource savings?</p> <p>- What alternative and sustainable resources exist?</p>		Channels  <p>- How can we use low impact distribution and communication channels?</p>	
Cost Structure  <p>- How can we exploit energy efficient/ sustainable alternatives in order to deduce cost?</p> <p>- How can we exploit energy efficient/ sustainable alternatives in order to reduce risks?</p>		Revenue Streams  <p>- How can we develop innovative financial models for the successful monetization of 'green' opportunities?</p> <p>- How can we meet business profitability and sustainable development?</p> <p>- How can we promote the fair distribution of benefits and profits to all constituents?</p>		

Business Analysis

INDEX

01_ Business Analysis stage

02_ Step 1: Business Model Analysis

- What is it?
- Objective
- Implementation

03_ Step 2: Cost Structure Analysis

- What is it?
- Objective
- Implementation

01_Business Analysis stage

The **Business Analysis** aims to provide a better understanding of the overall business rationale, the strategic priorities and objectives and the potential contribution of energy efficiency decisions. It provides the starting point for the implementation of the **DEESME approach for multiple benefits**.

In this stage the energy auditor/consultant together with company's representatives and with a validation of the management team will develop a common understanding about the business requirements and the way that energy efficiency decisions can fit in the business rationale and support the strategic priorities and objectives of the company.

Business Analysis

Step 1: Business Model Analysis

02_Step 1: Business Model Analysis

What is it?



A **business model** refers to *the rationale of how an organization creates, delivers, and captures value* (Osterwalder and Pigneur, 2010).

The **Business model analysis** provides the baseline for the DEESME multiple benefits approach. It serves as a diagnostic tool for the description and understanding of the current business situation, practices and objectives and provides the basis for the multiple benefits analysis that spans energy analysis beyond energy efficiency to relate it to the attainment of the general business objectives.

02_Step 1: Business Model Analysis

Objective



- **Goal of the BMC:** Provide a general understanding of the business context with regard to the value proposition, the customer, the business procedures, partnerships and the cost structure.
- **Output:** Draft the main features of the company business and get a first view of the opportunities and barriers to energy efficiency interventions to be identified and analysed in the energy audit step. The business model that will be developed can refer to the company in total, especially when the company has a single business activity or a main product/service. If the company has multiple, different business activities and products/services, then the business model can either refer to the business activity that is the most relevant to the energy analysis, or a separate business model should be developed for each business activity and product/ service that has an impact on energy analysis.

Note: *The method used will be the **Business Model Canvas**, which consists of a one-page document with 9 key blocks that collect the fundamental elements of a business in a structured way and helps to tailor the energy audit and the Energy Efficiency projects on companies' needs.*

5 out of the 9 building blocks of the business model will become the categories of multiple business benefits (Stage 3: Multiple Benefits Analysis) that can be related to the energy efficiency management

see next page →

02_Step 1: Business Model Analysis

Key partnerships → companies create partnerships to optimize their business models, reduce risk, or acquire resources.

Motivation for creating partnerships:

- Optimization and economy of scale
- Reduction of risk and uncertainty
- Acquisition of particular resources and activities

Types of partnerships:

- Strategic alliances between non-competitors
- Co-opetition: strategic partners between competitors
- Joint ventures to develop new businesses
- Buyer-supplier relationships to assure reliable supplies



02_Step 1: Business Model Analysis

The Business Model Canvas		Designed for:	Designed by:	Date:	Version:	Assumptions: - Fixed costs - Search, Pay (L&M, 2008)
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do our Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue streams?	Value Propositions What value do we deliver to the customer? Which one of our customer problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?	Customer Relationships What types of relationships does each of our Customer Segments expect? Who is reliable and maintainable about them? Which ones have the most potential? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Which are our most important customer(s)?	This is a great B2C Copy and paste it to the canvas. This is a great B2C Copy and paste it to the canvas. This is a great B2C Copy and paste it to the canvas. This is a great B2C Copy and paste it to the canvas.	
	Key Resources Which Key Resources do our Value Proposition require? Physical, Intellectual, Financial, Channels? Our Distribution Channels? Customer Relationships? Revenue streams?					
Cost Structure What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?		Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How are they currently being paid? How would they prefer to pay? How much does each Channel contribute to overall revenues?				

Designed by: Business Model Foundry AG (www.businessmodelgeneration.com/terms)
 This is an adapted version of the Business Model Canvas provided by Alex Charness in order to meet the objectives of the DESSME project.
 The original version of the Business Model Canvas can be found here: <https://www.businessmodelgeneration.com/terms>

Key activities: describes the strategic activities that must be carried out to create and support value propositions, reach customers, maintain relationships with them and generate revenues (e.g. purchase of raw materials, production...)
What must we do to succeed?



02_Step 1: Business Model Analysis

Key activities → every business model requires key action to:

- Create and offer a Value Proposition
- Maintain Channels to reach markets
- Maintain Customer Relationships with Customer Segments

Key activities link **Resources** to **Value Propositions** and they differ depending on the business model type.

Key activities can be categorized as follows:

- Production
- Problem solving
- Management
- Platform/network
- Communication



02_Step 1: Business Model Analysis

The Business Model Canvas					Designed for:	Designed by:	Date:	Version:	Assumptions: - Fixed costs/variable costs - Fixed/variable costs
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do we Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue streams?	Value Propositions What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundle of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?	Customer Relationships What type of relationship does each of our Customer Segments expect, we can establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Who are our most important customers?					<p>This is a great #1 Copy and paste it to the canvas.</p> <p>This is a great #1 Copy and paste it to the canvas.</p> <p>This is a great #1 Copy and paste it to the canvas.</p> <p>This is a great #1 Copy and paste it to the canvas.</p>
Key Resources What key Resources do our Value Proposition require? Physical, Intellectual, Human, Financial? Our Distribution Channels? Customer Relationships? Revenue streams?		Channels Through which Channels do our Customer Segments want to be reached? How are we reaching those channels? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?							
Cost Structure What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?		Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How are they currently being paid? How would they prefer to pay? How much does each channel contribute to overall revenues?							

Key resources: includes the strategic assets that a company must have in order to create and support its business model. *What resources & capabilities must we have to succeed?*



02_Step 1: Business Model Analysis

Key Resources → every business model requires Key Resources, which enable an enterprise to:

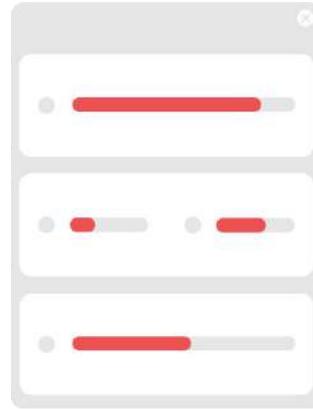
- Create and offer a Value Proposition
- Maintain Channels to reach markets
- Maintain Customer Relationships with Customer Segments

Type of Key Resources depending on the business model:

- Physical
- Financial
- Intellectual (brands, proprietary knowledge, patents and copyrights, partnerships, customer databases)
- Human

Key Resources can be:

- Owned
- Leased
- Acquired from **Key Partners**



02_Step 1: Business Model Analysis

The Business Model Canvas		Designed for:	Designed by:	Date:	Version:	Assumptions: What do we think is true? (p. 108, 109)
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do our Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue Streams?	Value Propositions What value do we deliver to the customer? Which one of our customer problems are we helping to solve? What bundle of products and services are we offering to each Customer Segment? Which customer needs are we satisfying? How costly are they?	Customer Relationships What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Which are our most important customer(s)?	This is a good #1 Copy and paste it to the canvas. This is a good #1 Copy and paste it to the canvas. This is a good #1 Copy and paste it to the canvas. This is a good #1 Copy and paste it to the canvas.	
	Key Resources What key Resources do our Value Proposition require? (Physical, Intellectual, Human, Financial)? Our Distribution Channels? Customer Relationships? Revenue Streams?					Channels Through which Channels do our Customer Segments want to be reached? How are we using these today? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?
Cost Structure What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?	Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How are they currently being paid? How would they prefer to pay? How much does each Channel contribute to overall revenues?					

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 This is an adapted version of the Business Model Canvas provided by Alex Charness in order to meet the objectives of the DEEM project.
 The original version of the Business Model Canvas can be found here: <https://www.businessmodelgeneration.com/terms>

Value proposition: package of products and services that represents a value (benefits that the customer has from the use of the product or service provided by the company) for a specific customer segment.
Why do the customers buy our offering/solution?

02_Step 1: Business Model Analysis

Value proposition → is **THE REASON WHY** customers buy or choose one company over another. It resolves a customer problem or satisfies a customer need.

Value Proposition can:

- Be innovative and represent a new or disruptive offer.
- Similar to existing market offers, but with added features.

Value may be: **quantitative** (e.g. price, speed of service) or **qualitative** (e.g. design, customer experience).

Elements of **value creation**:

- Newness
- Performance
- Customization
- “Getting the job done”
- Design
- Convenience/usability
- Brand/status
- Price
- Cost reduction
- Risk reduction
- Accessibility



02_Step 1: Business Model Analysis

The Business Model Canvas		Designed for:	Designed by:	Date:	Version:	Assumptions: - Model description - Sketch, Fig. 1.18, 1.19
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do our Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue Streams?	Value Propositions What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?	Customer Relationships What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Which are our most important customer?	This is a post #1 Copy and paste it to the canvas. This is a post #2 Copy and paste it to the canvas. This is a post #3 Copy and paste it to the canvas. This is a post #4 Copy and paste it to the canvas.	
	Key Resources What key Resources do our Value Proposition require? Physical, Intellectual, Human, Financial? Our Distribution Channels? Customer Relationships? Revenue Streams?					Channels Through which Channels do our Customer Segments want to be reached? How are we reaching them today? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?
Cost Structure What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?		Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Channel contribute to overall revenues?				

Customer relationships: type of relationship that the company establishes with the different customer segments.
How do we communicate with our customers?

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02_Step 1: Business Model Analysis

Customer relationships → Relationships can range from personal to automated.

The Customer Relationships influence the overall customer experience.

Categories of Customer Relationships:

- Personal assistance
- Dedicated personal assistance
- Self-service
- Automated services
- Communities
- Co-creation



02_Step 1: Business Model Analysis

The Business Model Canvas				
Designed for: _____		Designed by: _____		Date: _____
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do our Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue Streams?	Value Propositions What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?	Customer Relationships What type of relationship does each of our Customer Segments expect? Who is making and sustaining that relationship? Which channels have we established? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Who are our most important customers?
	Key Resources What key Resources do our Value Proposition require? Physical, Intellectual, Human, Financial? Our Distribution Channels? Customer Relationships? Revenue Streams?		Channels Through which Channels do our Customer Segments want to be reached? How are we using these channels? How are our Channels Integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?	This is a great #1 Copy and paste it to the canvas. This is a great #1 Copy and paste it to the canvas. This is a great #1 Copy and paste it to the canvas. This is a great #1 Copy and paste it to the canvas.
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The original version of the Business Model Canvas can be found here: <https://www.businessmodelgeneration.com/>

Channels: describes how the company reaches a certain customer segment to present and provide it with its value proposition.
How do we reach and sell to our customers?

02_Step 1: Business Model Analysis

Channels: Channels are customer touch points and provide an interface with customers.

Channel Types		Channel Phases				
Own	Direct	1.Awareness How do we raise awareness about our company's products and services?	2.Evaluation How do we help customers evaluate our organization's Value Proposition?	3.Purchase How do we allow customers to purchase specific products and services?	4.Delivery How do we deliver a Value Proposition to customers?	5.After sales How do we provide post-purchase customer support?
	Web sales					
Partner	Indirect					
	Own stores					
	Partner stores					
	Wholesaler					



02_Step 1: Business Model Analysis

The Business Model Canvas

<p>Key Partners</p> <p>Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</p>	<p>Key Activities</p> <p>What Key Activities do our Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue Streams?</p>	<p>Value Propositions</p> <p>What value do we deliver to the customer? Which one of our customer problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying? How costly are they?</p>	<p>Customer Relationships</p> <p>What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have the most potential? How are they integrated with the rest of our business model? How costly are they?</p>	<p>Customer Segments</p> <p>For whom are we creating value? Who are our most important customers?</p>	<p>Key Resources</p> <p>What Key Resources do our Value Proposition require? Physical, Intellectual, Human, Financial? Our Distribution Channels? Customer Relationships? Revenue Streams?</p>	<p>Channels</p> <p>Through which Channels do our Customer Segments want to be reached? How are we using these channels? How are our Channels Integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?</p>	<p>Cost Structure</p> <p>What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</p>	<p>Revenue Streams</p> <p>For what value are our customers really willing to pay? For what do they currently pay? How are they currently being paid? How would they prefer to pay? How much does each Channel contribute to overall revenue?</p>
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 The original version of the Business Model Canvas can be found here: (<http://businessmodel.lunduniversity.se/2012/03/05/>)

Customer segments: describes the groups of people or companies that the company is trying to target and sell its product or service to. *For whom are we creating value?*

02_Step 1: Business Model Analysis

Customer Segments → In order to better satisfy customers, a company may group them into distinct **segments with common needs, common behaviors, or other attributes**. Customer groups represent separate segments if:

- Their needs require and justify a distinct offer.
- They are reached through different Distribution Channels.
- They require different types of relationships.
- They have substantially different profitabilities.
- They are willing to pay for different aspects of the offer.

An organization must make a conscious decision about which segments to serve and which segments to ignore.

Examples of customers Segments:

- Mass market
- Niche market
- Segmented



02_Step 1: Business Model Analysis

The Business Model Canvas					Designed for: _____	Designed by: _____	Date: _____	Version: _____	Assumptions: - Fixed costs - Variable costs - Break-Even Point (BEP)
Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?	Key Activities What Key Activities do we Value Proposition require? Our Distribution Channels? Customer Relationships? Revenue streams?	Value Propositions What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?	Customer Relationships What type of relationship does each of our Customer Segments expect? Who is reliable and maintainable about them? Which ones have the most potential? How are they integrated with the rest of our business model? How costly are they?	Customer Segments For whom are we creating value? Who are our most important customers?	This is a great #1 Copy and paste it to the canvas. This is a great #2 Copy and paste it to the canvas. This is a great #3 Copy and paste it to the canvas. This is a great #4 Copy and paste it to the canvas.				
	Key Resources What key Resources do our Value Proposition require? Physical, Intellectual, Human, Financial? Our Distribution Channels? Customer Relationships? Revenue Streams?		Channels Through which Channels do our Customer Segments want to be reached? How are we using these channels? How are our Channels Integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating these with customer relationships?	Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How do they pay? How would they prefer to pay? How much does each Channel/Segment contribute to overall revenues?					
Cost Structure What are the most important costs inherent to our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?									

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 The original version of the Business Model Canvas can be found here: <https://www.businessmodelgeneration.com/>

Cost structure: defines the costs that the company will have to incur to make its business model operational.
What is the cost of our operation?

02_Step 1: Business Model Analysis

Cost structure: Creating Value, Delivering Value, maintaining Customer Relationships and Partnerships, and generating Revenue, all incur costs. Such costs can stem from **Key Resources**, **Key Activities** and **Key Partnerships**.

Two classes of business models (related to the Cost Structure):

- Cost driven
- Value driven
- In-between models

Cost Structures can have the following characteristics:

- Fixed costs
- Variable costs
- Economies of scale
- Economies of scope



02_Step 1: Business Model Analysis

The Business Model Canvas				
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Revenue streams: describes the revenue streams that the company obtains from the sale of products/services to a specific customer segment. How the company acquires value from the price the customer is willing to pay.
How do we have revenues & earnings?

02_Step 1: Business Model Analysis

Revenue Streams → They result from pricing decisions:

- A company must ask itself: "For what value is each Customer Segment truly willing to pay?"
- Each Revenue Stream may have different pricing mechanisms.

There can be one or more Revenue Streams from each Customer Segment:

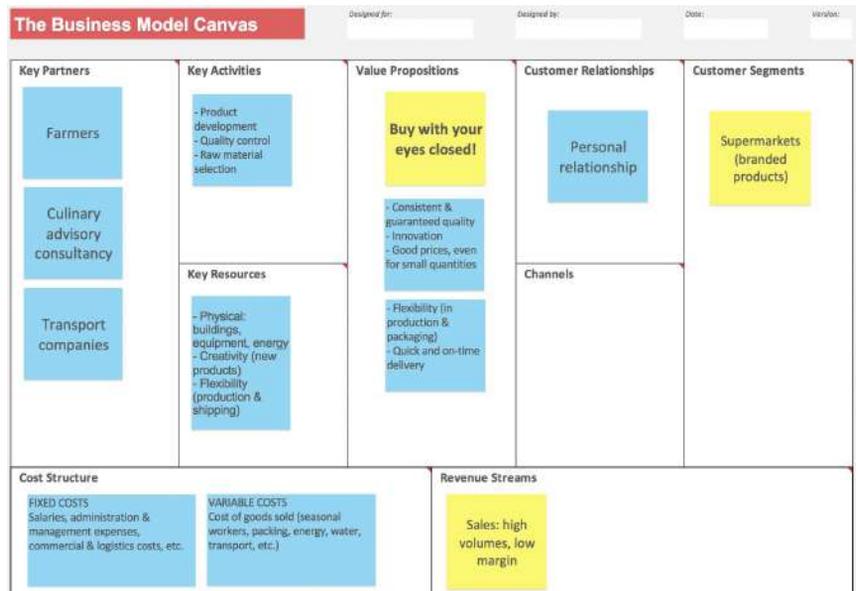
- **Transaction revenues:** one-time customer payments.
- **Recurring revenues:** ongoing payments to either deliver a Value Proposition to customers or provide post-purchase customer support.

Ways to generate Revenue Streams: Sale (ownership transfer), usage fee, subscription fee, lending/renting/leasing, brokerage fees, advertising.



02_Step 1: Business Model Analysis

Example of BMC → Taken from the *M-Benefits project* Company sector: food & beverage.



Business Analysis

Step 2: Cost Structure Analysis

03_Step 2: Cost Structure Analysis

The **cost structure analysis** identifies the cost centres, analyzes and reviews cost behaviour and group together all types of cost necessary to complete production processes. It is critical for the improvement of business efficiency and it helps to identify and prioritize opportunities for improved resource efficiency that can contribute to the business objectives. It is an important additional step in the business model analysis carried out by the energy auditor and the company.

For each cost centre it should be possible to:

- Identify it by geographical and/or functional point of view
- Measure energy consumption (directly or indirectly)
- Clearly identify one (or more) input(s) and one (or more) output(s).
- Calculate one or more energy indicators

The Cost Structure Analysis can be performed for the whole company, or any subdivision of it (Department, product line, procedure).

The Cost Structure Analysis must be coherent with the cost structure elements identified in the Business Model Analysis (Step 1 of the Business Analysis).





03_Step 2: Cost Structure Analysis

→ **Goal of the Cost Structure:**

- to provide a better understanding of the entire company's costs;
- to identify which areas need a more in-depth analysis; help prioritizing energy efficiency opportunities;

→ **Output:** calculation of the energy costs and energy-related costs for each cost centres. Energy-related costs (i.e. staff, health & safety, maintenance, etc.) can be split between two or more cost centres (i.e. if your company spends 10000 €/year for maintenance, 8000 €/year for "unit 1" and 2000 €/year for "unit 2", you could assign each cost to the relative cost centre).

Note: a cost centre is an area of business activity, process or plant that can be metered effectively and where there is an opportunity to manage and reduce energy consumption.



03_Step 2: Cost Structure Analysis

→ **Subdivision of cost centres:** coming from the "energetic structure" normally used for energy audits.

Process A (it should be repeated for all major processes)*	Process unit 1 ; Process unit 2 ; etc
Utilities (auxiliary services)	Cold production (chillers, dry-coolers, ...) ; boilers; air compressors; heat recovery; power plant; cogeneration plant; renewable energy (PV, solar systems, ...); fans & blowers; pumps; product handling, additional elements can be added.
General services	Lighting; offices conditioning; ventilation; IT equipment; additional services can added.
Vehicles (intended for personnel)	The type of vehicles should be added

*only for manufacturing companies

03_Step 2: Cost Structure Analysis

→ **INSTRUCTIONS:**

1. Insert as many rows as you need, in order to include all your machineries, plants, offices, etc.
2. Insert as many columns as you need, in order to evaluate all the costs you want.

WEIGHTS	50			15	5	5	10	5	5	5	5	...
	ENERGY CONSUMPTION (insert annual consumption in €)			MAINTENANCE COSTS	PERSONNEL COSTS	HEALTH&SAFETY	WATER CONSUMPTION	WASTE DISPOSAL	OTHERS "ENVIRONMENTAL" RELATED	OTHERS (SPECIFY)	...add more columns here if needed...	
	BENEFITS	Electricity	Natural gas	Other	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR
PROCESSES	Process unit/line 1 Process unit/line 2 Process unit/line 3 Process unit/line 4 Process unit/line 5 ...add a row above here if needed...											
AUXILIARIES	Cold production (chillers, dry-coolers, ...) Boilers Air compressors Heat recovery Power plant Cogeneration plant Renewable energy (PV, solar systems, ...) Fans & blowers Pumps AHUs Product handling ...add a row above here if needed...											
GENERAL	Lighting Offices conditioning Ventilation IT equipment ...add a row above here if needed...											
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0

03_Step 2: Cost Structure Analysis

→ **INSTRUCTIONS:**

3. Define a WEIGHT for each cost (attention: the sum must be 100).
4. Fill in all coloured (purple) cells (attention: fill in all figures as €/year).

WEIGHTS	50			15	5	5	10	5	5	5	5	...
	ENERGY CONSUMPTION (insert annual consumption in €)			MAINTENANCE COSTS	PERSONNEL COSTS	HEALTH&SAFETY	WATER CONSUMPTION	WASTE DISPOSAL	OTHERS "ENVIRONMENTAL" RELATED	OTHERS (SPECIFY)	...add more columns here if needed...	
	BENEFITS	Electricity	Natural gas	Other	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR	€/YEAR
PROCESSES	Process unit/line 1	3.500 €	15.000 €	- €	500 €	10.000 €	2.000 €	1.000 €	- €	- €	- €	- €
	Process unit/line 2	5.000 €	- €	- €	700 €	10.000 €	2.000 €	- €	- €	- €	500 €	- €
	Process unit/line 3	8.000 €	- €	- €	1.000 €	10.000 €	2.000 €	- €	- €	- €	- €	- €
	Process unit/line 4	2.400 €	- €	- €	400 €	5.000 €	2.000 €	- €	3.000 €	- €	- €	- €
	Process unit/line 5	7.000 €	- €	- €	400 €	5.000 €	2.000 €	- €	- €	1.000 €	- €	- €
	...add a row above here if needed...	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
AUXILIARIES	Cold production (chillers, dry-coolers, ...)	3.400 €	- €	- €	500 €	- €	- €	- €	- €	- €	- €	- €
	Boilers	1.900 €	23.000 €	- €	500 €	5.000 €	- €	1.000 €	- €	- €	- €	- €
	Air compressors	900 €	- €	- €	800 €	- €	- €	- €	900 €	- €	- €	- €
	Heat recovery	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
	Power plant	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
	Cogeneration plant	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
	Renewable energy (PV, solar systems, ...)	4.400 €	- €	- €	300 €	- €	- €	- €	- €	- €	- €	- €
	Fans & blowers	2.100 €	- €	- €	200 €	- €	- €	- €	- €	- €	- €	- €
	Pumps	1.100 €	- €	- €	200 €	- €	- €	- €	- €	- €	- €	- €
	AHUs	2.000 €	- €	- €	300 €	- €	- €	- €	- €	- €	- €	- €
	Product handling	3.000 €	- €	- €	500 €	- €	- €	- €	- €	- €	- €	- €
	...add a row above here if needed...	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
GENERAL	Lighting	800 €	- €	- €	500 €	- €	- €	- €	- €	- €	- €	- €
	Offices conditioning	1.500 €	3.000 €	- €	- €	- €	1.000 €	- €	- €	- €	- €	- €
	Ventilation	800 €	- €	- €	- €	- €	500 €	- €	- €	- €	- €	- €
	IT equipment	900 €	- €	- €	300 €	5.000 €	- €	- €	- €	- €	- €	- €
	...add a row above here if needed...	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €	- €
TOTAL		38000	41900	0	6600	50000	11500	2000	9500	1000	500	0

03_Step 2: Cost Structure Analysis

→ **INSTRUCTIONS:**

5. Look at the last column to find the cost centres you need to evaluate in your Multiple Benefits analysis.

5

Implementation

TOTAL	SCORES										TOTAL	COST CENTRE
€/100k	ENERGY	MAINTENANCE COSTS	PERSONNEL COSTS	HEALTH & SAFETY	WATER CONSUMPTION	WASTE DISPOSAL	OTHERS	OTHERS (SPECIF)	add more columns here if		TOTAL	
17.900 €	0.11708	0.01136	0.01000	0.00870	0.05000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.18715	TO BE USED
18.300 €	0.08185	0.01591	0.01000	0.00870	0.00000	0.00000	0.00000	0.05000	✗	#DIV/0!	0.11605	TO BE USED
19.000 €	0.03787	0.02275	0.01000	0.00870	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.09946	TO BE USED
12.600 €	0.01518	0.00909	0.00500	0.00870	0.00000	0.04284	0.00000	0.00000	✗	#DIV/0!	0.08691	TO BE USED
15.400 €	0.04430	0.00908	0.00500	0.00870	0.00000	0.00000	0.05000	0.00000	✗	#DIV/0!	0.11708	TO BE USED
0 €	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00000	
0 €	0.02152	0.01136	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.06088	TO BE USED
31.900 €	0.13719	0.01136	0.00500	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.22096	TO BE USED
1.789 €	0.00570	0.00682	0.00000	0.00000	0.00000	0.00000	0.00714	0.00000	✗	#DIV/0!	0.00966	TO BE USED
0 €	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00000	
0 €	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00000	
4.100 €	-0.07783	0.00682	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	-0.08105	
3.600 €	0.01119	0.00495	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.02394	
1.300 €	0.00696	0.00495	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.01351	
3.500 €	0.01266	0.00682	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.05048	TO BE USED
3.500 €	0.01898	0.01136	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.08025	TO BE USED
0 €	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00000	
1.480 €	0.00570	0.01136	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.02356	
5.300 €	0.02848	0.00000	0.00000	0.00435	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.03628	TO BE USED
1.500 €	0.00506	0.00000	0.00000	0.00117	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00778	
8.200 €	0.00570	0.00682	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.03351	
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	✗	#DIV/0!	0.00000	

Cost centres → You can calculate a score for each cost centre and, imposing a minimum value (second quartile by default), select the cost centres to be used in the Multiple Benefits approach.

Energy Analysis

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- What is it?
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01_Energy Analysis stage

The **Energy Analysis** is a core part of the integrated multiple benefits approach that seeks to introduce energy efficiency improvements which promote the business rationale and support the strategic priorities and objectives.

The main technical standards for energy auditing and energy management (EN 16247 and EN ISO 50001) can serve as business management tools for identifying business opportunities for improved efficiency and value creation.

Energy Analysis

Step 3: Energy auditing

02_Step 3: Energy auditing

What is it?



According to **EN 16247**, an **energy audit** is a systematic inspection and analysis of energy use and energy consumption of a site, building, system or organization with the objective of identifying energy flows and the potential of energy efficiency improvements and reporting them.

Energy audits lead companies to identify and implement energy saving and efficiency measures adapted to the organization's needs while making energy use more cost effectively and environmentally friendly.

02_Step 3: Energy auditing

Objective



→ **Goal of the energy auditing:** assess the current status of energy use in a company by determining the energy input, energy use and energy flows. It determines how to improve energy efficiency, reduce energy consumption and bring additional environmental benefits.

→ **Output:**

- Overview of energy consumption and energy flows.
- Identify opportunities for energy savings and reduce the energy costs, which improves profitability and enhances competitiveness.
- Identify opportunities for improvements in business processes and therefore improve productivity.
- Help organizations to reduce the environmental impact of their activities and therefore to fulfil obligations with respect to emission control (this is strengthened by the multiple benefits approach).
- Improve employee satisfaction and the reputation of the company to customers and the community.

Note: all sources of energy are to be taken systematically into account (electricity, combustible fuels, heating, etc.) and all sites, processes, facilities and transportation of the company in which the company uses or consumes energy.

02_Step 3: Energy auditing

→ Data collection:

- Data must be sufficiently reliable, representative, complete, traceable, useful and verifiable.
- Energy data should refer to both energy consumption and load profiles.
- Energy data must be continually or periodically measured.
- The reference period for the energy audit refers to 12 consecutive months and it should be the same for all sources of energy.
- Data is collected by the energy auditor in cooperation with the organization with regard to the energy used by sites, systems, processes and equipment.



02_Step 3: Energy auditing

- **Energy auditor:** the company sets a person in charge or contracts an external energy auditor for the performance of the energy audit. The energy auditor shall:
- Be suitable qualified and experienced for the type of work and the agreed scope, aim and thoroughness.
 - Treat as confidential all information provided by the organization during the energy audit.
 - Act in an objective manner.
 - Disclose any conflict of interests within the company in a transparent way.



02_Step 3: Energy auditing

→ Energy audit process:

According to the European standard DIN EN 16247-1 / Energy Audits - Part 1: General Requirements



02_Step 3: Energy auditing



1. Introductory contact



The **energy auditor** must set the framework of the auditing procedure, by setting the goals, needs, scope and expectations of the energy audit, as well as the criteria that will be used to measure energy efficiency, timescale to complete the energy audit and degree of thoroughness.

02_Step 3: Energy auditing



2. Kick-off meeting



The **energy auditor** determines the required data and the requirements for measurements and makes concrete agreements and arrangements about the practical performance of the energy audit in order to establish and ensure the cooperation. During the kick-off meeting the company nominates a representative who will be the contact person and responsible for assisting the energy audit.

02_Step 3: Energy auditing



3. Data collection



The **energy auditor** must, in cooperation with the organization, collect information and data related to the energy used by sites, systems, processes and equipment. Sources of information can include additionally the past data and previous analysis in the company regarding energy efficiency, energy tariffs, specification documents and manuals (for design, installation, operation and maintenance), economic data and other data from the energy management system (if it exists).

02_Step 3: Energy auditing



4. Field work



The **energy auditor** must inspect the sites, systems, processes and equipment in order to assess the energy use in real conditions (during the real operation of the business). Operating routines and user behavior and their influence on energy consumption and efficiency have to be assessed. This is the basis for the first recommendations for improvement.

02_Step 3: Energy auditing



5. Analysis



The **energy auditor** assesses the current energy consumption, identifies opportunities and alternatives for energy consumption improvement and develops recommendations that achieve energy efficiency improvement. These actions for energy efficiency improvement should be ranked upon agreed criteria.

02_Step 3: Energy auditing



6. Report



The **energy auditor's** report should be transparent, conclusive and comprehensible and must ensure that the energy auditor requirements agreed with the organizations have been met. It comprises a summary, general background information, the documentation of the energy audit and a list of options for improving energy efficiency, with:

- Relevant measures made during the energy audit.
- Assumptions made for calculating savings.
- Recommendations and plans for implementation.
- Information about available grants and allowances.
- Appropriate profitability analysis.
- Recommendations for measurement and verification procedures for an estimation of savings after the recommended measures are implemented.
- Possible interactions with other proposed recommendations.



02_Step 3: Energy auditing



7. Final meeting



In the final meeting, the **energy auditor** presents the results of the energy audit and his/her conclusions in a way that facilitates decision making for the organization.



Energy Analysis

Step 4: Carbon Footprint estimation

03_Step 4: Carbon footprint

The **carbon footprint analysis** evaluates the greenhouse gas emissions caused by the business operations of the company.

It captures the mix of energy sources used in producing, delivering and using a product/service, as well as non-energy related GHG emissions.

The analysis support companies to estimate the carbon footprint of their major operations/products and provide guidelines on how to improve it.



03_Step 4: Carbon footprint

Note: Carbon Footprint Analysis is optional in the DEESME Approach for Multiple Benefits. For this it is only highlighted in the training procedure. Companies interested in implementing the Carbon Footprint Analysis can find support in the following links:

- **GHG Emissions calculation tool:**
<https://ghgprotocol.org/ghg-emissions-calculation-tool> (beta tool)
<https://ghgprotocol.org/calculation-tools>
- **EPA calculation tool:** Simplified GHG emissions calculator
<https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator>
- **CCalCC2: based in 14044 and PAS 2050** - CCalCC2 Carbon Footprinting Tool
<http://www.ccalc.org.uk/ccalc2.php>

03_Step 4: Carbon footprint

- **Goal of the carbon footprint estimation:** identify cost savings across the supply chain as well as opportunities to reduce environmental impact through reductions in material use, water, waste and energy.
- **Output:**
 - Quantification of GHG emissions of the organization.
 - Quantification of GHG emissions of suppliers and customers (if scope 3 is applied).
 - Identification of impacts for specific products/services, in terms of tCO₂e.
 - Help organizations to reduce their impact, quantifying the effort in order to achieve a specific reduction goal.
 - Improve reputation of the company.
 - Many big companies now start asking for a carbon footprint in order to insert a company in their suppliers list.

Note: Three core standards around carbon footprint analysis are the ISO 14044 (LCA), ISO/TS 14067, PAS 2050, and GHG Protocol. The GHG Protocol is one of the most common international protocols used by business leaders and governments to comprehend, quantify and control GHG emissions; It will be used as a reference method in this document.

03_Step 4: Carbon footprint



1. Choose the project scope

SCOPE 1: DIRECT GHG EMISSIONS

emissions from sources that are operated by the project/process. For example: combustion of fossil fuels, industrial processes and fugitive emissions, such as refrigerants or methane leakage.

SCOPE 2: INDIRECT GHG EMISSIONS

emissions associated with energy consumption (electricity, heating, cooling and steam); by improving energy consumption a company reduce also its GHG impact.

SCOPE 3: OTHER GHG EMISSIONS

Upstream/downstream emissions from a facility 100% dedicated to the project activity that would not otherwise exist and did not exist prior to the project inception.

Indirect GHG emissions from vehicles or fleets using transport infrastructure including modal shift effects.

Indirect GHG emissions associated with raw material production.

Indirect GHG emissions associated with product/service utilization and disposal at the end of its life.

Indirect GHG emissions for the production, processing and transport for biofuel and bioenergy projects (if applicable for determining climate mitigation eligibility).



03_Step 4: Carbon footprint



2. System boundaries

Choose the system boundaries, including organization and process boundaries, according to the requirements described in the table. System boundary could also be the organizations itself, without any more specification on which processes are included or not.

PROJECT TYPE	FOOTPRINT BOUNDARY CLARIFICATION
ALL PROJECTS, (OTHER THAN FOR THOSE EXCEPTIONS SPECIFIED BELOW)	<p>INCLUSION: scope 1 and 2 emissions for a typical year of operation.</p> <p>EXCLUSION: scope 1 and 2 emissions associated with the commissioning, construction and decommissioning of the project.</p> <p>EXCLUSION: scope 3 emissions.</p> <p>INCLUSION: scope 3 emissions from 100% dedicated sources upstream or downstream that would not otherwise exist and a number of specific cases below. An example of the first case would be a power plant that exists solely to supply the project (upstream) or a waste disposal site that is for the exclusive use of the project (downstream) that would not otherwise exist.</p>
TRANSPORT MOBILE ASSETS AND INFRASTRUCTURE	<p>INCLUSION: scope 3 emissions from vehicles travelling on the financed physical infrastructure links, or fleets departing from, or arriving at a transport node, are included in the absolute and the relative emissions calculations. GHG relative emissions are calculated based on the displacement of passengers from one type of transport to another (modal shift effects), shifts in travel patterns (one road to another or from one time of day to another) and the induced increase in passengers and freight traffic. If the project includes the replacement of rolling stock, the savings in emissions from this intervention should also be taken into account.</p>
ENERGY NETWORK PROJECTS	<p>INCLUSION: scope 3 emissions from outside the boundary defined by the physical limits of the project are included in the relative emissions calculation where they are considered significant. For example, a district heating network project typically has a boundary that includes the losses of the heat network and any sources of heat generation under the control of the operator. If the project results in fuel switching (individual heating to district heating) or results in a change of the operational regime of a heat plant outside the control of the project operator, significant GHG emissions from these sources are included.</p>
INDUSTRIAL PRODUCTION FACILITIES	<p>INCLUSION: scope 3 emissions from outside the boundary defined by the physical limits of the project are included in the relative emissions calculation where they are considered significant. For example, the installation of a combined heat and power plant that provides waste heat to a residential area can lead to large GHG savings outside of the project boundary. If an industrial project leads to large energy or GHG emissions outside of the direct project, these should be included.</p> <p>EXCLUSION: The scope 3 emissions upstream and downstream of the industrial production is generally not considered (see exception above under "All Projects" covering 100% dedicated upstream and downstream sources). For example, the use of steel to make wind turbines or glass to double glaze windows would not be considered part of the absolute or relative emissions calculation.</p>
ALL REHABILITATION / REFURBISHMENT PROJECTS	<p>CLARIFICATION: The boundary for absolute emissions calculations for projects that rehabilitate or refurbish existing facilities corresponds to the boundary of the rehabilitation or refurbishment project and not the GHG emissions for the whole facility. If however the GHG emissions of the facility are significantly modified because of the project, the relative emissions calculation shall use a boundary that includes the entire facility.</p>



03_Step 4: Carbon footprint



3. Determination of the reference period

Usually the energy auditor/consultant should use the most recent 12 months period or a continuous period of multiple years, but if necessary this interval could be reduced or extended. The most important is that the period should be representative of the company normal activity.



03_Step 4: Carbon footprint



4. Collection of data - assessment of data quality

- Identification of GHG sources
- Selection and collection of activity data relating to GHGs; please refer to the Excel tool in order to have an outlook on which data should be collected
- Data collected must meet the requirements for the scope chosen
- Data is collected by the auditor in cooperation with the organization
- Some data (e.g. energy consumption) could be already available from the energy audit (step 3), so refer to it before asking data to the company.

This step should include also an assessment on the data quality collected; since this method is intended for implementing a simplified calculation of the Carbon Footprint, this evaluation is not included. Please refer to the protocols cited to get more information on this topic if needed.



03_Step 4: Carbon footprint



5. Identification and calculation of GHG inventory

- Selection or development of GHG emission factors.
- Calculation of GHG emissions.
- Calculation of the GHG inventory



03_Step 4: Carbon footprint

→ **Tool:** Emissions that can be included are the following ones:

- Fuel/energy purchased
- Fugitive emissions (e.g. refrigerant)
- Raw materials
- On-site combustions
- Process emissions
- Transportation (inbound & outbound)
- Business travels
- Employee commuting
- Waste
- Water



Multiple Benefits Analysis

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01_Multiple Benefits Analysis stage

The **Multiple Benefits Analysis** follows the energy analysis aiming at expanding its scope beyond energy savings and relating it to the general business priorities and objectives. The “*multiple benefits*” refer to business and non-energy benefits can be related, directly or indirectly, to the energy efficiency measures.

01_Multiple Benefits Analysis stage

The **Multiple Benefits Analysis** aims to:

- Highlight the various energy and non-energy benefits that are related to the energy efficiency measures and decisions;
- Link energy-related management decisions and business management priorities and objectives;
- Sensitize managers on energy efficiency decisions by demonstrating their relationship with the general business priorities and objectives.

Note: *The Multiple Benefits Analysis includes two steps: a) Multiple Benefits Identification and b) Multiple Benefits Evaluation. They are both presented in this file as they are closely related the one to the other.*

Multiple Benefits Analysis

Step 5: Multiple Benefits identification

02_Step 5: Multiple Benefits identification

What is it?



The **multiple benefits identification** refers to identifying the multiple benefits that are relevant to the company under study.

The energy auditor/consultant, together with the management team of the company, will decide together which types of multiple benefits can address the requirements and objectives of the company.

They can choose the multiple benefits from a non-exhaustive list and they can introduce additional types of multiple benefits and metric that serve better the the requirements and objectives of the company.

02_Step 5: Multiple Benefits identification

Objective



- **Goal of the multiple benefits identification:** provide a basis for the identification of business and non-energy benefits that be related, directly or indirectly, to the energy efficiency benefits and measures.
- **Output:** an “open” list of multiple benefits that are tailored to the requirements of each individual company, according to the characteristics of the sector/subsector it operates and the particular business logic and objectives.

Note: The identification of multiple benefits is based on the domains of the Business Model Canvas. It can be tailored to the company's needs and objectives by adding new, leaving out or modifying the proposed types of multiple benefits and indicators.

→ see next page

02_Step 5: Multiple Benefits identification

Implementation



The types of Multiple Benefits are related the following elements of the business model analysis:

- **Value proposition:** multiple benefits related to improved product/ service efficiency, new products (especially “green products”) and innovations.
- **Activities:** multiple benefits related to productivity, utilization, maintenance, emissions/carbon footprint, quality, and accidents/risks.
- **Resources:** multiple benefits related to energy consumption, raw materials /water/ consumables consumption, waste, recycling, employees (satisfaction, health and security, skills, training).
- **Customers (including Channels and Relationships):** multiple benefits related to “green customers” share/ “green sales”, new customers, customer satisfaction, customer loyalty.
- **Partners:** multiple benefits related to supply chain relationships (e.g. Green Public Procurement contracts, strategic agreements based on the adoption of ISO standards), litigation risks, regulatory compliance (adoption of social and environmental policies), and stakeholder relationships.

02_Step 5: Multiple Benefits identification

Note: The energy auditor/ consultant and the company's managers will decide for the following:

- The types of multiple benefits that are relevant for the company.
- The indicators they will use (the ones suggested or any other indicator).
- Additional multiple benefits and/or indicators that they believe necessary.

However: it is suggested the analysis covers all the domains and benefit types, exactly because the multiple benefits analysis aims to make managers "think broader" about energy efficiency measures. Benefit types that may seem irrelevant from a first glance could provide important insights for business improvement.

DOMAIN	BENEFIT TYPE	INDICATOR
Value Proposition	1. Improved product/ service efficiency	Energy cost per unit of product/ service
	2. Introduction of new products/ services	N° of new 'green' products/ services
	3. Development or innovations	Total R&D expenses for 'energy efficiency' initiatives
Activities	4. Increased productivity	Value of output items/ Value of input items
	5. Increased utilization	Capacity utilization
	6. Improved maintenance	Maintenance Unit Cost
	7. Reduced carbon footprint	Total GHG emissions per year
	8. Improved quality	Right First Time
	9. Improved Safety	Incidence Rate
Resources	10. reduced energy consumption	Total energy consumption per year
	11. Improved raw materials consumption	Quantity of raw materials purchased
	12. Increased recycling	Percentage of total waste that is recycled
	13. Reduced waste	Waste reduction rate
	14. Increased employee satisfaction	Employee Satisfaction Index
Customers	15. Acquisition of 'green' customers	'Green' customers share
	16. Acquisition of new customers	New customers share
	17. Increased customer satisfaction	Satisfied customers share
	18. Increased customer loyalty	Loyal customers rate
Partners	19. Improved supply chain relationships	Total n° of suppliers with ISO certification for energy or environmental management
	20. Improved stakeholder relationships	Total n° of stakeholders involved in decision making
	21. Reduced litigation risks	Total amount of expenses and fines related to environmental law violations
	22. Increased regulatory compliance	N° of EU and national energy policies adopted

02_Step 5: Multiple Benefits identification

Value Proposition: Product/ Service Efficiency

- **Description:** it refers to the business efficiency in providing product/ service to the market. It is relevant to the value proposition because the efficiency of delivering products/ services is quite often a source of value for the customer and also a source of competitive advantage for the company.
- **Basic indicator: Energy Cost Per Unit.** It refers to the total cost of energy spent over a period of time divided by the number of units produced in that time frame. It relates directly the energy consumption to all the functions of the business model.
 - Calculation method: $(\text{Total Energy Cost}) / (\text{Number of Units Produced})$.
- **Additional/ Alternative indicators:**
 - **Unit cost.** It is a basic accounting measure that refers to the total expenditure (includes all of the fixed and variable cost) incurred to produce, store, and sell one unit of a particular product or service
 - **Return on Assets (ROA).** It is a basic accounting metric that measures the efficiency in the use of the business assets.

02_Step 5: Multiple Benefits identification



Value Proposition: New Products/ Services

- **Description:** it refers to new product/ service development by the company in a year. The main benefit of new product/ service development is that the new products/ services have the potential to provide increased value to the customer.
- **Basic indicator: New 'green' products/ services:** it refers to the number of new 'green' products (i.e. environmentally friendly, in total or in some parts, with regard to the resources/ materials or the processes used) introduced in the market in the period of a year
For example, the development of a new product/ service that consumes less energy in its production procedures or during its use by the customer can be seen as a 'green' product/ service.
- **Additional/ Alternative indicators:**
 - **n° of new products/ services (in general),** introduced in the market in the period of a year. It can be used especially when a company does not produce 'green' products/ services; or it can be used complementarily to the basic metric ('green' products/ services) to provide a complete view on the business performance.
 - **New Product Introduction Rate:** it refers to the effectiveness of the new product development process, for regular or for 'green' products/ services. It is calculated as the amount of time it takes to design, develop and roll out a new product.

02_Step 5: Multiple Benefits identification



Value Proposition: Innovation

- **Description:** it refers to the exploitation of new ideas for the development of more efficient and effective processes or new products and services. Innovation brings new business opportunities, enables the development of new business models and provides the basis for the development of competitive advantage in the market. Innovation is also an enabler for the transition towards efficient, sustainable and secure energy systems.
- **Basic indicator: Total R&D expenses.** It applies to the implementation of 'energy efficiency' initiatives in a period of a year.
- **Additional / alternative indicators:**
 - **Total R&D expenses.** It refers to all the R&D activities of the company.
 - **Total R&D expenses for 'green initiatives'.** It aims to focus on R&D initiatives that have a positive impact to the environment.
 - **The production of intellectual property** (e.g. number of patents).
 - **Innovation rate.** There are two basic metrics for the measurement of the innovation rate: 1. revenue share of innovation / total turnover * 100, and 2. n° of innovations / n° of total products * 100.

02_Step 5: Multiple Benefits identification

Activities: Productivity

- **Description:** it is a measure of the efficiency of a company's production process/ operations. Productivity is defined as the ratio between the output volume and the volume of inputs and reveals how efficiently production inputs are being used to produce a given level of output. Productivity is a general measurement that can be tailored to the particular attributes of different companies and in different sectors.
- **Basic indicator: Value of output items/ Value of input items.**
Calculation method: Value of output items can be calculated as amount of output items * price. Value of input items can be calculated as amount of input items * cost.
- **Additional / alternative indicators:**
 - **Workforce productivity:** (total output) / (total number of employees).
 - **Reduced production cycle** (the average time for process completion, calculated by subtracting the process start time from the process end time).
 - **Increased production yields** (the number of finished products against the inputs (labour, materials and energy) needed to create them in a certain period of time).
 - **Increased productivity of machinery** (the total number of products produced / total of machines used in a certain period of time).
 - **Overall Equipment Effectiveness** (calculated by multiplying Availability X Performance X Quality).



02_Step 5: Multiple Benefits identification

Activities: Utilization

- **Description:** refers to how much of the production capacity is being utilized. It is the amount of output as a proportion of the total possible output.
Utilization is a typical measure for manufacturing companies, however it can also be applied to services (e.g. the amount of time that point of service are used to serve customers).
- **Basic indicator: Actual utilization / total productive capacity.**
- **Additional / alternative indicators:**
 - **Asset Utilization:** it is calculated by dividing the actual output by maximum capacity and multiplying the result by 100.
 - **Workforce Utilization:** it is calculated by dividing the actual output by maximum workforce capacity and multiplying the result by 100.



02_Step 5: Multiple Benefits identification

Activities: Maintenance cost

- **Description:** it refers to the expenses for the upkeep and repair of machinery and components throughout the business operation.
The measure is useful also for tracking machinery's effectiveness over time.
- **Basic indicator: Maintenance Unit Cost.** The metric is flexible and can be applied to one asset, a collection of assets, or a plant as a whole.
Calculation method: (total maintenance cost) / (standard units produced).
- **Additional / alternative indicators:**
 - **Maintenance Cost per Machine.**
 - **Malfunction Rate** (the number of malfunctions or the number of breakdowns of machinery and equipment in a certain period of time).

02_Step 5: Multiple Benefits identification

Activities: Carbon Footprint

- **Description:** it is the amount of carbon dioxide released into the atmosphere as a result of the activities of a company.
This generally applicable indicator from WRI includes the amount of GHG emissions to air from fuel combustion, process reactions and treatment processes. It includes CO₂, CH₄, N₂O, HFCs, PFCs and SF₆, and are given in metric tons of CO₂- equivalents.
- **Basic indicator:** It is calculated by summing the emissions resulting from the business operations for the manufacturing of a product or the performance of a service. The usual metric for carbon footprint is the number of tons of carbon dioxide emitted per year.
Calculation method: A method for the calculation of carbon footprint is presented in section 4 of this deliverable (step 4 of the proposed methodology)
 $\text{Energy Cost Per Unit} = \frac{\text{Total Energy Cost}}{\text{Number of Units Produced}}$.
- **Additional / alternative indicators:**
 - **Reduced dust emissions**
 - **Reduced NO_x / SO_x emissions** (each can be calculated separately).
 - **Water footprint**, as a measure of the total level of freshwater consumption for the direct or indirect operation of the business.

02_Step 5: Multiple Benefits identification

Activities: Quality

- **Description:** quality describes broadly the capability of the product/ service to meet certain standards (e.g. technical standards, or user's requirements). Improving the quality is paramount to all businesses. The producers tend to measure the conformance quality, or the degree to which the product/service was produced correctly (without faults), according to the requirements of technical standards. The consumers, on the other hand, may focus on the specification quality of a product/service, or how it compares to the similar offering of the competitors.
- **Basic indicator: Right First Time.** It measures how many products are produced correctly from the first time (without the needs for modification or rework). In its reverse form, it portrays an other popular quality metric, the '**Percentage of Defectives**', which is calculated as the total number of defectives to the total output.
- **Additional / alternative indicators:**
 - **Overdue Corrective Action Rate:** (number of overdue improvement actions) / (number of all improvement actions).
 - **Customer Service Costs:** (number of product recalls) * (the cost of product recall).

02_Step 5: Multiple Benefits identification

Activities: Health and safety incidents

- **Description:** it refers to incidents such as injuries, diseases and other dangerous occurrences at the workplace. Improving the organization's health and safety culture and performance means that the organization places a high priority on preventing injuries, minimizing risks, solving occupational health and safety issues, investing in control measures and engaging the entire workforce in health and safety.
- **Basic indicator: Incidence Rate.**
 - Calculation method: the number of health and safety incidents that occur over a standard period of time.
 - A variation of this metric is the number of incident events that occur over a standard period of time by a standard number of people (usually 100).
- **Additional / alternative indicators:**
See next slide →

02_Step 5: Multiple Benefits identification

Activities: Health and safety incidents

→ **Additional / alternative indicators:**

- **Lost Time Injury Frequency Rate:** the number of lost time injuries which occur per million hours worked.
- **Reduced Absenteeism:** the number of unexcused absences in a given period of time divided by the total period and multiplied by 100.
- **Production Days Lost through Sickness Absence:** the percentage of total work days lost by sickness absence.
- **Employee Comfort:** comfort at work is seen as a three-dimensional concept, each dimension corresponding to a different level of analysis, namely physical, evaluative, and psychological. Each dimension will be illustrated through survey (questionnaire) investigating (i) the physical factors of the work environment, (ii) satisfaction with the work environment, and (iii) attachment to the workplace and to the affective ties of employees to their workplace.

02_Step 5: Multiple Benefits identification

Resources: Energy Consumption

→ **Description:** it is the total sum of energy consumed for a certain activity in a given period of time. The measurement of energy consumption is covered by the energy audit, presented in section 4 of this deliverable (step 3 of the proposed methodology).

→ **Basic indicator: Total Energy Consumption per Year.**

- Calculation method: It derives from the sum total of the energy bills. It can include all types of energy source, such as electricity, district heat, fossil fuels, other fuel-based energy (e.g. biomass, waste fuel) and non-fuel based energy (e.g. solar, wind).

→ **Additional / alternative indicators:**

- **Total Energy Consumption per Department/ Business Unit.** An alternative of the basic indicator for energy consumption that drills down to the level of Department or Business Unit.

02_Step 5: Multiple Benefits identification

Resources: Raw Materials Consumption

- **Description:** it measures the total amount of raw materials required to produce the final products or deliver the services of an organization. In this category we should also add the use of consumables and other types of materials used in the business operation.
- **Basic indicator:** **Quantity of raw materials purchased.**
- **Additional / alternative indicators:**
 - There are more composite indexes for the measurement of raw materials that can tailor to the attributes and the requirements of each company. They can be decided with the Purchases Office.

02_Step 5: Multiple Benefits identification

Resources: Recycling

- **Description:** recycling is the process of converting waste materials into new materials and objects. The recovery of energy from waste materials is often included in this concept.
- **Basic indicator:** **Percentage of total waste that is recycled.**
Calculation method: $(\text{total waste that is recycled}) / (\text{total waste generated}) * 100$
- **Additional / alternative indicators:** There can be several particular benefits related to recycling.
 - **Product Recycling Rate:** it measures the proportion of the products a company sells that is recycled or reused. It is calculated as: $(\text{amount of products recycled or reused}) / (\text{total amount of products sold}) * 100$

02_Step 5: Multiple Benefits identification

Resources: Waste

- **Description:** waste can be solid, liquid, or gaseous and each type has different methods of disposal and management. Waste management is the activities and actions required to manage waste from its inception to its disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process.
- **Basic indicator: Waste Reduction Rate.** It is a measure of the level to which a company is able to reduce the waste it is generating as part of its operations.
Calculation method: $\frac{\text{Wasted raw material (in this period a)}}{\text{Wasted raw material (in the last period b)}} * 100$
- **Additional / alternative indicators:**
 - **Reduced Waste Heat.**
 - **Reduced Product Waste.**
 - **Reduced Hazardous/ Non-hazardous Waste.**

02_Step 5: Multiple Benefits identification

Resources: Employee satisfaction

- **Description:** it is the extent to which employees are content with their jobs and work environment. Factors that influence employee satisfaction include compensation, workload, perceptions of management, flexibility, teamwork, other benefits, etc.
- **Basic indicator: Employee Satisfaction Index (ESI).** It is based on a survey that includes three questions: a) how satisfied are you with your current workplace? B) how well does your current workplace meet your expectations?, and c) how close is your current workplace to the ideal one? The employees answer the questions on a scale from 1 to 10 (1 is the lowest rating and 10 is the highest rating).
Calculation method: ESI is calculated as $\frac{[(\text{questions average value}) / (\text{questions maximum value})] * 100$.
- **Additional / alternative indicators:** There are several indicators for measuring employee satisfaction.
 - **Employee retention/loyalty:** it refers to the ability of an organization to retain its employees and it is calculated by the average number of years that employees work at the company or by the retention rate, which is the percentage of employees a company retains over a given period of time.
 - **Employee recruitment:** it refers to the process of attracting the best candidates for a certain position at a company and it can be estimated with the number of new employees recruited per year.

02_Step 5: Multiple Benefits identification

Customers: Acquisition of 'green' customers

- **Description:** it refers to the share of the customers who prefer 'green' consumption options, customers who are aware of the necessity for the protection of the environment and they purposefully purchase 'green' products/services. The number of 'green customers' can derive from customer survey or any other form of customer feedback, or from the analysis of the sales records (how many customers buy 'green' products/ services).
- **Basic indicator: 'Green' customers share.**
Calculation method: $(\text{number of 'green customers'}) / (\text{total number of customers}) \times 100$
- **Additional / alternative indicators:**
 - **Green Products/Services Share** $[(\text{number of 'green' products/ services}) / (\text{total product/service portfolio})] \times 100$.
 - According to the characteristics of the company and its customer base, additional metrics could refer to particular cases of 'green' products/ services, such as the **percentage of recyclable or cyclical products**, the **percentage of energy-saving products/ services**, etc.



02_Step 5: Multiple Benefits identification

Customers: Acquisition of new customers

- **Description:** it refers to the number the customers who have purchased from a company and used the product/ service for the first time. New customers can also be switching from a competitor brand.
- **Basic indicator: New customers share.**
Calculation method: $(\text{New customers in a period}) / (\text{total number of customers}) \times 100$.
- **Additional / alternative indicators:**
 - **Customer Acquisition Rate:** it is calculated by dividing the number of customers acquired over a period of time by the length of the same period.
 - **Customer Acquisition Cost:** it is calculated by dividing all the costs spent on acquiring more customers (marketing expenses) by the number of customers acquired in the period the money was spent.
 - **Customer Conversion Rate:** it is the percentage of potential customers who take a specific desired action. For instance, in e-commerce it refers to the percentage of website visitors that perform a specific desired action on the website or landing page.
 - **Number of Referrals:** it is the number of new customers who register after the recommendation of existing customers. A business can track not just new conversions but also customers who are satisfied enough to tell others about it.



02_Step 5: Multiple Benefits identification

Customers: Customer satisfaction

- **Description:** it is defined as a measurement that determines how satisfied customers are with a company's products/ services, procedures and capabilities. Information for customer satisfaction, including surveys and ratings, can help a company determine how to best improve or change its products/ services and its operations.
- **Basic indicator: Satisfied Customers Share (Customer Satisfaction Score).** It is based on the answers to the question: "Overall, how satisfied are you with X?".
Calculation method: (total of positive responses ('very satisfied' and 'somewhat satisfied') with the products/ services or procedures of the company) / (total number of responses) * 100.
- **Additional / alternative indicators:**
 - **Net Promoter Score (for customer satisfaction):** it measures the affective and behavioral dimensions of customer satisfaction by evaluating the likelihood of customers to recommend a brand or its products/services. It is based upon the answers to the question: "On a scale of 0 to 10, what is the probability that you would recommend X brand to your friends or colleagues?" The NPS is obtained by subtracting the percentage of detractors (customers who respond 0 to 6) from the percentage of promoters (who respond 9 or 10).

02_Step 5: Multiple Benefits identification

Customers: Customer loyalty

- **Description:** it is a measure of a customer's likelihood to do repeat business with a company or brand. It is the result of customer satisfaction, positive customer experiences, and the overall value of the goods or services a customer receives from a business..
- **Basic indicator: Loyal Customer Rate.** It is the number of customers who purchased more than a certain number of times (in depends on the sector) divided into the number of unique customers in the same period.
Calculation method: (Number of customers who purchased + X times) / (number of unique customers) * 100, where X is the required number of purchases for loyal customer in the particular sector/ subsector.
- **Additional / alternative indicators:**
 - **Lifetime value (LTV):** it refers to the total amount of money customers spend on a company's brands from their first to their latest purchase. Based on this metric, companies can recognize their 'good customers', that is the customers that make the higher turnover over time.
 - **Churn rate:** it refers to number of customers who cancel or disengage from an order. It is calculated as a percentage of the cancelations or disengagement from an order over the total number of orders.
 - **Lost customers:** it refers to the number of customers who have quitted the company over a certain period. It is calculated as the percentage of customers lost/ quitted over the total number of customers in a certain period.

02_Step 5: Multiple Benefits identification



Partners: Supply chain relationships

- **Description:** the supply chain is a network between a company and its suppliers and partners that is formed for the production and distribution of products/ services to the customer. It includes different activities, people, entities, information and resources and is aimed to reduce costs, speed up the production cycle and help the company remain competitive in the market. Entities involved in the supply chain may include producers, vendors, warehouses, transportation companies, distribution centres, and retailers.
- **Basic indicator:** Total number of suppliers with ISO certification for energy or environmental management; or a similar and relevant instrument of accreditation.
- **Additional / alternative indicators:**
 - **Supplier Environmental Sustainability Index:** it is an indicator that measures the environmental performance of suppliers. It usually is a multi-item measure including elements such as energy consumption, carbon emissions, waste levels, and water usage, among others.

02_Step 5: Multiple Benefits identification



Partners: Stakeholder relationships

- **Description:** stakeholders are individuals, groups and other entities affected by the operation of a business and also affecting the operation of a business through their reactions. Maintaining strong relationships with the core stakeholders is key to the long-term development and success of a business company. Common business stakeholders include customers, communities, employees, owners, suppliers and partners, government agencies and regulators.
- **Basic indicator:** Total number of stakeholders involved, directly and/ or indirectly, in business decisions making.
- **Additional / alternative indicators:**
 - Total number of stakeholders involved in volunteering projects and other CSR (Corporate Social Responsibility) activities.

02_Step 5: Multiple Benefits identification

Partners: Litigation risks

- **Description:** it is the risk for a company to suffer legal procedures as a result of its actions/ inaction, products, services or another event.
- **Basic indicator:** Expenses and fines related to environmental law violations over a period of time.
- **Additional / alternative indicators:**
 - Expenses and fines related to any law violation over a period of time (e.g. anti-competitive behaviour, etc.).

02_Step 5: Multiple Benefits identification

Partners: Regulatory compliance

- **Description:** Regulatory compliance is an organization's adherence to regulations, guidelines and specifications relevant to its business processes. For example, the adoption of the principles and measures of the Energy Efficiency Directive or the Renewable Energy Directive of EU is a metric of the regulatory compliance.
- **Basic indicator:** Number of EU and national energy policies adopted (in total and over the past year).
- **Additional / alternative indicators:**
 - There can be several particular indicators of regulatory compliance, many of which have a sectoral character.

Multiple Benefits Analysis

Step 5: Multiple Benefits evaluation

03_Step 5: Multiple Benefits evaluation

The **multiple benefits evaluation** aims to assess the relevance and the potential impact of the multiple benefits identified on the companies' operation and business model in order to frame how the companies can take advantage of these multiple benefits.

What is it?



03_Step 5: Multiple Benefits evaluation

- **Goal of the multiple benefits evaluation:** assess and prioritize the different opportunities for exploiting the multiple benefits that are related to energy efficiency measures.
- **Output:** the results are employed for the development of ideas, plans and courses of actions for the business exploitation of the multiple benefits that are related to energy efficiency measures.

Note: The evaluation of the multiple benefits requires the collaboration between the energy auditor/consultant and the business managers who participate in the multiple benefits analysis. The evaluation is qualitative in nature and it is based on the knowledge, experience and insights of the energy auditor/consultant.

03_Step 5: Multiple Benefits evaluation

Overview

Evaluate the multiple benefits identified previously according to: **(1)** their level of **significance** and **(2)** their **impact** on value creation and the efficiency for the company.

(3) Then decide the **exploitation proposal**, i.e. how the company can take advantage of the multiple benefits with the highest valuation.

BENEFIT	SIGNIFICANCE	IMPACT		EXPLOIT. PROPOSAL
		Value Creation	Efficiency	
1. New Products/ Services	Major	High	High	
2. Innovations	Major	High	High	
3. Market value	Minor	Low	Low	
4. Productivity	Minor	Low	High	
5. Utilization	None	--	--	--
5. Maintenance	None	--	--	--
6. Carbon footprint	Minor	Low	High	
7. Quality	Major	High	High	
9. Safety	Major	Low	High	
10. Energy consumption	Minor	Low	High	
11. Raw material consumption	None	--	--	--
12. Recycling	Minor	Low	High	
13. Waste	None	--	--	--
14. Employee satisfaction	High	High	High	
15. 'Green customers' share	Major	High	Low	
16. New customers	Minor	High	Low	
17. Customer satisfaction	Major	High	Low	
18. Customer loyalty	Major	High	Low	
19. Supply chain relationships	Minor	High	Low	
20. Stakeholder relationships	Minor	High	Low	
21. Litigation risks	Minor	Low	Low	
22. Regulatory compliance	High	Low	High	



03_Step 5: Multiple Benefits evaluation

Multiple benefits evaluation is based on two factors:

1. The significance:

- All the multiple benefits identified in the previous step are assessed as having "Major", "Minor" or "None" significance for the competitive improvement of the company.
- Benefits that are decided to have no significance at all can be omitted from further analysis.

2. The type of impact/contribution:

There are two types of impact/contribution:

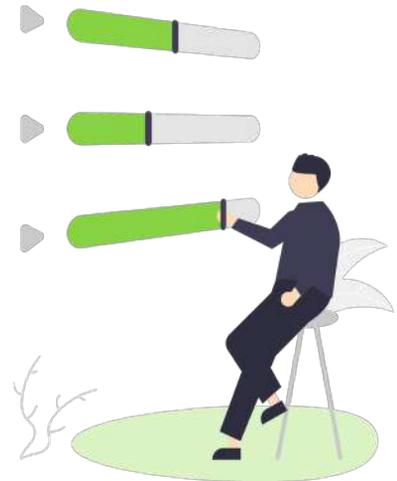
- **Impact/contribution in the value creation:** it has a strategic character and can lead to business model innovation.
- **Impact/contribution in the business efficiency:** it has an operational character and can lead to business model improvement.

The impact/ contribution can be assessed as "High" or "Low".

Benefits that have **minor significance** and **low impact contribution** can be omitted from further analysis.

→ At the end we continue with **multiple benefits that combine:**

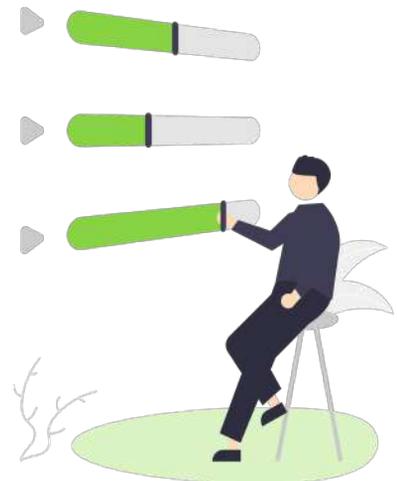
- **Major significance** and **high or low impact contribution**
- **Minor significance** and **high impact contribution.**



03_Step 5: Multiple Benefits evaluation

3. The exploitation proposal

- The energy auditor/consultant and business managers who participate in the multiple benefits analysis will decide how the company can take advantage of the multiple benefits that have the greatest significance and impact on the business model. A detailed action plan will be necessary for the proposals that receive the priority of the management team.



03_Step 5: Multiple Benefits evaluation

→ **Tool:**

- Set of basic multiple benefits (M) related to the elements of the Business Model Canvas.
- Suggestions for additional multiple benefits (A) that can be related to each basic type of multiple benefits are included.
- Any other additional benefits not mentioned and relevant for the company can be added.

BENEFIT TYPE	Metric / Indicator	INDICATOR	INDICATOR VALUE	INDICATOR	IMPACT on sales creation	IMPACT on efficiency	Additional comment
Value proposition							
Improved product/service efficiency	M	Energy cost per unit of production/service					
	A	Unit cost					
	A	Return on Assets (ROA) = Net Income/Avg. total assets					
<i>Add any other benefit</i>							
Introduction of new products/services	M	Nº of new 'green' products/services introduced in the market in the period of a year					
	A	Nº of new products/services (in general) introduced in the market in the period of a year					
	A	New Product Introduction Rate					
<i>Add any other benefit</i>							
Development or innovations	M	Total R&D expenses for 'energy efficiency' initiatives in a year					
	A	Total R&D expenses (in general)					
	A	Production of intellectual property (e.g. nº of patents)					
	A	Innovation rate through 1. Revenue share of innovation/total turnover*100, and 2. Nº of innovations/nº of total products*100					
<i>Add any other benefit</i>							
Activities							
Increased productivity	M	Value of output items / value of input items					
	A	Workforce productivity = total output / total nº of employees					
	A	Reduced production cycle = process start time - process end time					
	A	Increase production yields = outputs (nº of finished products) / inputs (time, materials and energy) in a certain period of time					
	A	Increase productivity of machinery = total nº of products produced / total of machines used in a certain period of time					
	A	Overall equipment effectiveness (OEE) = availability (total run time of an asset / total planned production time of an asset) x performance (actual system throughput / maximum possible throughput) x quality (nº of usable units produced / total units started)					



Business Model Sustainability Advancement

INDEX

01_ Business Model Sustainability Advancement stage

02_ Step 6: Business Model improvement / innovation through sustainability

- What is it?
- Objective
- Implementation

01_Step 7: Business Model Sustainability Advancement stage

The **Business Model Sustainability Advancement** searches for opportunities for business model innovation and improvement through the development of business sustainability.

It takes place after the evaluation of the multiple business benefits and concludes the DEESME Multiple Benefits approach.

Business Model Sustainability Advancement

Step 7: Business Model Improvement / Innovation

01_Step 7: Business Model improvement / innovation

The energy auditor/consultant and the management team review the initial business model. There are two major cases of business sustainability advancement:

1.

Through business model innovation: it refers to the innovation of the business model with regard to its core elements and their relationships. Taking into account the evaluation of the multiple benefits in the previous stage, opportunities for business model innovation can derive from the advancement of the benefits that have major significance and high positive impact on the opportunities for value creation.

2.

Through business model improvement: it refers to the improvement of the efficiency of the existing business model. Opportunities for business model improvement can derive from the benefits that have major significance and high positive impact on the efficiency of the business operations.

What is it?



01_Step 7: Business Model improvement / innovation

- **Goal of the BMC:** the advancement of business model sustainability through business model innovation and improvement.
- **Output:** the new improved business model provides answers to key questions for sustainable business and frames a roadmap for a sustainable business future. It outlines the opportunities that can derive from the adoption of energy efficiency measures and the development of sustainable business practices and ideas.

Note: Business sustainability refers to the effect of the business activities on the environment, with the intention not only to avoid harming the environment, but to have a positive impact and to pursue mutual benefits. The concept of business sustainability today extends beyond the business impact on the environment and includes also the business impact on the community and the society.

Objective



02_Step 7: Business Model improvement / innovation

Sustainable Business Model Canvas					Designed for:	Designed for:	Date:	Version:	Documentation: Feedback/Changes WBSO, 2024-04-24-2024
Key Partners Can we choose partners with compelling sustainability certifications and wider support? How can we collaborate with stakeholders for the advancement of business sustainability?	Key Activities How can we improve the efficiency of the key activities? How can we develop sustainable practices (e.g. recycling) to the performance of the key activities?	Value Propositions How can we better respond to customer needs for sustainability? What are the opportunities for sustainable business in our market?	Customer Relationships How can we cultivate the nature of sustainability with customers?	Customer Segments What are the social and market trends with regard to sustainability? What are the needs of each customer/customer segment related to resource efficiency and sustainability?	This is a part of Key and parts # to the canvas. This is a part of Key and parts # to the canvas. This is a part of Key and parts # to the canvas. This is a part of Key and parts # to the canvas.				
	Key Resources How can we develop sustainability of the key resources? What alternative sustainable resources exist?		Channels How can we use low impact distribution and communication channels?						
Cost Structure How can we exploit sustainable alternatives in order to reduce costs? How can we exploit sustainable alternatives in order to reduce risks?		Revenue Streams How can we develop innovative financial models for the successful monetization of sustainability opportunities? How can we meet business sustainability and profitability? How can we generate the fair distribution of benefits and profits to all stakeholders?							

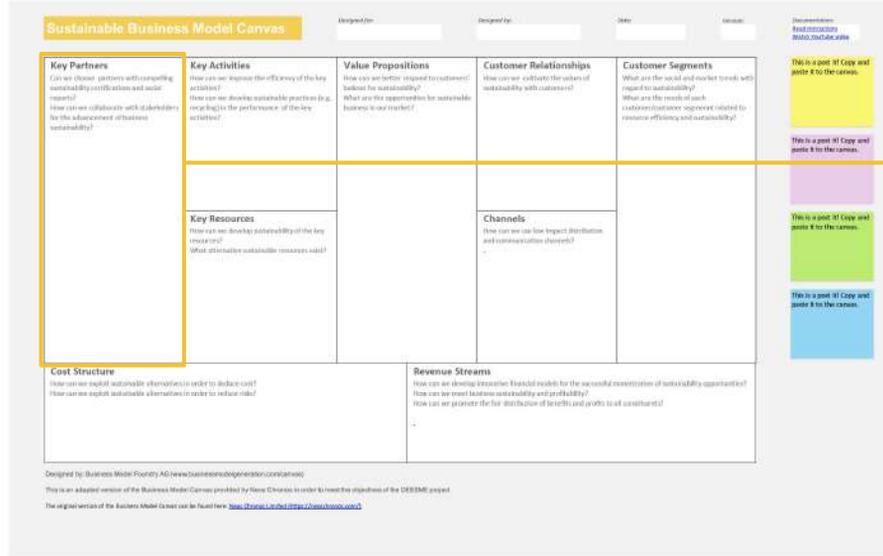
Designed by: Business Model Foundry AG (www.businessmodelgeneration.com/about)
 This is an adapted version of the Business Model Canvas provided by Peter Chenoweth in order to meet the objectives of the DESIRE project.
 The original version of the Business Model Canvas can be found here: <http://www.strategyzer.com/canvas>

02_Step 7: Business Model improvement / innovation



The key questions of the business model analysis are **NOW** answered having in mind not the current business context (as in the initial phase), but the **OPPORTUNITIES** that can derive from the adoption of energy efficiency measures and the development of sustainable business practices and ideas.

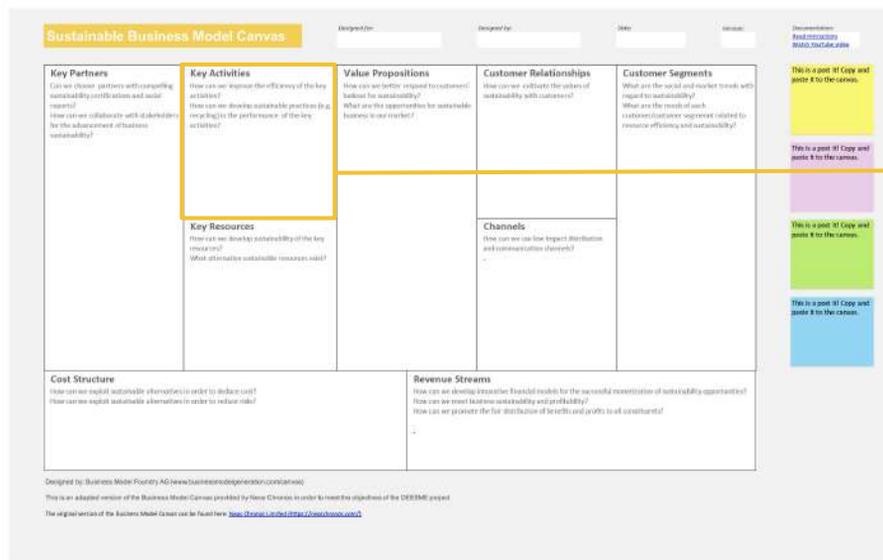
02_Step 7: Business Model improvement / innovation



Key partners: defines the network of suppliers and partners necessary for the functioning of the corporate business model.

- Can we choose partners with compelling sustainability certifications and social reports?
- How can we collaborate with stakeholders for the advancement of business model sustainability?

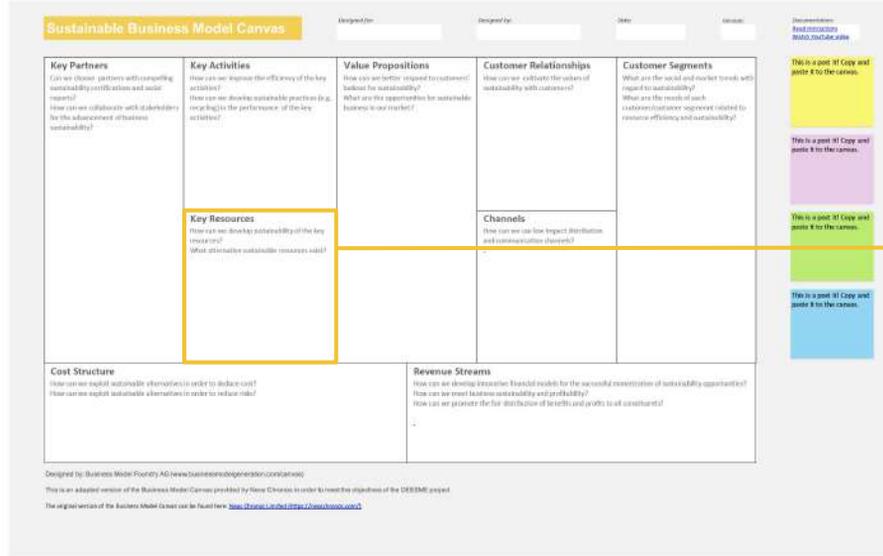
02_Step 7: Business Model improvement / innovation



Key activities: describes the strategic activities that must be carried out to create and support value propositions, reach customers, maintain relationships with them and generate revenues (e.g. purchase of raw materials, production...)

- How can we improve the energy efficiency of the key activities?
- How can we develop green practices (e.g. recycling) in the performance of the key activities?

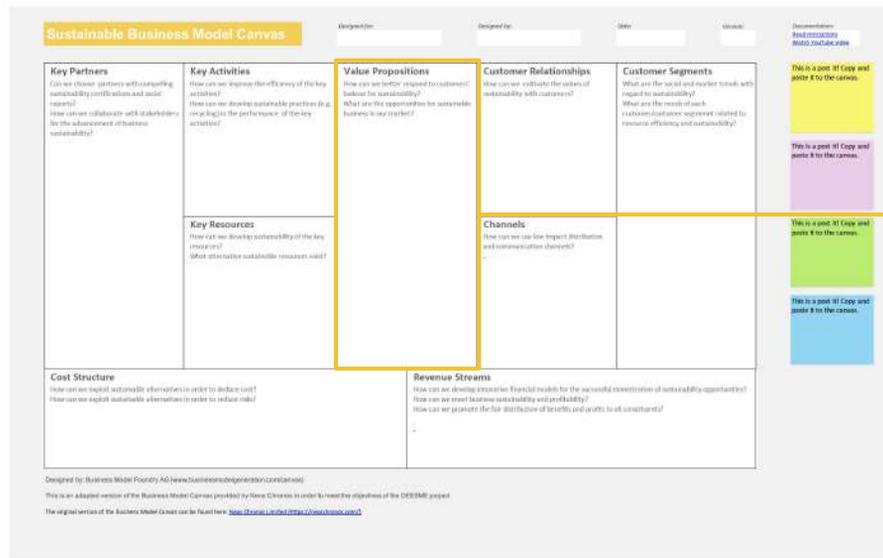
02_Step 7: Business Model improvement / innovation



Key resources: includes the strategic assets that a company must have in order to create and support its business model.

- How can we achieve energy and resource savings?
- What alternative and sustainable resources exist?

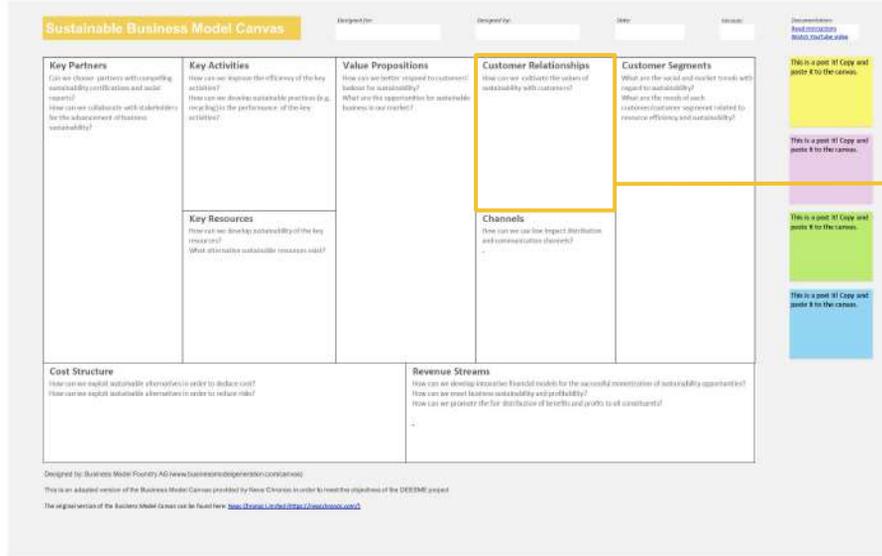
02_Step 7: Business Model improvement / innovation



Value proposition: package of products and services that represents a value (benefits that the customer has from the use of the product or service provided by the company) for a specific customer segment.

- How can we better respond to customers' desire for energy savings/ sustainability?
- What are the opportunities for 'green' solutions in our market?

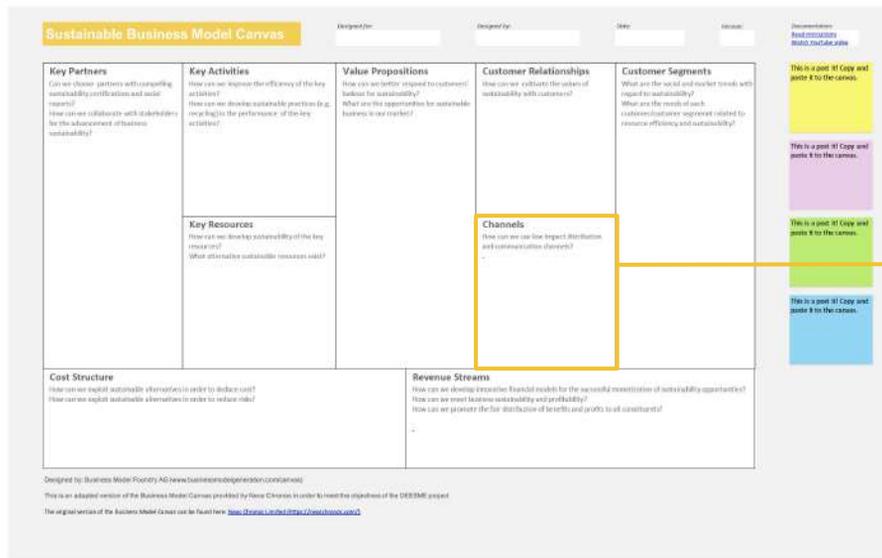
02_Step 7: Business Model improvement / innovation



Customer relationships: type of relationship that the company establishes with the different customer segments.

- How can we cultivate the values of energy savings and sustainability with the customers?

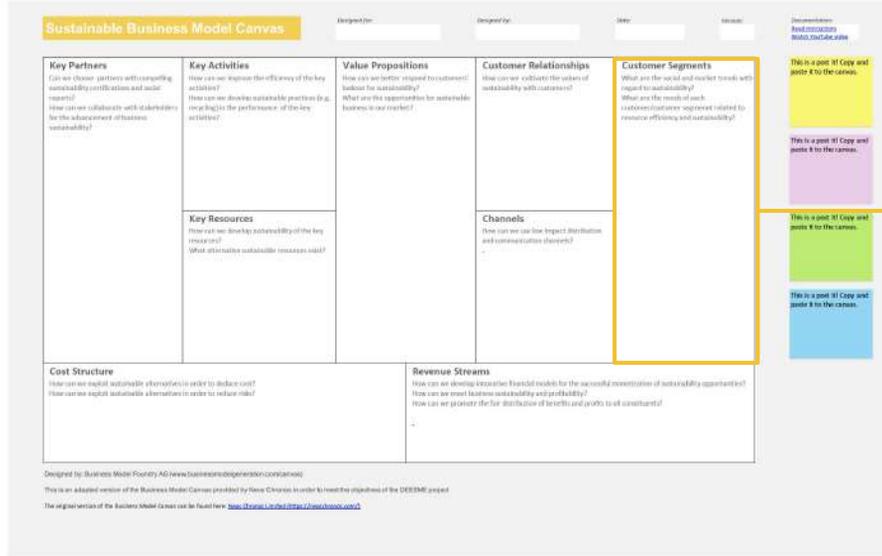
02_Step 7: Business Model improvement / innovation



Channels: describes how the company reaches a certain customer segment to present and provide it with its value proposition.

- How can we develop distribution and communication channels that have low environmental impact?

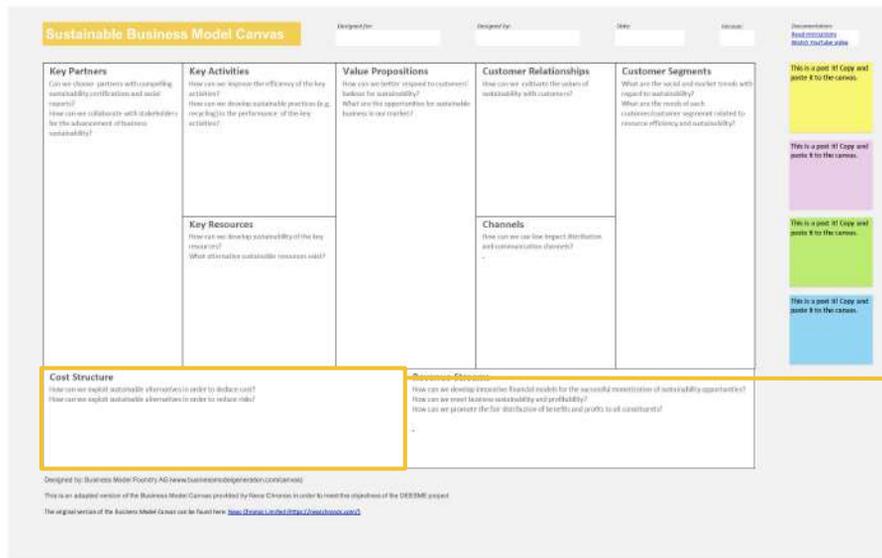
02_Step 7: Business Model improvement / innovation



Customer segments: describes the groups of people or companies that the company is trying to target and sell its product or service to.

- What are the social and market trends with regard to energy efficiency/ sustainability?
- What are the needs of each customer/ customer segment related to energy savings, resource efficiency and sustainability?

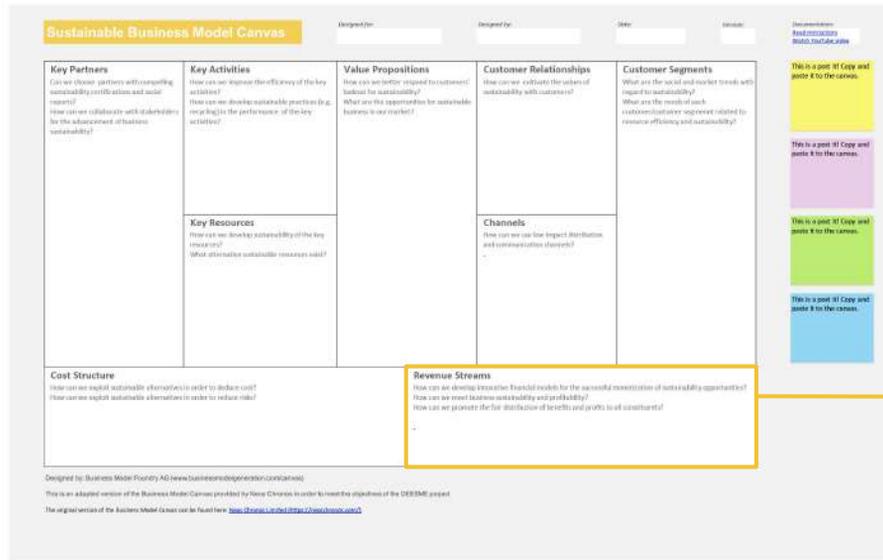
02_Step 7: Business Model improvement / innovation



Cost structure: defines the costs that the company will have to incur to make its business model operational.

- How can we exploit energy efficient/ sustainable alternatives in order to reduce cost?
- How can we exploit energy efficient/ sustainable alternatives in order to reduce risks?

02_Step 7: Business Model improvement / innovation



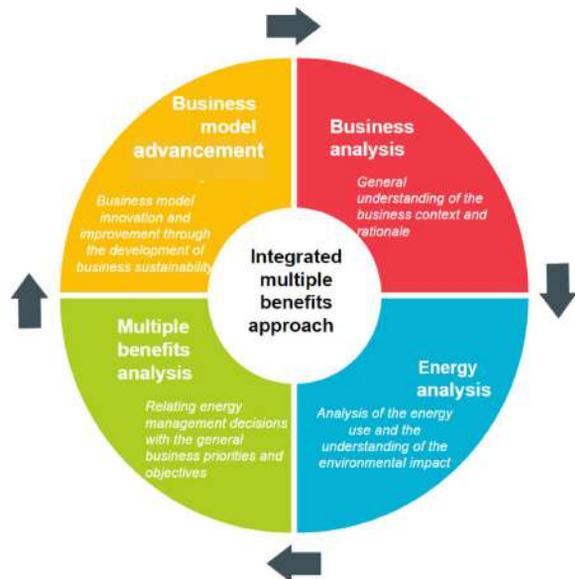
Revenue streams: describes the revenue streams that the company obtains from the sale of products/services to a specific customer segment. How the company acquires value from the price the customer is willing to pay.

- How can we develop innovative financial models for the successful monetization of 'green' opportunities?
- How can we meet business profitability and sustainable development?
- How can we promote the fair distribution of benefits and profits to all constituents?

02_Step 7: Business Model improvement / innovation

The **business model analysis** concludes the DEESME multiple benefits approach by seeking the improvement or the innovation of the business model through the lens of the energy efficiency analysis and the preceding multiple benefits analysis.

The proposed methodology can be seen as a life cycle that begins and ends with the business model analysis - as a diagnostic and strategic tool, respectively. Each iteration of the cycle leads to improved levels of energy efficiency and business model sustainability through improvement and innovation.



Energy Management Systems

supporting the Multiple Benefits approach

INDEX

- 01_ Introduction to the methodology
- 02_ Training objectives
- 03_ Recommendations for training
- 04_ Extended Energy Management System - basic concepts
- 05_ Extended Energy Management System ISO 50001:2018 analysis
- 06_ Examples

01_Introduction to the methodology

What is it?



The **DEESME project** aims to support companies, particularly SMEs, in the definition and implementation of energy saving measures. DEESME relies on multiple benefits concept to convince companies to improve the energy performances and to make investment, starting from the implementation of the energy management systems.

The DEESME approach for **Multiple Benefits** aims to relate energy efficiency with the non-energy aspects and general business. Hence, energy efficiency management can be related to the business management and the strategic objectives the companies.

The following presentation introduces the concept of Extended EnMS and explains how the Multiple Aspects can be managed in the framework of the Energy Management System allowing companies to achieve and valorise Multiple Benefits.

02_Training objectives

Objective



The training materials aim to mobilize and qualify the energy auditors/consultants and the business managers regarding the **multiple benefits approach** as part of the implementation of **energy auditing and energy management systems**.

These materials are intended to **train companies' technical staff in charge for energy efficiency, environmental management, etc. and professionals** (mainly energy experts) to identify, categorize, evaluate and quantify potential improvement opportunities and energy and non-energy benefits for the overall business strategy.

03_Recommendations for training

Objective



Note: This document provides elements for reflection on how ISO 50001 and the individual clauses can be re-read according to the MB approach.

The use of these training materials therefore requires the availability of the ISO 50001 standard and / or basic training materials.

Up to Clause 6.6 of ISO 50001, contents extracted from the guideline “The energy management system supporting the Multiple Benefit approach” of the DEESME project are reported.

03_Recommendations for training

Objective



Note: From clause 8 (Operation) onwards, teachers are invited to stimulate a debate among course participants to identify useful solutions for managing the MB aspects.

Clauses from 8 onwards are better suited to a discussion on more operational business implications.

The discussion can be stimulated starting from the analysis of the clauses of ISO 50001. The teacher can keep the contents of the guideline “The energy management system supporting the Multiple Benefit Approach” of the DEESME project as a reference point.

04_Extended Energy Management Systems - basic concept

According to ISO 50001:2018

- **Management System:** set of interrelated or interacting of an organization (3.1.1) to establish policies (3.2.3) and objectives (3.4.13) and processes (3.3.6) to achieve those objectives.
- **Energy Management System - EnMS:** management system (3.2.1) to establish an energy policy (3.2.4), objectives (3.4.13), energy targets (4.3.15), action plans and process(es) (3.3.6) to achieve the objectives and energy targets.

04_Extended Energy Management Systems - basic concept

According to the DEESME project:

- ✓ **Multiple benefit:** those benefits related to energy efficiency projects/actions that do not strictly result from energy saving actions.
- ✓ **Multiple benefit aspect:** those aspects, involved by energy efficiency projects/actions, that relate to areas of operation or of the business other than energy savings.
- ✓ **Extended EnMS:** the energy management system supporting the Multiple Benefit approach, which scope includes Multiple Aspects.

04_Extended Energy Management Systems - basic concept

According to the DEESME project:

- ✓ The Multiple Benefits approach is an integrated approach, not an integrated management system.
- ✓ An Integrated Management System can be defined as a single system designed to manage multiple aspects of an organization's in conformity with multiple standards, such as those for energy, environment, health and safety management.
- ✓ Once a company has decided to implement the ISO 5001 standard, MB aspects management remain optional, selective and discretionary; the certification does not apply to MB aspects management.

04_Extended Energy Management Systems - basic concept

Added value of the MB approach:

Maximising benefits related to energy efficiency actions: extended analysis of options, documented approach for an appropriated communication towards business customers, public procurers, consumers, communities, etc.

Approaching the compliance with new EU Policies and Acts such as:

- Corporate Sustainability reporting (2014/95/EU Directive)
- Taxonomy Regulation (852/2021)
- Agenda 2030 requisites

Improving performances of the overall management and specific aspects management such as environment, occupational health and safety, process efficiency, communication, marketing, procurement, etc.

05_Extended Energy Management Systems ISO 50001:2018 analysis

Foreword:

- Adopting the Multiple Benefit approach implies involving a large part of the managers/responsible within the organization.
- The Multiple Benefit approach is based on a strong commitment of the top management.

The following slides propose some consideration on how ISO 50001 clauses can be applied for supporting the MB approach.

05_Extended Energy Management Systems ISO 50001:2018 analysis

ISO 50001 introduction

In the process of improving their energy performance, organizations should include the evaluation of other energy-related performances (e.g.: performance regarding the environment, occupational health and safety, production processes efficiency, etc.) in order to better highlight all the benefits obtainable from energy improvement in addition to those strictly linked to energy costs saving.

The Multiple Benefit approach can increase the awareness of the company management and staff of the strategic role of energy efficiency and of the need to involve all levels of the organization in its improvement process.

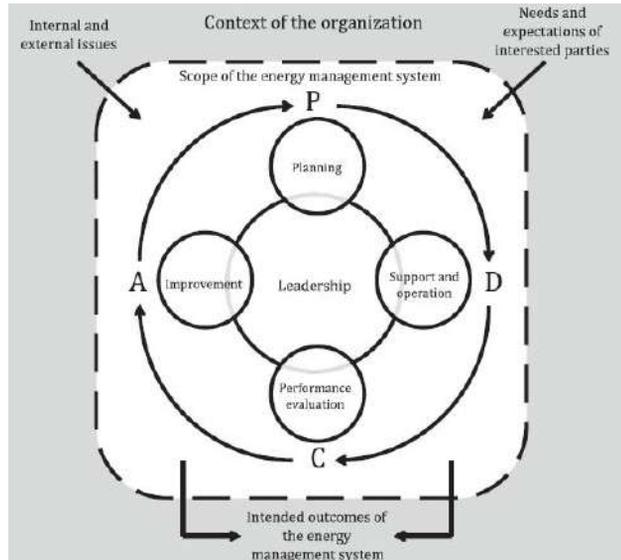
According to the standard requirements, all the elements of an EnMS may be valorised considering multiple aspects. Policies, objectives, strategies of companies should consider other strategic issues together with energy efficiency and performance issues.

05_Extended Energy Management Systems ISO 50001:2018 analysis

ISO 50001 introduction

PLAN - DO - CHECK - ACT
(DEMING) CYCLE

HIGH LEVEL STRUCTURE



ISO 50001:2018

05_Extended Energy Management Systems ISO 50001:2018 analysis

Clause 4.1: understanding the organisation and its context

The MB approach requires to expand the scope of investigation and intervention, therefore to expand its purposes and the intended outcomes of the EnMS. Consequently, relevant external and internal aspects to be considered could be more than those usually analysed for a typical EnMS. For example:

- Changes to environmental policies and laws (e.g.: Taxonomy Regulation).
- Changes to health and safety policies and laws in the workplace.
- Customer inquiries (e.g. life cycle approach, etc.), since the life cycle impact may be strongly influenced by energy efficiency.
- Modifications to Laws and regulations regarding public and private procurement (i.e.: evidence of complying with energy and other requirements at the same time may be required).
- Impacts on working environment, employees' attitude, sense of belonging and commitment (less absenteeism, more productivity, etc.) since investments in new plants or installations due to energy efficiency targets may influence these aspects).

ISO 50001:2018

05_Extended Energy Management Systems ISO 50001:2018 analysis

Clause 4.2: understanding the needs and expectations of interested parties

Dealing with MB may require the involvement of additional interested parties. Interested parties relevant to the Extended EnMS include stakeholders interested in the MB Aspects considered by the company, not only in the “energy performance”. Among them can be mentioned:

- Local authorities in charge for environment or in any of the considered MB aspects.
- Workers unions (if they exist within the company).
- Social associations dealing with any of the Multiple Benefits.
- Research and development bodies.

It is possible to identify and satisfy more needs and expectations than in a typical EnMS. The organization may extend applicable legal requirements management to different issues addressed within the EnMS but will not be obliged to do this: it is an opportunity rather than a duty.

ISO 50001:2018

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Clause 5.1: leadership and commitment

Bullet c): Need to ensure the integration of the management system into business processes: the inclusion of several aspects in the scope determines the growth of the importance of the system for the business and a wider involvement of the company management.

Bullet d): The top management ensures the improvement programs are approved and carried out: investments generate energy saving benefits together with benefits on the field of H&S, environment, human resources, etc. An action plan supporting an investment is successful if shared among all involved managers and when all benefits are defined and communicated.

Bullet i): Considering the extended scope of the EnMs, the energy management team can be more effective including additional members responsible for issues included into the EnMS scope; H&S, communication managers, etc.

Bullet j): The adoption of the MB approach requires that people contribute to the EnMS effectiveness for all issues included into the scope. Training can support awareness and commitment. Training should cover a wider range of contents. This determines the need not to separate the technical knowledge within the company.

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Clause 5.1: leadership and commitment

Bullet k): with MB approach, the support to other management roles acquires even greater importance and effectiveness; the action should better involve a bigger number of subjects and/or functions. Support should be therefore reinforced. For example, it seems useful that roles, responsibilities, powers and authorities are clearly defined and communicated. This not only for energy management but also for other aspects and both in the definition phase of the organization chart and in the attribution of specific roles, responsibilities, and authorities.

Bullet l): considering the extended EnMS scope, together with EnPI(s), also additional performance indicators may be defined as far as useful to monitor and demonstrate the achievement of intended benefits.

Bullet m): to ensure that processes are implemented to identify and address changes affecting the EnMS and energy performances, it should be ensured that the proper "management committee" deals on a regular basis with the EnMS requirements and effects on production, EH&S, organization, etc.

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Clause 5.3: organization roles, responsibilities and authorities

ISO 50001 encourages the creation of a team that deals with energy.

In fact, in order to deal with energy improvements, the personnel in charge of production, maintenance, purchases, design, monitoring of consumption, etc. should be involved.

Working in a team encourages to share knowledge, allowing a greater attention to different aspects and therefore the natural consequence of paying attention to Multiple Benefits.

Personnel should have adequate responsibility and power to avoid that the MB approach remains theoretical.



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Clause 6.1: actions to address risks and opportunities

Planning actions based on the analysis of risks and opportunities is a methodology that allows to maximize opportunities and reduce risks. If this analysis is extended to MB aspects, it is possible to achieve more results with the same actions. For example, investment in energy efficiency leads to a reduction in rework, in emergency maintenance and in accidents and to a maximization of production. The latter benefit has further positive effects on efficiency.

MB approach does not require that MB aspects management performance is in continual improvement. This means, for example, that if the organization considers H&S and personnel commitment and awareness objectives linked to investments in new or revamped plants. The organization is not obliged to demonstrate improvements as regards injuries and personnel commitment indicators.

On the other hand, if a company adopts the MB approach, aims to verify that the energy improvement is not achieved causing harm to other areas. This concept is relevant to the “**DO NO SIGNIFICANT HARM**” - DNSH principle according to the Taxonomy Regulation 852-21.



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For the following clauses 6.X, it is possible to make reference also to the DEESME guideline “Multiple Benefit approach of Energy Audit”

Clause 6.3: energy review

In addition to the energy analysis according to ISO 50001 and ISO 50002 (Guideline), the MB approach allows companies and consultants to evaluate the improvement options in a global perspective, adding to the energy assessments also issues related to the multiple aspects.

Clause 6.4: energy performance indicators

To these indicators it is possible to add others linked to the MB aspects considered in order to monitor their performance. Examples may be:

- Specific water consumption affected by new cooling systems.
- Green-gas emissions influenced by reduction of electric energy consumption.
- Complaints and suggestions regarding work environment (indicator that may be adopted to measure targets for employees' awareness and commitment) affected by investments in new plants and installations.

Non-energy indicators should be identified and selected following the methodology proposed in the guideline “Multiple Benefit approach of Energy Audit” (DEESME project).

05_Extended Energy Management Systems ISO 50001:2018 analysis

Clause 6.5: energy baseline

Include additional variables related to MB, the organization can, together with the estimate of future energy uses and energy consumption, estimate other non-energy benefits.

Clause 6.6: planning for collection of energy data

The organization must ensure that the key characteristics of its operations that affect energy performance are identified, measured, monitored and analyzed at scheduled intervals.

In terms of Multiple Benefits, the measurement of these characteristics can allow, for example, to check the efficiency of the company plants, to evaluate their performance, to carry out preventive maintenance in case of drift from the expected consumption values.

05_Extended Energy Management Systems ISO 50001:2018 analysis

Clause 7.1: resources

The energy performance continual improvement, granted by adequate resources, allows the organization itself to be more competitive, reducing energy costs.

In the same way, the Mb approach supposes that investments to support energy related projects and energy performance improvements will be profitable regarding more aspects, not only the energy costs.

Clause 7.2: competences

The organization should determine what is the necessary competence, provide that competence, evaluate the effectiveness of actions taken to provide the competence and retain appropriate information as evidence of the competence of people working under its control that affects not only energy performances but also actions, projects and activities carried on to achieve Multiple Benefits.

05_Extended Energy Management Systems ISO 50001:2018 analysis



Clause 7.3: awareness

- Considerations similar to the previous ones
- Ideas?

Clause 7.4: communication

Internal and external communications, including actions defined at bullets a) to e), ISO 50001, clause 7.4.

The MB approach allows organizations to be more transparent towards interested parties (e.g. customers, suppliers, control bodies, etc.) by enhancing their projects in terms of Multiple Benefits.

Effective communication grants value to anything that is carried out.

The organization may extend processes for collecting internal communications and suggestions to one or more of the multiple aspect or benefits considered.

05_Extended Energy Management Systems ISO 50001:2018 analysis



Clause 7.5: documented information

In the ISO 50001 praxis, the focus is on figures, not procedures. Limited use of "Paper".

So, for the purposes of the MB approach, only those documented information necessary to demonstrate the achievement of the other Multiple Benefits might be adopted.

In any case it is suggested to identify, inside extended EnMS documents and procedures, sections dedicated to aspects that do not relate with energy management in order to avoid misunderstanding with third party auditors in case of EnMS certification versus ISO 50001.

Also the documentation management for the extended EnMS follows the same requirements as the other ISO standards (clauses 7.5.1, 7.5.2 and 7.5.3).

However, control and distribution must follow paths involving several subjects for the purposes of checks, the correct identification of the personnel involved and the effective application of the procedures and instructions that the company has given itself.

05_Extended Energy Management Systems ISO 50001:2018 analysis

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06_Examples

Example 1

Replacement of the heating systems in a mechanical manufacturing department to save energy costs, improve indoor environment quality, reduce risks during maintenance and enhance internal and external communications.

Details, problems and opportunities

A company producing electrical appliance provides heating in a mechanical manufacturing department using heating fans powered by natural gas. This system warms up the whole volume of air in the area. The technical intervention is the substitution of fans with infrared radiating panels powered with the pre-existing natural gas pipelines. Energy savings are expected: small volumes of air will be warmed up, because people and workplaces will be directly heated by radiations and because no thermal energy will be lost through air change.

06_Examples

Multiple benefits

The H&S responsible of the company has been involved. Some relevant benefits have been highlighted. An indoor environment dust monitoring campaign has been planned because is expected that the minor turbulence due to the substitution of fans may lift up a minor quantity of dusts.

Temperature and air moisture will also be monitored as relevant parameters for quality of the work environment and as relevant variables connected to energy uses and indicators.

The H&S responsible also believes that wellness in the workplaces in terms of temperature and humidity control and regulation will be improved.

Moreover, the maintenance department will deal with less difficulties to access panels instead of fans to carry out maintenance controls and interventions.

HR department has been involved in order to include the project in a general internal communication project and policy adopted to communicate that the company considers employees as the most important resource and is addressing a people oriented and safe work environment investing for that.

Energy savings will cause less CO2 equivalent emissions: this will be publicly communicated.

ISO 50001 reference

6.3 Energy review

7.3 Awareness

7.4 Communication

8.2 Design

9.1 Monitoring, measurement, analysis and evaluation

06_Examples

Example 2

Revamping the steam distribution systems in a mechanical process industry in order to save energy costs through minimization of steam losses, to reduce costs and improve safety in case of maintenance or faults and to be able to communicate the company's "responsible care" for the environment.

Details, problems and opportunities

Steam pipelines connect sections of the chemical process, such as distillation, oxidation, hydrogenation, etc. Condensation traps drain condensation to grant the correct moist percentage and consequently the best efficiency of the heat distribution system.

A check of all traps installed has been carried out. Approximately 35% of the traps resulted to be obstruct or to loose steam continuously. Mean estimated losses in 2018 - 2020 resulted in about 100.000 €/year.

The technicians proposed two different interventions to plan and carry out checks and maintenance of condensation traps:

- Single traps restoration; low cost; low duration.
- Replacement of traps or pipeline sections; high cost of intervention; long life.

Steam pipelines were not in sections and were collecting different sections of the chemical plant; therefore, in case of traps replacement, it would be necessary to stop production processes in a large portion of the entire plant. For this reason, costs of solution b) was very high not only because of the intervention itself, but also because of the missed production.

06_Examples

Multiple benefits

The company's management understood that several additional benefits could be addressed planning an even bigger investment, i.e. to completely renew the design of the steam distribution system using valves and by-pass, in order to make possible replacement of traps without stopping production processes. Top management addressed additional multiple benefits:

- The possibility to carry out any maintenance or revamping of single plants, chemical reactor or vessel without stopping production of a whole plant section.
- Increase of occupational safety standards due to the possibility to isolate vessel or reactors in case of fault.
- Less concern due to major hazards: reduction of "domino effect"; reduction of "top events" consequences, reduction of "areas of concern"; no more population involved by top events effects.
- Enhance better relationships with Public Authorities and with neighborhood.

ISO 50001 reference

8.1 Operational planning and control

8.2 Design

Further Information

DEESME Project Website: <https://www.deesme.eu>

DEESME on Social Media:

→ Twitter: <https://twitter.com/DeesmeH2020>

→ LinkedIn: <https://www.linkedin.com/company/deesmme-h2020>