

The evolution of energy managers in the last 25 years: the Italian experience

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Abstract

Since 1991 in Italy it is mandatory to appoint an energy manager for every industrial organization with an annual consumption of more than 10,000 toe (ton of oil equivalent) and for organizations from other sectors over 1,000 toe (listed as one of the 10 EU best practices by the EE Watch project).

In almost 25 years the energy market and the awareness about energy efficiency have dramatically changed. Environmental concerns, strong policies to promote energy efficiency, and transformations such as the liberalization of the energy markets, the high-energy prices in the period 2005–2014, and the effects of the global crisis, are the main reasons behind the gain in importance of energy management among enterprises and public bodies.

In Italy, this led to the recognition of the importance of qualified energy managers within the organizations. The energy management expert, a skilled and certified professional according to the Italian standard UNI CEI 11339, was thus introduced in 2009 and many energy managers opted for the certification. Around two thousand energy management experts were certified by the end of 2017.

The introduction of energy management systems (EMS) through the EN 16001 and the ISO 50001 standards started a deeper change in the role of energy managers. By the end of 2017 there were almost 1,500 ISO 50001 certified sites in Italy. EMSs both improve the role of energy managers and start a

change management process: such organizations are more likely to recognize the importance of resource efficiency all over the value chain and in connection with the value proposition.

This paper is based on four surveys conducted in 2016 and 2017 and a study focusing on non-energy effects, resource efficiency, supply chain transformation, and industry 4.0. The outcomes show how companies are facing the challenges posed by the Paris Agreement on climate change.

Introduction

The role of the Energy Manager (EM) in the industry arose in the seventies, at the time of the first oil crisis – following the rationale that if there is an important task you have to appoint a person in charge of it. This good practice became compulsory by law for certain users in Japan [1] in 1979 and in Italy in 1982. The role and the tasks of the EM evolved and the compulsory appointment is still considered a good practice: in Europe, it is listed as one of the European highly effective energy efficiency policies [2], worldwide, according to the ACEEE 2017 International Energy Efficiency Scorecard [3], Italy and Japan share the second place, and in both cases the presence of an obligation to appoint an EM was considered for the score. The mandate for energy manager was one of the ten ranking criteria for an evaluation restricted to industrial energy efficiency according to Kelly (2016) [4].

In Italy law 308/1982 established the obligation for all industrial enterprises with a consumption over 10,000 toe/year and with over 1,000 employees to appoint a person “in charge for the rational use of energy”, usually referred as EM. At that time, the lack of a structure managing the appointment of the EM

Table 1. Number of appointed energy managers according to Law 10/1991 [10].

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Agriculture	47	48	51	57	53	67	74	100	98	88
Industry	637	639	632	608	615	604	650	671	710	820
<i>manufacturing industry</i>	632	632	624	599	614	591	600	605	649	718
Energy and network services (*)	176	305	328	292	299	316	323	352	344	263
Civil sector (residential and services)	836	727	790	758	726	728	786	655	737	758
<i>related to public administration</i>	190	180	187	153	161	165	201	177	186	173
Transport	374	411	418	408	409	412	385	325	343	310
Total	2'070	2'130	2'219	2'123	2'102	2'127	2'218	2'103	2'232	2'239

Source: FIRE. For more detailed information: www.fire-italia.org
 (*) Since 2008 the activities of the waste cycle have been moved from the civil sector to industries with network services
 Additional note: data presented here include the local energy managers appointed by the multisite companies

implied the failure of the appointment scheme. Law 10/1991 extended the EM mandatory appointment to all the industrial enterprises over 10,000 toe/year and for the organizations both of civil (residential and services) and transportation sectors over 1,000 toe/year. The Law better defined the role and established a fine for non-compliance organizations [5]. FIRE (the Italian Federation for Rational use of Energy) was designated by the Italian Ministry for the economic development to manage the database of EM on a yearly basis, collect issues and best practises, support in the appointment procedure and the related opportunities, promote the EM role, publish the yearly book of appointed EMs and report the main figures [6].

In the last decade (Table 1) the number of appointed EMs has shown a continuous slight increase, around 10 % [9]. Concerning the fulfilment of the Law it appears that the industrial sector has been till now the most responsive. This is mainly due to the fact that:

- industrial users are more aware of the benefit of reducing energy costs for higher competitiveness;
- non-industrial users have a lower energy threshold (1,000 toe instead of 10,000 of industrial ones) and, even with the typically higher specific energy costs, the total energy cost doesn't justify the appointment of a full-time EM;
- in the Public Administration there is, in general, a lower awareness about energy efficiency.

It must be noted, however, that FIRE does not have access to the consumption data of all the Italian users nor their energy services contracts, thus it is impossible to define how many obliged organizations have failed to appoint the EM. For Public Administration, it is estimated that the threshold of 1,000 toe can be reached for Municipalities with population of about 15,000 inhabitants, which means a large non-fulfilment of the energy manager obligation or a diffuse use of energy services.

According to law 10/1991, the main tasks of the EM are:

- to identify actions, measures, procedures and whatever is needed to promote the rational use of energy;
- to ensure the preparation of energy balances also in accord to the economic parameters and the final energy uses;
- to prepare energy data to verify the measures implemented with National subsidies.

The role of EM evolved with the opening of the energy markets, the continuous evolution of the legislation on various levels

(European, national, local) and the technical standards, increasingly complex contracts (energy performance contract, etc.) and increasingly complex and competitive energy markets.

The Italian legislation didn't give any indication on compulsory training/qualification for the EM, as for instance in Japan, neither a market based certification mechanism was present for energy professionals. To strengthen the role of EM and other energy efficiency professionals, typically freelancers or employees of ESCOs (Energy Service Companies), also in view of the publication of the European standard on energy management¹, a standardization work was set up to define the competences of the energy management expert (EME). The main starting points were the draft of EN 16001 and a field research on industry, services, public administration and EM [7]. The result was the Italian technical standard UNI CEI 11339:2009 [8] on the qualification of the EME.

As soon as a consistent number of certified EME was available on the market, the legislation required this figure in the application for incentives, such as the white certificate scheme, and in the first round of compulsory energy audits² for large and energy intensive enterprises. Thus, the EME certification become more interesting for the EM.

The EM can consider the EME certification to strength his position, but it isn't a requirement to have a certified EME inside the organization, unless the organization wants to apply for White Certificates (WhC) or make internally the compulsory energy audit. In large organizations, the EM is generally internal and requires managerial skills, knowledge of company decision-making processes and an expanded vision of the company's value chain. The EM has a high level and many tasks so it is usually one or more of the collaborators that become certified EME.

In small-medium enterprises where there are a limited number of collaborators, or in the case of external consultants wanting to offer more services to the customers and strength their position on the market, it is desirable for the EM to be an EME. The share of certified EME among EM (Table 2) didn't change much for the internal EM in the last three years, while more than half of the external EM appointed in 2017 are certified.

1. Under the CEN/CNLC Task Force 189, the project team Energy Management Systems had the kick off meeting on January 2007 and completed the CEN in July 2008.

2. According to art. 8 of the Legislative Decree 102/2014, transposition of the art. 8 of the 2012/27/EU Directive.

Table 2. The share of certified EME among internal and external appointed EM.

Certified EME	2015	2016	2017
% of internal EM	8 %	12 %	13 %
% of external EM	11 %	37 %	53 %

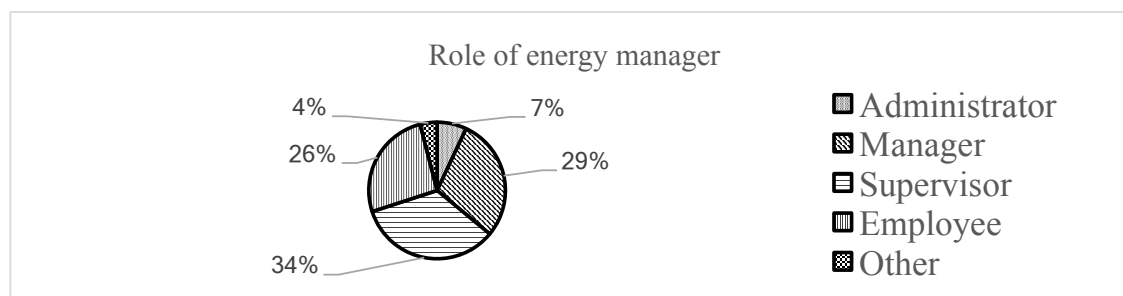


Figure 1. Distribution of the role of energy manager [11].

The evolution of energy managers

To highlight and understand the evolution of the role of energy managers, the barriers they face, the opportunities to grasp, and the tools that can support their action, FIRE implements every year some surveys. In this paper, the most recent ones are summarised, to show some interesting outcomes and better understand the possible future of energy managers.

GENERAL METHODOLOGY

The surveys can be divided in two categories: the ones which investigate the evolution of the energy manager's role and the others that focus on specific topics.

The first ones aim to understand which are the actual trends in the EM role, which are the main barriers and how useful and effective the energy efficiency policies are. All the questionnaires have been provided through an online platform and, in a second moment, there were calls to deepen specific topics or to contact those who haven't replied to the emails.

Among the surveys on specific topics, a permanent focus is dedicated to Energy Management Systems (EnMSs). The idea is to perform a more general survey every second year, identifying and monitoring the trend of evolution of EnMS. In the other years, some specific aspects of EnMSs are deepened. Those aspects are chosen according to the key topics considered relevant in that period.

Since the surveys deal with different topics – and the methodology to choose the statistic sample isn't the same³ – they don't aim to make a comparison. The purpose is to give a general and as possible complete overview of the energy manager's role and its evolution by exploiting several aspects.

THE OUTCOMES OF THE SURVEYS

FIRE periodically performs surveys among EMs, whose results are included in the annual report, accompanying the annual publication of the EM directory.

The general aim is to understand how the role of the EM evolves, what are the trends in energy management, what are the main barriers, how useful are the support and incentive schemes and what are the needs and the opportunities for improvement. The survey's topics vary year by year, depending on the trends and the problematics in place during the period of the survey. In this way, the whole energy manager's audience, and the stakeholders in general, can have a yearly updated overview of the situation.

The EM can be internal to the organization, as for more than 80 % of the total EMs appointed or an external professional. The internal EM (Figure 1) in most cases (around 70 %) have a high corporate profile, from different levels of supervisor, to the manager up to the administrator of the organization. As suggested⁴ it is a high-level profile, with managerial, technical, economic-financial, legislative and communication skills that supports corporate decision-makers in energy-related policies and actions.

Survey carried out in 2016 [11] is more general, aiming to give an overview on the position of EM and his activities. The sample was chosen so that it was the most representative of the population of the subjects appointing an EM in Italy in 2015. The total of interviewed EMs is 116, of which 10 in the public sector.

The statistical sample has been fixed at 5 % of the whole population. The sample has been chosen so that it could be representative of the whole population, according to the following criteria:

- sector (e.g. industrial, public administration, tertiary),
- number of sites of the organization (e.g. for the industrial sector many companies have multiple productive sites),
- global consumption declared (since 2015 every company who appoints an energy manager must declare its consumption to FIRE),

3. E.g. the samples don't have the same stratifications, they have not been chosen assuming the same criteria.

4. Circolare Ministero Sviluppo Economico 18 dicembre 2014.

- the geographic location (e.g. northern, southern and central).

These organisations within the sample have been chosen so that the proportion of the selected organisations (as well as the energy managers) and those of the entire population are the same.

A typical issue encountered by EMs, whether internal or external consultants, is the communication with the staff within the organization. 30 % of respondents reported communications issues, mostly with other business functions.

Setting energy performance objective is very important, it's a first step to achieve them, but the top management doesn't always set clear energy targets to be achieved: about a third of the EMs interviewed don't have assigned energy performance objectives, most of the assigned objectives are economic.

Most of the respondents consider themselves as a support to the decision makers, only for issues related to energy or technological aspects (Figure 2).

Going into deep on their activities, more than half of the respondents are directly involved in energy consumption monitoring and proposal for efficiency measures. About 40 % of them are directly involved in measurement and verification of savings, application for incentives, management of energy supplies and activities of benchmarking. Although not always been committed directly, they however coordinates activities of energy audits of individual sectors, personnel awareness and management and maintenance of energy plants.

Regarding the activities carried out, the allocation of an energy efficiency budget directly managed by the EM was investigated. 73 % of the respondents do not manage any budget and therefore the energy efficiency proposals are presumably tied to a purchasing office. On the other hand, in 27 % of the events EM has the possibility to manage a certain budget, of these, only 13 % find that the budget assigned to them is appropriate.

The role of the EM is very important in the national energy scenario, for this reason it was investigated the perception of the importance of the role within organization. The results are presented divided by sector of activities (industry, tertiary, transport, agriculture compared with public administration that has different peculiarities) and by type of EM (internal or external).

In total (Figure 3), 50 % of respondents believe that its role is growing, 41 % stable and 9 % decreasing. This is also the situation for the internal EMs of industry, transport, tertiary and agriculture, while the internal EMs of the Public Administration and all the external EMs, consider the importance of the role as stable in most cases. This may be linked to the fact the internal EMs are more diffused in large organisations, where there is historically more attention to energy and the energy efficiency is more frequently considered as an important factor for the competitiveness. Regarding the external EMs, it is also possible that, being external, is less likely to catch the sings of transformation.

In total (Figure 4) EMs are able to play a role on the strategies of the company, in fact only 10 % of respondents have a scarce

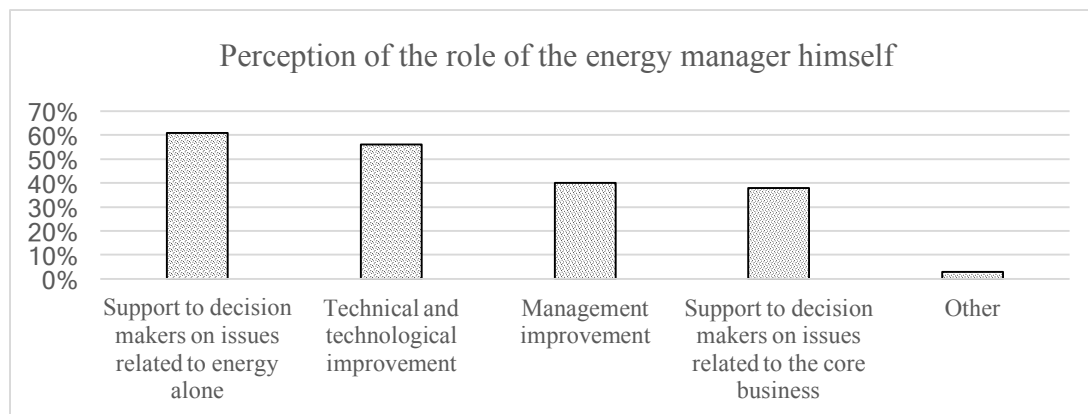


Figure 2. Role of energy manager in the organization.

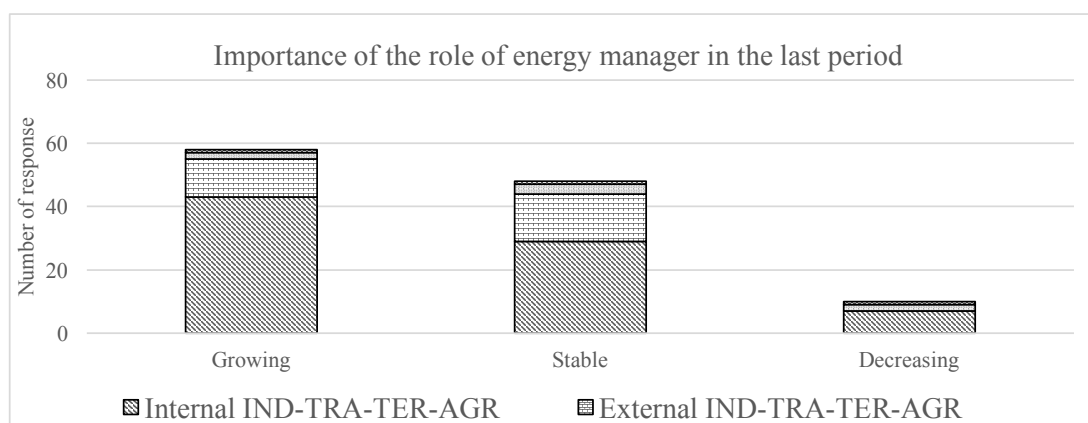


Figure 3. Importance of the role perceived by energy managers.

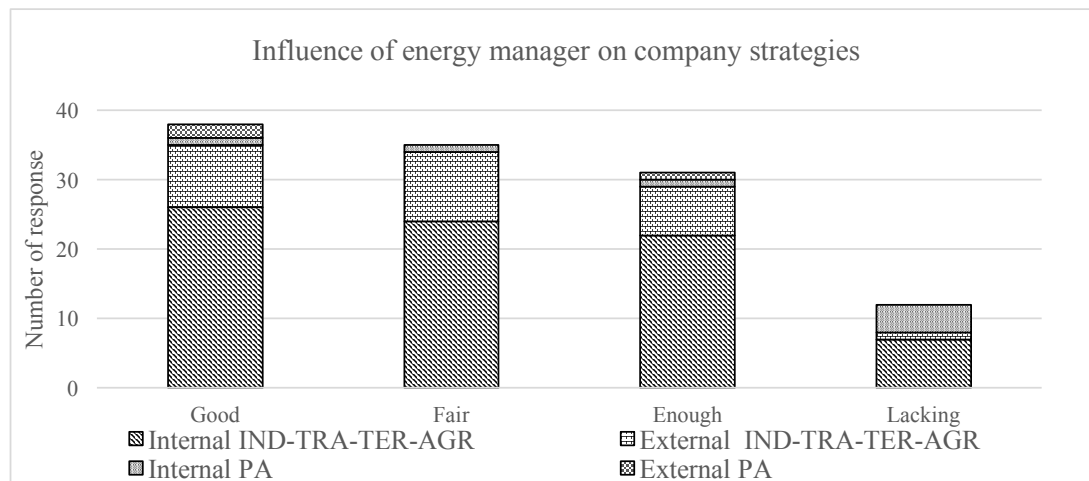


Figure 4. Influence on company strategies.

influence on the decision-making. This is more or less the situation of all the EMs, but the internal ones of Public Administration that in most cases can't influence the organisation's energy strategy. This may be linked to the fact that sometimes, mostly in the Public Administration, the EM is considered merely a legislative obligation and not an opportunity.

The survey conducted in 2017 [9] focused on four main topics: industry 4.0, multiple effects of energy efficiency, monitoring systems, split incentive and energy performance contracts. Respondents came from industry sector, tertiary and public administration. Below some results of the first two topics are summarized. Questions about industry 4.0. were only sent to industry EMs, while multiple effects of energy efficiency were investigated among industry and tertiary sectors EMs. In detail, this second general and more recent survey has been sent to 2,239 EMs and had a 12 % response rate (265 answers).

Regarding the industrial sector, 109 answers have been collected: around half of them comes from large companies, SMEs (Small and Medium Enterprises) count for around 15 % and energy intensive enterprises for around 30 %. For these topics, the interest was to have the broader possible vision, i.e. as much answers as possible, thus it wasn't defined a specific and representative sample, but the survey has been sent to every EM.

The new frontier of energy management is closely linked to the so-called fourth industrial revolution. The goals of energy management in an industry and of the "industry 4.0" plan are in fact similar: increasing the competitiveness companies in the national and international market. This revolution will lead to the cybernetic connection of all systems, chasing four main themes [12]:

- Data, computational power and connectivity (big data, IoT, cloud technology);
- Analytics and intelligence (advanced analysis, digitalization and automation tools);
- Human-machine interaction (interface touch, virtual and augmented reality);
- Digital to physical connection (additive manufacturing, human-robot collaboration, storage of electricity).

The specific topic of survey [9] committed to industrial EMs, investigated how industrial companies are consistent with this status, and verified the propensity of these towards the adoption of initiatives promoted by the government.

Figure 5 shows that approximately three quarters of the contacted EMs of industrial sector see in the "Industry 4.0" plan the potential solutions applicable to energy management: automation, predictive maintenance and the measurement of energy consumption, for example, are powerful tools to reduce waste and process inefficiencies. However, the companies in which the EMs operate, at the moment of the survey were not fully compliant with the status of "industry 4.0" and only 10 % say they are very close to this concept.

An energy efficiency intervention typically has two distinct types of effects: energy saving is the benefit on which the attention is mainly focused by investors and operators., Energy efficiency interventions can also generate other positive (and negative) non-energy effects. A fair number of EMs involved in the survey, both from tertiary (92 respondents) and industrial sector (109 respondents), considers these effects on a qualitative level, and some of them also tried to make quantitative evaluations (Figure 6). The industrial sector seems more familiar than the tertiary one with the non-energy benefits (NEBs). A reason for this could be that mostly manufacturers are sensitive to non-energy benefits such as higher production quality, reduced maintenance and production interruption. EMs, mostly the industrial ones, are starting to use these benefits to support their efficiency improvement proposals. The most frequent non-energy benefits are the increase of the corporate image, the improvement of maintenance and qualification of employees. On the other hand, the risk of process interruption is the main non-energy loss due to an efficiency intervention.

Another survey in 2017 [13] investigated the supply chain transformation. It was conducted on a sample (50 answers) of EMs of the most advanced industrial enterprises in terms of energy efficiency. The term supply chain means the management of the different logistic activities of companies in order to guarantee performance and improve efficiency. Collaboration between supply chain partners adds value to the entire supply chain as risks can be shared, costs are reduced, and business times can be accelerated.

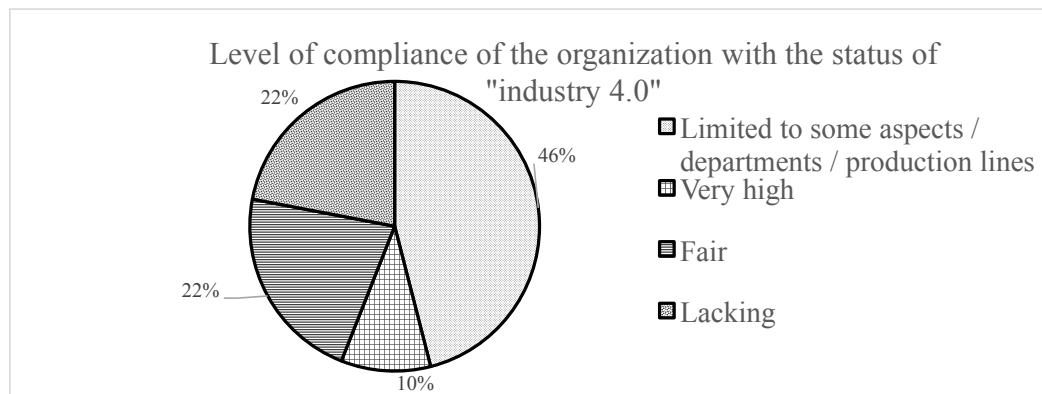


Figure 5. Level of compliance with Industry 4.0.

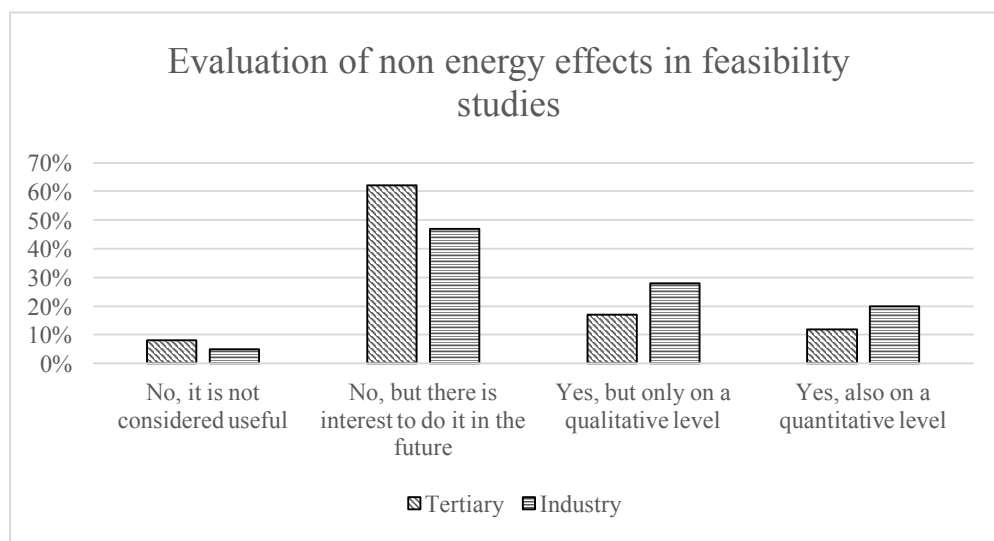


Figure 6. Evaluation of non-energy effects.

One element to consider, from a supply chain perspective, is the traceability of the products supplied: about half of the respondents take into account this aspect. Besides, three-quarters of them have a supplier control system.

Energy and environmental sustainability, and resource efficiency are related to a careful assessment of impacts at each stage of the supply chain. The most forward-thinking companies, in fact, have created a sustainability plan and provided an annual budget dedicated to it, having understood how this can increase performance.

The primary information is that Italian industrial enterprises, regardless of their size and the type of market in which they operate (i.e. national, international), pay great attention to the issue of sustainability and resource efficiency. With regard to the answers received, in fact, only four entities have shown an unwillingness for this kind of themes: two of these, however, have stated that in the short term they will take into account these issues.

The main company functions seem to be involved (Figure 7), in a more or less homogeneous way, in the sustainability and management of resources. Results point out that energy is the most represented function in the sustainability area. Although the distribution of the survey to EMs can affect this statement, it confirms the importance of EMs and states their involvement not only in the companies' boundaries to rise energy efficiency,

but also in a large-scale resource management to contribute to the competitiveness and sustainability of enterprises.

ENERGY MANAGEMENT SYSTEMS AS A TOOL TO ENHANCE THE ROLE OF THE ENERGY MANAGERS AND THE ORGANIZATIONS' ENERGY PERFORMANCE

The energy management systems had a relevant diffusion in Italy since the EN 16001. At the end of 2017 there were almost 1,500 certified sites, a very high number considering the absence of any support for the certification or advantage for the certified organizations. FIRE in collaboration with Italian standardisation bodies⁵ conducts annual surveys on Energy Management Systems (EnMs).

The 2016 survey on ISO 50001 certified EnMs has been sent to 54 certified organizations that have appointed an energy manager. This sample matches with the 15 % of the entire population⁶. The scope of this survey was to achieve an overview on the

5. CEI – the Italian body for the standardization in the fields of electrotechnics, electronics and telecommunications. CTI – the Italian body for the standardization in the fields of thermotechnique.

6. The survey involved the 115 organizations that have both implemented an EnMS and appointed an EM in 2016, a subset of the 350 ISO 50001 certified organizations in 2016 (estimated value on ACCREDIA data).

ISO 50001 market and its state of the art. For this reason, beside the certified organizations, the survey has been also sent to the certification bodies and to many consultants. Seven Italian certification bodies have replied to the questionnaire: they were the main ones, responsible for over 210 Italian certifications. Finally, 20 consultants were involved who have implemented more than 110 EnMSs. In this way, it has been possible achieving the point of view of all the actors involved in an Energy Management System.

In 2017, it has been developed a more detailed questionnaire about the EnMSs and his purpose was to investigate the energy performance indicators (EnPI), the monitoring system, the technological investments and the energy team.

The survey has been performed through 30 phone interviews to EMs of industrial sector (63 %), tertiary (30 %) and public administration (3 %). These energy managers have been chosen considering the results of the previous year general survey on EnMS, in which they emerged to be virtuous and able to give substantial and real contributions.

In organizations that have implemented an EnMS, the EM can hold the role of management system responsible: this is the keystone that allow him to enhance his influence and strengthen his role, increasing finally the effectiveness of her/his work. The EnMS, indeed, facilitates the activities of the EM favouring interactions inside the organization and fixing quantitative targets and goals to be achieved.

As previously seen, the EM in many cases doesn't have the needed resources a clear performance objectives, can't influence the organization's strategies (Figure 4) and has communication issues within the organizations. The EnMS is one of the best ways to give the EM and the energy matter the importance they deserve. The top management should demonstrate his commitment in energy management by allocating the necessary resources to achieve the established goals. The organization's commitment can be found in the Energy Policy whose scope is to trigger several actions regarding the energy efficiency, putting in this way the EM in foreground and allowing a continual improvement of the organization's energy performance. Moreover, the ISO 50001

management system requires a formalization of the responsibilities within the organization's boundaries. An EM often works alone with difficult interactions with other business units. The EnMS should help to overcome these issues, it requires indeed that the organization constitutes an Energy Team whose purpose is to support the EM's decisions and activities. The EM is part of an Energy Team that is usually composed by 5 or 6 people [15] coming from different areas of the organization. If without the management system the EM would have had communication or decision-making issues with the other business units, thanks to the adoption of the EnMS the energy topics become more transversal and strengthen the figure of the EM, since all the energy-related matters are dealt in an integrated way. Finally, an organization where the EM role is acknowledged and formalized it is an important and great step forward in energy efficiency. The EnMS, certified according to the ISO 50001, is one of the best options for those organizations that want to increase their energy efficiency, improve the communication between their business units and put the energy matter at the centre of their priorities.

Organizations that implement an EnMS foresee to get some benefits, not energy-type only. A triple survey [14], carried on between experts, organizations and certification bodies, polled which are the main benefits expected by the organizations that are going to implement such a system. As shown Figure 8, one of the benefits is "a better organization resources management": this is the evidence that at least some organisations started understanding how this Management System can support them in managing their resources. The EnMS is one of the steps that organizations could undertake to start a holistic approach for managing all their resources; in this way, they allow the EM to have a complete overview, both on energy and other resources uses, and let him to start an optimization process.

From 2015 to 2017 the number of organizations who appointed an EM, and that at the same time has implemented an EnMS, has increased of 75 % (Table 3). This is a sign of how much important is becoming the energy management and consequently the role of the EM since, as said, within the EnMS he/she assumes a strategic function.

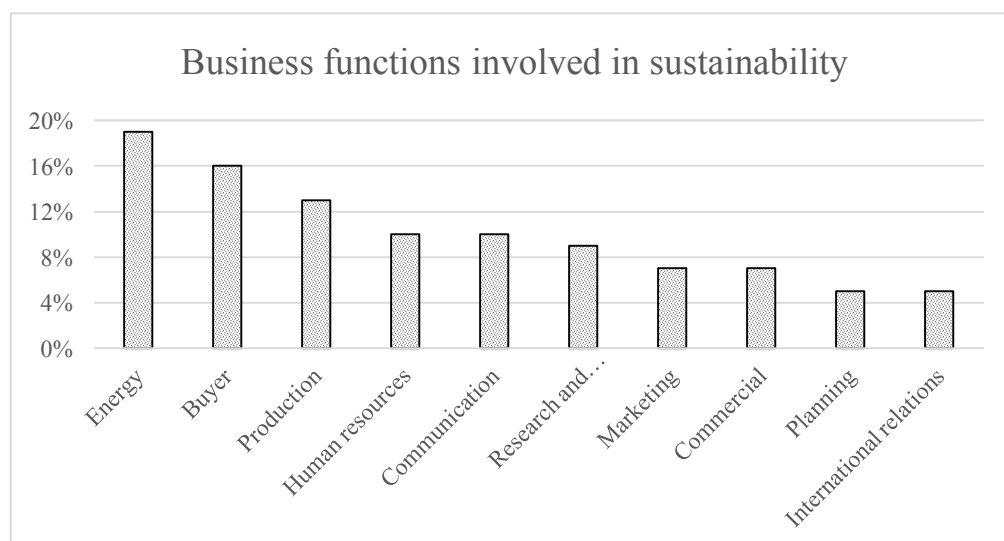


Figure 7. Sustainability in business functions.

Also in general, as shown in the Figure 9, the number of Certified Sites in Italy is continuously increasing year after year demonstrating that the Italian organizations have a great interest in this kind of management system. Despite the lack of any supporting incentives or concessions for these systems in Italy, the EnMS are spreading among many organizations. As widely discussed before, the EnMS can create an ideal environment where the EM can perform at his best, thus there is a great interest of EMs in implementing EnMS and this could be one of the reasons of this wide diffusion.

An EM has many activities to undertake in his organization and managing an EnMS could be one of those duties that takes most of the worktime. The main concept of this system is indeed the continual improvement. Comparing the energy consumption (in toe) of the organizations with an EnMS in 2016 and 2017, it emerges that more of the 50 % of them have decreased their energy consumption. Despite this indicator (total energy consumption/year) is not adjusted to another parameter (for example the production), it anyway underlines an encouraging trend. In the energy efficiency field the EnMS is a very important tool: it allows the organizations to become more competitive and it enhances the role of the EM inside the organization itself. Figure 10 shows the energy savings, divided by sector, gained by the organizations (the same ones involved in the previous survey) that implemented an EnMS. An EnMS can improve the energy performance from 1 % to 5%, on average, depending on the kind of organization and on how much chal-

lenging the Energy Policy has fixed the goals. As shown most of the organizations in the industrial and tertiary sectors achieved savings from 1 % to 3 %, the Public Administration instead gained lower results (<1 %). These figures on the achieved savings due to EnMS confirm the results of a previous study on a similar sample [16].

The increase of the number of EnMS in Italy goes at the same speed of the enhancement of the role of the EM. As discussed before, he is the natural leader of this System and through his skills and thanks to the energy team he can manage not only the energy-related issues but also everything connected to them. The EM must be able to connect cross-functional business units (purchase, engineering, marketing, sustainability, finance) and engage them. The EnMS helps these “cross-functional communications and interactions” since the entire organization, or every employee, should be aware about energy topics.

Finally, the ISO 50001 requires a continuous improvement and it asks to the EM to look for a constant evaluation. The Energy Management System should have not seen as a static picture since it is an ongoing process that must meet all the challenges that organizations will face.

An example of innovative energy management

Several Italian companies are heading to a better energy management. Thanks to the questionnaires and the surveys described in the previous paragraphs, especially about energy

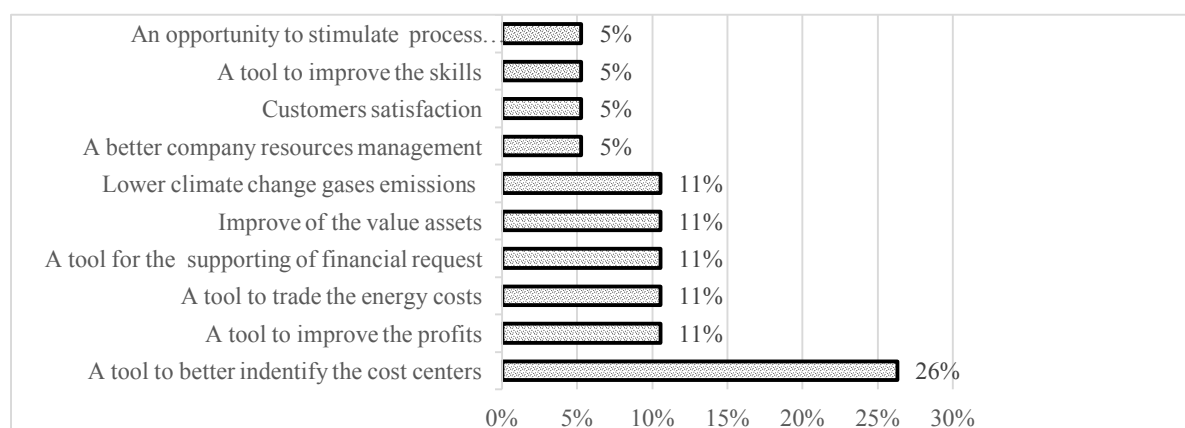


Figure 8. Which are the economic and/or energy benefits that a certified organization expect? Graph based on 7 answers (multiple choices) coming from the Certification Bodies involved in the survey [14].

Table 3. Number of ISO 50001 certified organizations that have appointed an Energy Manager (source: FIRE).

	n° of organizations that have an EnMS		
	2015	2016	2017
Agricultural sector	1	1	–
Industrial sector	51	102	106
of which manufacturing sector	45	84	89
Energy generation and related service	32	41	46
Tertiary sector	25	34	34
of which Public Administration	2	2	3
Transportation	6	9	16
Total	115	187	202

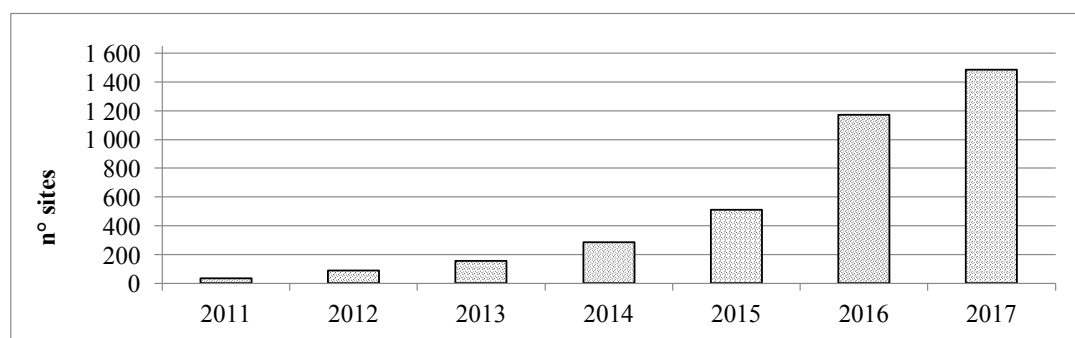


Figure 9. Certified sites in Italy 2011–2017 (Source: FIRE elaboration of Accredia database).

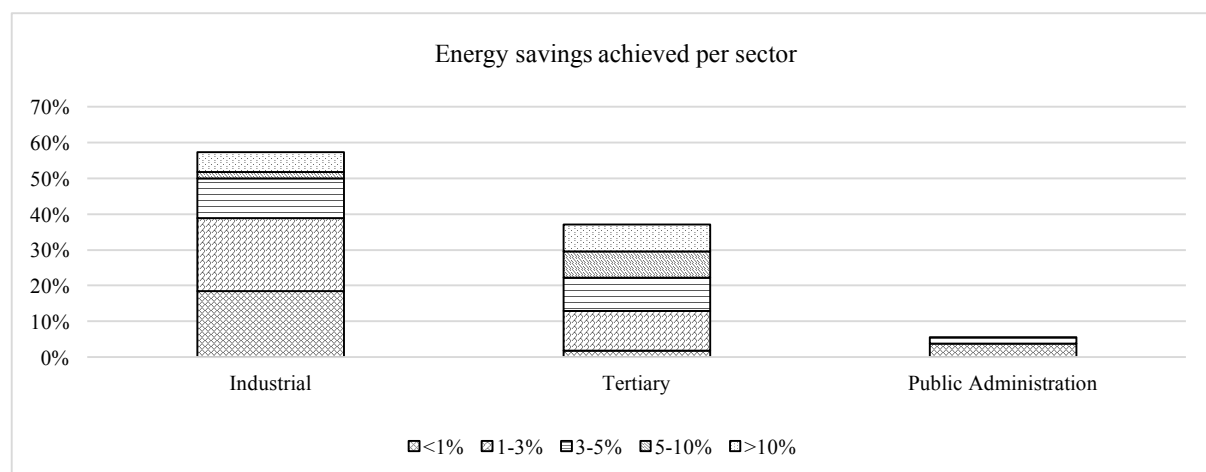


Figure 10. Energy savings in different sectors (Graph based on 54 answers coming from the certified organizations involved in the survey) [14].

manager's role [9] [11], it has been possible also to identify good practices in the evolution of EMs.

An example of this evolution is represented by an Italian electronic company [17] in which the appointed EM is the head of a large team, dealing full time with energy and plant maintenance. Basically, the energy team works as an internal energy service company (ESCO): it has a dedicated budget for its activities and can reinvest the saving generated by the implemented energy efficiency measures. Among the several team's activities, it also manages a trigeneration power plant paying great attention to the regulatory constraints on greenhouse gas emissions.

The most important benefit, obtained by the company thanks to the work of the energy team, is the continuity of the production. The whole company has seen in the energy efficiency the keystone for not interrupting its production: indeed, due its special production, even a short stop could lead to huge economical loss. Furthermore, the EM who has got the EME certification can directly draw up the compulsory energy audit and participate to the WhC mechanism. This isn't very common, in fact the obliged companies⁷ usually outsource the energy audit to external providers.

7. The obliged companies by the Italian transposition of art. 8 of 2012/27/EU directive are the large enterprises and the energy intensive enterprises.

Conclusions

Appointing a good EM can lead to excellent results within an organization, both public and private, since the EM has been able to evolve, adapting and taking advantage of the changing in the legislation and technical standards. The number of appointed EMs and the role as well, have been increasing during the years. Initially, in 1992, the EM's main tasks were to realize energy audits and feasibility studies, then he had also the opportunity to participate to WhC mechanism (for the company that have appointed him). Nowadays, the EME certification confirms how important the role of EM is becoming. A company that have an EME in its staff (in general could be the EM or someone of the energy team) is able to conduct compulsory energy audits on its own and participate to the WhC scheme.

Still, the EME certification is a strong confirmation of the acquired professional skills, and its achievement is an important goal both for the EM himself and for the company.

The enhancement of EM role has gone hand in hand with the number of appointed figures. Despite a certain rate of non-compliance organizations, as shown previously by the Table 1, the number of energy managers is slightly increasing year after year. In 2017, it reached the highest value of appointed EMs since ten years: 2,315. This is a sign of how important this role is becoming and how, little by little, the energy awareness of the companies has improved.

The advantages of having an EM are not only related to energy saving and bill reduction, but there are a lot of NEBs (Non-energy benefits) related to energy efficiency measures. These benefits directly interest a company core business, for example increasing productivity and product quality, or reducing maintenance stops. Presently more EMs, especially in large and market leader organizations, are evolving their role, focusing on integrating energy management with the involvement of all company functions. Presence of EM helps to achieve the objectives of reducing emission, sustainability, with a better use of all resources. Furthermore, there is a growing attention to the use of new ICT technologies for monitoring and automation purposes - although not yet adequate to the industry 4.0 scenarios. The most advanced EMs have realized that energy and other resources are not just commodities or sources of cost, but can be transformed into business and competitiveness levers integrating themselves with the development of new products and services and more efficient supply chains.

Many energy managers are also involved in the implementation of the Energy Management System (ISO 50001). Some of them have always believed in this kind of System, started at the beginning with the Environmental Management System – when the EnMS didn't exist.

Following the EM's own natural attitudes, and the actual evolution of the market, the EM is increasingly becoming a “cross-functional” manager who have not only technical skills but he spreads the energy efficiency knowledge among all the company's business units. To best perform its activities, the energy manager must have personal qualities but also the involvement and commitment of top management is very important. The management's company must create the conditions for the energy manager to operate at his best and find the necessary collaboration through all the company's business units: this is typically happening when an EM works in an EnMS.

The several elements shown along this paper highlight that the way towards the energy management 2.0 has already started and some virtuous organizations, and their EMs, are heading in that direction.

References

- [1] Energy Management Programmes for Industry, International Energy Agency and Institute for Industrial Productivity 2012.
- [2] How to make Europe number 1 in Energy Efficiency, Key results from the Energy-Efficiency-Watch-Pro-
- ject 2016 www.energy-efficiency-watch.org/fileadmin/eew_documents/EEW3/EEW3_Brochure/Brochure_final_english.pdf.
- [3] The 2016 International Energy Efficiency Scorecard, American Council for an Energy-Efficient Economy – C. Kallakuri, S. Vaidyanathan, M. Kelly, R. Cluett, 2017.
- [4] International approaches to industrial energy efficiency: a comparison of countries – M. Kelly, 2016 eceee Industrial Summer Study proceedings.
- [5] Evaluation of the energy manager programme – D. Di Santo, N. Labanca, 2006.
- [6] I responsabili per l'uso dell'energia in Italia, l'elenco dei nominativi per il 2016 – L. De Chicchis, A. Di Gaudio, D. Di Santo, M. Iaiani, O. Micone, F. Mori. FIRE 2017.
- [7] Il mercato di fronte all'Energy Management: una indagine di campo – T. Colombo, P. De Pascali, M. De Renzio, D. Forni, C. Napolitano, S. Picchiolotto, e-Quem project 2007,
- [8] UNI CEI 11339:2009 “Gestione dell'energia. Esperti in gestione dell'energia. Requisiti generali per la qualificazione”.
- [9] Rapporto 2017 sugli energy manager in Italia, indagine, evoluzione del ruolo e statistiche – L. De Chicchis, D. Di Santo, F. Mori. FIRE 2017.
- [10] Law 10/1991 – Norme per l'attuazione del Piano Energetico nazionale in materia di uso nazionale dell'energia, di risparmio energetico e di sviluppo delle fonti rinnovabili di energia.
- [11] Rapporto 2016 sugli energy manager in Italia, evoluzione del ruolo e statistiche – M. Ancora, D. Di Santo, L. De Chicchis, F. Mori, G. Tomassetti, FIRE 2016.
- [12] How to navigate digitalization of the manufacturing sector – V.A. McKinsey 2015.
- [13] Indagine su supply chain e sostenibilità – FIRE 2017.
- [14] Indagine sui sistemi di gestione dell'energia certificati ISO 50001 in Italia – V.A. FIRE, CEI and CTI, 2016.
- [15] Indagine sui sistemi di gestione dell'energia certificati ISO 50001 in Italia – V.A. FIRE, CEI and CTI, 2017.
- [16] Industrial Energy Management Systems in Italy: state of the art and perspective – F. Bonacina, A. Corsini, L. De Propris, A. Marchegiani, F. Mori, 2015.
- [17] Presentations of the EM report at the Ministry of Economic Development, July 2017 (www.fire-italia.org/presentazione-rapporto-em-2017).