



DEESME

National schemes for energy efficiency in SMEs

Deliverable 3.2

The ENergy Management System supporting the Multiple Benefit approach

Authors:

Giovanni Franco, Camillo Franco, Roberto Galvanelli – SOGESCA srl



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Abbreviations and keywords

Abbreviations

| | |
|---------------|---|
| EnMS | E nergy M anagement S ystem |
| Extended EnMS | E xtended E nergy M anagement S ystem |
| MB | M ultiple B enefits |
| EED | E nergy E fficiency D irective |
| NA | N ational A uthority |
| EnPI | E nergy P erformance I ndicators |

Keywords:

energy audit, energy management system, extended energy management system, EnMS, Multiple Benefits, Multiple Benefits aspects.

1. Executive Summary

Typically, solutions of any type for energy saving are evaluated in terms of direct short-term economic return. On the other hand, other consequent benefits in various management areas (environment, safety at work, business attractiveness, productivity, etc.) are seldom considered and evaluated.

This guideline intends to provide consultants in the energy sector and business managers with useful information to enhance the Multiple Benefits approach, i.e. to include non-energy aspects in the Energy Management System (EnMS) and to identify and enhance the benefits obtained.

The document provides considerations on the relationships between the Multiple Benefits approach and ISO 50001 certification, the integrated approach, the ISO 50000 series standards and other standards concerning the management of non-energy aspects that may be involved in interventions in the energy field such as ISO 14001, 46001, 45001 and other technical standards based on the High-Level Structure.

The relationships between the MB approach and recent European Union policy initiatives on sustainability (e.g.: Taxonomy, Sustainability Report, etc.) are also highlighted, concluding that this approach brings companies closer to compliance with these new provisions.

An accurate reading of ISO 50001 is then provided, clause by clause, providing insights into the methods and meaning of the application of the Multiple Benefits approach.

For a full understanding of this section of the document (Chapter 5), ISO 50001 is required for parallel reading.

At the end of the document, examples of real-life situations are provided, where an organisation plans an action, a project or an investment aimed at energy cost savings and takes the opportunity to extend achievements to Multiple Benefits.

In some of the described examples, the company launched the initiative just focusing on EnMS or on energy savings and gradually extended its objectives to MB; in other cases, the company adopted a MB approach from the beginning.

The following best practices are provided to encourage organisations to “think” according to a Multiple Benefits approach when planning any change or new projects and developments following the examples provided.

2. About the DEESME project

Improving energy efficiency is the most cost-effective way to reduce energy-related emissions, improve economic competitiveness and increase energy security. In the EU, several pieces of legislation are in force aiming at guiding states and companies, regardless of their size, on ways to improve their energy efficiency. One of these is the Energy Efficiency Directive (EED), from here onward “the 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. Art. 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 (EnMS). 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. It is of paramount importance to make them aware of the Multiple Benefits that can derive from improving their energy efficiency and to accompany them in the energy transition, with knowledge and funding from both the public and private sectors. This is the objective of DEESME, a H2020-funded project (September 2020 – September 2023).

The DEESME project enables companies, especially SMEs, to manage the energy transition, taking profit of MB and provides NA with guidelines and recommendations to empower their schemes under Art. 8, using the MB approach.

The MB approach starts from the consideration that an investment in the energy field must not be evaluated only from a strictly economic point of view (kWh and € saved and payback times only in the light of these aspects). Energy efficiency brings many other environmental, social and economic benefits. This approach seeks to expand the energy efficiency perspective beyond traditional measures of reducing energy demand or lower greenhouse gas emissions.

In order to achieve these results, the project aims to:

- ✓ remove barriers for SMEs to implement energy saving measures and to invest in low carbon technologies, which are mostly related to lack of awareness (investing in energy efficiency is not perceived as a strategic priority), low capital and difficult access to financing, doubts on actual saving potential and lack of technical human resources;
- ✓ adopt a MB approach that expands objectives of energy saving and management to other related aspects (i.e. environmental aspects, safety on the job, production efficiency, etc.), linking energy saving to several business areas, thus allowing them to go up in rank in their management. Energy management becomes “Resources management”, increasing its strategic role for the business.

The project identifies and shares good practices from national schemes, related EU-funded projects, and other initiatives with NA and supports them in developing more effective schemes dealing with energy audits and EnMS. The project assists SMEs to implement the technical DEESME solutions by organising information and training initiatives, realising energy audits, and implementing EnMS starting from international standards integrating the MB approach.

The project is built on a consortium of academics, research organisations, 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).



3. Introduction to Multiple Benefit approach

Business managers tend to focus on business priorities and on the attainment of the core business objectives and they have a low priority for energy management, as they do not understand it or it is not in direct line with core business objectives (UNEP, 2017). If they cannot perceive the business benefit of energy management projects, they tend to neglect them or to see only the social benefits (at their expense).

This attitude is even more frequent in SMEs, as they have limited managerial and organisational resources and competencies. Hence, a key factor for the adoption of energy and environment management projects by business companies, especially by SMEs, is the change of this attitude. In the literature various barriers to energy efficiency investments can be found (see also Deliverable 3.1 of the project “DEESME”).

Conventionally, the most common approach for the evaluation of energy efficiency projects is their financial analysis as investments that should bring a positive return. Such analysis is based on a cost-benefit comparison limited to energy sources – such as electricity, gas, etc. – costs and savings, and does usually apply the payback period or the NPV (Net Present Value) as an evaluation criterion. However, this approach tends to focus on the costs and revenues that will be produced by the energy savings and seldom analyses the “other” Multiple Benefits. The concern is that many projects with good overall impact may not be approved because of the narrowness of the analysis.

In addition, the evaluation of energy efficiency projects, simply as investment opportunities, means that they could be ignored, even if they have a positive financial profile, because, for instance, they do not fit to short term business objectives, or because there are other investment alternatives with direct higher yield. Therefore, it is important to connect the decision for energy efficiency projects to the business models and the strategic objectives.

The MB approach for the evaluation of energy efficiency projects suggests that energy efficiency has many environmental, social and economic benefits (IEA, 2014). This approach seeks to expand the perspective of energy efficiency beyond the traditional measures of reduced energy demand or lower greenhouse gas emissions.

According to the H2020 M-Benefits project¹, additional/multiple business benefits can include increased process and product reliability, reduced operation and maintenance costs, increased productivity (capital and labour), increased equipment life-time, avoided equipment costs, improved working environment (e.g. air quality, temperature control, reduced noise, improved lighting), fond and committed employees, increased staff morale/satisfaction, enhanced corporate image and reputation, increased sales, increased profitability, tax concessions, etc.

The integrated MB approach in DEESME aims at valorising the role of the EnMS to manage together MB aspects and to achieve, make explicit, valorise and communicate the Multiple Benefits.

¹ www.mbenefits.eu

4. Introduction to the methodology

4.1. Why and how to adopt the Extended EnMS.

THE EXTENDED ENERGY MANAGEMENT SYSTEM

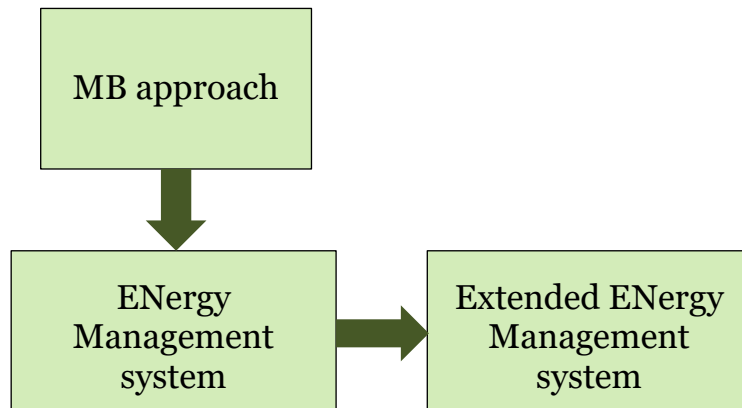
This document is a guideline aiming at defining an effective and homogeneous method for the development of an ENergy Management System that intends to manage the implementation of the MB approach.

The guideline intends to allow energy efficiency to go up in rank in general management priorities, increasing its strategic role for the business.

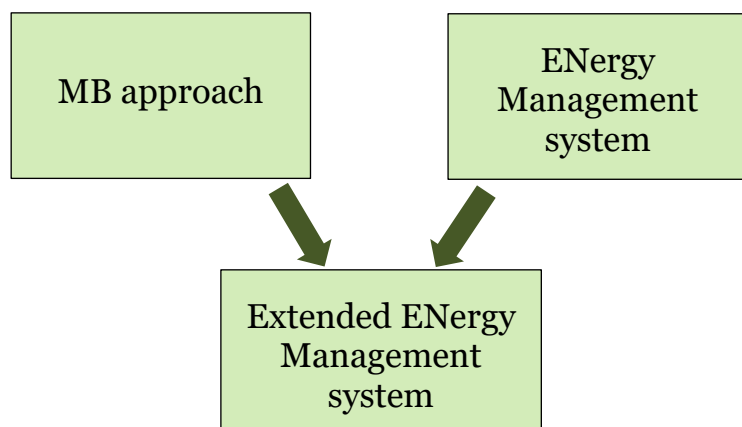
This system is named “**Extended Energy Management System**”, which scope includes the MB management.

There are two implementation processes scenarios for adopting the proposed methodology:

- ✓ The integration of the MB approach in an already existing ENergy Management System



- ✓ the adoption of the MB approach simultaneously to the design of the energy management system.



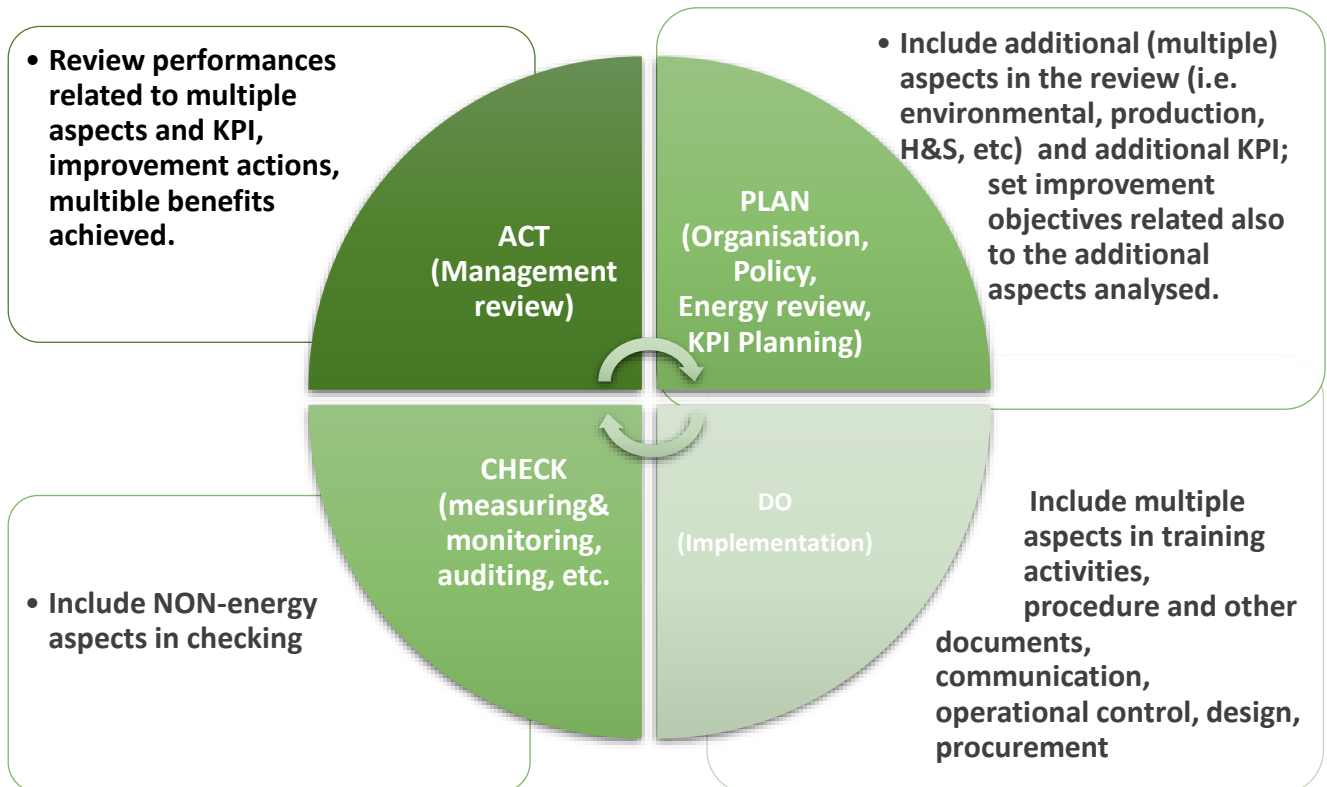
The approach proposes further aspects to be evaluated for energy efficiency: not only the economic and financial ones but also those related to Multiple Benefits such as environmental, occupational health and safety, production efficiency benefits, etc.

It suggests managerial and operational solutions to keep these aspects under the management control and improve them over time to achieve MB.

In order to ensure an easy application of this guideline, the management of MB aspects is developed in line with the principles and requirements of ISO 50001 which are analysed one by one.

For each relevant clause, considerations are reported regarding the added value of the MB approach, suggestions on applying the requirement to the benefit of MBs, etc.

The following scheme illustrates how the MB approach interacts with the ISO 50001 implementation cycle (Deming cycle)



Starting from the "Plan" step, non-energy aspects and indicators related to energy saving in the company concerned are included in the initial review, the evaluation of the various aspects and the definition of improvement objectives.

In the "Do" step, the company organizes itself to be able to manage also the NON-energy aspects in an integrated form with the energy ones in order to maximize the energy and non-energy benefits. The company is committed to improving the preparation of its staff, integrating its organization and operating and control procedures, planning, purchasing methods, etc.

In the "Check" phase, the company monitors energy and non-energy performance, applying what is planned and organized for the control and implementing the integrated indicators.

Finally, the Review activities (ACT) allow for reviewing the effectiveness of the entire system built and applied and finding solutions for improving the system itself as well as company performance.

Before adopting the DEESME methodology of the Extended EnMS some important considerations are the following:

- ✓ Adoption of the MB approach is an opportunity for any company (energy-intensive, non-energy-intensive, large, medium or small).
- ✓ Organisations can choose which of the Multiple Benefits and aspects to include into the EnMS, according to a self-made risk and opportunity analysis and free decision.
- ✓ The MB approach is not intended to be certified; when applied to Multiple Benefits aspects or benefits, ISO 50001 requirements are not mandatory; the verb “shall” is not applicable with regards to the Multiple Benefits management.
- ✓ Critical requirements of ISO 50001, such as the achievement of continuous improvement of energy performance, are not applicable to multiple objectives.
- ✓ Since all ISO 50001 requirements – irrespective if mandatory or not - are always good practice management recommendations, they are considered as recommendations, suggestions and opportunities within DEESME project.

The implementation of the energy audit that also considers the Multiple Benefits is described in the guideline “MB approach of Energy Audit” of the DEESME project, making sure that it also complies with the requirements for the energy analysis required by ISO 50001 (see 4.2).

In relation to the individual principles and requirements of ISO 50001 in this guideline, reference is also made to the requirements of other technical standards dealing with aspects of the set of "MB aspects" potentially connected with energy management.

When dealing with Multiple Benefits linked to energy efficiency, an **integrated approach** is being adopted by the management. In fact, in addition to energy, other aspects are addressed such as environment, safety at work, production efficiency, etc.

In this document the adjective "Integrated" is used for the term "Approach". The MB approach consists in highlighting all the benefits deriving from correct energy management. This approach needs to know the management performance upstream of the MB aspects on which the company has chosen to work and therefore to integrate them in the company management together with the energy aspects.

Typically, however, the **Integrated Management System** can be defined as a single system designed to manage MB aspects of an organisation in conformity with multiple standards, such as those for energy, environment, health and safety management, etc.

When a company chooses to apply the MB approach to its energy management system, it is directed towards integrated management in the strict sense, since it also starts to implement some elements of the reference ISO standards. References to the ISO standards concerning the aspects taken into account by the MB approach are provided at the end of some recommendations regarding the individual clauses.

According to the so-called High Level Structure, such standards have the same structure (chapters and clauses).

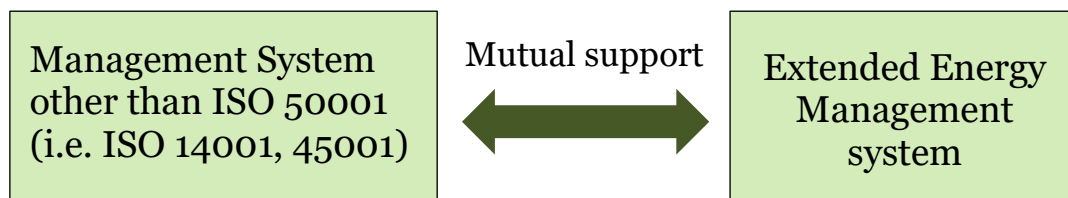
This is particularly useful for those organisations that choose to operate an integrated management system as well as the MB approach that can meet the requirements of two or more management system standards simultaneously.

RELATIONSHIPS WITH MANAGEMENT SYSTEMS OTHER THAN ISO 50001

Companies already adopting other management systems could have an advantage in applying the MB approach into the EnMS. For instance:

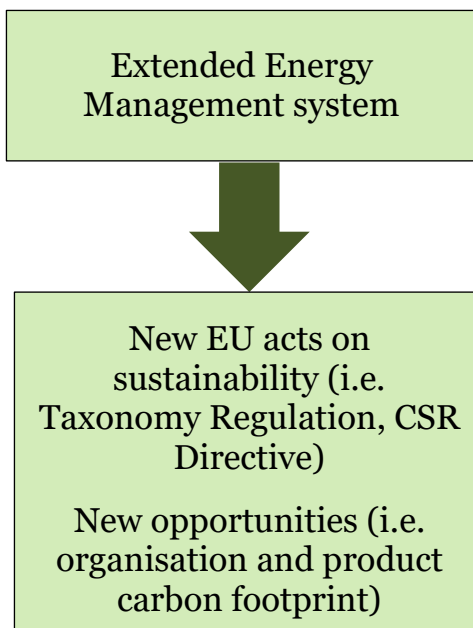
- ✓ ISO 14001 - Environmental management systems — Requirements with guidance for use (<https://www.iso.org/standard/60857.html>).
- ✓ ISO 45001 - Occupational health and safety management systems — Requirements with guidance for use (<https://www.iso.org/iso-45001-occupational-health-and-safety.html>).
- ✓ ISO 9001 - Quality management systems — Requirements (<https://www.iso.org/iso-9001-quality-management.html>).
- ✓ ISO 46001 - Water efficiency management systems — Requirements with guidance for use (<https://www.iso.org/standard/68286.html>).

Similarly, the assessment and management of non-energy aspects in the energy management system can facilitate the implementation of the reference standard and certification. For example, the inclusion of environmental aspects in the Extended Energy Management System can help a company if it decides to obtain ISO 14001 environmental certification.



THE MULTIPLE BENEFITS APPROACH AND NEW EU POLICIES ON SUSTAINABILITY

Moreover, the MB approach and the Extended EnMS can help companies to meet the obligations that are gradually introduced by European policies in support of environmental sustainability.



Many of such obligations currently affect large companies listed on stock exchange or financial institutions, but important changes are expected that will affect all large companies in the short term. Sustainability is becoming a driver for financial activities.

Sustainable finance refers to the process of taking environmental, social and governance considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities.

Sustainable finance has a key role to play in delivering on the policy objectives under the European Green Deal as well as the EU's international commitments on climate and sustainability objectives. It does this by channelling private investment into the transition to a climate-neutral, climate-resilient, resource-efficient and fair economy, as a complement to public money.

To this end, the Commission, since 2018, has been developing a comprehensive policy agenda on sustainable finance, comprising the action plan on financing sustainable growth and the

development of a renewed sustainable finance strategy in the framework of the European Green Deal and the new strategy for financing the transition to a sustainable economy. The Commission is also coordinating international efforts through its International platform on sustainable finance.

Among the tools related to sustainable finance as well as to the MB approach, we can mention the **Non-financial Reporting Directive**– Directive 2014/95/EU - (NFRD)

EU rules currently require large public-interest companies with more than 500 employees to publish regular reports on the social and environmental impacts of their activities.

This helps investors, civil society organisations, consumers, policy makers and other stakeholders to evaluate the non-financial performance of large companies and encourages these companies to develop a responsible approach to business.

Under Directive 2014/95/EU, companies have to publish information related to

- ✓ environmental matters
- ✓ social matters and treatment of employees
- ✓ respect for human rights
- ✓ anti-corruption and bribery
- ✓ diversity on company boards (in terms of age, gender, educational and professional background).

Looking ahead, the obligation will be extended according to **Corporate Sustainability Reporting Directive proposal (CSRD)**² to all large companies, an audit (assurance) of reported information will be requested and more detailed reporting requirements will be introduced.

Obligations should be in effect in the financial year starting on 1 January 2023 or during calendar year 2023.

Taxonomy is another chapter of European sustainability policies that has interesting relationships with the MB approach.

Taxonomy defines a common language and a clear definition of what is ‘sustainable’.

The EU taxonomy is a classification system, establishing a list of environmentally sustainable economic activities.

The Taxonomy Regulation 2020/852 was published in the Official Journal of the European Union on 22 June 2020 and entered into force on 12 July 2020.

It establishes the basis for the EU taxonomy by setting out 4 overarching conditions that an economic activity has to meet in order to qualify as environmentally sustainable.

The Taxonomy Regulation establishes six environmental objectives

1. Climate change mitigation
2. Climate change adaptation
3. The sustainable use and protection of water and marine resources
4. The transition to a circular economy
5. Pollution prevention and control
6. The protection and restoration of biodiversity and ecosystems

Different means can be required for an activity to make a substantial contribution to each objective.

² https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

Under the EU Taxonomy Regulation, the Commission had to come up with the actual list of environmentally sustainable activities by defining technical screening criteria for each environmental objective through delegated acts.

Since this Regulation is mandatory for companies which are subject to the obligation to publish a non-financial statement or a consolidated non-financial statement (see above), the taxonomy obligation should be in effect in the financial year starting on 1 January 2023 or during calendar year 2023

Companies that ‘think’ MB, are also approaching the application of the principle "Do no significant harm" (DNSH) according to the Taxonomy Regulation and subsequent Technical Guidelines of the European Commission. This principle is adopted also for the access of SMEs to European funds.

According to the description of the two new tools of the EU policies on sustainability, it is possible to state that:

- ✓ the obligations are progressively extended to all companies (some exceptions are not excluded, for example, for smaller companies),
- ✓ all companies must therefore organize themselves to document the results obtained, define objectives and demonstrate that they constitute a sustainable investment,
- ✓ the MB approach undoubtedly supports this path.

ASPECTS RELATING TO THE USE OF THE GUIDELINE

Following the discussion of the principles and points of ISO 50001 (chapter 5 of the document), some examples of application of the MB approach to specific cases are illustrated (chapter 6). Thus, the energy consultant, the main reference actor able to efficiently promote and apply the MB approach to companies and other entities, will have a straight path to follow, directly integrated with ISO 50001.

The same shall apply when the energy manager is part of the organisation.

The integration of the management of MB aspects / benefits can be made with very limited and negligible cost increases when compared to the resulting benefits.

At the same time, SMEs managers will be able to find ideas and suggestions to promote energy audits and energy management systems as part of their business development policies.

The business managers will focus on the relationship between energy management and business efficiency and improvement.

This guideline aims to define an effective and homogeneous methodological approach during and after the DEESME project for the development of an Extended EnMS that intends to manage the implementation of the MB approach.

In fact, it guides the partners activities aimed at building up the innovative extended EnMS during the project and it will be useful to consultants who will adopt it in the future.

In particular:

- ✓ in chapter 5, the theoretical application of MBs is analysed with respect to the requirements of ISO 50001
- ✓ in chapter 6, examples are provided that show the added value of the MB approach, compared to the traditional one, to the requirements of the ISO 50001 standard.

4.2. Relations of MB approach with other ISO 50000 standards

The standards concerning energy management can be used to improve the company's performances, such as the ones listed below:

- ✓ ISO 50005 - Energy management systems — Guidelines for a phased implementation

According to this standard, the implementation of the MB approach could also be phased together with the Energy Management System.

The phasing can concern both the development of the management of one or more MB aspects and the progressive insertion of several aspects, at different times, in the management.

- ✓ ISO 50002 - Energy audits — Requirements with guidance for use

This is the ISO standard that guides the implementation of the energy analysis. Therefore, in addition to the guideline " Multiple Benefit approach of Energy Audit" of the DEESME project, this standard can also be taken as a reference to conduct an appropriate energy audit for the management of MB. It can provide appropriate solutions for measuring and observing the energy use, energy efficiency and consumption, identifying and providing priorities of opportunities to improve energy performance and obtain related environmental and other benefits.

- ✓ ISO 50003 - Energy management systems — Requirements for bodies providing audit and certification of energy management systems

This standard supports the management system third party audit process. This document specifies requirements for the specific technical area of energy management systems (EnMS) that are needed to ensure the effectiveness of the audit and certification and provides organisation with information on additional requirements that must be satisfied to achieve and maintain ISO 50001 certification (i.e. continual energy performance improvement).

- ✓ ISO 50004 - Energy management systems — Guidance for the implementation, maintenance and improvement of an energy management system

This document provides practical guidance when implementing the requirements of an energy management system (EnMS) based on ISO 50001. It shows the organisation how to take a systematic approach to achieve continual improvement in the EnMS and energy performance. This document is not prescriptive. Each organisation can determine the best approach to adopt the requirements of ISO 50001. The user is advised to use this document with ISO 50001 and its annexes.

This document provides guidance to users with different levels of energy management, energy consumption and EnMS experience. Each clause explains how an organisation can approach a part of an EnMS. Practical tools, methods, strategies and examples are provided to help organisations implement an EnMS and to continually improve energy performance. The examples and approaches presented in this document are for illustrative purposes only. They are not intended to represent the only possibilities, nor are they necessarily suitable for every organisation. In implementing, maintaining or improving an EnMS, it is important that organisations select approaches appropriate to their needs" (*www.iso.org web site*).

This document is therefore a further source of suggestions for improving the management of MB aspects while maximizing the related benefits.

- ✓ ISO 50006 - Energy management systems — Measuring energy performance using energy baselines (EnB) and energy performance indicators (EnPI)— General principles and guidance.
- ✓ ISO 50015 - Energy management systems — Measurement and verification of energy performance of organisations — General principles and guidance

These two standards propose, at different levels, solutions to facilitate the measurement of performance and its evaluation. ISO 50015 is of a more general nature, while ISO 50006 is more specific and provides evaluation methods and tools by applying the reference EnPIs. These two standards are therefore particularly useful because they provide suggestions to better highlight the improvements obtained and therefore the benefits of direct management. In this way, companies put themselves in a position to maximize the induced benefits. They have documentation to support communication, participation in private and public tenders, request for funding, drafting of the Non-Financial Report and accreditation with finance representatives (ref. **Taxonomy**).

ISO 50006 provides criteria to assess energy performances and improvements of the EMS and of single projects, based on project baselines, project performance indicators and project targets. The standard helps the organisation to understand how improvements should and can be measured for each of the planned improvements projects.

4.3. Relations of this guideline with “Multiple Benefits approach of energy audit” (Deliverable 3.1 of DEESME project)

In the previous chapter it was specified that D3.2 deals with the extended energy management system and therefore how to bring under control the management, not only of the energy aspects but also of other non energy aspects, i.e. the general management and the strategic aspect of business operations. It also explained why and how it can be useful to use the deliverable.

In line with all organisational standards, the development and implementation of the system is preceded by an analysis phase to define a baseline referring to the aspects considered.

The chapters mentioned below as well as in the whole analysis of the requirements of ISO 50001 of the following chapter 5 of this guideline, refer to the guideline “Multiple Benefits approach of energy audit” (DEESME project -Deliverable D3.1).

In summary, the procedure recommended in this guideline has the following structure:

1. Phase 1: Business Analysis. It includes the Business Model Analysis that demonstrates the underlying business logic and the Cost Structure Analysis for the investigation of cost efficiency. It involves management and helps to identify targets and objectives of the EnMS, concurring in defining the energy policy (see chapter 5.7.2)
2. Phase 2: Energy Analysis. This phase reveals the opportunities for energy efficiency and reduced energy emissions through the Energy Auditing and Carbon Footprint analysis respectively. This step has a strong correlation with the Energy Review in ISO 50001 (see chapter 5.8.3)
3. Phase 3: Multiple Benefits Analysis. In this phase the company under investigation recognizes and evaluates the multiple benefits that may exist to supplement and expand the scope of energy management and relate energy efficiency decisions to business development. This is the “extended” part of the energy review, coming from non-energy benefits identified and evaluated using both phase 1 (types of benefits useful for the company) and phase 2 results (energy efficiency projects proposed with regards also to non-energy benefits)

4. Phase 4: Business Model Sustainability Advancement. This is the last phase that concludes the procedure to find out opportunities for increasing the business model sustainability through innovation and improvement, taking into account the improvement of energy efficiency, the exploitation of identified Multiple Benefits and the development of business sustainability. Referring to the ISO 50001, this phase is similar to the management review, because starting from the MB results, a company could change its business model.

The Multiple Benefits analysis supplements the energy analysis in order to:

- ✓ highlight the various non-energy benefits that are related to the energy management systems;
- ✓ connect energy management decisions and business management priorities and objectives;
- ✓ sensitise managers, especially of SMEs, on energy efficiency decisions, by demonstrating their relationship with the general business priorities and objectives.

The role of the business managers becomes central in the evaluation of the Multiple Benefits: the results of the multiple benefits analysis are exploited to focus ideas and to develop plans and actions for the overall business improvement and development.

The relations between the guideline “Multiple Benefits approach of energy audit” and this document “EnMS for the development of the Multiple Benefits Approach” can be summarized in the following key points:

- ✓ they both contribute to the extension of the scope of the energy management and relate it to business management, in general, and to strategic management (decisions for business efficiency and improvement). The Extended EnMS aims at improving the overall performance (not only the energy one) and increasing the competitiveness of the company.
- ✓ Both focus on the implementation of the multiple benefits concept: the first methodology deals with energy audit (analysis, evaluation and selection of Multiple Benefits) and emphasizes the business aspects; it provides the baseline of reference for the evaluation of the management and for its improvement.
- ✓ The guideline “EnMS for the development of the Multiple Benefits Approach” supports the management of the energy and non-energy aspects coming from the analysis and the improvement of related companies’ performances.
- ✓ The auditing methodology retraces the well-known PDCA cycle of the ISO standards, even if focuses on the energy review
- ✓ Results of the energy audit methodology are inputs for the extended EnMS; for example:
 - (Significant Energy Uses) SEUs in EnMS are identified among cost centers defined during cost structure analysis conducted in step 2 of Stage 1 (see chapter 2.3.1)
 - KPIs defined during energy audit (chapter 4.1) have to be used as KPIs also in EnMS
 - Multiple Benefits identification (chapter 5.2) helps defining other (non-energy) KPIs to be used in the Extended EnMS, and also gives management inputs to energy policy.
 - Business Model Sustainability Advancement results (chapter 6) are inputs to the management review in Extended EnMS.

5. Revisiting the standard ISO 50001:2018 according to Multiple Benefit approach

5.1. Specifications on ISO 50001 use

The ISO 50001 standard is protected by copyright and, for this reason, it is not possible to paste its contents in this document. Users are therefore invited to purchase it and to examine this guideline comparing the relevant clauses of the standard.

Only some extracts of the "Introduction" chapter are reported since the introduction is public (<https://www.iso.org/obp/ui/#iso:std:iso:50001:ed-2:v1:en>).

In this case, the aim is also to recommend some integrations in the ISO 50001 introduction that may prompt users of ISO 50001 to adopt the Multiple Benefit approach.

The text extracted from ISO 50001 is in italics; DEESME recommendations are reported in boxes.

5.2. EN ISO 50001:2018 Foreword

In the "foreword" of the ISO 50001:2018 standard, ISO underlines the main changes compared to the previous edition of the Standard. They include, among others:

- *better integration with strategic management processes;*
- *stronger emphasis on the role of top management.*

Since the MB approach extends the scope of the Management System from energy management to other technical issues such as maintenance costs and non-technical aspects like marketing or commercial activities, the two new elements reported above are far more significant.

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

This is also needed for the correct implementation of the MB approach for auditing and in particular for the elaboration of the Business Model Canvas according to step 1 of the MB methodology "Multiple Benefit approach of Energy Audit" (chapter 2.3; Deliverable 3.1; DEESME project).

This step allows companies to integrate energy efficiency, sustainability and other MB aspects into the strategic business objective, and, obviously, needs a strong commitment of the top management

5.3. ISO 50001:2018 Introduction

ISO 50001 - 0.1 General

The aim of this document is to enable organisations to establish the systems and processes necessary to continually improve energy performance, including energy efficiency, energy use and energy consumption.

In the process of improving their energy performance, organisations 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.

This document specifies the energy management system (EnMS) requirements for an organisation. Successful implementation of an EnMS supports a culture of energy performance improvement that depends upon commitment from all levels of the organisation, especially top management. In many instances, this involves cultural changes within an organisation.

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 organisation in its improvement process.
[.....].

Development and implementation of an EnMS includes an energy policy, objectives, energy targets and action plans related to its energy efficiency, energy use, and energy consumption while meeting applicable legal requirements and other requirements. An EnMS enables an organisation to set and achieve objectives and energy targets, to take actions as needed to improve its energy performance, and to demonstrate the conformity of its system to the requirements of this document.

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

Energy policy must be defined following the MB evaluations as described in chapter 5.2 of the methodology “Multiple Benefit approach of Energy Audit” (Deliverable 3.1. – DEESME project).

Energy targets and action plans can be conducted as described in chapter 4 of the same guideline.

ISO 50001 - 0.2 Energy performance approach

This document provides requirements for a systematic, data-driven and facts-based process, focused on continually improving energy performance. Energy performance is a key element integrated within the concepts introduced in this document in order to ensure effective and measurable results over time. Energy performance is a concept which is related to energy efficiency, energy use and energy consumption. Energy performance indicators (EnPIs) and energy baselines (EnBs) are two interrelated elements addressed in this document to enable organisations to demonstrate energy performance improvement.

A systematic, data-driven and facts-based process should be adopted to measure results over time regarding MB aspects and benefits. The “baseline” should consider indicators and performances related to MB aspects and Multiple Benefits.

ISO 50001 - 0.3 Plan-Do-Check-Act (PDCA) cycle

The EnMS described in this document is based on the Plan-Do-Check-Act (PDCA) continual improvement framework and incorporates energy management into existing organisational practices.

In the context of energy management, the PDCA approach can be outlined as follows.

- **Plan:** *understand the context of the organisation, establish an energy policy and an energy management team, consider actions to address risks and opportunities, conduct an energy review, identify significant energy uses (SEUs) and establish energy performance indicators (EnPIs), energy baseline(s) (EnBs), objectives and energy targets, and action plans necessary to deliver results that will improve energy performance in accordance with the organisation's energy policy.*
- **Do:** *implement the action plans, operational and maintenance controls, and communication, ensure competence and consider energy performance in design and procurement.*
- **Check:** *monitor, measure, analyse, evaluate, audit and conduct management review(s) of energy performance and the EnMS.*
- **Act:** *take actions to address nonconformities and continually improve energy performance and the EnMS.*

Energy performance issues should be addressed by a Plan-Do-Check-Act (PDCA) cycle together with companies’ organisational practices and multiple relevant issues and aspects within companies’ business development plans.

The MB approach reflects the PDCA cycle. The MB approach can be seen as a life cycle that aims at achieving the business sustainability that comes from the energy efficiency as it begins with business model analysis as a diagnostic tool and ends with the review of the business logic through the prism of energy efficiency measures for the development of business model innovation and improvement (see “Multiple Benefit approach of Energy Audit” (Deliverable 3.1. – DEESME project for further information). The energy baseline is established according to the chapter 4.1 of the same guideline.

In chapters 2.3 and, mainly, 5.2, the guideline for auditing helps to analyse and evaluate the managerial implications of energy management, shows how energy management can support overall business efficiency and improvement and supports top management in reviewing of the business model.

ISO 50001 - 0.4 Compatibility with other management system standards

This document conforms to ISO's requirements for management system standards, including a high-level structure, identical core text, and common terms and definitions, thereby ensuring a high level of compatibility with other management system standards. This document can be used independently; however, an organisation can choose to combine its EnMS with other management systems, or integrate its EnMS in the achievement of other business, environmental or social objectives. Two organisations carrying out similar operations, but having different energy performance, can both conform to the requirements of ISO 50001.

The MB approach can also be considered as the integration of other aspects within the energy management system. This integration can be carried out in accordance with ISO standards with a compatible structure. In this way, the company that achieves ISO 50001 certification will have an advantage when implementing further management systems standards.

ISO 50001 - 0.5 Benefits of this document

Effective implementation of this document provides a systematic approach to improvement of energy performance that can transform the way organisations manage energy. By integrating energy management into business practice, organisations can establish a process for continual improvement of energy performance. By improving energy performance and associated energy costs, organisations can be more competitive. In addition, implementation can lead organisations to meet overall climate change mitigation goals by reducing their energy-related greenhouse gas emissions.

Competitiveness is a top issue in the MB approach. According to the ISO 50001 standard, the Multiple Benefit approach considers MB aspects when planning, doing, checking and reviewing projects to improve energy efficiency.

5.4. Scope (ISO 50001:2018 – chapter 1)

This document specifies requirements for establishing, implementing, maintaining and improving an energy management system (EnMS). The intended outcome is to enable an organisation to follow a systematic approach in achieving continual improvement of energy performance and the EnMS.

This document:

- a) is applicable to any organisation regardless of its type, size, complexity, geographical location, organisational culture or the products and services it provides;*
- b) is applicable to activities affecting energy performance that are managed and controlled by the organisation;*
- c) is applicable irrespective of the quantity, use, or types of energy consumed;*
- d) requires demonstration of continual energy performance improvement, but does not define levels of energy performance improvement to be achieved;*
- e) can be used independently, or be aligned or integrated with other management systems.*

The Multiple Benefit approach doesn't conflict with the scope specification of ISO 50001. It expands its boundaries considering that, together with the energy aspects, other aspects might **be considered, monitored and managed** and that improvements are evaluated in light of many benefits, not only those strictly energetic (e.g.: environmental, social, etc.).

5.5. Terms and definitions (ISO 50001:2018 – chapter 3)

In addition to definitions provided in chapter 3 of ISO 50001:2018, this guide makes reference to the following ones:

- ✓ **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.
- ✓ **Multiple benefit evaluation:** the qualitative or quantitative assessment of a Multiple Benefit
- ✓ **Extended EnMS:** The energy management system supporting the Multiple Benefit approach.

5.6. Context of the organisation (ISO 50001:2018 – chapter 4)

5.6.1 Understanding the organisation and its context (4.1)

This is a key issue from the MB point of view.

ISO 50001 doesn't provide a definition of "Context"; paragraph 4.1 states that "Understanding the context" means to determine external and internal issues that are relevant to its purpose.

The adoption of the MB approach pushes organisations to expand the scope of investigation and intervention, therefore to expand the 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 implementing a typical energy management system. This document provides organisations with a list of external and internal issues that can influence them during the improvement process considering the Multiple Benefits.

Examples - List of external/internal issues

- ✓ Changes to environmental policies and laws (e.g.: Taxonomy Regulation).
- ✓ Changes to health and safety policies and laws in the workplace (i.e.: new safety requirements could be met together with the energy efficiency ones), since investments in new plants or installations may impact both energy efficiency and H&S.
- ✓ Customer inquiries (e.g.: adoption of integrated approaches, 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.

With reference to the suggested areas of integration, it should be noted that chapter 4.1 of the reference ISO standards (i.e.: ISO 14001, ISO 45001, ISO 46001) requires an understanding of the organisation and its context that can be reasonably integrated in an overall approach.

5.6.2 Understanding the needs and expectations of interested parties (4.2)

Dealing with MB may require the involvement of additional interested parties otherwise not involved. It should be intended that “the interested parties” relevant to the EnMS (see ISO 50001_2018 §4.2 a)) include stakeholders interested or affected by the Multiple Benefits aspects considered by the company, not only in the “energy performance”. Among them the following can be mentioned:

- ✓ Local authorities competent in environmental management or in any of the considered Multiple Benefits
- ✓ Workers unions (if they exist within the company)
- ✓ Social associations dealing with any of the Multiple Benefits
- ✓ Research and development bodies dealing with climate change and adaptation or with other issues related to any of the Multiple Benefits

Thanks to the involvement of the interested parties, it will be possible to identify and satisfy needs and expectations that an EnMS limited to energy saving cannot satisfy. The organisation may extend applicable legal management requirements to different issues addressed within the EnMS but will not be obliged to do this: it is an opportunity rather than a duty.

An effective analysis of needs and expectations of interested parties can address the choice of Multiple Benefits to be considered within the extended EnMS.

The other ISO standards of interest (i.e.: ISO 14001, 45001, 46001), in chapter 4.2, also provide requirements related to the involvement of interested parties. It is clear that these can coincide but, in certain cases, they are certainly different (e.g. workers' unions for health and safety in the workplace). Since the MB approach is not subject to certification, the involvement of interested parties that are not strictly related to energy efficiency is at the discretion of the company.

5.6.3 Determining the scope of the energy management system (4.3)

To determine the scope of the EnMS, the organisation should consider:

- ✓ the external and internal issues (chapter 4.1 of the ISO 50001), including those related to Multiple Benefits;
- ✓ according to chapter 4.2 of ISO 50001, to define the EnMS scope, needs and expectations of extended interested parties in order to assure the full implementation of the Multiple Benefit approach.

The scope of the EnMS has to be determined also with reference to the identified multiple benefits as described in the guideline “Multiple Benefit approach of Energy Audit” (chapter 5.1 - Deliverable 3.1 – DEESME project).

The case of a company consuming gasoil as forklifts fuel up to 0.5% of the total energy consumption is a simple example. In this case, following ISO 50001 requirements, it may be reasonable not to include forklifts fuel consumption (energy use) in the EnMS scope. Considering expectations of workers and benefits due to a healthier work environment, the EnMS scope might be extended to the mentioned energy use.

At this stage, top management should identify MB aspects to be considered in running the business. This step is facilitated by the High Level Structure of ISO standards (chapter 4.3 deals with scoping).

5.6.4 Energy management system (4.4)

Based on the MB approach, the EnMS should be planned and documented to demonstrate - to any interested party according to the company objectives – achievements related to any of the intended benefits of the EnMS itself.

The Extended EnMS can also demonstrate that energy improvements are not achieved worsening performances of other areas (transfer of impacts).

5.7. Leadership (ISO 50001:2018 – chapter 5)

5.7.1 Leadership and commitment (5.1)

The clause concerning general requirements for leadership and commitment can be applied to any management system and to any relevant business issue.

The fact that the management system deals with more aspects and aims to achieve a wide number of different benefits, reinforces the opportunity, and - at the same time - guarantees, to fully implement these requirements.

Some additional comments can be made on some of the bullets listed in §5.1 of the Standard.

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

Bullet d): requires that the top management ensures that improvement programmes are approved and carried out. It should be considered that actually investments generate energy saving benefits together with benefits in the field of H&S, environment, human resources, cost reduction, etc. For this reason, an action plan supporting an investment will probably be successfully completed 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 involving additional members responsible for issues included into the EnMS scope. The H&S manager, the HR manager, the communication manager, etc. may be invited on request.

Bullet j): the adoption of the MB approach requires that persons contribute to the EnMS effectiveness for all issues included into the scope. Training can support awareness and commitment. For this reason, training should cover a wider range of contents. This determines the need not to separate the technical knowledge within the company, but to train managers and employees of each sector on several issues connected with energy saving and with all expected benefits.

Bullet k): with the MB approach, the support to other management roles acquires even greater importance and effectiveness. The action should better involve a larger 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 relevant for the intended outcomes of the EnMS. This approach is valid both in the definition phase of the organisation chart and in the attribution of specific roles, responsibilities, and authorities assigned in other EnMS documents (e.g. job description).

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

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

Once the company has established the aspects to be integrated into the Extended EnMS, the requirement 5.1 of ISO 50001 applies, which is similar to the corresponding requirement 5.1 of the other standards. Therefore, the necessary policy and programs and human and economic resources must be adequate to improve performance in the considered areas.

5.7.2 Energy policy (5.2)

According to the High Level Structure, Chapter 5.2 of the ISO standards regulates the contents of the Policy.

The Policy is an opportunity to highlight and communicate the adherence to the Multiple Benefit approach. The approval of such a Policy confirms the adherence at company level to the Multiple Benefit approach.

Considering the multiple benefits approach, improvement opportunities addressing different issues are identified as described in chapter 5.1 of the guideline “Multiple Benefit approach of Energy Audit” (D.3.1 of DEESME) and might be identified as part of the energy review as described in chapter 4.1 of the same guideline.

ISO 50001 strongly supports the purchase of more efficient products (clause 5.2, bullet f)). This drives the organisation to pay attention to additional criteria, other than only cost, and therefore opens up to multiple combined improvements. In some cases, the reduction of energy consumption can be accompanied by better environmental performance or safety at work (for example air compressors of the latest generation usually consume less energy, but also emit less noise pollution). The energy policy should appropriately explicitly support this approach.

It is also important that the energy policy supports the design phase (ISO 50001, clause 5.2, bullet g)). Reasoning in the design phase taking into account the Multiple Benefits to be pursued allows an integrated approach that is easier to manage compared to interventions made later. For example, a correct design of steam lines within a production plant, can allow not only a reduction in consumption but also a reduced and better maintenance activity, bringing important benefits also from the production point of view.

5.7.3 Organisation roles, responsibilities and authorities (5.3)

Adopting a Multiple Benefit approach, the top management should consider to assign and communicate roles, responsibilities and authorities not only regarding energy performance management but also regarding all aspects relevant for any benefit and aspect considered within the extended EnMS. This should be applied to – at least - objectives, action plans, reporting.

As an example, the controller should be addressee of specific roles if a new plant has been installed to achieve energy efficiency targets together with reduction of maintenance costs.

The standard 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.

Adopting MB approach, top management may consider to include within the energy management team those responsible for any activity connected to MB aspects (e.g.: environment, resources use efficiency, reduction of maintenance costs, etc.).

The choice should fall on personnel with adequate responsibility and power to avoid that the MB approach remains theoretical.

Since many aspects of corporate life are affected by the MB approach, it is absolutely necessary that the company's top management participate at least in defining basic choices, monitoring performance and reviewing

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

- ✓ business strategy (members of the company's strategic team/board),
- ✓ operations/ production
- ✓ finance/accounting manager
- ✓ communication
- ✓ purchasing

5.8. Planning (ISO 50001:2018 – chapter 6)

5.8.1 Actions to address risks and opportunities (6.1)

When reviewing the organisation activities and processes (see ISO 50001 §6.1.1), the organisation adopting the MB approach should consider a wider range of issues and interested parties needs and expectations.

Planning actions based on the analysis of risks and opportunities is a methodology that allows to maximize opportunities and reduce risks based on the analysis performed. If this analysis is extended to the MB aspects in addition to the energy ones, it is possible with the same actions to achieve more and better results.

For example, investment in energy efficiency leads to a reduction in rework, a reduction in emergency maintenance and, consequently, to a reduction in accidents (in an emergency, there is usually more exposure to the risk of injury) and maximization of production. The latter benefit has further positive effects on efficiency because, typically, energy efficiency pairs well with the operation of plants and systems at full load.

Finally, maximising energy efficiency also involves some environmental benefits, for example, related to the reduction of CO₂ emissions (greenhouse gases), water consumption, etc.

The MB approach does not require that MB aspects management performance results in continual improvement.

This means, for example, that if the organisation considers H&S and personnel commitment and awareness objectives linked to investments in new or revamped plants, the organisation itself is obliged to demonstrate energy performance improvements according to ISO 50001 requirements but is not obliged to demonstrate improvements as regards injuries and personnel commitment indicators.

On the other hand, if a company decides to apply the MB approach, it means, at least, that it wants 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.

The planning phase is therefore very useful for the development of this integrated vision of improvement.

5.8.2 Objectives, energy targets and planning to achieve them (6.2)

The MB approach allows organisations to establish objectives common to multiple business sectors, being able to establish objective criteria for their measurement and evaluation in terms of importance.

When adopting a Multiple Benefit approach, the organisation will establish objectives as regards the Multiple Benefits considered. The organisation is therefore invited to comply with all the bullets listed in ISO 50001 §6.2.2 (letters a) to h)). Requirements concerning consistency with energy policy (bullet a)), consideration of applicable requirements (including legal - bullet c)), monitoring, communicating and updating objectives and targets (bullets f) g) and h)) should be considered mandatory as reasonable; requirements to consider significant energy uses and opportunities to improve energy performances (bullets d) and e)) may not be applicable to other benefits. Objectives and targets will be measured (bullet b) when the organisation wants and has the possibility to collect and analyse proper data; in any case, measuring objectives is strongly recommended to assess results and be able to report to anybody if requested.

ISO 50001 - 6.2.3 is a good practice to manage action plans regarding any of the MB aspects and objectives considered within the Extended EnMS.

The compliance with requirements for planning the MB aspects is very important for a homogeneous and synergic management of the improvement path in many areas. Establishing that energy efficiency must also allow for the reduction of water consumption, implies a more in-depth study of possible solutions, leading the company to devise solutions that reduce the use upstream or provide for the insertion of devices for the closure of the water cycle. In this case the benefit will also consist in the reduction of water costs which, in general, will be constantly growing.

5.8.3 Energy review (6.3)

It should be considered that the energy analysis required by ISO 50001 allows organisations to accurately identify the areas of greatest consumption in terms of energy. This identification is also necessarily reflected in the exact definition of the cost centers, thus allowing a more correct distribution of energy costs.

For a correct identification of cost centres, please refer to chapter 3.2 of the guideline “Multiple Benefit approach of Energy Audit” (D3.1 of the DEESME project).

Furthermore, the multiple benefits approach applied to the definition of improvement opportunities allows companies and their consultants to evaluate them in a global perspective, adding to the energy assessments also issues related to the many aspects considered.

The energy audit, carried out according to the provisions of point 4.1 of the guideline “Multiple Benefit approach of Energy Audit”, can be extended to a calculation of the company's Carbon Footprint following the instructions provided in chapter 4.2.

There are two main reasons why calculating a carbon footprint of a product/service can be useful:

- ✓ it enables to identify cost savings across the supply chain;
- ✓ it helps to identify opportunities to reduce the environmental impact through reductions in material use, water, waste and energy and to comply with current and upcoming obligations.

5.8.4 Energy performance indicators (6.4)

The organisation must determine energy performance indicators that are suitable for measuring and monitoring its energy performance and enabling it to demonstrate the improvement in energy performance.

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):

- ✓ first a Business Model Canvas has to be elaborated, in order to highlight the investment priorities and the basis of the value proposition. The Business Model Canvas allows to visually represent the way in which a company creates, distributes and captures value (chapter 3.1)
- ✓ The results from the previous step should help auditors to identify which benefits have to be selected, in order to demonstrate how energy efficiency measures can contribute to the execution and the progress of the business model (chapter 5.1).

These benefits can be measured and treated on the basis of non-energy indicators, just like typical energy performance indicators.

5.8.5 Energy baseline (6.5)

The Energy baseline concept helps to consider performance based on relevant variables by verifying that there are no major changes in static factors. Reasoning in this way also for MB aspects, it is possible to associate other non-energy benefits to the variables relevant to those benefits.

The organisation can therefore gain a better control and may be able to demonstrate and communicate the results obtained establishing a proper baseline for the MB aspects considered. This can be done using pre-determined performance indicators.

In this way the organisation may, together with estimating future energy uses and energy consumption, estimate other not energetic benefits.

The baseline must be defined not only for the energy vectors analysed in the energy audit, but also for all non-energy benefits identified and defined as provided for in chapter 5.1 of the guideline “Multiple Benefit approach of Energy Audit” (D3.1 of the DEESME project).

5.8.6 Planning for collection of energy data (6.6)

The organisation must ensure that the key characteristics of its operations that affect energy performance are identified, measured, monitored and analysed 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 and to carry out preventive maintenance in case of drift from the expected consumption values.

The organisation should extend its data collection plans to those parameters and variables relevant for the considered MB aspects (bullets a) of ISO 50001 §6.6). It is recommended that data to be collected include the operation criteria related to the multiple aspect, static factors, if applicable, and data specified in action plans (bullets c), d), e) of ISO 50001 §6.6).

5.9. Support (ISO 50001:2018 – chapter 7)

Clauses 7.1, 7.2, 7.3 and 7.4 are similar in the ISO standard concerned by the MB approach. Considering the Extended EnMS implementation, we underline that they take on particular importance since the issues on which internal skills, awareness and internal and external communication must be developed are diversified and require an integrated vision. These issues should therefore be discussed through meetings and working group sessions involving multiple sectors and the top management.

5.9.1 Resources (7.1)

ISO 50001 supposes that energy performance continual improvement, granted by resources provided by the organisation, allows the organisation itself to become more competitive, by 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 different aspects.

5.9.2 Competence (7.2)

The organisation can use the EnMS to enhance its employees, favoring internal and external training opportunities, to increase their skills.

The organisation should determine the necessary competence, provide that competence through training, evaluate the effectiveness of actions taken to provide the competence and retain appropriate information as evidence of the competence of persons doing work under its control that affects not only energy performances but also actions, projects and activities carried on to achieve Multiple Benefits.

5.9.3 Awareness (7.3)

As stated above, the teamwork strength is not only linked to competence but also to the awareness of what can be achieved by working together on Multiple Benefits.

The organisation should ensure that persons doing work under its control are aware of the choice to adopt the MB approach, the importance of their contribution, activities or behavior to achieve Multiple Benefits, the implication of non-conforming with EnMS / Multiple Benefits requirements and of benefits generated to the organisation by the MB approach.

5.9.4 Communication (7.4)

The organisation should determine internal and external communications relevant to the EnMS and the considered Multiple Benefits and aspects, including actions defined at bullets a) to e), ISO 50001, clause 7.4.

The MB approach allows organisations 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. Achievements and results do not exist if they are not communicated. Communication is a mean to gain maximum advantage from any project, action or activity.

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

Relationship with customers should also be taken into account when elaborating the Business Model Canvas, first step of the methodology “Multiple Benefit approach of Energy Audit” (chapter 3.1). This analysis could also help auditors in selecting which non-energy benefits must be included in communication (chapter 5).

5.9.5 Documented information (7.5)

The Energy Management Systems makes limited use of documents because it is accepted that only what is strictly necessary for the effectiveness of the system can be documented. In the ISO 50001 praxis, time is spent to analyse figures, not procedures. This approach makes it possible to focus mainly on the quantitative measurement of the improvement.

Keeping this approach, we can think of inserting, for the purposes of the MB approach, only those documented information necessary to demonstrate the achievement of the other Multiple Benefits (environmental, quality, safety, etc.) without necessarily implementing all the documentation that typically accompanies the other management systems.

Anyway, it is reasonable that criteria suggested by ISO 50001, clause 7.5, to create, update and control documentations, are applied in the same way to any document and record adopted to support Multiple Benefit approach.

It is suggested to identify, inside extended EnMS documents and procedures, chapters and 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.

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.

5.10. Operation (ISO 50001:2018 – chapter 8)

5.10.1 Operational planning and control (8.1)

According to ISO 50001, the organisation shall plan, implement and control its processes, related to significant energy uses, in order to meet ISO 50001 and EnMS requirements and to implement planned actions.

Process deviations often influence different aspects (e.g. Products quality, air emissions, indoor environment, etc.); therefore operational control required by ISO 50001 can be profitably extended, when appropriate, to MB aspects relating to considered MB.

The control and planning of processes allows to act taking into account the Multiple Benefits. Activities related to operational control and maintenance allow to see first-hand that some energy benefits are accompanied by others, for example:

- ✓ eliminate compressed air leaks in the company network, to reduce energy consumption, reduces noise emissions (environmental / safety aspect);
- ✓ reduce energy consumption due to poor performance of buildings and structures, increases the comfort of the rooms for the people present, increasing their productivity and reducing accidents or occupational diseases;
- ✓ increasing the energy efficiency of production by reducing maintenance on emergency faults can lead to a reduction in accidents, or in any case an increase in safety in general;
- ✓ the recovery of thermal energy from fumes or exhausts can lead to better environmental performance.
- ✓ the use of renewable energy involves an evident lower environmental impact
- ✓ the purchase of equipment or machines with better energy performance could also lead to better environmental or safety performance (for example, the use of LED lights in certain environments could improve the lighting of the rooms)

ISO 50001 requires the organisation to plan and control intended changes, to review the consequences of unintended changes and to take actions to reduce their adverse effects. This is an effective approach even more as regards MB aspects and Multiple Benefits. In fact, mutual effects of changes – intended or not – occurring in different ranges of the activity or of the organisation, may be complex.

The organisation may consider to evaluate in advance both changes produced by energy efficiency project, actions on plans to other Multiple Benefits and changes determined on energy performance by project, actions or plans implemented within different scopes

Operational planning and control are phases that can lead to the achievement of a high level of efficiency of the plants as well as energy savings, environmental pollution reduction and, in general, good functioning, also guaranteeing control of the compliance with safety and productivity requirements. The MB approach leads to a strengthening of this management phase, placing other aspects, in addition to the energy one, under direct control. Their consideration is not only a positive consequence but is fully valued.

Therefore, the tools used by the company for the operational control of MB aspects must also include dedicated verification steps. On the other hand, this is the only way to bring to the surface and therefore enhance the multiple benefits that are obtained from this type of management.

5.10.2 Design (8.2)

In the design of new, modified and renovated facilities, equipment, systems and energy-using processes, the organisation may consider improvement opportunities not directly related to energy performance but having indirect consequences on it. For example, cooling systems not using water reduce the water consumption. Water recovery can generate additional energy consumption.

On the other hand, new facilities, equipment etc. (or revamping of) can be designed to achieve improvements also in other areas (i.e., water consumption, noise level, maintenance requirements, etc.); on every design (eco-design) process, the benefits must be maximized and errors avoided.

The transfer of impacts from one area to another must be avoided according to the Life Cycle requirements.

Consequently, in the eco-design process, the organisation should adopt an integrated approach, involving all the concerned managing areas planning internal workshops, creating working groups, or adopting similar approaches.

The MB approach requires this type of approach, further extending the field of application of eco-design, since a certain design choice must also guarantee an improvement in workplace safety and a general improvement in the working environment.

5.10.3 Procurement (8.3)

In establishing and communicating the purchase criteria to its suppliers, the organisation may take into consideration aspects not directly related to energy performance but which indirectly may have consequences on its energy consumption.

For example, waste production linked to a new or revamped plant, even if energy efficient, can generate energy consumption in other phases of the process.

On the other hand, the procurement of new devices, etc. can be made highlighting improvements in other areas (i.e. water consumption, noise, maintenance requirements, etc.). On any purchase opportunity, the benefits should be maximized.

The organisation may ask suppliers to provide information/data also related to these additional criteria.

This good practice allows companies to involve their suppliers in the MB approach, selecting the most suitable ones to support a path of sustainability.

5.11. Performance evaluation (ISO 50001:2018 – chapter 9)

5.11.1 Monitoring, measurement, analysis and evaluation of energy performances and the EnMS (9.1)

Another significant aspect of the EnMS is the monitoring phase. In the energy field, monitoring is the heart of the system. Proper monitoring of energy use and consumption, through the correct identification of EnPIs (Energy Performance Indicators), allows the effective identification of the actions and plans to be implemented to improve performance and evaluate their effectiveness.

Similarly, by proceeding in the same way, it will be possible to carry out the monitoring of other Multiple Benefits, taking into account, however, some difficulties that may be encountered in the choice of parameters and indicators when leaving a technical field such as energy consumption and considering relevant benefits in more intangible business areas such as the corporate climate, involvement, awareness and corporate image.

Anyway, for each of the considered Multiple Benefits, the organisation should determine indicators that can support actions planning and their control, as required by ISO 50001, clause 9.1.1, bullet from a) to d) (See D3.1).

According to clause 9.1.2 “Evaluation of compliance with legal requirements and other requirements”, ISO 50001 requires to plan and carry out periodical assessments of legal compliance within energy management as well as other requirements that company has chosen to abide by.

The organisation may plan similar assessments within different MB aspects, when relevant for intended achievements and to support planning, monitoring and evaluation of planned actions. This is strongly recommended when dealing with regulated issues, such as health and safety. Otherwise it may be evaluated by the organisation according to specific needs and opportunities.

As already underlined for “Operational planning and control”, the correct implementation of this clause, involving all aspects affected by the MB approach, makes it possible to bring to the surface and therefore enhance the multiple benefits that are obtained from this type of management.

5.11.2 Internal audit (9.2)

Internal audit planning could help systematically assess the extent to which Multiple Benefits have been achieved.

As regards Multiple Benefits, internal extended audits may be planned, conducted and documented to provide information whether the extended EnMS improves performances of the organisation within the MB aspects included in the scope of the extended EnMS, conforms its own requirements and achieves expected results.

Specific moments of the EnMS audit could be dedicated to non-energy aspects, or other company figures could be involved in the general energy audit such as the H&S manager or the Environmental and Quality manager.

Bullets b), c) and d) of clause 9.2.2 of ISO 50001 require additional comments.

Regarding the definition of criteria (set of document/regulations establishing requirements to be verified) and of the scope of the audit, the organisation should consider that a standard to implement MB approach in addition to this guideline (lack of audit criteria) is not available and that the scope may significantly vary depending on Multiple Benefits and aspects included in the extended EnMS.

When planning extended audits, the organisation should therefore clearly define – according to audit objectives, which managerial areas, functions and offices will be audited and clearly identify requirements to be verified (requirements may be internal, such as requirements of actions or plans and their results, or external, such as legal requirements or client requirements). This is strongly recommended in order to ensure audit effectiveness and to avoid internal conflicts (e.g. with other management systems audit) and misunderstanding.

In the same way the organisation should identify relevant managers – recipients of audit results – according to audit objectives and scope.

It is also recommended to select auditors in order to ensure objectivity and impartiality of the audit process. When possible, auditors not involved in activities related to Multiple Benefits and aspects included in the audit scope should be selected (this point may be critical for small organisations).

Moreover, the organisation may consider to assign auditor competent in issues included in the audit scope. The degree of competence should be determined considering the extension of audit requirements.

When audit criteria are limited to action plans deadlines and milestones, managerial competence is suitable. In the case audit objectives includes the evaluation of effectiveness of an energy efficiency project also addressed to improve company public image, specific competence may be required for a fully successful audit.

5.11.3 Management review (9.3)

In companies adopting several management systems, the value of planning, conducting and recording this moment in a unitary and integrated way, is not always understood.

The value of making this moment integrated is not only linked to the avoidance of duplication of systems (two documents, two dates, etc.), but it is precisely because the value of Multiple Benefits resulting from the same action is not lost.

To deal with this aspect of Multiple Benefits in a useful way, the Management Review should not be conducted as the answer to the Standard requirement, but as a company moment to seek continuous improvement in every aspect.

If the company is unable to carry out this moment of Review in a unified and coordinated manner, it will be difficult to continuously develop the approach to Multiple Benefits.

The decision to adopt the MB approach may be reviewed as well: the decision can be widened to additional benefits not yet included in the extended EnMS scope.

The company will also review the business model that was initially drafted in stage 1 of the “Multiple Benefit approach of Energy Audit” methodology. The reviewing report identifies opportunities for the progress of business model sustainability that can be seized thanks to energy efficiency measures and the options for the development of sustainable business practices and ideas. This step is described more in details in chapter 2.3.4 and 5.2 of abovementioned guideline and reflects the “cycle” approach. The role of the business managers becomes central in this step because the results of the multiple benefits analysis are exploited to focus ideas and to develop plans and actions for the overall business improvement and development.

5.12. Improvement (ISO 50001:2018 – chapter 10)

5.12.1 Nonconformity and corrective action (10.1)

This clause can be fully implemented by the organisation in case the MB approach is adopted.

5.12.2 Continual improvement (10.2)

It is reasonably expected that the organisation will address the continual improvement of the suitability, adequacy and effectiveness of the extended EnMS. Stated that to demonstrate the continual energy performance improvement is a requirement of ISO 50001 standard (requested as well by the ISO 50003 standard as a requirement for third party audit), the improvement of performances of additional MB aspects is an opportunity rather than a mandatory requirement.

All the standards concerned (ISO 14001-environment, ISO 46001-water, ISO 45001-safety on the job etc.) promote the continual improvement.

6. Examples of Energy Management based on Multiple Benefits approach

This section provides examples of real-life situations where an organisation planned an action, a project or an investment aimed at energy costs saving and took the opportunity to extend achievements to multiple benefits.

It should be noted that, in some of the described examples, the company launched the initiative just focusing on EnMS or on energy savings and gradually extended its objectives to MB; in other cases, the company adopted a MB approach from the beginning.

Multiple Benefits are identified and described case by case and are referred to the relevant ISO 50001 clause(s). In all cases, energy savings generate a global reduction of CO₂eq emissions from the power generation system.

The following best practices are provided to encourage organisations to “think” according to a Multiple Benefits approach when planning any change or new projects and developments following the examples provided.



Example n.1 – New improvement process: introduction of a new heating system

Action/project or investment and objectives

In the framework of its Energy Management System to be certified according to ISO 50001, a company planned to change the heating systems in the mechanical manufacturing department to save energy costs.

Details, problems and opportunities

A company producing electrical appliances 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 consists in the substitution of fans with infrared radiating panels powered with the pre-existing natural gas pipelines. There are no overhead cranes in the department, so there are no problems in installing panels close to single work places.

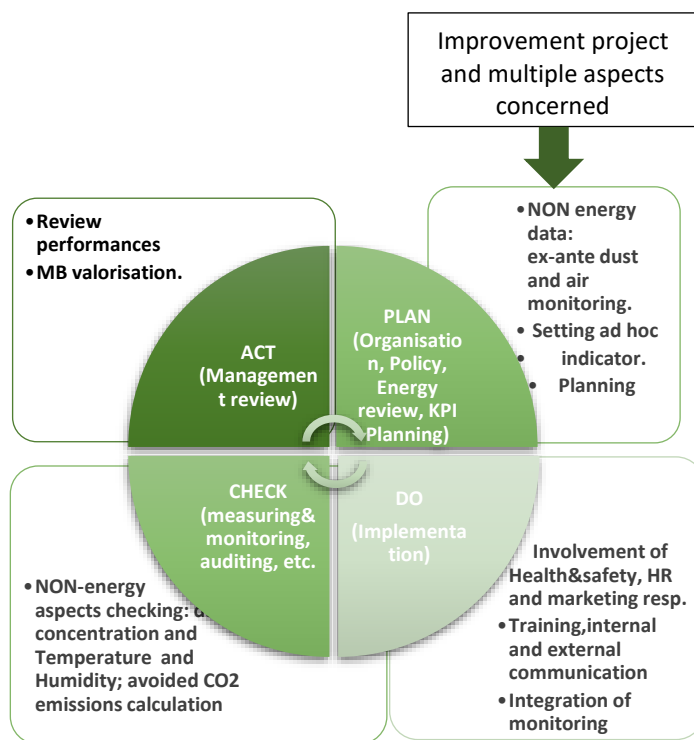
Energy savings are expected because smaller volumes of air will be warmed up, because persons and work places will be directly heated by radiations and because no thermal energy will be lost through air change.

Multiple benefits

The company already has ISO 9001 and 14001 certificates. The Environmental and Health & Safety responsible of the organisation was involved in the ISO 50001 implementation process and he was able to understand that much more improvements would have been achieved in the work environment.

An indoor environment dust monitoring campaign has been planned and realized to collect data on powder concentration before and after the intervention. As expected, the lower turbulence due to the substitution of fans has lifted up a lower quantity of dusts.

Similarly, the monitoring also concerned the temperature and humidity of the air in order to evaluate the improvement of the working environment and the optimization of energy use. It was in fact expected that the heat production was correctly directed towards the workplaces instead of being dispersed throughout the entire shed, especially at the top.



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

Energy savings reduce CO₂ equivalent emissions and the company has included the quantification of such reductions in the framework of the EnMS

All this was possible because the company decided to collect and analyze non-energy data, being convinced that the planned intervention would generate benefits of a different nature.

It therefore decided to integrate the energy monitoring process with the monitoring of dust and heat distribution in the work area.

This path was supported by qualified technical personnel who were able to integrate skills in many technical fields.

The company also understood the importance of communicating the environmental and social benefits obtained and was able to create effective internal and external communication by developing collaboration between the technical, human resources and marketing sectors.

Thanks to all these solutions, the scope of the Energy Management System of the company was broadened and it becomes an Extended Energy Management System according to this guideline

ISO 50001 reference

§ 6.3 Energy review

§ 7.3 Awareness

§ 7.4 Communication

§ 8.2 Design

§ 9.1 Monitoring, measurement, analysis and evaluation



Example n.2 – New improvement process: steam distribution revamping

Action/project or investment and objectives

Revamping the steam distribution system in a chemical 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 health and safety and for the environment.

Details, problems and opportunities

The company quality management system was certified according to ISO 9001 standard; no further management systems were implemented nor certified. The company decided to launch the implementation of an energy management system in order to support improvement projects identified within the "energy review" carried out according to the Italian law 102/2014 (EED Directive). This approach drove the formalized organization in the "DO" step of the Deming Cycle to create an extended "energy team", including several technicians, such as maintenance and departments responsible. Therefore, the approach was focused on technical interventions and additional improvement project were proposed. The example deals with one of the additional improvement projects.

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.

In the framework of the Deming Cycle, the check of all traps installed (NON energy aspect) has been carried out. Approximately 35% of the traps resulted to be obstructed or to continuously lose steam. Mean estimated losses in 2018 -2020 resulted in about 100,000 Euro/year.

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

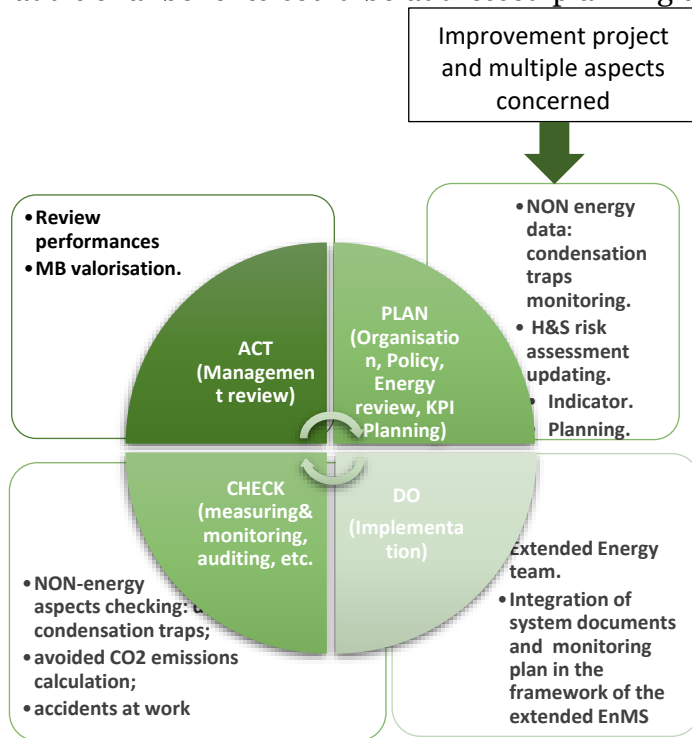
- a) Single traps restoration: low cost, low duration.
- b) Replacement of traps or of pipeline sections: high cost of the intervention, long life.

Steam pipelines were not divided in sections and were connecting different parts 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.

Multiple benefits

The company's management, supported by the "Extended energy team", 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 the neighborhood.

ISO 50001 reference

§ 8.1 Operational planning and control

§ 8.2 Design

Example n.3 – New improvement process: coupling the existing chemical reactor

Action/project or investment and objectives

Couple the existing chemical reactor with a new one to improve product quality, reduce energy consumption, reduce water consumption and improve occupational health and safety.

Details, problems and opportunities

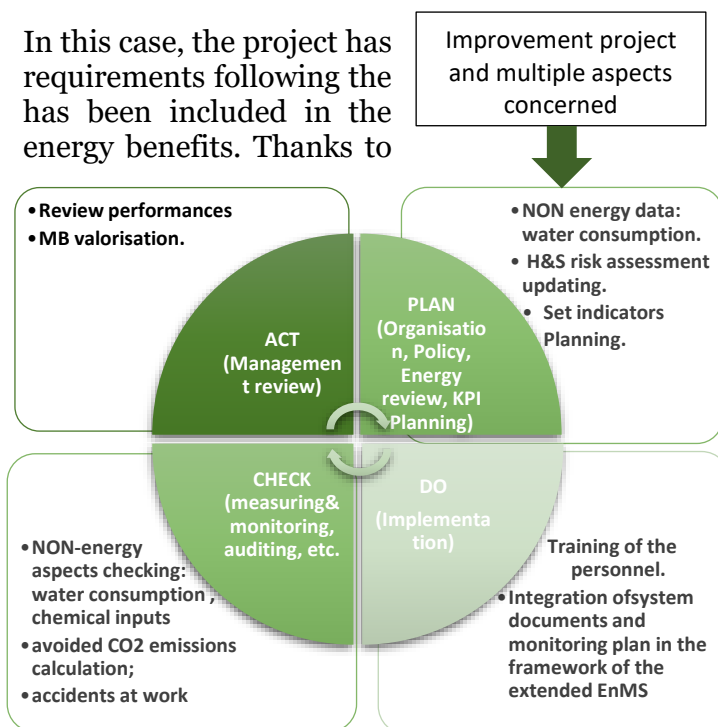
A chemical production industry decided to double the chemical reaction line. The company has a Quality management system certified according to ISO 9001 standard; the customer care and the commercial department communicated to the management that clients were beginning to request smaller orders (smaller quantities to be delivered at each order) of the most part of the chemicals produced by the company.

The production is carried out in batches; this means that the reaction vessel shall be washed up more frequently than in the past. Changing the recipe for production can create problems with the quality of the product as the required purity must be granted at any time, also after each washing. Moreover, each washing causes use of water and energy with no production of goods. Doubling the reaction line, two different chemicals can be produced at the same time. The number of washings can be reduced. For example, one of the two reaction vessels can be dedicated to the most requested chemical, minimising stops and washings. In any case, the availability of two reactors allows higher flexibility.

This discussion was carried on involving the operation manager and the production responsible that were involved at the same time within the project for the implementation of ISO 50001 standard. The project was therefore included into the list of improvements opportunities of the energy management system.

Multiple benefits

In this case, the project has requirements following the has been included in the energy benefits. Thanks to



been launched because of product quality reduction in the purchasing orders but is ISO 50001 system because of the foreseen the integration between ISO 9001 and ISO 50001 systems it was possible to monitor also the NON energy benefits. Since benefits related to Health and Safety were also identified, they have been also included in the monitoring programme according to the H&S management in force according to national Laws.

During the development of the project, new opportunities were identified. The idea to create a more flexible reactor system, steered all the technical choices regarding feeding systems, pumps, pipelines, etc. The new reactor is much more energy efficient than the old one. The company took the opportunity to change single components of the old reactor – such as pumps - with new and

more energy efficient ones.

The new reactor has also higher levels of safety, thanks to new and more reliable components (valves, flanges, pumps, etc.), new monitoring and control systems and general design with new sensors and instruments. The new safety concept has been extended to the old reactor. A new control and monitoring integrated plan has been developed keeping under control all parameters required for quality, safety and energy aspects within the plant. The supplier proposed a training course to introduce personnel to use and maintenance of the new plant. The organisation asked to include in the program additional sessions dedicated to safety awareness and to communicate the company's commitment in innovation and safety.

The following multiple benefits are addressed:

- ✓ Less costs and higher reliability in ensuring product required purity;
- ✓ Reduction of “non-productive” energy consumption at each change and washing of production / recipe;
- ✓ Reduction of water use at each change of production / recipe;
- ✓ Increase of occupational safety standards due to substitution of components and to the new control system;
- ✓ Increased awareness and competence of personnel after the supplier's training course.

ISO 50001 reference

§ 5.1 Leadership and commitment

§ 6.3 Energy review and opportunities for improvement

§ 7.2 Competence

§ 7.3 Awareness

§ 8.1 Operational planning and control

§ 8.2 Design

§ 8.3 Procurement

§ 9.1 Monitoring, measurement



Example n.4 – New improvement process: introduction of an efficient motor

Action/project or investment and objectives

Substitution of the old extractor fan of the foundry furnace air emission treatment plant with a new IE3 one to reduce energy consumption and lower noise emissions.

Details, problems and opportunities

The company developed an energy review according to the Italian Law 102/2014 (EED Directive) within a ISO 50001 energy management system certification project. The company implemented the new EnMS integrated with ISO 14001 environmental management system. The project has been developed by a team including members of the team dealing with ISO 14001 management system. In order to grant energy efficiency, the most significant energy consuming plants were taken into consideration.

The main chimney of the foundry plant conveys air emissions coming from the furnace to the atmosphere. The air treatment plant includes the main extraction fan, a cyclone to trap heavy dust and a fabric filter for particulate. The power requested is quite high and it directly depends on the air flow rate which can vary in different phases of the foundry process.

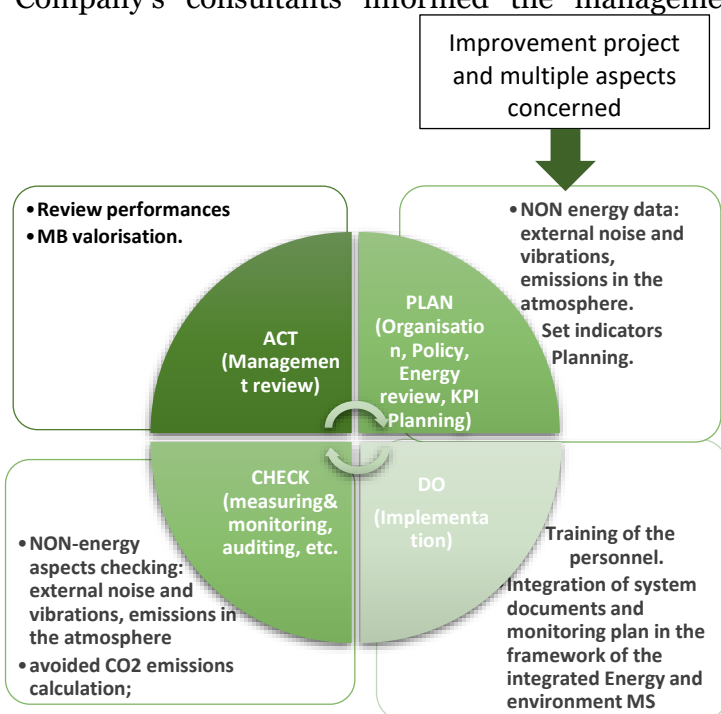
A new IE3 engine coupled with an inverter has been chosen to improve energy efficiency and to have access to governmental financial support. The procurement department specified within the contract the energy performances of the fan according to the Directive 2009/125/CE (Eco-design Directive). The investment is high but this kind of intervention is included within those supported by government financial contribution, thus significantly reducing the payback time. The old fan produced vibrations that propagated to the metal sheets of the ducts of the plant and produced considerable noise emissions. Neighbours often complained about that and the city Council was often asked to solve the problem. Complaints of population were one of the main issues addressed by the company's environmental management system.

Multiple benefits

Company's consultants informed the management of the opportunity to use financial contribution to support energy efficiency investments.

After an energy audit, the most promising project resulted to be the substitution of the extracting fan of the furnace chimney because of the short payback time and of the big amount of expected savings.

Since the city Council recently pushed the company to find solutions to complaints due to the noise generated by the plant, the company carried out a campaign to characterize noise emissions of the air treatment plant (power per each frequency band and identification of main emission points). This is an extension of the review considering a NON energy aspect.



The company asked the supplier not only to change the fan, but also to modify the air ducts to reduce vibrations. A final target for noise levels at the plant border was defined into the management system and also in the contract. So, the plan was integrated with a NON energy target as well as the procurement procedure

In this case, the input coming from financial contribution opportunity and from a specific energy efficiency project, allowed the company to develop cooperation between energy and environmental teams and to extend benefits of the project to environmental aspects. The management shared the project with neighbors and with the city Council in order to get their consensus.

The following multiple benefits are addressed:

- ✓ Reduction of energy consumption (kWh per melted ton);
- ✓ Access to governmental financial contribution;
- ✓ Reduction of noise levels near the plant;
- ✓ Cooperation with city Council and neighbors and enhanced relationships.

ISO 50001 reference

§ 7.4 Communication

§ 8.1 Operational planning and control

§ 8.2 Design

§ 8.3 Procurement

§ 9.1 Monitoring, measurement, analysis and evaluation of energy performance and the EnMS



Example n.5 – New improvement process: improvement of compressed air production and distribution

Action/project or investment and objectives

To carry out a campaign to identify and repair compressed air losses from pipelines, flange, valves, etc. to reduce energy consumption of the compressors and to provide homogeneous working pressures at any delivery point of the distribution network.

Details, problems and opportunities

Normally, in case of lack of preventive maintenance, small losses of compressed air can occur along the distribution network, typically at junctions, valves, flanges. Losses never stop when the system is under pressure and the overall effect can be significant even in case of small losses. Losses can cause a decrease of delivery pressure getting far from the compressors, especially in case of long distribution branches.

In this case, losses of compressed air used to create increasing problems in production but no interventions were authorized by the CEO.

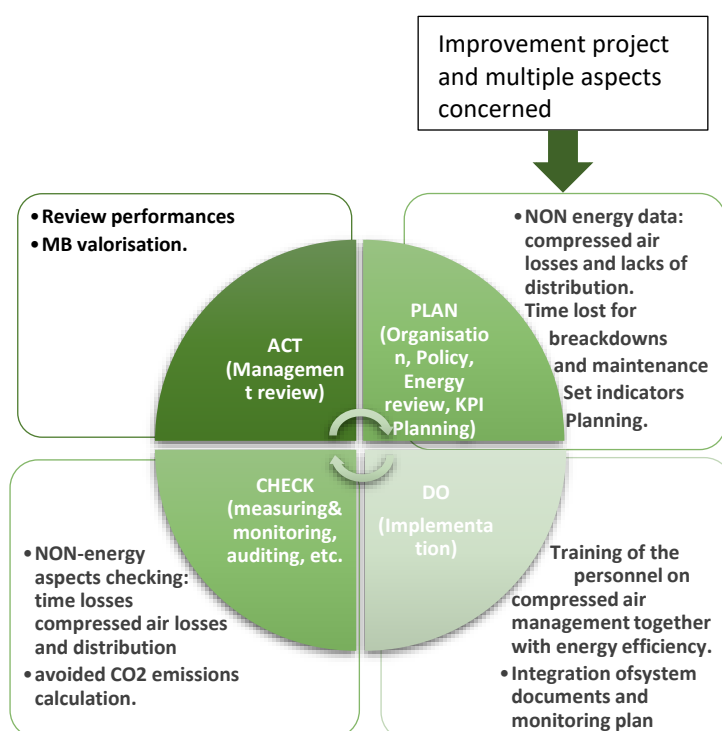
Following a proposal coming from the ISO 50001 implementation project, the consultant suggested to investigate losses and to quantify the cost of air losses.

Losses can be easily identified: the heads of the production departments were involved in the campaign.

Investment for revamping and maintenance to avoid air losses has been analysed; pay back time resulted quite short. The management decided to launch the project.

At the same time the company decided to buy a new compressor, coupled with an inverter. The supplier was asked to plan a training course dedicated to the head of production departments in order to communicate advantages of the project both for production purposes and for environmental and energy efficiency targets. The training involved also tuition how to identify losses.

Multiple benefits



Objectives of the project included from the beginning both energy saving and homogenization of delivery pressure along the compressed air distribution network.

When launching the project, the management asked to the supplier, specialized in compressed air distribution systems diagnostic, to involve the head of the production departments in order to enhance their awareness of the importance to avoid air losses.

The involvement of the company's employees appeared to be important to grant losses prevention in the future. In fact, sometimes valves / taps were left open, also when this was not necessary.

The following additional multiple benefits were pursued and achieved:

- ✓ Grant high delivery pressure at any point of the compressed air distribution network and guarantee good operational conditions in any production stage.
- ✓ Reducing of maintenance costs and avoiding air compressed interruptions.
- ✓ Improve personnel involvement and awareness.

In this case only NON energy aspects related to the production were included in the management system. The level of the pressure has been taken under control at all points of use of compressed air putting together energy efficiency and homogeneous air distribution.

ISO 50001 reference

§ 7.3 Awareness

§ 8.1 Operational planning and control



Example n.6 – Establishment of a technical coordination team

Action/project or investment and objectives

Appointment of an Extended “energy team” to support the effective implementation of the energy management system in the framework of an ISO 50001 certification project taking in to consideration NON energy aspects and multiple benefits.

Details, problems and opportunities

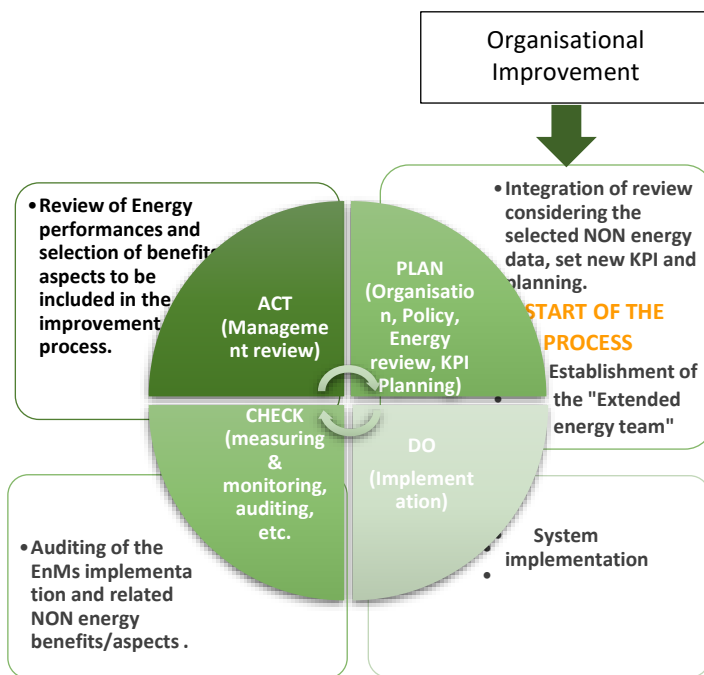
As requested by ISO 50001, clauses 5.1 i) and 5.3, top management of the company identified functions and persons to be involved in the development, implementation and maintenance of the EnMS.

People from production, maintenance, procurement, human resources, design and development departments have been appointed.

Multiple benefits

During the initial phases of the project, the energy team used to meet every two weeks.

After a few meetings, the production manager decided to include the discussion of a missed incident on the agenda. The discussion made possible the identification of a corrective action involving logistic, production and safety aspects.



After that, the “energy team” has been turned in “technical coordination team”; the role of the team has been extended with new assignments including dealing with projects planning, problem solving, data measurement and assessment and with new issues such as safety, environment and energy. Meetings were planned every week.

In this way the production manager addressed additional multiple benefits:

- ✓ Improve communication and coordination among departments
- ✓ Enhance effectiveness of analysis of problems and planned solutions
- ✓ Improve competences, involvement and awareness of personnel in project planning and assessment and in problem solving

The Energy Management System has been so extended to the monitoring, assessment and improvement of performances related to additional aspects.

Solutions were also introduced at organization level, building up an extended “Technical coordination team”, organizing meetings, training sessions, etc.

In this way, multiple benefits have been identified and valorised.

ISO 50001 reference

§ 5.1 Leadership and commitment

§ 5.3 Organisation, roles, responsibilities and authorities

§ 7.3 Awareness

§ 7.4 Communication

Example n.7 – Appointing a new “Development and changes manager” dealing with energy and non-energy aspects.

Action/project or investment and objectives

Appointment of an “Energy Manager” with extended responsibilities in order to coordinate operations regarding maintenance, design and development of new products/processes, environment, safety and energy management.

Details, problems and opportunities

Because of increasing costs of CO₂ emissions due to the EC policies against global warming, the company decided to address new investments toward energy efficiency and reduction of CO₂ equivalent emissions.

The energy management system of the company was certified according to ISO 50001 standard. The HR department was asked to select and employ a senior skilled “energy manager” also to become the coordinator of the “Energy team”.

From an organizational point of view, the question was whether the EM should be integrated into the central maintenance department or in the design and development department or, furthermore, in the environmental department.

Top management decided to create a new function, directly depending from the General Manager. Assignments of the new function included not only energy management, but also coordination of new developments of products and processes with “veto power” to any project and development.

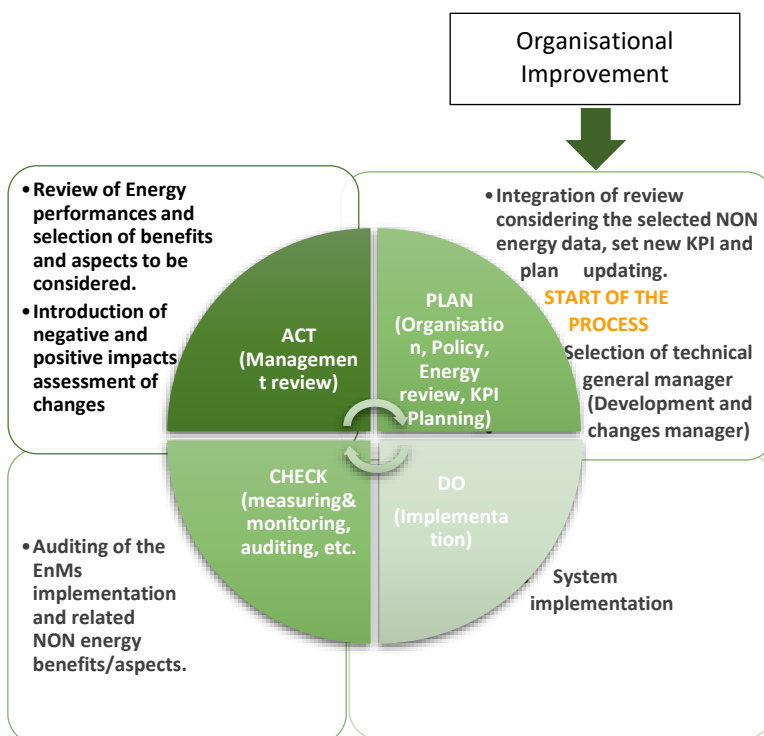
Multiple benefits

The intended objective of the General Manager when creating the new function and appointing the new manager was to oblige managers to share new developments projects.

The new function was defined as “Development and changes manager (D&C Manager)”.

The idea was to identify in advance any negative impact that could be generated by any change in products, processes, plants, logistics, etc. and to identify positive synergies in order to avoid delays in projects implementation, to grant effectiveness and to reach multiple benefits. The new manager was in fact the multiple benefit manager.

A new coordination working group has been created. The D&C manager has been appointed as secretary. He was intended to provide support and services to the other managers other than simply to be their new leader.



The HR manager has also been involved in order to take in consideration organisational changes.

The new manager allowed – through the cooperation with other managers - to identify additional improvement projects entailing energy efficiency coupled with further benefits. Internal logistic was the main area of impact of additional projects since logistic changes requires cooperation of all departments and functions (e.g. procurement, production, warehouses). Examples of MB coming from additional improvement projects were reduction of fuel consumption due to handling reduction, reduction of stocks, safer internal mobility.

The following additional multiple benefits were pursued and achieved:

- ✓ Minimization of negative impacts on energy efficiency, environment and occupational safety in case of changes in products or processes.
- ✓ Enhance control of planned changes and in reviewing unintended changes.
- ✓ Improve effective communication among departments dealing with connected processes.
- ✓ Improve managers awareness of the importance to consider all aspects in an integrated approach when planning new developments and changes.
- ✓ Additional improvement projects focused in logistic area

In this case the focus is on the strategic organisational solution (the introduction of the Energy Manager who is also a general technical manager) to take under control negative and positive consequences of any organizational, technological, process modification.

This is the base to assess also NON energy benefits when energy investments have to be decided and to identify and valorise Multiple Benefits.

ISO 50001 reference

§ 5.1 Leadership and commitment

§ 5.3 Organisation, roles, responsibilities and authorities

§ 7.3 Awareness

§ 7.4 Communication

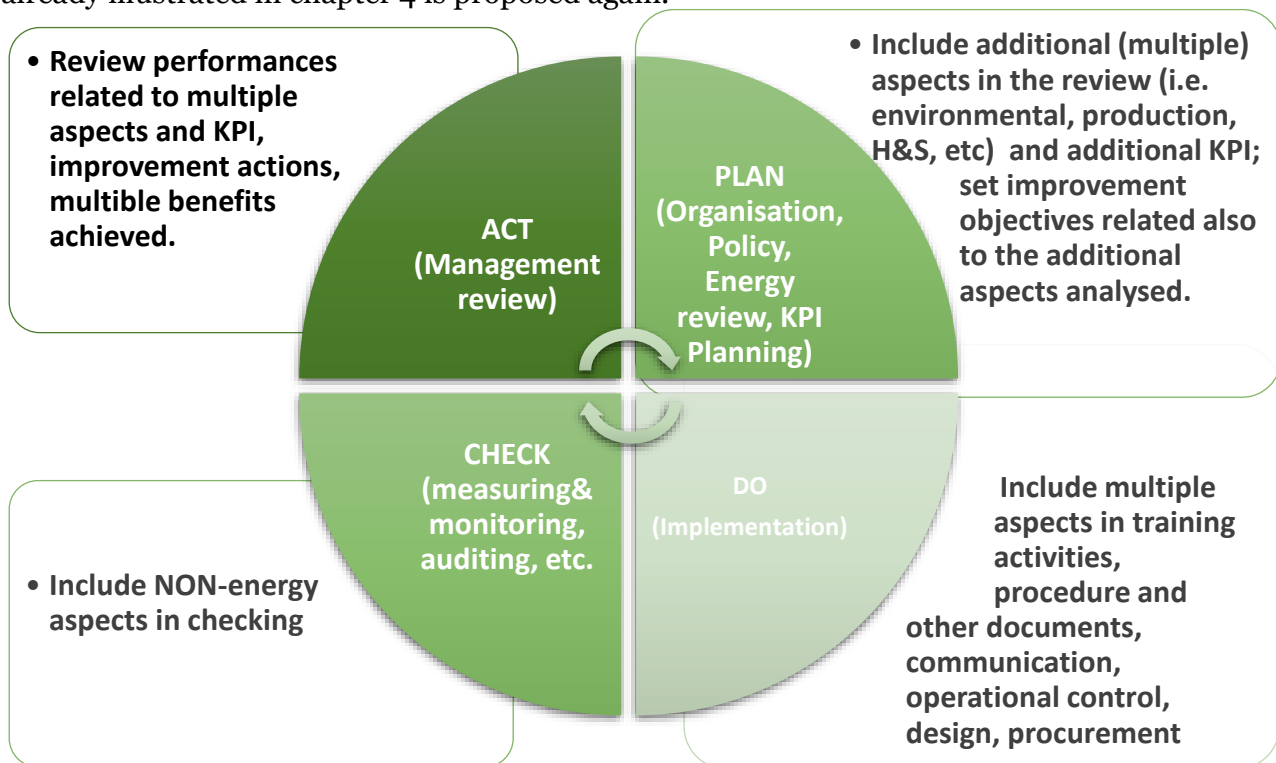
§ 8.1 Operational planning and control

§ 8.2 Design



7. Conclusions

The Guideline "The Energy Management System supporting the Multiple Benefit approach" explains how to integrate the Multiple Benefit approach into design and implementation of the ENergy Management System based on ISO 50001 as well as the usefulness of this integration. It first clarifies the concepts of Multiple Aspect and Multiple Benefit and provides further definitions, before showing that it is possible to integrate NON-energy aspects (multiple aspects) in the various steps of the ISO 50001 application cycle (Deming cycle). In this regard, the scheme already illustrated in chapter 4 is proposed again.



Starting from the "Plan" step, non-energy aspects and indicators related to energy saving in the company concerned are included in the initial review, the evaluation of the various aspects and the definition of improvement objectives.

In the "Do" step, the company organizes itself to be able to manage also the NON-energy aspects in an integrated form with the energy ones in order to maximize the energy and non-energy benefits. The company is committed to improving the preparation of its staff, integrating its organization and operating and control procedures, planning, purchasing methods, etc.

In the "Check" phase, the company monitors energy and non-energy performance, applying what is planned and organized for the control and implementing the integrated indicators.

Finally, the Review activities (ACT) allow for reviewing the effectiveness of the entire system built and applied and finding solutions for improving the system itself as well as company performance.

It was therefore clarified how the proposed methodology is formally placed with respect to the ISO 50001 standard, to other standards (of the ISO 50000 series and others) and to the certification process.

In this document the adjective "Integrated" is used for the term "Approach". The MB approach consists in highlighting all the benefits deriving from correct energy management. This approach needs to know the management performance upstream of the MB aspects on which the company has chosen to work and therefore to integrate them in the company management together with the energy aspects.

Typically, however, the **Integrated Management System** can be defined as a single system designed to manage MB aspects of an organisation in conformity with multiple standards, such as those for energy, environment, health and safety management, etc.

Companies that have already implemented, for example, an environmental (ISO 14001) or health and safety (ISO 45001) management system certainly have an advantage in identifying other aspects to be considered in the management system to which benefits can be associated deriving from energy management and investments.

Specularly, companies that deal with multiple benefits method can comply also with sustainability policies (environmental, social and economic) and therefore the application of the relative technical standards and the legislative innovations being defined. (i.e. Taxonomy, CSR Directive, etc.).

The central section of the guide punctually analyzes the relationship between the multiple benefits approach and the individual requirements of ISO 50001, providing ideas for the timely development of this relationship in individual companies. In particular, for each relevant requirement, it is suggested how to manage the NON-energy aspects together with the energy ones in order to maximize the multiple benefits deriving from organizational and procedural solutions and from technological and process interventions.

The final section, to complete the previous one, has instead illustrated some practical cases highlighting how the evaluation of the NON-energy aspects also allows companies to obtain and exploit numerous advantages, not only energy ones.

Some of these cases concern companies already ISO 50001 certified which have progressively expanded the field of application of their assessments; other cases, on the other hand, concern companies not certified to ISO 50001 that have in any case applied the multiple benefits approach in concrete investment cases that also required a set-up and organization path.

In summary, the guideline demonstrates that the multiple benefit approach:

- ✓ is fully compatible and synergistic with the design and implementation of the ENergy Management System based on ISO 50001 to build up the so called “Extended Energy Management System”;
- ✓ it is facilitated by the adoption of other management systems such as environmental, health and safety, quality and others;
- ✓ stimulates and facilitates the introduction in the company of solutions for the management of non-energy aspects (e.g.: sustainability);
- ✓ generates interesting and very useful synergies to maximize the benefits of management and plant engineering interventions;
- ✓ supports the path of energy transition in synergy with the path of sustainability;
- ✓ leads to a growth in the knowledge and skills of company personnel;
- ✓ allows the improvement of the corporate image thanks to the knowledge of multiple benefits and their enhancement in the market;
- ✓ makes the company more efficient, not only in terms of energy but also in the management of all evaluation and decision processes;
- ✓ involves the company management more significantly since the aspects concerned are numerous, interconnected and typically of greater interest (position in the market, customer acquisition, consolidation in supply chains, corporate image and value, etc.).