



EVALUATION OF THE ENERGY MANAGER PROGRAMME (ITALY)

WITHIN THE FRAMEWORK OF THE AID-EE PROJECT

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1 Characterization of the instrument

The Italian National Energy Plan in 1982, with the promulgation of the Law 308/1982, imposed on large industrial consumers the obligation to nominate a person Responsible for the Rational Use of Energy (usually referred as Energy Manager).

Over the years this technical expert has played a decisive role in large enterprises, where the amount of energy consumed has brought this job to the managerial level. Despite many companies adopted an energy manager, the lack of a structure dedicated to the management of the appointments of the energy managers implied the failure of the appointment scheme after the first year of operation of the law.

After nine years, with the Law 9 and the Law 10 of 9 January 1991 concerning the implementation of the new National Energy Plan, many advanced requirements were set to promote energy efficiency and renewable energy sources. Specifically, article 19 of Law 10/1991 extended the mandatory appointment of the energy manager to large energy consumers in the civil and transport sectors, better defined the role of this figure and imposed fines on those companies and authorities failing to make the annual nomination.

To avoid the problems experienced in applying Law 308/1982, in 1992 the task to manage the Energy Manager network and to support and strengthen the appointed subjects was given to FIRE, the Italian Federation for the Rational use of Energy. FIRE is a no-profit association founded by ENEA (the Italian Agency for New Technologies, Energy and Environment) and two associations which represented the Energy Manager appointed under the Law 308/1982 (AIGE, Italian Association for Energy Management, and EMC, Energy Manager Club).

In the next years various laws, decrees, and technical standards have implied the development of the Energy Manager role that has become a very complex figure with expertise in many fields, like energy, environment, finance, and communication.

The main goal of this instrument (rather unique in its kind, as specific legislations envisaging energy manager mandatory appointment do not seem to exist in other EU countries) is to guarantee that companies which have an important primary energy consumption have an expert who deals with the analysis of energy flows, promotes energy efficiency measures and support the top management and the policy makers (in the Public Administration) to pursue a sustainable development. The threshold is set in 10.000 toe/year for all subjects operating in the industrial, civil and tertiary sectors users and in 1.000 toe/year for remaining sectors (e.g. public administration). The appointed Energy Manager can be an employee of the company subject to the obligation or a consultant. The second approach is particularly useful for medium size companies and for small Local Authorities, which don't

reach an energy bill capable to justify the hiring of dedicated employees.

As explained in the report's chapters specifically dedicated to instrument evaluation, lacks in law 10/91 application for what relates energy manager appointment and verification of energy saving measures implemented weaken instrument effectiveness. The most relevant deficiency is the absence of a tool (e.g. a database) for the monitoring of energy consumption in primary energy of all the companies and authorities operating in Italy and the consequent difficulty in verifying the compliance with the obligation. Furthermore, fines for not compliant subjects mentioned in the law were not applied so far, this often making energy manager appointment a matter of obliged subject voluntary initiative.

1.1 Targets, including relation to end use sector

The basic goal of the article 19 of Law 10/1991 is the appointment of an Energy Manager in each company that reaches the consumption threshold indicated by the Law, with the objective of assuring that energy consumption is monitored and controlled and that energy efficiency measures are promoted and implemented. No explicit energy saving targets in relation to energy efficiency measures implemented. Since Energy Managers have the task to rationalize the end-user consumptions, it follows that this Programme should have a strong impact as a measure for demand side management, with benefits for end-users and for the Country with respect to sustainable development and dependence on foreign countries for primary energy.

1.2 Period the policy instrument was active

The Energy Manager network became operational in 1992 and will continue to operate in the future. The implementation of the Legislative Decree 192/2005, which aims to promote energy efficiency in buildings, especially in the public sector, can strengthen the role of the energy manager operating in the Public Administration and boost the appointments in this important sector starting from year 2006.

1.3 Actions, Specific technologies and/or energy efficiency measures

Law 10/1991 requires:

- Directors for the conservation and rational use of energy (commonly referred to as Energy Managers) for all subjects operating in the industrial, civil and tertiary sectors and consuming more than 10,000 toe/year equivalent and for all the subjects operating in the remaining sectors (e.g. public administration) and consuming more than 1,000 toe/year equivalent: Law 10, 1991, Article 19

- Purchase of Efficient Products and Components for the subjects operating in the public sector: Law 10, 1991, Article 26, comma 7
- Energy Plans for regional and city authorities: Law 10, 1991, Article 5

More precisely the law 10 requires:

- Energy Managers to identify actions, interventions and procedures necessary to ensure the promotion of the rational use of energy.
- the public sector to meet its service requirements by the application of efficient solutions in proprietary or rented properties where these prove technically feasible and economic.
- for regional and city authorities (with populations greater than 50.000) to evaluate energy saving potentials in the wider economy and to formulate objectives in order that these may be met. More recently the law has attributed to provincial administrations (which lie between the regional and city/town administrative levels) the voluntary task of developing programmes with which to realise the energy savings in accordance with the regional plans.

As Energy Managers deal with the promotion of energy efficiency in their companies, they can propose and perform almost every kind of action in this field. A survey performed by FIRE in 1998 showed interesting results. A sample of 10% of the appointed Energy Managers answered the proposed questionnaire and indicated that almost 65% of them implemented energy efficiency measures in the previous three years. Such measures included also cogeneration, heat recovery, heating plant enhancements and other high scale interventions.

1.4 Target groups

The Energy Manager Programme has a broad scope regarding the target groups, since it addresses all sectors:

- Public sector (municipalities, ministries, other public administrations)
- Industrial sector (medium and large enterprises, power producers, utilities, etc.)
- Transport sector (goods and public transport, airports, large train stations, etc.)
- Commercial and service sector (shopping malls, warehouses, banks, hotels, sport centres, ESCOs, etc)
- Agriculture sector (large farms)

1.5 National context

Since the Energy Managers tasks are horizontal with respect to the main functions in the various companies and deals with every aspect related to energy use, their role is linked with every law and regulation concerning energy efficiency. This means that Energy Managers are a key figure to carry out important measures related to the Kyoto target, such as the energy efficiency certificates mechanism, the national targets for renewable energy sources, the buildings certification procedure, the emission trading and the IPPC directives.

1.6 International context

The role of energy manager is recognised worldwide. Italy has introduced a mandatory approach which can enhance the capability of the companies to deal with the challenge of a sustainable development. It has to be stressed that one of the main advantages of such an approach is the creation of a national network, which could be easily extended to a European scale, useful for spreading best practices and changing experiences among the appointed Energy Managers.

FIRE was also active in the CEN-CENELEC BT-JWG-EM work-group charged with the task of analysing the opportunity to introduce some standards for Energy Manager and Experts in the European Community (standards for ESCOs, energy management systems, energy savings and efficiency calculation, white and green certificates were also considered by the same work-group). As a result some recommendations were produced in the middle of 2005 to implement the European and national standards on these themes.

1.7 Market failures to overcome

The main market failures are related to:

- the fact that many public and civil users have not appointed an energy manager;
- the inadequate hierarchical position of some Energy Managers in their companies;
- the difficulties to convince top managers and policy makers in adopting the proposed measures.

The problem mentioned at the first point could be reduced by the regulations introduced by the Legislative Decree 192/2005, which gives to the Energy Managers operating in the public sector the new task to check and approve the energy efficiency certifications for new and renovated public buildings introduced by Law 10/1991.

1.8 Organisations, which are responsible for implementation and execution

The following organisations/actors are involved in the implementation and execution of the Energy Manager Programme:

Ministry of Productive Works (MPW). The Energy Department of the MPW is the main responsible Ministry for the Energy Manager Programme. MPW gives direction to FIRE and can decide to strengthen the role of Energy Managers through the issuing of its own decrees or participating in the definition of other legislative acts (e.g. Legislative Decree 192/2005). The MPW is, however, scarcely involved in the practical work of running the programme.

FIRE. The Italian Federation for the Rational use of Energy manages the energy managers network and supports Energy Manager in their activities. It operates as an independent organization, financed by its own associated (energy managers, but also market operators, consultants, utilities, local authorities, universities, etc). FIRE 's main tasks with respect to the implementation of the Energy Manager Programme include the following:

- Management of the database of Energy Managers on an yearly basis
- Support and Training of Energy Managers
- Collection of problems and best practise among Energy Managers
- Dissemination of best practices among Energy Managers through the web site www.fire-italia.it and the organization of workshops
- Support to companies to the appointment procedure and the related opportunities
- Monitoring of Energy Managers appointments
- Promotion of the Energy Managers role
- Publication of a yearly book collecting the appointed Energy Managers, reporting the main figures on the subject and giving advice on the appointment procedure; starting from 2003 the book has been replaced with an electronic version available via internet

ENEA. The Italian Agency for New Technologies, Energy and Environment gives hospitality to the main FIRE operative unit and organizes, in collaboration with FIRE and on indication from the Ministry of Productive Works, the training courses for Energy Managers (both a five days course, which is organized 4-5 times/year and many thorough and exhaustive seminars on specific issues).

Companies subject to the obligation. They are responsible for implementing the obligations set by Law 10/1991 and the other regulations mentioned in this report. The obliged companies can be divided in four groups:

- Public bodies;
- Industrial users;

- Transport users;
- Commercial and service users.

1.9 Available budget

The Government gave ENEA and FIRE around 100.000-150.000 €/year till year 2000 to carry on their activities related to energy managers. Presently, as already stated in the preceding chapter, FIRE is able to continue its activities on a self-financing basis. The expenses related to this task can be quantified in about 125.000 €/year.

1.10 Available information on initial expected effectiveness and cost-efficiency of the instrument

There are no information available on the expected effectiveness and cost-efficiency of the instrument.

2 Policy theory

2.1 Cause-impact relations, indicators and success and failure factors

In Figure 1, the main steps of the policy theory are shown together with indicators to measure success and failures factors in the implementation steps. The most important success and fail factors are listed as well. Below follows a presentation of the policy theory.

Since a method for precisely evaluate the impact of this instrument doesn't exist, an effort has been done to find out some data that consented to make quantitative analysis.

The basic steps of the policy theory concerning Energy Managers are the following.

1. Industrial companies that reach the primary energy consumption threshold required by Law 308/1982 nominate an Energy Manager.
2. Companies that reach the primary energy consumption threshold required by Law 10/1991 nominate an Energy Manager.
3. FIRE is given the task to manage the Energy Manager network and to give technical support to the appointed Energy Managers.
4. Energy managers implement audits and make energy efficiency proposals.
5. Energy Manager role is broadened and becomes more complex for the changes in the regulatory framework.
6. Energy Managers in the Public Administration are given a control role with respect to the mandatory energy efficiency declaration for buildings.
7. Energy Managers can submit experiences and have a managerial and technical support from FIRE.

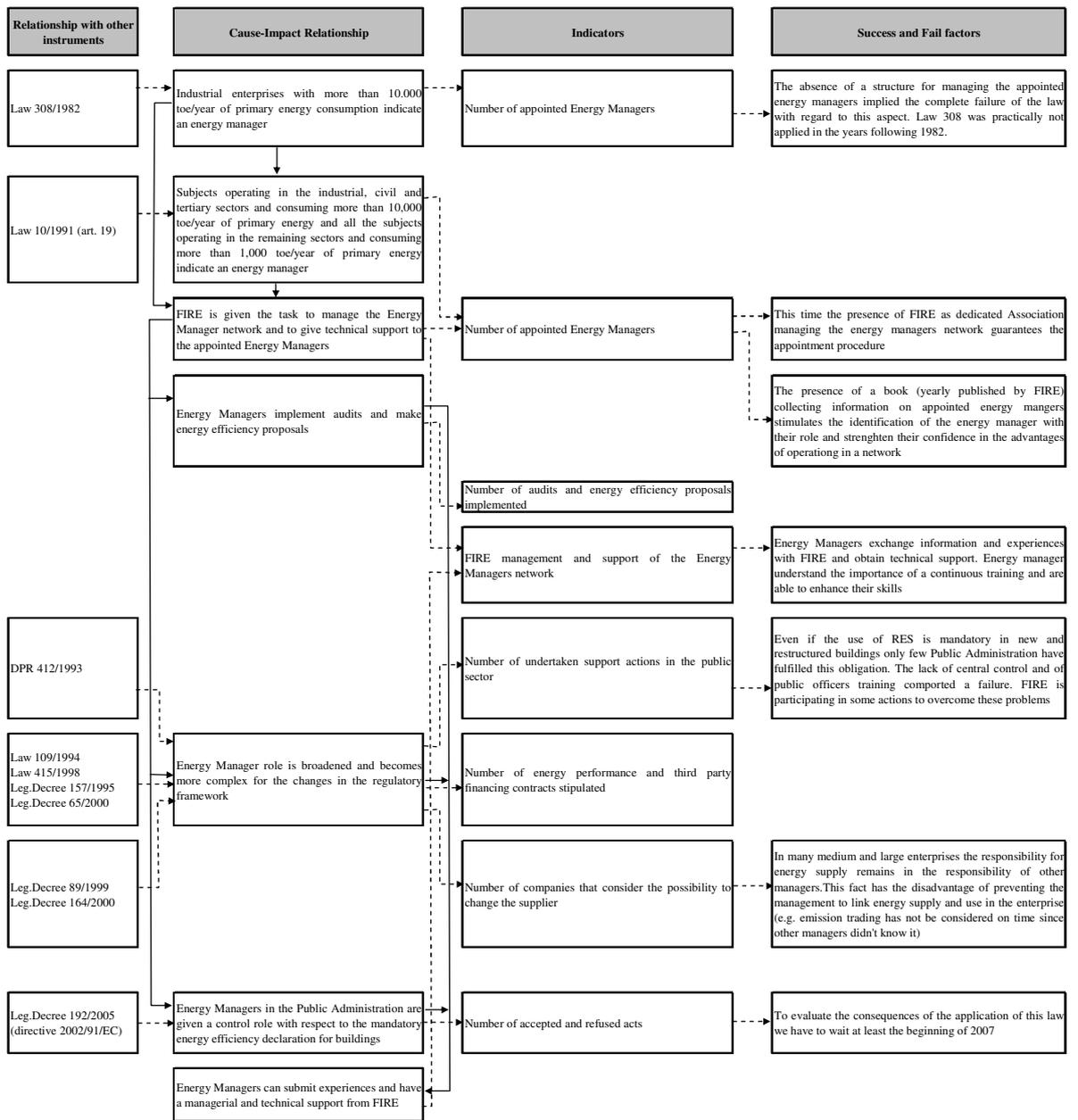


Figure 1 Overall picture of assumed functioning of the instrument: cause-impact relations, indicators, success and failure factors and interactions with other instruments.

2.2 Interaction with other policies

The Energy Manager Programme interacts with the following policy instruments:

Law 308/1982. This Law introduced for the first time the figure of the appointed Energy Manager in Italy, but it was limited to the industrial sector and it didn't de-

fine the role of the Energy Manager as clearly as the Law 10/1991 did. It suffered for a lack of monitoring and management measures that invalidated its complete enforcement with respect to the issue of Energy Manager. Nevertheless, industrial consumers nominated many Energy Managers and gave birth to the two associations (AIGE and EMC) that created FIRE in 1988.

Presidential Decree 412/1993. This Decree, in enforcement of Law 10/1991 started a control mechanism for all civil thermal plant, indicated important measures of energy efficiency, such as the obligation for public buildings to use renewable energy sources in case of renovation, and established the procedure to evaluate the normalized energy requirement for buildings. It also created the figure of the person responsible of the thermal plants, with the responsibility to assure their safety and efficiency.

Discipline about Public Works. Even if the discipline about Public Works is not directly linked to Law 10/1991, with the introduction of third party financing created the possibility for the Energy Managers in the public sector to use this tool to satisfy the energy efficiency requirements of the Public Administration. This allowed to implement many project since 1994 that wouldn't have been realized otherwise for lack of economic resources. There are a lot of decrees, which establish the regulatory framework. The main ones are Law 109/1994, Law 415/1998, Legislative Decree 157/1995, and Legislative Decree 65/2000.

Energy Market liberalization Legislative Decrees. The market liberalization had an important repercussion on the role of Energy Market. The negotiation of electricity and natural gas has become a difficult task, which requires a constant training to follow the ever-changing rules and completely different mental approach to this issue. The main decrees that changed the electricity and natural gas markets are the Legislative Decree 79/1999 and the Legislative Decree 164/2000.

Legislative Decree 192/2005. This is the decree that started the enforcement of the 2002/91/EC directive. It is important for the Energy Manager Programme since it requests to Local Authorities that the reports, which confirm that the buildings meet the requested energy efficiency standards, must be verified and signed by the Energy Manager.

Besides above mentioned interactions several potential interactions with the following energy policy instruments recently entered into force at the European as well as the Italian level do exist:

- the Italian energy efficiency decrees of July 2004 introducing white certificates
- the EU emission trading directive
- the EU directive on energy efficiency and energy services

- the EU directive on CHP

Energy managers may have a very important role for the effective implementation of all of these instruments. Unfortunately, an energy manager role definition in relation to activities he can accomplish in the framework of such regulatory instruments is often missing in the Italian companies and local authorities.

3 Evaluation

In the present chapter outcomes per each of the indicators defined for the various steps of the policy theory are presented and failure and success factors determining such outcomes are discussed.

3.1 Number of Energy Managers appointed by Law 308/1982

The number of appointed Energy Managers was of 600 in the first year. There are no accurate data available. Law 308 was practically not applied in the years following 1983.

3.2 Number of Energy Managers appointed by Law 10/1991

In the last decade the number of appointed Energy Manager has been almost constant around 2.500 individuals.

The tertiary and the public sector can do much better. This reflects perhaps two aspects:

- non industrial users have a lower threshold, that doesn't justify the appointment of an Energy Manager as the industrial one; the present high prices of fossil fuels will perhaps increase the number of nominated Energy Managers;
- since the law doesn't ask for expensive measures, it wasn't difficult for companies subjected to the regulations to nominate as Energy Manager whoever they wanted inside the organization.

The industrial users have been till now the more precise among the others. It must be noticed, however, that FIRE doesn't have access to the consumption data of the companies, thus it is impossible to state how many obliged companies have failed to appoint the energy manager. Some estimate can be done for Local Authorities, since the threshold of 1.000 toe is reached for population of about 12.000-15.000 inhabitants.

The table illustrated how the different sectors are characterised by the appointment of Energy Managers.

APPOINTED ENERGY MANAGERS	1999	2000	2001	2002	2003
Agriculture	39	39	36	40	36
Industry	597	604	590	615	612
<i>of which Manufacturing ones</i>	594	602	588	612	610
Energy and Water industry	158	154	159	169	177
Commercial and service	914	900	778	852	843
<i>of which Public Administration</i>	247	208	161	208	223
Transport	323	282	269	290	331
TOTAL	2031	1979	1832	1966	1999

The differences throughout the years are due to many reasons. The main one is that the never applied sanctions to the defaulters don't help companies to remind every year to appoint someone, especially when the old Energy Manager has to be changed. Other reasons for changes are: companies mergers or separations and activation of energy services not directly linked to the supply of energy (e.g. a service that guarantees a given temperature in a building relieves the end-user to consider the corresponding primary energy).

Although quantitative data are not available, number of companies and, above all, public authorities not compliant with 10/91 obligation on appointing an energy manager remains high. Besides not application of envisaged sanctions, another reason for this is probably that obliged subjects do not think energy management can improve their business or cannot invest on it.

Success and failure factors

Excluding cases in which the nomination of the energy manager is only a purely formal exercise to comply with Legislation, it can be reasonably assumed that companies and public authorities appointing their own energy managers do that because they are really convinced of the usefulness of devoting one of their employee activities to energy management.

The constancy of the number of appointed energy managers shows that the program has given some results and is judged positively by companies.

Big lacks in energy manager appointment in the public and commercial sectors have to be pointed out. FIRE estimates that the number of Italian municipalities that would have to nominate an Energy Manager should be around 650. It means the only one third-one half of the subjected municipalities has respected the law requests. It should be noticed that the exact number can't be known, firstly because this figure is based upon the population of the municipalities and not upon the unknown energy consumption, secondly because some municipalities doesn't require an appointed Energy Manager since they entrusted the heating demand as a service to an ESCO. If this service is based upon indicators different by energy consumption (e.g. room temperature) the related energy is not quantified and doesn't participate in the calculation of the primary energy demand of the municipality.

The program will have shown better results with respect to the appointment procedure if the sanctions indicated by the law would have been applied. It would have been sufficient to create an office with the task of applying the law. Of course, the first step should have been the creation of a database with the energy consumption in primary energy of all the companies operating in Italy. It wouldn't have been costly and the Law would have been better respected.

It is also worth mentioning that the Law 10/1991 requested the appointment of the Energy Manager to the subjected companies in order to give them the possibility to access the public funding delivered by the same Law. Unfortunately it doesn't seem to have been applied in concrete terms.

A good tool for enhancing the application of the Energy Manager Programme would be to give FIRE the power to have statistics about companies consumption, in order to make it possible to find out defaulting companies, and to establish some procedure to collect data about the measures implemented by the Energy Managers.

3.3 FIRE management and support of the Energy Managers network

FIRE succeeded in creating a network of Energy Manager that allowed to present many case studies and best practices examples since 1992. The network, nourished through workshops, seminars, a technical call centre, the magazine "Gestione Energia" and the web site www.fire-italia.it, which reports many guides to technologies, regulations, funding opportunities, market liberalization, etc, has given the possibility to exchange many problems and solutions and many case studies in the last decade.

It is difficult to evaluate the number of experiences related to FIRE, since many of them are given in an oral form. FIRE publishes a quarterly magazine (GestioneEnergia), which collects some of them. Others are available in the FIRE web site. But it can be said that around 200 Energy Managers participate in training course organized by FIRE and ENEA and 600 Energy Managers per year are involved in FIRE meetings and workshops.

FIRE is also cooperating with ENEA in a programme aimed at strenghtening the role of Energy Manager in the Objective 1 Regions in Italy and to create regional networks of them to support the planning and managing of energy issues of the Regional and Local Governments.

Success and failure factors

Even if many contributions derive from a few active Energy Managers, the results of FIRE activities can be considered positive.

Till year 2000 FIRE operated through the economic support of ENEA granted by the Ministry of Productive Works. In the last five years, due to some changes in the organization of ENEA, FIRE has to carry on without it (around 100.000 €). This has

created some problems, overcome through the creation of services reserved to FIRE members. In this way FIRE succeeded in financing its activities, but the wrong side of the medal is that Energy Managers that didn't become FIRE members have lost some of the advantages of the network. FIRE decided to keep as many information as possible available to every users, but anyway the potential of the network has been reduced. There could be another interpretation of the matter. It is possible that the most part of the active Energy Manager has become FIRE members. Since the number of the members is around 500, it can be extrapolated that the Energy Managers who have the possibility to work plainly in their position are about 500-1.000.

In many countries there has been a contraction in the funding of activities which don't have a direct money return. If this trend had the advantage of cutting out some inefficiency, there are public activities which are useful and difficult to carry on in a market model without depriving them of some potential. The effect of certain decisions should be analyzed and monitored in order to understand if the benefits overcome the losses.

The annual Energy Managers book collects only the data and addresses of the appointed Energy Managers, but it is a precious tool to find out colleagues working for other companies and ask for suggestions or for exchanging experiences. This is a positive tool, even in its simplicity.

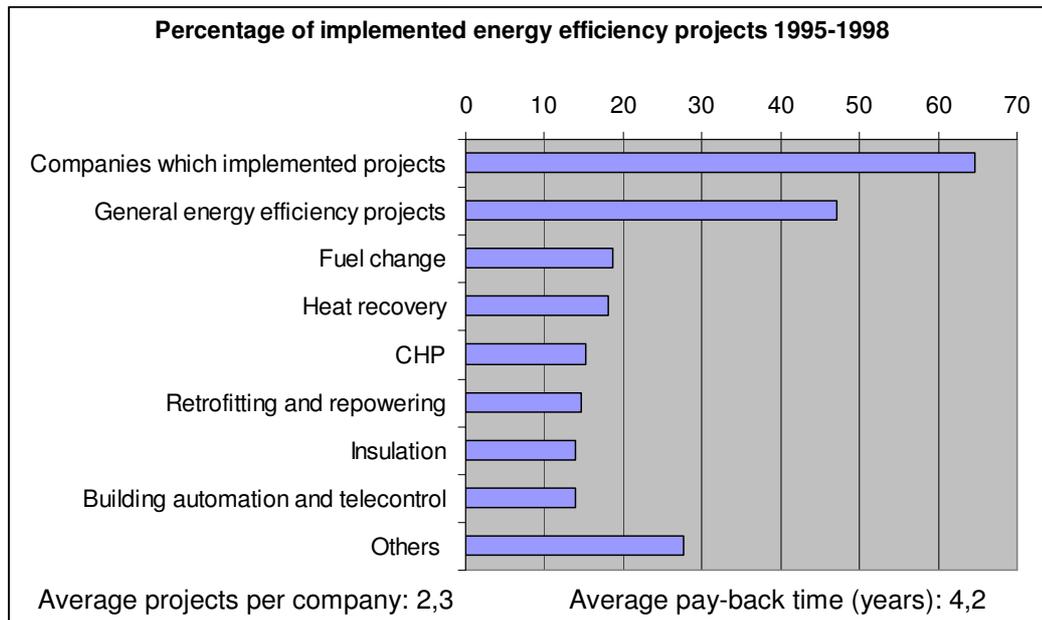
As a whole, considering the working groups active on many themes (buildings, distributed generation, energy efficiency decrees, etc), the technical support given by means of phone calls and of e-mails and the experiences related in FIRE workshops and in other events it could be said that this indicator is positive, even if it is impossible to quantify.

FIRE could play an important role in monitoring law 10/91 application. This would require a specific mandate to FIRE to monitor energy manager appointment procedures and energy saving actions undertaken by these subjects, a higher support from the Government and the institution of a suitable monitoring protocol.

3.4 Number of audits and energy efficiency proposals implemented

A FIRE survey in 1998 indicates that almost 65% of the Energy Managers implemented energy efficiency measures in their companies. Since only 10-15% of the Energy Manager answered the posted questionnaire, it is probable that the sample includes Energy Managers above the average as far as the initiative is concerned.

A figure with the results of the survey is shown below.



Success and failure factors

The main goal of the law 10/1991 was to promote energy efficiency. The creation of an energy manager network was only one of the various measures required by the law. The fact that a large number of the appointed Energy Managers participating in the survey implemented energy efficiency measures indicates that energy manager appointment probably has often positive effects.

Nevertheless, many Energy Managers didn't succeed in their primary task. There are many reasons for this and they are not all related to the programme itself, but to the typical barriers that energy managers face:

- energy far away from the core business of the companies;
- top management unaware of energy issues;
- lack of capability for Energy Manager to speak non-technical languages with the people who take the decisions about investments;
- lack of economical and financial resources;
- unfavourable rules for Energy Manager budget allocation.

To overcome these issues the solution are:

- to use mass media campaigns to create a general awareness about energy issue (we already are on the right path and many events confirm a positive trend);
- to train Energy Manager in order to give them environmental, financial and communicating skills;
- to promote the creation of ESCOs capable to offer services which include third party financing and energy performance contracting;
- to convince the top management to leave to good Energy Manager part of the savings that they guarantee through energy projects and measures.

In case of Energy Managers working in the public administration the rate of failures in fulfilling expectations of the Legislator when setting out the requirement appears particularly high.

Generally the problems inflicting Energy Managers of the public administration are well documented (for example SAVE (1994), Picchiolotto (1998))

Even when nominally active Energy Managers often find their time dedicated to activities which at best are only marginally in line with their legislative defined role, such as Thermal Plant Manager, or more tenuously developing public tenders, or managing building stock. The nomination of the Energy Manager can thus (often) result a purely formal exercise to comply with Legislation, with no effective means for the nominee to cover the role. Otherwise the position is most often covered by a technician, badly positioned in the managerial hierarchy to exert any influence on purchase decisions.

3.5 Energy Manager changing role

Today energy managers should confront themselves with many issues, such as the energy markets liberalization, the decentralization of administrative and political tasks, the diffusion of third party financing and ESCOs, the evolution of energy efficiency technologies, the trend of fossil fuels price.

This everchanging environment requires a consistent training in order to keep up to date.

Energy Managers in fact are horizontal professionals able to:

- monitor hourly and disaggregate energy consumption (market liberalization helps);
- analyze energy flows (EMAS can support it);
- find out behaviours and customs against energy efficiency;
- verify O&M procedures (building automation, remote monitoring);
- do feasibility studies with respect to energy efficiency technologies;
- evaluate proposals from ESCOs and other operators;
- manage electricity and gas contracts.

This means that they have to add to the technical capabilities the knowledge and some skills related to environmental, financial and communicating aspects.

In addition to the that, it is worth mentioning that energy managers can potentially have a very important role for the achievement of the national objectives established as a consequence of the the several energy policy instruments recently adopted at the European as well as the Italian level (i.e. the Italian energy efficiency decrees of July 2004 introducing white certificates, the EU emission trading directive, the EU directive on energy efficiency and energy services, the EU directive on CHP).

Success and failure factors

ENEA and FIRE cooperate in organizing training courses for Energy Managers that every year collect from 200 to 250 participants (not appointed energy managers are included). In 2005 some short courses dedicated to specific themes (energy audits, feasibility studies, energy service contracts optimization, etc) were launched in order to address specific issues indicated by Energy Managers.

Universities started offering in the last four years many masters and courses dedicated to energy management. Thus education and base training are being adapted to the requests of the current market.

The lack of continuous training was reported by 45.3% of the Energy Manager, who took part in the FIRE survey of 1998, as the main issue concerning their role. It was felt as more important than lack of financial resources (42.2%), operational autonomy (23.3%) and other issues. This confirms the importance of dedicating resources to this issue.

FIRE is partner of an Equal project aimed at developing dedicated training traditional and e-learning tools for Energy Managers. This project will start in 2006.

Even if the use of RES is mandatory by DPR 412/1993¹ in new and restructured buildings only few Public Administration have fulfilled this obligation. The lack of central control and of public officers formation comported a failure. FIRE is participating in some action to overcome these problems.

As far as Public Works framework is concerned there are no data available to evaluate the effectiveness of the possibility for Energy Managers to introduce third party financing and project financing in the energy service contracts. But many feed-backs by FIRE indicate that this possibility is being used by a growing number of Administrations (even if probably under 10% of the total with respect to the number).

An issue related to the energy market liberalization process is that it exacerbated the need to reunite the function of energy management to that of energy purchase. Where the functions remain separated (with reference to a single person or to a single department) it is difficult to obtain the best prices and it is also difficult to relate energy prices to issues like the implementation of the IPPC Directive or the Emission Trading Directive. Many companies found themselves unprepared and took some decisions about the energy processes that favoured low price in the beginning, but were discovered to be detrimental in order to complain to the mentioned directives.

As a positive factor a FIRE survey in 2001 indicated that 46% of the interviewed energy managers were considering the opportunity to change their company supplier of electricity.

¹ DPR 412/1993 obliges public authorities to implement "efficient solutions" for central heating plants when the extra costs with respect to the "standard" alternatives are repaid, from energy savings, within eight years or ten years in the case of towns with more than 50,000 inhabitants (Articles 5, commas 15 and 16).

3.6 Number of buildings and energy efficiency reports controlled by Energy Managers working for Public Authorities

The Legislative Decree 192/2005, if correctly applied, will strengthen the role of Energy Managers in the public sector and will promote the appointment of Energy Managers by defaulting administrations.

In 2007 it will become possible to verify the efficacy of this measure and to give information about this indicator.

3.7 Net Impact

There are no data available to determine the net impact of the Programme. It should be taken into account that it is quite difficult to determine the energy savings obtained from Energy Managers, both because some implemented measures are not easy to quantify (in many cases it is difficult to measure the real savings and estimates are not worthy to be considered) and because it is not always clear which role the Energy Manager has in implementing energy efficiency projects.

It has also to be taken into account that measures for monitoring the actions carried on by Energy Managers were not considered by the Law 10/1991. The only available data are the ones due to FIRE surveys, which are mentioned in the preceding paragraphs and are not sufficient to determine the net impact of the Programme.

3.8 Effectiveness

No information available (see above).

3.9 Cost Efficiency

No information available (see above). Some data about known costs are given as a reference.

The direct cost for the Government is estimated in 100.000 € till year 2000. In the following years it has been substantially insignificant.

The cost for the companies is difficult to quantify. Many Energy Managers are busy also with different business; some of them dedicate few attentions to energy if compared with other tasks. It can be noticed that a high level manager will cost 70.000-100.000 €, which means that he should be able to obtain savings of at least the same order. If we consider an energy saving of 10% per year, it follows that the energy bill of the company has to be around 1.000.000 € to justify the employment of an Energy Manager. Otherwise either he is an external consultant, or he has to be manager of many issues

4 Conclusions

4.1 Net impact, effectiveness and cost efficiency

As stated in the previous chapter it is impossible to evaluate the Net impact, the effectiveness and the cost efficiency of the Energy Manager Programme. This is due to the particular characteristics of the Programme in itself and to some difficulties in calculating and collecting necessary data.

4.2 Success and fail factors

In the present section success and fail factors mentioned for each of the policy implementation steps are briefly summarised.

- Number of companies and public authorities not compliant with 10/91 obligation on appointing an energy manager is high. This is probably due to the fact that envisaged sanctions are actually not applied on such subjects that, probably, do not think energy management can improve their business or cannot invest on it.
- Obviously the appointment of energy managers does not automatically imply that actions to improve energy efficiency are undertaken. Scarce attention has been reserved to verify that appointed energy managers comply with law 10/91 obligations related to measures that these subjects are supposed to implement. The same scarcity of attention is observed in relation to local authority compliance with DPR 412/1993 obligations related to energy efficient measure implementation in heating plants, this fact further weakening the role energy managers may have within the Public Administration.
- Some municipalities do not require an appointed Energy Manager because they entrusted the heating demand as a service to an ESCO. If this service is based upon indicators different by energy consumption (e.g. room temperature) the related energy is not quantified and doesn't participate in the calculation of the municipality primary energy demand.
- In case of Energy Managers working in the public administration the rate of failures in fulfilling expectations of the Legislator when setting out the requirement appears particularly high. Even when nominally active, Energy Managers often find their time dedicated to activities which at best are only marginally in line with their legislative defined role, such as Thermal Plant Manager, or more tenuously developing public tenders, or managing building

stock. The nomination of the Energy Manager can thus (often) result a purely formal exercise to comply with Legislation, with no effective means for the nominee to cover the role. Otherwise the position is most often covered by a technician, badly positioned in the managerial hierarchy to exert any influence on purchase decisions.

- A creation of a database with the energy consumption in primary energy of all the companies operating in Italy would allow to apply sanctions indicated by law 10/91 in case Energy Managers are not appointed.
- The programme would be enhanced if procedures to collect and verify data about the measures implemented by the Energy Managers were established.
- Amount that the government dedicated in the past to manage the country wide network of energy managers is rather small (100.000- 150.000 €/year). As of 20001 FIRE is not economically supported by the Ministry of Productive Works.
- The annual Energy Managers book collecting data and addresses of the appointed Energy Managers is a precious tool to find out colleagues working for other companies and ask for suggestions or for exchanging experiences.
- Typical barriers (not necessarily related to the programme in itself) that energy managers face are :
 - top management unaware of energy issues;
 - lack of capability for Energy Manager to speak non-technical languages with the people who take the decisions about investments;
 - lack of economical and financial resources;
 - unfavourable rules for Energy Manager budget allocation.

To overcome these issues the solution are:

- to use mass media campaigns to create a general awareness about energy issue;
 - to train Energy Manager in order to give them environmental, financial and communicating skills;
 - to promote the creation of ESCOs capable to offer services which include third party financing and energy performance contracting;
 - to convince the top management to leave to good Energy Manager part of the savings that they guarantee through energy projects and measures.
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- Where the functions of energy management and energy purchase remain separated (with reference to a single person or to a single department) it is difficult to obtain the best prices and it is also difficult to relate energy prices to issues like the implementation of the IPPC Directive or the Emission Trading Directive. Many companies found themselves unprepared and took some decisions about the energy processes that favoured low price in the beginning, but were discovered to be detrimental in order to complain to the mentioned directives.
 - The Legislative Decree 192/2005 (giving Energy Managers in the Public Administration a control role with respect to the mandatory energy efficiency dec-

laration for buildings), if correctly applied, will strengthen the role of Energy Managers in the public sector and will promote the appointment of Energy Managers by defaulting administrations.

- Despite several issues related to law 10/91 implementation, the program is probably judged positively by companies, as confirmed by the number of appointed Energy Managers not declining with time, notwithstanding economic sanction mechanism in case of non compliance not being put into action.

4.3 Monitoring and evaluation

Monitoring and evaluating the impact of the Energy Manager Programme in terms of energy savings achieved would be a very difficult task. Currently data available about energy consumption are not even sufficient to identify subjects that according to the terms established by law 10/1991 would be obliged to appoint energy managers. In the public sector the only monitoring system available is often constituted by the information reported in the energy bill to be paid to energy suppliers. In private sectors it results often very difficult to get precise indications about costs related to energy consumption. Law 10/1991 does not envisage the creation of any system aimed at monitoring compliance with the obligations and energy consumptions of obliged actors. As already mentioned a first important step in this direction would be the creation of a database with the energy consumption in primary energy of all the companies operating in Italy. A further step could be constituted by the institution of a reporting obligation imposed over energy managers, allowing to estimate level of activity on energy efficiency in the sectors addressed by law 10/1991. FIRE could play a key role in monitoring law 10/91 application. This would require a specific mandate to monitor energy manager appointment procedures and energy saving actions undertaken by these subjects, a higher support from the Government and the institution of a suitable monitoring protocol.

4.4 Learning experiences

Considering that cost-effective improvements in energy efficiency can very often be realised in the sectors where law 10/91 establishes mandatory energy manager appointment, the main question raising from the analysis of the present policy instrument is whether an obligation to appoint energy managers was actually needed, or the implementation of energy management systems could have been stimulated in a different way in Italian companies and public authorities where a considerable cost effective energy saving potential is available. Concerning this aspect a different point of view should be kept for the public sector and the private one.

Surveys realised on law 10/91 level of application seem to indicate a lower interest in energy management in Italian public administrations not only due to their possible lower energy consumption (energy consumption threshold established for the

obligation to comply with law 10/91 requirements is 1,000 tep/year for these subjects and 10,000 tep/year for subjects operating in the industry, civil and tertiary sectors) or to more limited economic resources available for investments on energy efficiency.

Given such lower sensibility to economic saving opportunities linked to energy management in the public sector, it is not unlikely that establishing the obligation to institute an energy management system for the implementation of cost-effective energy efficient solutions in this sector is more effective than employing other policy instruments to overcome existing inertia to undertake energy efficiency actions, provided that envisaged fines are applied in case of non compliance.

Concerning other sectors, it cannot be excluded that approaches focusing on formation and information on energy efficiency opportunities and stimulating the creation of energy efficiency investment mechanisms could alone provide sufficient incentive for the institution of energy management systems within companies².

Despite problems mentioned in law 10/91 application, 2,500 energy managers appointed have been able to implement several energy efficiency measures, both in the public and private sectors, during the last decade. Good results have been obtained in several hospitals, buildings, supermarkets and in the industrial sector. Many technologies have been utilized, such as efficient lighting, efficient solutions for heating and cooling, cogeneration, efficient electrical engines, etc.

ESCOs have been able to allow the implementation of projects where the lack of financial and economical resources seemed to prevent their realization. In many public administrations the Energy Managers have been able to develop good skills at writing good contracts with energy performance contracting and third party financing.

Even if the rise of awareness and of energy prices eliminates in principle the necessity of a compulsory law, the Italian experience is interesting especially for one reason.

The appointed energy manager has the possibility to operate in a network, managed by a dedicated subject (FIRE in Italy), which gives to them the possibility to easily exchange problems, solutions, and best practices.

The network helps them also in finding a team spirit that facilitates their task when every top manager or every policy maker seems to ignore energy issues.

For these reasons it could be said that the Energy Manager Programme achieved positive results, even if the experience has shown many issues and problems, some of those are still to be addressed. Thus it could be a good initiative to be replicated in other EU member countries. In fact it is possible to learn from chapter 3 how to adapt the Italian law to their characteristics. Energy Managers can be a powerful instrument for policy makers to tune the regulatory framework and the financing tools and to monitor the implementation of energy efficiency programme.

² On this point it may be worth mentioning initiatives undertaken at European level like EUREM project aiming at the development and implementation of a training programme for energy managers denominated European Energy Manager (Production) tailor-made for EU country production enterprises.

For what it has been said in this report, it should be reductive to think that a single person can solve every problem related to energy in his company. With regards to the role of the appointed Energy Manager the following functions have been identified.

- Expert on energy issues

This is a professional with experience of design and/or management of energy plant in enterprises or large organisations.

- Person responsible for the conservation and rational use of energy

This refers to the basic requirements issued by article 19 of law 10/1991. The expert is charged with promoting the rational use of energy and preparing energy balance sheets annually. It should be noted that the only requested activity refers to the evaluation of the total consumption of primary energy, a quite simple task, since this is the only data collected by FIRE on behalf of the Ministry of Productive Works.

- Manager responsible for energy purchasing and accounting

Managers or technical personnel entrusted with managing contracts for the supply of electricity, natural gas and other fuels. The experts must correctly and economically stipulate supply contracts and manage the accounting for direct energy consumption.

- Specialist in energy diagnosis and controls

Performs two activities: testing of heat generators and/or boilers and energy audits, the typical activity performed by the industrial consultant who, on the basis of a small number of data (energy bills, plant visit) outlines a diagnosis and suggests the actions required.

- Person responsible for energy use in thermal plant

This is a role created by the Presidential Decree 412/1993, issued in implementation of Law 10/1991, that requires every thermal plant to have a "person responsible" who will ensure compliance with environmental and safety standards. This task needs a specific competence in the design and operating of thermal plant.

- Buildings certification auditor

This role is going to be introduced as implementation of the Legislative Decree 192/2005, which acknowledge the 2002/91/EC directive. Energy Managers who work as independent consultants could candidate themselves for this role, that could be a natural complement of their main competences.

In addition to the above functions it has to be pointed out that energy managers can potentially have a very important role for the achievement of the national objectives

established as a consequence of the the several energy policy instruments recently adopted at the European as well as the Italian level (i.e. the Italian energy efficiency decrees of July 2004 introducing white certificates, the EU emission trading directive, the EU directive on energy efficiency and energy services, the EU directive on CHP).

It is important to note that the various functions listed above usually are not performed by the same person and the question therefore arises of how the various involved managers interact within the structure of the company. If the potential difficulty related to the coordination of these functions is overcome, then it is possible to achieve the best results.

To sum up, in the following list the various functions that an Energy Manager should be able to perform are indicated:

- Specific knowledge and awareness of the structure where he operates;
- Analytical energy accounting and related measures;
- Analysis, evaluation and definition of the most convenient energy purchasing contracts;
- Plant Operation and Maintenance optimization;
- Energy Audits with definition of efficiency improvement actions;
- Preliminary design of such actions, with technical and economic analysis, feasibility study and risks evaluation;
- Definition of Contracts to install improved or new equipment and its O&M;
- Project Management;
- Activity planning and scheduling;
- Definition of actions and plans for the awareness and of the promotion and efficient use of energy;
- Certification of the energy performance of the buildings and their equipment energy efficiency;
- Inspection of the energy efficiency of heating and air-conditioning equipment;
- Evaluation and validation of energy saving projects.

In many cases it is better to think about the Energy Manager as the coordinator of some personnel resources dedicated to the energy issues. Thus for Public Authorities this role can be assigned to the general manager of the Energy Agency, where it does exist.

4.5 Learning experiences in local authorities

Since local authorities play a central role in the promotion of energy efficiency – they are final users, older brother that should give the good example and powerful policy makers in the subsidiarity model – the lessons learned in this sector are reported.

Law 10/1991, notwithstanding the limits to its application, has played a fundamental role in activating potential and promoting initiatives in the public administration and services on energy matters. In the Italian situation, while the law as such does not guarantee that the obligation imposed will be universally respected, it is nevertheless of fundamental importance in permitting those who are already ready to act to do so (in the absence of the law, all those who have some power of control have a right of veto, and they exercise it!).

These hierarchical and organisational aspects could certainly not be dealt with by an energy law applying only in the field of the Ministry of Productive Work, to which Law 10/1991 chiefly refers, since they involve more general problems of reform of the way government administration works, the "public function" and matters within the competence of other ministries.

It is not surprising that the most interesting cases of implementation of Law 10/91 are found in medium-large towns. In small local authorities, resources are lacking, while in the biggest cities rigid bureaucracy prevails.

What has emerged in relation to energy problems in the services sector finds a parallel in a general tendency towards devoting attention no longer merely to supply in some form or other of the services that constitute the reason for the organisation's existence. Other factors are assuming increasing importance: safety, environment and energy, parameters relating to the quality of the provided service that creates its value to the customer or user who purchases it.

The move towards this approach has taken place at the central government level with modalities that envisaged chiefly the setting of objectives and left greater responsibility on how to reach them with peripheral organisations. This process has been carried on with many difficulties due to the important changes asked to local authorities and regional government. One of the main issues is the lack of personnel and of resources that make it difficult to fulfil all the new tasks, especially in "minor" themes like energy.

Since it is not feasible the idea to create larger departments, it becomes useful to create agencies that can support local authorities. The SAVE programme can help in creating new energy agencies.

At the same time it is important to try to involve the users in the process of developing an efficient market in which many operators move with the right awareness of environmental and energy issues and who are able to propose to the citizenship and to the users efficient solutions directed toward a sustainable development.

Some municipalities have already adopted positive actions at various level and many will join in the future. There is an evident assumption that the best ideas will be copied and spread as examples of better services to the public.

In this situation, the role played and to be played by the Energy Managers network is therefore of strategic importance, with the creation of repeated opportunities for the Energy Managers nominated in various areas and various sectors to meet and compare the feasibility of the best proposals and the efficacy of the procedures conceived, thus creating an “esprit de corps” even for imitation, and also ensuring that the individual Energy Manager, left to himself, does not give up when some difficulty appears.

Moreover, Energy Managers can become an instrument in the hands of local policy makers to find out problems and possible solutions and to support them in implementing regulations, based on direct experience in the field, which are feasible and applicable.

This hypothesis of gradual growth from the bottom up is therefore not the result of a minimalist approach or of a search for the line of least resistance, but instead aims to take its place in the general context of a political choice of de-legislation, of autonomy and empowerment of local and peripheral organisations which will lead to the growth of the more efficient ones and the closure of those more rigid and inefficient.

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