

The Italian energy saving obligation to gas and electricity distribution companies.

Scenario and case studies calculations show high environmental and economic benefits to actors (DISCOs, ESCOs, customers) and society

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Abstract

The twin decrees issued by Italian Ministry of Industry (April, 24th 2001) set the obligation to Gas and Electricity Distribution Companies (DISCOs) to achieve certain primary energy savings in years 2002-2006 (directly, or subcontracting to ESCOs, or buying energy efficiency certificates). The Regulatory Authority defines rules for implementation. In this paper:

1. we analyse the scheme, including tariff regulation to eliminate the loss of net revenues for DISCOs and allow the recovery of costs of DSM programmes as identified by Legislation (1995 to 2001) and the Authority; we discuss the most critical design issues (e.g. implications of the level of cost recovery and its interaction with the certificate market, factors hindering ESCOs' participation, ...).
2. we present a spectrum of quantitative analysis on the effects of such scheme. Main results are:
 - the saving targets set by the Italian legislator, though considered ambitious, are achievable using a relatively small fraction of the actual energy saving potential in Italy.
 - taking into account a) present Italian conditions of installed stock, b) measured data on load curves and consumption of end-use devices, c) level of cost recovery

proposed by the Authority, and d) the tariff mechanism which partially decouples revenues from sales volumes, a number of programme designs would result in considerable economic benefits to customers, DISCOs, ESCOs and efficient appliances manufacturing industry. For example CFLs, under a free distribution programme, could deliver a large amount of the savings in the first 2 years.

Introduction

Both the Italian Gas and Electricity Market, historically characterised by the presence of state-owned vertically integrated monopolist companies, have been deeply modified by the process of integration in the Internal Markets of electricity and gas, provided by the European directives 96/92/CE and 98/30/CE. As of January 2003 the gas market is fully liberalised, while in the electricity market all customers consuming more than 0,1 GWh are eligible (approximately 150 000 final customers). Distribution and supply to captive customers are provided by distribution companies obliged only to accounting unbundling.

ENEL is the largest electricity distributor, responsible for more than 85% of the market, while private companies are active on the free market and municipal distributors supply captive customers in some large city (Rome, Milan, Turin...). Italgas serves more than 60% of gas final customers, while a large number of small local companies are active on the territory. ENEL has recently entered in the gas market, acquiring Camuzzi (the most important Italian private distribution company) and transforming it into ENELGAS, which claims to serve 1,6 million customers, 11% of the market.

As in any liberalised market, without the presence of a supportive framework energy companies will hardly perform any energy efficiency activity. The Italian Legislation has therefore prepared the room for the introduction of a legal obligation to distribution companies, acting firstly on price regulation, to remove any artificial incentive to sale increase or disincentive to energy efficiency in final use.

Price Regulation

In describing the evolution of the Italian scheme dealing with consumption trends and energy efficiency activities we will distinguish between:

1. Signals through tariffs aimed at controlling the trend towards growth of energy consumption as a whole,
2. Tariff regulation and other regulation aimed at making economically viable and setting targets for Energy Efficiency Demand Side Management (EE-DSM) activities done through direct actions by energy companies in order to promote the diffusion of energy efficient technologies and operation modes.

These two kinds of instruments are present in different pieces of National legislation and of decisions of the Regulatory Authority.

SIGNALS THROUGH TARIFFS TO FINAL CUSTOMERS

These signals have been present for a long time in the Italian electric sector and they might be considered one of the relevant causes of the low energy intensity of the Italian economy, together with other factors like e.g. climate and space density (lower transport distances, smaller household surfaces per capita...).

For example time of use tariffs have been introduced for industrial customers using high voltage in 1980, subsequently extended to medium voltage customers; by 1995, around 70% of industrial consumption was taking place under those types of tariffs. In any case the effect of time of use tariffs is mainly that of shifting load from peak to non-peak hours; it does not generally save energy and in some cases (e.g. where night energy storage is used) it might in fact imply more energy consumption (due to storage losses).

In the household sector the energy component of the tariff was progressive with consumption (the more kWh consumed, the higher the price of a single kWh) and the capacity component of the tariff is progressive with maximum contractual load (kW). These features have been in place since 1974. The steepness of the progressive function has been increased in 1993. These features of the tariff constitute a signal of relatively strong marginal price of energy (up to 30 Eurocent/kWh for the energy consumed which exceeds the value of 220 kWh/month per household) and power, (while the average price is in line with the values in the other European countries).

This obviously makes the payback times of energy efficient appliances much shorter than if a flat tariff would be in

place and discourages improper use (for example electric heating has an extremely low diffusion in Italy).

Currently most household customers have contracts that allow them to draw no more than 3 kW from the grid (a switch intervenes when load exceeds the contractual limit and physically disconnects the household from the grid). Average per household consumption is 2 220 kWh/year (GRTN, 2000).

These kinds of tariff and contractual signals have been softened by the tariff reform undertaken by the Regulatory Authority (*Autorità per l'energia elettrica e il gas*) in December 1999, and further moves towards a flat regime are planned. The Ministry for the Environment has in many occasions pointed out the potential negative effects of this move on the diffusion of energy efficient devices and on the general trend of energy consumption, suggesting ways to ensure economic efficiency through the match between revenues and costs for energy companies without removing the progressive features of domestic tariffs.

Till now, direct activities by utilities to promote end-use efficiency at customer's premises have been fragmented and loosely evaluated and documented. Much more impact on energy consumption trends and load shape has been probably produced by tariff structures.

For the future, energy demand trend will be influenced by the fact that:

1. the tariff signals towards energy efficiency to domestic customers might be partially or totally removed if suggestions by the Ministry of the Environment will not be accepted; and will be totally eliminated if complete – that is also for medium and small customers – retail liberalisation would be introduced, in which case tariffs to final customers themselves would disappear. Tariff regulation would remain only for the distribution and transmission segments... Anyway taxation on energy sold to household customers remains progressive with consumption.
2. time of use tariffs should continue to be offered to large customers by utilities, even if they will no more be set by some type of regulatory authority (large customers are now free to choose their supplier and tariffs are no longer regulated)¹.
3. two tariff-regulation signals have been introduced for electric and gas distribution companies to eliminate “artificial incentives to increase sales” and make the companies profits EE-DSM neutral or better.
4. an obligation to deliver EE-DSM programmes has been introduced for electric distribution companies.

In the following we analyse more in detail the two tariff regulation signal and the obligation mechanism.

MULTIPLE DRIVER TARGET REGULATION

In Multiple Driver Target Regulation admitted total revenues coming from certain customer classes are no more 100% proportional to energy units sold. In the electricity

1. Recently some municipal companies (e.g. AEM Milano) are offering time of use tariff also to domestic customers with 3 kW contracts (that represent 99% of the domestic customers).

sector the Italian Regulatory Authority has set a maximum level for total revenues deriving from distribution to non-eligible customers that may vary proportionally 75% with the number of customers and 25% with the amount of sales. Total revenues deriving from supply are 100% proportional to the number of customers. The introduced MDT regulation, reduces the extra-profits connected with increasing energy sales beyond the expected levels used in setting unit prices by the regulator (see also Pagliano et al. 2001) according to the principle of harmonisation of the economic interest of energy companies and the objective of efficient use of resources established by Law 481, November 1995 and Regulatory Authority Bill 204/1999.

DSM ACTIVITIES COST RECOVERY

Costs of EE-DSM programmes incurred by utilities will be recovered through a small fraction of the tariff; this is established by Law 481, November 1995; Bill 23 May 2000, n. 164 (Decreto Letta); Bills 24 April 2001. Detailed implementation is underway by the Regulatory Authority: proposals are presented in following paragraphs.

Obligation to Electricity and Gas Distributors

An obligation to EE-DSM (Energy Efficiency Demand Side Management) for **electricity** distribution companies is contained in Bill n.79, 16th of March 1999, (Decreto Bersani), Implementation of the Directive 96/92/CE on common rules for the internal electricity market:

- Art 9. *Distribution activity* Licences (regarding the distribution service, to be assigned within March 31st 2001 from the Minister for Industry) require, among other things, measures for increasing the efficiency in end uses of energy according to quantitative targets determined by a Bill to be drafted by the Minister for Industry with the agreement of the Minister for Energy, within ...

An obligation to EE-DSM for **gas** distribution companies and requirement for correct tariff regulation is contained in Bill 23 May 2000, n. 164 (Decreto Letta), "Implementation of the directive n. 98/30/CE on common rules for the internal gas market":

- Art. 16. *Obligations to distribution companies* Distribution companies will pursue energy savings and the development of renewable energy. National quantitative targets, defined accordingly to the Kyoto commitment, and the principles for the evaluation of results will be set by a decree of the Minister for Industry, in agreement with the Minister for the Environment;
- Art. 23. *Tariffs* Distribution tariffs will take into account the necessity to remunerate activities aimed at increasing the efficiency in end uses of energy and to promote the use of renewable energy sources, quality, research and development aimed at increasing service quality...

On April 24th 2001 Italian Ministry of Industry in co-operation with Ministry of Environment issued two decrees establishing DSM targets for electric and gas distribution companies:

- the Electricity Decree establishes quantitative objectives for increasing energy efficiency in end uses, according to art. 9 of Law n 79 of March 1999 (Italian Implementation of Internal Electricity Market Directive).
- the Gas Decree establishes quantitative objectives for increasing energy efficiency in end uses (including the development of decentralised renewable energy sources) according to art. 16 of Law n.164 of May 2000 (Italian Implementation of Internal Gas Market Directive).

THE ELECTRICITY DECREE

This law:

- determines the quantitative obligation for electric distribution companies (DISCOs) to achieve "increased energy efficiency in end-uses" for the period 2002-2006,
- establishes general criteria for the planning and implementation, evaluation and control of the programmes.

All distribution companies serving more than 100 000 final customers are subject to the obligation, i.e. ENEL plus 8 municipal distribution companies among which those serving Rome, Milan, Turin.

The overall primary energy savings to be achieved through end-use efficiency measures are established as follows:

MTep / year	by year
0,10	2002
0,50	2003
0,90	2004
1,20	2005
1,60	2006

The law also states that:

1. at least 50% of the primary energy savings should be obtained through energy efficiency measures which produce a reduction of electric energy consumption (a list of such measures and devices is specified by the law); the rest can be obtained e.g. via fuel switching from other fuels to electricity, provided that primary energy savings are achieved. Savings achieved in 2001 will be accounted for in the objective for 2002;
2. savings are cumulative, meaning that e.g. in 2005 programmes enacted in 2005 plus measures introduced through programmes undertaken in previous years and which are still active should as a whole save 1,20 MTep/year. Maximum lifetime of measures is conventionally set at 5 years;
3. DISCOs should draft annual plans taking into account Energy plans prepared by Regional and local governments (which voluntarily agreed to complete their planning within 2002);
4. Regional governments can establish agreements with DISCOs with the objective of achieving the goals set up in the Regional energy plans, possibly contributing to

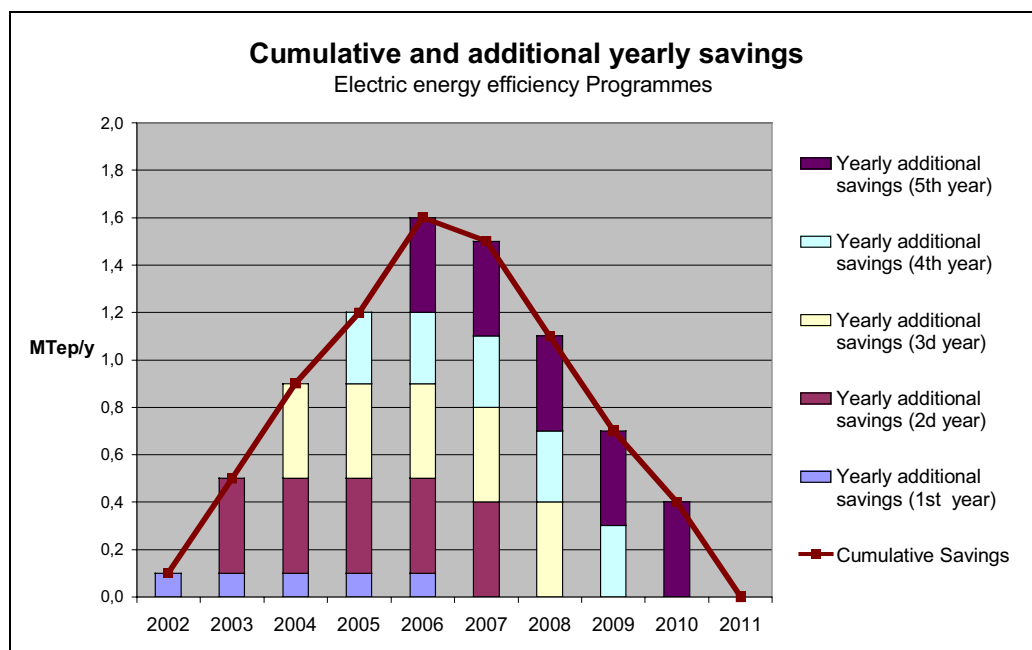


Figure 1. Cumulative and additional yearly savings for the electricity distributors.

- funding the programmes with use of their own resources;
5. Programmes can be implemented: directly by DISCOs, by one or more of their subsidiaries, or by ESCOs;
 6. the Regulatory Authority will assign annually to DISCOs and ESCOs energy savings credits corresponding to the energy savings achieved through the programmes they implemented (as evaluated and validated by the Authority); credits will be tradable in a specific market set up by the Grid Manager or directly among the actors;
 7. starting in may 2003, DISCOs should be in possession of credits corresponding to their saving targets; in case of non compliance, the Regulatory Authority will apply fines at least equal to the investments necessary for achieving the missing energy savings;
 8. costs incurred by DISCOs, for the part not covered by other types of funding, can be recovered through retail tariffs to captive customers and through network access tariffs for non captive customers, according to criteria established by the Regulatory Authority; those criteria will take into account also profit losses (or increases) connected to sales reductions (or increases) as a consequence of the programmes.

THE GAS DECREE

The law:

- determines the quantitative obligation for gas DISCOs to achieve “increased energy efficiency in end-uses and development of renewable energy sources” for the period 2002-2006,
- establishes general criteria for the planning and implementation, evaluation and control of the programmes.

All distribution companies serving more than 100 000 final customers are subject to the obligation, i.e. Italgas, EnelGas plus 19 municipal distribution companies among which those serving Milan, Bologna, Florence, Naples.

The primary energy to be saved through end-use efficiency measures or substituted by renewable energy sources is established as follows:

MTep / year	by year
0,10	2002
0,40	2003
0,70	2004
1,00	2005
1,30	2006

The law also states that:

1. at least 50% of the primary energy savings should be obtained through energy efficiency measures which produce a reduction of gas consumption (a list of such measures and devices is specified by the law); the rest can be obtained e.g. via fuel switching from other fuels to gas, provided that primary energy savings are achieved or through renewable energy sources. Savings and renewables achieved in 2001 will be accounted for in the objective for 2002.

Rules similar to 2) to 8) of the Electricity Decree apply here, with some more involvement of Regional governments.

THE GUIDELINES FOR THE DESIGN, IMPLEMENTATION AND EVALUATION OF DSM ACTIVITIES

On April 4th 2002, the Energy Authority has issued a proposal for the Guidelines for the Design, Implementation and Evaluation of the Activities carried out under the obligation: these guidelines also cover the mechanisms of cost recovery

and of the energy efficiency certificates issuing and trading. Energy Authority's proposals regarding costs recovery are:

- The cost to be recovered by Distribution companies for each kWh saved is identified as an average value (probably between 3,3-4,4 Eurocent/kWh saved in the first year), calculated as a percentage of the sum of the average avoided cost of the saved energy and the environmental avoided costs;
- Cost recovery for each activity is admitted for a maximum of five years following the implementation of the programme, (if an activity is implemented in 2003, the DISCO will receive a cost recovery from 2004 to 2008). From the second to the fifth year from implementation cost recovery will be corrected each year multiplying it by a coefficient between 0,9 and 1,0 that takes account of the annual persistency of the programme;
- Gas distributors can recover only costs of programmes for the reduction of Gas consumption; Electricity distributors can recover only costs of programmes for the reduction of Electricity consumption;
- Some correction factors can be introduced for specific programmes with higher costs;
- Since the distribution tariffs are designed following a Multiple Driver Target, the Authority will not introduce further specific mechanisms to take into account profit variations;
- The cost will be recovered through an addition to the variable fraction of the tariff, which will finance a national compensation fund;
- Additional specific funding by national or regional governments can be used to perform the programmes.

The Authority will also be responsible for the evaluation of the programmes carried out. Each distributor should give evidence of the programmes carried out to fulfil its own obligation, obtaining EE certificates. A fee is due by those who fail their target. All actors (ESCOs, Energy agency...) can obtain EE Certificates. Distributors can act in three ways:

- Direct fulfilment of the obligation,
- Bilateral contracts with ESCOs or other actors that would act on their name,
- Buying Energy Efficiency certificates on the market.

The Energy Authority has not yet issued the final regulation, thus in this paper we discuss the proposals. In the calculation we accept the data proposed.

Critical Factors

QUANTIFICATION OF COST RECOVERY

Considering the entity of direct and indirect advantages for customers (and for the national balance of payments), in our opinion it comes out that it would be possible and even desirable to fix a cost recovery unit value higher than 200 Euro/Tep. We suggest to choose a higher value in order to assure satisfactory economic conditions to the companies under the obligation. Especially in the first years, the costs for starting the

new activity and the consequent higher risks, both for DISCOs and for ESCOs, should be taken into account.

Besides, in order to assure mid-term economic efficiency, we think it necessary to fix a higher admitted cost recovery unit value for the projects that consist in integrated activities rather than for the projects that aim at the installation of a single appliance. The planning of a whole building retrofitting (or of a new one) through a mix of measures with different payback times, in such a way as the average payback time of the bundle may be acceptable, allows to reach resources which are profitable but are not perceived as such by customers who ask for short payback times.

On the contrary, if we merely aim at finding out low cost resources (cherry picking, for instance the replacement of lamps without replacement of ballast, luminaries, control systems) we are prevented from reaching, in a second phase, other savings resources that have been set aside at first. In any case to reach these resources in a second phase would imply higher costs compared to the costs we would bare if we carry out all the activities in a bundle.

Therefore the search for and the use of very low cost resources in the first phase could involve the loss of an opportunity for energy and, above all, cost savings. In other words, it would produce a higher average cost of conserved energy in the mid-term.

MARKET DISTORTIONS AND OTHER FACTORS HINDERING ESCOS' PARTICIPATION

With reference to the Decrees implementation it is important to examine three markets in which distortions, dominant positions and other operational problems could occur:

- The Energy Efficiency Certificates Market;
- The End-use Energy Services Market and, in particular, the Energy Efficiency Services Market;
- The market of electricity and gas supply to qualified customers.

There is the risk of distortions, dominant positions and other operational problems:

- Distributors can recover part of the costs with certainty through tariffs and according to a unit value previously fixed; on the contrary, ESCOs are in a highly uncertain position, being cost recovery not certain and linked to the EE Certificates market price; all this can give rise to a distortion in the energy services market, with unfair competition between distributors and ESCOs;
- The actors in the EE Certificates market will be very different in dimension: large companies such as ENEL or Italgas; medium-sized companies, such as local energy agencies; small companies, such as, frequently, the ESCOs. In this situation in the EE Certificates market there is really the risk of creating conditions which are typical of monopolistic or oligopolistic systems;
- If, for some reason, the EE Certificates market price were lower than the cost recovery accorded to distributors through tariffs, buying EE Certificates on the market distributors could obtain an unjustified gain, which results from the difference between the cost recovery and the EE Certificates market price.

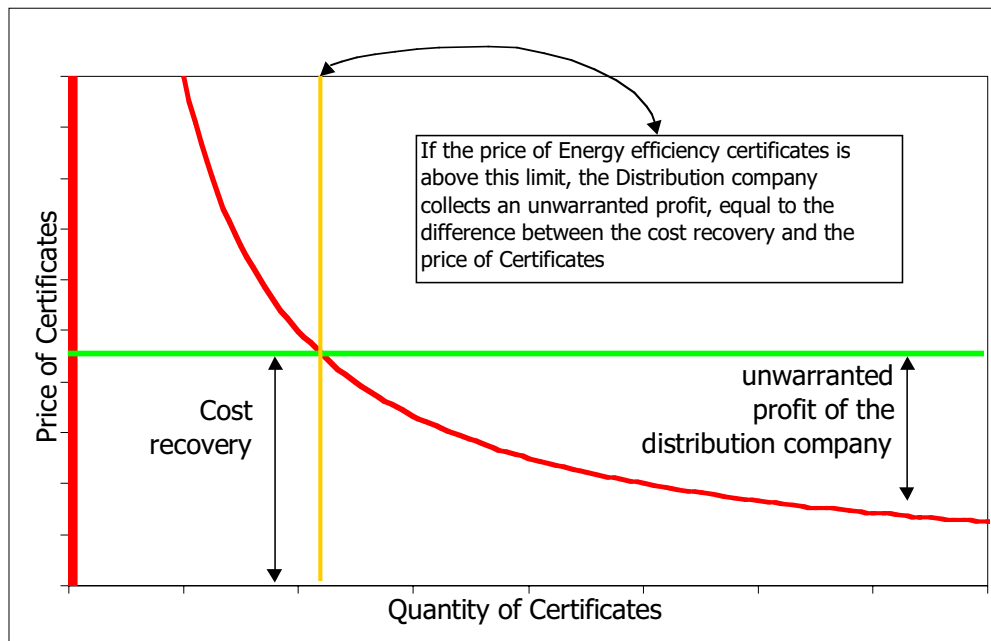


Figure 2. Possible market distortions in the Energy Efficiency Certificates Market. The sloping curve represents the price of EE Certificates.

The Authority suggested some mechanisms aimed at reducing the risks we have mentioned above:

- It has been decreed that distributors are allowed to implement energy efficiency programs through direct actions only if supply activities are entrusted to a different actor with structural (and proprietary in perspective) unbundling;
- Energy Efficiency Certificates banking: it has been settled that the EE Certificates have a term of five years;
- Banking limit, i.e. maximum amount of EE Certificates that distributors can bank: the limit has been fixed in proportion to the target that has to be reached;
- Hypothesis of *Futures* issuing in case of excessive lack of EE Certificates offer compared to demand.

EE Certificates banking and *Futures* issuing, which aim above all at stabilising EE Certificates price on the market, could however give rise to some problems:

- With the resort to EE Certificates banking and *Futures* issuing it is not possible to quantify the actual savings per year with certainty;
- The *Futures* issuing involves the postponement of the targets achievement and of sanction imposition;
- The banking limit can produce a paradoxical situation: if a distributor in a year owns more EE Certificates with respect to his target and to the banking quota and he does not succeed in selling the surplus because there are too many EE Certificates on the market, they are depreciated;
- A series of management problems occur: the need of introducing a limit to banking and to the amount of *Futures*; the need for the Authority of managing sums of money (sale of EE Certificates and EE Certificates repurchase

the following year); profits and losses for the Authority due to the fluctuations of the EE Certificates price on the market from year to year;

- It is not clear if EE Certificates can be banked by ESCOs too and how the banking limit for them should be fixed.

In the following we will try to put forward a few suggestions that are alternative or integrative compared to the ones proposed by the Authority.

1. Sanctions may be imposed by degrees and it is possible to recover them.

2. EE Certificates, even those in surpluses with respect to the targets, have to be recovered.

It is possible to allow the yearly withdrawal and cost recovery of the EE Certificates in surplus compared to the targets for that year. This possibility would be in complete accordance with law and, in our opinion, it is even suggested by it:

- Ministerial Decrees dated April 24th 2001, Art.3, clearly assert that the targets that have been fixed are **MINIMUM AMOUNTS** that distributors must achieve.
- 2. Law 481, November 1995, refers to the recovery of the costs borne for energy efficiency diffusion **WITHOUT INTRODUCING ANY LIMIT.**

This opportunity is fundamental in two situations:

- For distributors if banking and its limit are maintained,
- For ESCOs that can have to face dominant positions and market distortions.

To avoid the fact that the certainty of recovery may reduce competition and the incentive towards efficiency some devices may be introduced, for instance:

- Limit to the repayable EE Certificates beyond the target quota,
- For these EE Certificates recovery could be fixed at a lower level,
- Cost recovery could be addressed not to distributors but to the actors who implement programs, i.e., according to circumstances, to distributors or to the ESCOs,
- Recovery addressed to distributors should be reduced to the value of the EE Certificates market price, if this was lower than the fixed recovery.

ASSURING THE FULFILMENT OF THE SAVING TARGET: FINANCIAL PENALTIES

In order to assure the achievement of the targets fixed by the decrees and the dimension of energy efficiency market, the level at which sanctions are fixed is highly important. With regard to this aim various aspects have to be taken into account. Above all let us go through the Decrees with regard to sanctions (Art.11): "In case of non-compliance the Regulatory Authority for Electricity and Gas, according to Law 481, November 1995, imposes sanctions that have to be proportional and in any case higher than investments needed to compensate the non-compliance."

The sanction should be fixed at a value highly superior compared to the value of the acknowledged medium unit cost, since the Authority clearly asserts that the acknowledged medium unit cost covers only a quota of the projects implementation costs (the remaining quota being financed through participants' contributions and through other resources).

Secondly, if sanctions have actually to be an incentive for distributors to respect the fixed targets, their value has to be rather high, at least twice the value of the recovery via tariffs.

Finally if we consider the damage suffered by society owing to the non-achievement of the targets, the sanctions' value should be fixed at the level of the energy price, environment externalities included.

In the Consultation Paper the Authority asks if, in our opinion, sanctions should be different in the case of non-compliance to the total target allotted to each distributor with respect to the case of non-compliance to the bond of reaching at least 50% of the target through projects aimed at reducing end-use of their specific distributed energy. If this means that the Authority imposes lower sanctions in the second case, our answer would be NO: actually both targets are obligations imposed by the decrees. If we go attentively through the decrees we can find that, for instance, for the year 2003 electric agencies are expected to reach two targets: 0,25 MTep electricity savings and further 0,25 MTep primary energy savings (electricity, gas and so on). This means that the two targets are equivalent: the 50% target is as binding as the general one. Therefore sanctions for the non-achievement of the 50% target merely through electricity (or gas) should not be lower than sanctions for the non-achievement of the total target: they have to be high in any case.

On the other hand, if sanctions differentiation means that higher sanctions are imposed for non-compliance to 50% target, our answer would be YES: in our opinion this case

should be considered more severely in comparison to the case of non-compliance to the remaining part of the target.

INFORMATION CAMPAIGNS

It must be taken into account that it may be very difficult to estimate the effects of information campaigns when they are not directly linked to stimulating programs. Besides, these campaigns can be easily exploited for other aims rather than savings, for example for appliances sales promotion.

Therefore we look favourably on the Authority's proposal to fix a maximum limit (varying in a range of 5-10%) to the quota of yearly target that can be achieved through information campaigns not combined with stimulating programs for customers. Indeed, in order to avoid problems in savings estimation, it could be settled that the respective costs may be recovered via tariffs but that the eventual savings cannot be counted with regard to the target that has to be reached. In other words, the importance of these activities and, in consequence, the opportunities of recovering the costs that have been borne for them via tariffs have to be acknowledged. However, since their effect is not clear, they could be left out of the count for the target and considered adjunctive with respect to it (among the DSM programs that, according to Law 481, November 1995, can recover the costs via tariffs but are not included in the decrees targets).

These campaigns have to be addressed to a great deal of customers and have to give useful information even to people who do not take part in the programs. In any case a series of basic accompanying measures must be considered as mandatory for the projects: without these measures the projects cannot be considered valid. Moreover, these basic measures must not give rise to additional cost recovery: it is obvious that without these measures the settled savings cannot be achieved. Thus, for instance: advertising campaign through the mass media (TV, radio, placards...), explanatory brochures sent to the customers and so on. Only adjunctive and more complex accompanying campaigns should give rise to additional cost recovery that would have to be taken into account by the Authority.

INTEGRATED PROJECTS, LONG TERM EFFECTS AND MARKET TRANSFORMATION CAMPAIGNS

The case of the projects that keep producing remarkable effects even after the first five years have to be attentively examined. These projects may substantially be of two kinds, i.e.:

1. Programs that imply activities with long term effects (i.e. solar collectors), which should receive a higher cost recovery,
2. Programs that give rise to remarkable market transformations (for instance: energy+), which should have a corrective coefficient higher than 1.

The introduction of pilot projects has had a very good outcome. For this reason, it should be considered with more attention and be better organised and structured.

Quantitative analysis

LEVEL OF THE TARGET / SAVING POTENTIAL

The Italian Electricity Grid Manager (Machì, 2002) estimates that electricity consumption would increase by 3.5%/year from 2003 on. No data are available on the future development of the Italian Gas sector.

Both in the electric and gas sector if the annual **cumulative**² saving target for 2006 are between 2 and 3% of the annual primary energy consumption in that specific sector.

The Italian National Agency for the Protection of Environment (ANPA) estimates (Krause, 1999) that in the Italian electrical end-use the overall technical potential saving is 49%, the accessible potential saving is 20%, the economically convenient potential saving is 14%. Recent projects³ based on direct consumption measurement estimate the Italian technical potential saving in the electrical end-use in the residential sector is 37%. The Rome Municipality Energy Plan (Frankl et al., 1996) estimates that the economically convenient potential savings in the heating sector is 29%.

- The EU Commission Green Paper (EU Commission, 2000) citing the MURE model quantifies the “technical potential for improved energy efficiency” at 40% of current energy consumption and the “economic potential for cost-effective improvements in energy efficiency of at least 18% of current energy consumption”.
- All studies at different scales are converging, showing that Italian targets, though considered ambitious, are achievable using a relatively small fraction of the actual energy saving potential in Italy.

ECONOMICAL EFFECTS (ELECTRICITY SECTOR ONLY)

The Initial Investment is the amount of money needed to save 1 kWh in the first year of the implementation of the programmes. The Initial Investments depend on Cost of conserved energy, Annual Interest Rate and Lifetime of the Measures. We introduce the following hypothesis, deriving from international experiences and literature (INDEEP Database, CEC 1999, CEC 2000, EST 1997, Benediktson and Hein 2000):

- Cost of conserved energy \approx 4,5 cent/kWh saved. Cost of conserved energy is expressed as total cost of the measure (cost born by distributors, by final customers, including eventually public financial support) divided by the total kWh saved;
- Annual interest rate 7%;
- Lifetime of Measures 8 years.

Given the above hypothesis the Initial Investment results to be 23 Eurocent/kWh saved in the first year of implementation.

For the calculation of the economic costs and benefits of the Italian Decree on Energy Efficiency Measures performed by Electricity Distributors we introduce the following additional hypothesis:

- Cumulative savings: up to 1,6 MTep/year in 2006 (as established by the Electricity Decree),
- Distribution Companies are entitled to recover 200 Euro/Tep saved through Energy Efficiency Services and Programmes (the Energy Authority has proposed a cost recovery between 150 and 200 Euro/Tep),
- Energy savings are assumed to cancel out after 5 years from implementing the Measure even though most of technology have lifetime higher than 5 years: we underestimate the total energy and economic savings,
- Initial Investments are covered 50% by the DISCOs and 50% by the final customer who benefits of the intervention.

The yearly economic savings for customers/society is calculated as: reduction of national energy bill due to reduced consumption, minus payment to Distribution companies for cost recovery of programmes, minus reimbursement to DISCOs to compensate for reduction in sales (automatic through the MDT regulation), minus contribution of individual customers (who pay part of the extra costs of EE technologies).

The yearly economic gains for Distribution companies are calculated as: revenues from the “cost recovery mechanisms” (from a small part of the distribution tariff), minus cost of Programmes and technologies net of contribution of individual customers (who pay part of the extra costs of EE technologies).

The results of our simulation show:

- Net present value of economic savings for customers/society: 480 Million Euro,
- Net present value of economic gains for Distribution companies: 300 Million Euro.

We would like to point out once more that energy (and economic) savings for the final customers are probably underestimated due to the conservative hypothesis of 5 years lifetime of the Measures. Furthermore, we do not include in our calculation different positive side effects:

- Market transformation effects: the large scale implementation of energy efficiency programmes will probably reduce the costs of energy efficiency technology and services, thus the cost of conserved energy is decreasing in a dynamic vision and the companies’ profits are increasing; also final customers not directly participating to the Programmes will benefit of the cost decrease of energy efficiency technologies,
- Jobs created/not lost, Extra company profit tax, extra VAT are expected in the energy efficiency technology production, sell and installation sectors.

ENVIRONMENTAL EFFECTS

Globally the two laws constitute (qualitatively and quantitatively) an important element of the Italian strategy for

2. The maximum target to be achieved in five years (see Figure 1).

3. E.g. EURECO - Demand Side Management En-use Metering Campaign in the residential sector in 400 households in Denmark, Greece, Italy and Portugal. Cabinet Sidler co-ordinated the project, the eERG group was responsible for the measurements in Italy.

achieving its target for CO₂ emissions reduction, as described in the graph below.

The Italian strategy to achieve Kyoto target is based on 6 different Actions (CIPE, 1998): Action 4 regards energy demand reduction in industry households and services and the DSM obligation covers 56% of its specific target. The 14% of the global Italian Kyoto commitment is achievable with the obligation to the Electricity and Gas distributors.

We would like to stress once again that end-use efficiency activities (unlike most of CO₂ reduction interventions) produce a net economic benefit (have negative costs).

Analysis of a Specific Technology – The CFL case

We assume that each new CFL installed saves 0,0146 Tep/year, as indicated in the Authority's guidelines. If the Electricity distributors would send 3 CFL to each Italian family (20 million families, 60 million CFLs) they would reach 97% of their total saving target for the first three years of implementation (2002 to 2004).

Given a cost of electricity of 12 Eurocent/kWh, the Italian residential customers would save 477 million Euro/year on their electricity bill. Since lifetime of lamps is approximately 10 years, electricity savings would add up to almost 5 000 million Euro.

DISCOs would receive 14 Euro in five years for each distributed lamp, given a total cost of 8 to 10 Euro/lamp. The total amount of **profits** for the Electricity distributors would be between 230 and 350 million Euro.

One simple program of CFL give-away would then allow the electricity distributors to fulfil their obligation (until 2004) with no implementation risk (they would not need to convince the customers to participate and would not need the customers participation to the costs of the program), a reasonable profit and high savings for the residential cus-

tomers class. Complaints from distributors claiming that the targets are too ambitious, seem therefore out of place. Rather we fear that this possibility could induce electricity distributors to give away free CFL instead of helping the development of a mature market for energy efficiency services, covering a wide spectrum of technologies and actors. We would suggest to the Authority:

1. To diminish the amount of savings accounted for CFL: recent electricity consumption measurement (Eureco, see note 3) would suggest 0,0105 Tep/year (28% below the value indicated by the Authority);
2. To increase the amount of savings accounted for integrated projects, with higher design costs, e.g. efficient lighting projects in the service sector, including the substitution of lamp, ballasts and luminaries, the introduction of control systems; building envelope projects, including installation of selective glazing, solar protections, higher thermal mass, night passive ventilation to obtain low-energy-consumption summer comfort.

Once again we see that the saving target are reachable, that the measures bring economical benefits to the final customers, the distribution companies and the producers of energy efficient technologies.

Conclusions

The obligation given to Gas and Electricity Distribution Companies to achieve certain primary energy savings will become operative as soon as the Energy Authority will issue the final regulation. Calculations based on reasonable hypothesis and on results of comparable previous experience show high energy saving potentials with negative costs. The saving target is relatively small (compared to the saving potential) but it can help to start the market for physical/genuine energy services.

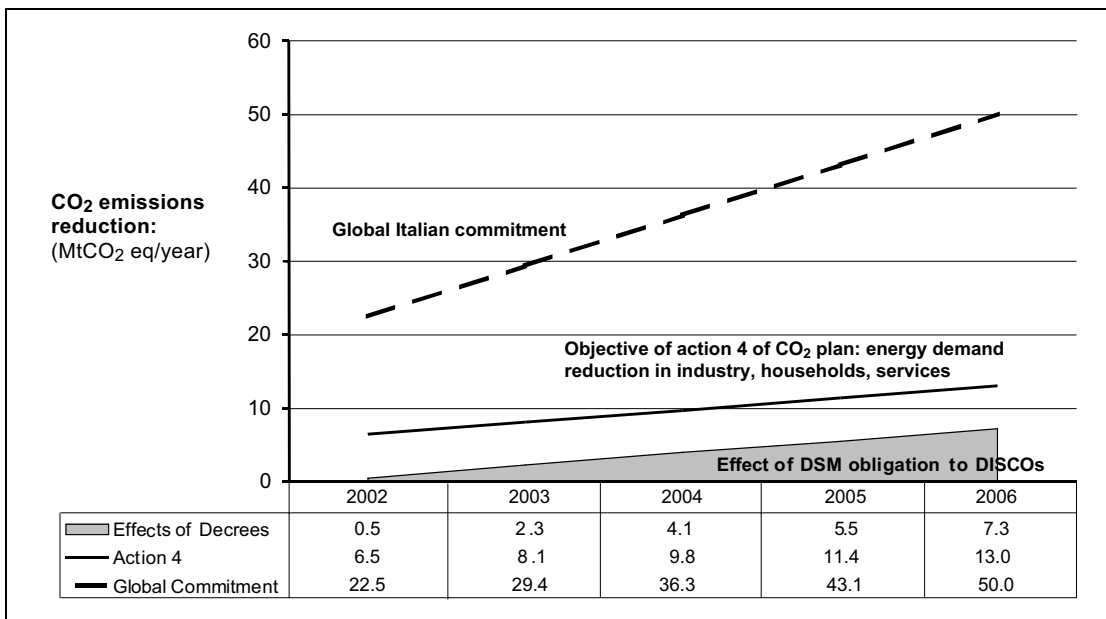


Figure 3. CO₂ emission reduction objective for Italy (according to Kyoto protocol) and portion achievable through the DSM obligation for electric and gas DISCOs.

The Decrees are pursuing a realistic environmental target, stimulating technology development, using a self-financing mechanism that brings economic direct benefits to all the actors of the process:

- Final customers will achieve high economic benefits, having a magnitude of some hundreds million Euro per year;
- The cost recovery mechanism proposed by the Authority (coupled with the Multiple Driver Target regulation already in force) will probably bring high net economic gains to the DISCOs that will carefully select the programmes to perform. Energy Companies will have new business opportunity to diversify their activities. The new business sector of Final Energy Services can be very profitable in the medium term;
- The efficient technology producers and installers as well as ESCOs will profit of important side effect.

The process will constitute an opportunity for the Italian industry sector to enlarge their capabilities to offer new technologies and new services also in the international markets, fostering the security of energy supply and creating new qualified job opportunities.

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