Italian Local Policies and Programmes for Energy Efficiency. The Case Study of Rome

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1. Synopsis

The paper considers the implementation of Italian local policies for energy efficiency focusing on the case study of the city of Rome.

2. Abstract

Law 10/1991 was issued in order to implement the National Energy Plan in the areas of energy efficiency, renewables, and CO_2 emissions reduction.
The law requires the adoption of a number of tools: energy labelling of various end use devices, new building codes, incentives to the use of renewables, etc. Furthermore, Municipal and Regional Governments are required to develop their own energy plans with an emphasis on renewables and improved energy efficiency.

We present an analysis of the degree of implementation and efficacy of these tools, with a focus on local energy planning and actions. A relatively small number of energy plans have been drafted till now, very few DSM programs have been performed by Municipal utilities and some Local Energy Teams have been created with support of EU.

The present level of analysis and action doesn't seem to be adequate to the importance of the energy saving potential estimated in some of these plans. To support this thesis we present some of the results of the study for the Energy Plan of Rome (the fastest growing end uses, energy saving potential and renewables potential ..), which was concluded in 1995, according to an Integrated Resource Planning (IRP) approach. Follow-up actions from the plan have been a more detailed feasibility study for programmes to promote the use of daylighting and to reduce space cooling loads, and proposals for the inclusion of new rules in the building codes.

3. Introduction

In the last eight years new laws and official acts in Italy seemed to start a good effort towards energy efficiency & CO_2 reduction policy following the examples of USA and other Countries in Europe. In section 4 a quick list of the measures provided for by laws is given. In section 5 details of the degree of implementation of such measures are presented. We focus on local policies and programmes. In particular the methodology and results of Municipal Energy Plans carried out till now in Italy are considered. In section 6 the case study of the City of Rome is examined. The Energy Plan of the City has been carryed out according to an Intergrated Resource Planning methodology. It contains an evaluation of the energy saving potential and renewable energies potential and an Action Plan indicating a set of costeffective DSM actions. As a follow-up of this study a sectorial research about tertiary consumption for building cooling has been promoted by the local electric utility. A brief discussion of the results is reported.

4. Italian Local Policies for Energy Efficiency

After the negative result of the referendum about nuclear energy, in 1988 the Italian Government adopted a new

National Energy Plan. Five main objectives were taken into account: to promote energy saving, to protect the environment and the human health, to develop domestic energy resources, to reorganise the energy supply situation and to improve international competitiveness of Italy. In addition, in the framework of the international effort in order to reduce greenhouse gas emissions, which has been concretised by the Declaration of EU Deputies of Energy and Environment in 1990 and finally by the Agenda 21 in Rio de Janeiro in 1992, Italy has assumed the objective of having in 2.000 the same amount of CO_2 emissions assessed in 1990. As a follow-up of this new approach to energy problems new laws have been promulgated.

Laws n.9 and n.10 in 1991 and law 412 in 1993 represent the first concrete acts in the direction of promoting energy saving and renewable energy diffusion.

Law 9/91 states a set of fiscal incentives for investments voted to save energy in the domestic and industrial sectors and for the first time allows electric energy production by private generators.

On the other hand, main issues of law 10/91 and its connected public acts are: (1) to state that all the cities with more than 50.000 inhabitants must have an Energy Plan; (2) to state that all the subject than consume more than 1.000 tep (10.000 tep in the industry sector) per year must have an “energy manager”; (3) to define economic incentives to all the project voted to energy saving; (4) to state that in all the buildings belonging to Public Administration the use of renewable energy is compulsory if its inapplicability cannot be demonstrated; (5) to introduce the term of energy certification of building to define new rules for the design of heating plants.

Laws n.9 and n.10/91 fix economic benefits for the sales of energy produced by Indipendent Power producers (IPPs) either by the use of renewable sources either with conventional sources exploited according to some efficiency criteria (these sort of plants are grouped under the name “fonti assimilate”, say “consistent with renewable sources”). Unfortunately the largest part of the available funds have been addressed to this last kind of plant. After a recent act of Italian Government these incentives have been suspended. At the moment there is an official list of eligible projects that has been closed at June 1995. The so-called Category A plants (which include all the renewable sources installations and the “consistent” projects under 10 MW) have an eligible amount of installed power of about 3.000 MW while all the other “consistent” projects (over the 10 MW) equal 5.100 MW. If we look at the already funded project, i.e. the wind turbine installation, only 20 MW have been installed compared to an eligible amount of 735 MW. This demonstrates that even if the new National Energy Plan and related laws have represented a positive impulse toward the diffusion of new, low pollutant, energy systems, they have been often applied for other purposes which have reduced their impact. In addition, there is a big uncertainty about the possibility that such measures will be provided in the future because of the contradictory acts of the Government.

Following the directions stated in law 10/92, the Decree 412/93 and connected UNI guidelines have defined a mandatory methodology in order to evaluate from an energy efficiency point of view building activities and heating plant design or renovation. It represents a good effort in order to put some thresholds to the energy consumption for heating building that is, in its technical explication, in line with CEN activity. Otherwise, there are no rules about energy consumption for summer air conditioning, even if cooling installations are dramatically rising also in domestic sector.

Last but not least, in 1995 ENEL (the national electric public utility) has been stated to be sold to private investors. Because until now the electricity market has been substantially a public monopoly, a Control Authority has been created with the aim of tariff definition. A new law approved in 1996 states that the tariff must be determined according to price cap mechanism. Costs incurred by utilities for DSM actions can be paid back through an appropriate small tariff correction.

5. Italian Local Programmes for Energy Efficiency

As for energy saving the degree of implementation of laws 9/91 and 10/91 is not fully satisfactory.

5.1. Energy labelling and customers information

Law 9/91 states that ENEA[1] should provide criteria to create an energy label for efficient appliances in the domestic use. The law also adds that use (and characteristics) of efficient appliances should be encouraged by ENEL and all other electric municipal utilities. Till now great efforts have been directed toward appliances safety and quality (IMQ label) while energy saving has been left in the corner. Indeed EU Directive for labelling of fridges which had to be implemented at the beginning of 1995 has not yet been implemented in Italy.

The same law establishes a programme-agreement of ten years between Ministry of Industry and ENEA for information dissemination & training about efficient energy use. A similar agreement has been carried out between Ministry of Industry and public mass media to promote information on energy efficiency, particularly in schools. ENEA is providing courses for technicians every year and prints monthly technical publication about efficient energy use[2]. ENEA has also drafted brochures for domestic users and organizes public demonstrations of efficient technology. ENEA has about twenty public centres devoted to energy consulting. However public advertising of where ENEA centres are located has been lacking.. Information campaigns on energy efficiency have been performed also by ENEL and other Municipal electric-gas-water utilities (essentially information brochures for residential sector). TV ads to promote energy saving were broadcast but suggestions on behavioural changes or technical improvements sounded a bit general.

ENEA has developed a database of energy efficient technologies (electric appliances as well as building technologies) called ATHOS. This would be quite a useful mean to promote energy efficiency (for example it could be helpful to give technicians comparative information on specific solutions as well as to give customers comparative information on household appliances). Unfortunately the database can be consulted only at ENEA centres. As for household appliances updating of database was rather slow in past two years.

Other centres for information on energy and environment have been established on a local base in a few Italian regions (Local Energy Agencies): Lombardia, Valle d'Aosta, Emilia Romagna, Toscana, Liguria, Calabria, Sicilia. Most of them are co-financed by the EU. They aim to be a local service to disseminate information and to promote specific actions towards energy/environment conservation. In Lombardia the Local Energy Team is working to realize an energy information network among big cities and to promote building certification. In Valle d'Aosta information campaigns, soft energy audits of buildings and waste management are going on.

5.2. Municipal Energy Plans and DSM Actions

Energy Plans for cities whit more than 50000 inhabitants have also to manage the problem of pollution that is stabilization of emissions in 2000 at levels of 1990. In this framework DSM actions should be implemented on a local base as suggested by the energy plan of the Municipality. Till now only a few energy plans have been drafted, while only a few DSM actions have been performed according to the energy plan. Law 10/91 does not define how much time municipalities have to carry out their Energy Plan. The law also does not provide for a public commission to check the quality of the plan. Here we present a brief summary of local energy plans pointing out methodology and most relevant results.

Torino (big industrial city in the north of Italy) (AEM 1993): ecoplan with evaluation of emissions but power production approach (no IRP): proposal of district heating (actually implemented in the south part of the city) with an estimated energy saving of 70.000 tep (3,8% of total consumption), cogeneration plant supplied by residential wastes (104.000 tep, that is 5% of total energy request of the city), cogeneration plant to supply a building area using wood (wastes derived from management of green areas of the city), hydroelectric plant of 150 MW built in the mountains near the city, promotion of use of electric car inside the city (the programme has been activated at the end of 1996)

Rivoli (small city in the neighbourhood of Torino): same approach as for Torino (drafted in 1995): cogeneration plant using wood (schools and swimming pool) funded by third party financing, energy efficiency in street lighting

Bologna (medium-large city in the centre-north of Italy) (Ambiente Italia 1994): plan for reduction of CO_2 emissions, IRP approach: in 2005 a reduction of 31% of emissions of pollutants respect to those ones of 1990 can be obtained thanks to (1) electric energy savings in the domestic sector (13% less than in 1990) (2) reduction of rate of increase of electricity consumption in tertiary sector (from 28% estimated for 2005 if nothing happens to 24% if rational use of energy is implemented) (3) more efficient transportation (3% reduction of consumption respect to 1990) (4) cogeneration plants (estimated energy saving of about 80.000 tep) (5) installation of thermal solar collectors (50.000 m^2) (6) photovoltaic plants (5 MW) (6) wind power plants in the mountains near the city (20 MW) (7) waste management (recycling & thermal destruction)

Livorno (medium city in the centre-north of Italy) (Ambiente Italia 1995): eco-energy plan focused on some issues: proposal for a cogeneration plant in a hospital area of the city (57 tep/year saved), use of biogas from waste management (1.900 tep/y), power production thanks to pressure gap in gas urban network (72 tep/y), analysis of possibility for installation of thermal solar panels in public buildings, study for integration of energy saving in residential building inside the urban plan, mobility plan, district heating (2.220 tep/y saved), steam distribution network for industrial use (2.140 tep/y saved)

Rovigo (medium city in the north of Italy) (Ambiente Italia 1995): energy-environment integrated plan focused on some issues (drafted in 1995): evaluation of potentials from biomass to be used in a cogeneration plant for district heating (15.000 tep/y saved), more efficient street lighting (about 1 GWh/y), feasibility analysis of retrofit for energy conservation of public buildings

Padova (medium city in the north of Italy) (Ambiente Italia 1995): energy-environment integrated plan focused on some issues (drafted in 1995): cogeneration and district heating, more efficiency in urban transportation, arrangement of a local energy-environment information system, creation of a Local Energy Team

Rome (Ambiente Italia 1995): IRP approach on all issues: results are reported in section 6.

Sesto San Giovanni (little city in the neighbourhood of Milano) (Ambiente Italia 1996): IRP approach: cogeneration and district heating (90 MWt); waste incineration (250 Ktep/y); solar systems for heat water (10 Ktep/y); retrofit of buildings and reduction of cooling loads (savings of 30%); higher efficiency in electric appliances (saving of 22% of total electric consumption); water systems efficiency (savings of 63% in primary energy).

DSM actions carried out till now in Italy seem a bit fragmented. Here is a brief resumé. Street lighting is one of the easiest DSM actions (because it usually involves one single actor: the Municipality or the local electric utility) and it is actually applied in most big cities (after the pilot project of Cremona in Lombardia, started at the end of 80s). A simple software provided with a database of street lighting products for little Municipalities (to show potential savings they could achieve by renovating their street lighting system) is under development as a UE project.

An information campaign for employees of Valle d'Aosta Region to teach how saving electric energy in offices was implemented in 1996 by *Ambiente Italia*. A questionnaire was sent together with the brochure to ask people how they felt about the issue of saving energy. There were 20% of answers which seem quite good. People were much interested in the issue and required much more information on how saving energy at their home. Employees were also asked to make a list of electric appliances present in their offices. After reading the brochure almost all of them could write down the list correctly. A medium power intensity for lighting (25 W/m≈) and office equipment (30 W/m≈) could be drawn from data: they sound high. These data have been also confirmed by a soft energy audit of the administrative regional building which was performed during the campaign. Collected data were given as input to a simulation program that provided consumption of the building at actual situation or when more efficient lighting & office equipment were installed or heat gains by the envelope were reduced. Installing double glazed windows together with high efficient lighting and office equipment can save up to 98 tep/y and 59.500 ECU/y with a reduction in electric power load of 66 kW. Future campaigns will be devoted to heatingfor public buildings and heating/electric uses in the domestic sector.

"Operazione Lampadina" (October 1994-February 1995) was the only DSM programme activated in Italy for effi-

ciency in domestic lighting. The Municipal electric utility in Rome (ACEA) with the help of Greenpeace and ANIE (Italian association of electric appliances producers) organised the campaign. ACEA sent a coupon together with the bill to all its customers. People could buy CFLs paying it by instalments on their electric bill (no discount was given). Monitoring was a bit of a failure, since people bought lamps without using the coupon (resellers decided to apply full price if coupon was presented, due to long times in being repaid by ACEA). Total increase in lamps sales during the campaign was estimated around 100.000 units. ACEA estimated 3,3 MW of saved extra-peak power with a money saving of 46.150 ECU for the utility (also considering reduction in sales). Money saving is due to the fact that ACEA buys almost all electric power and energy by ENEL (only a small fraction of electricity is self-produced by ACEA). Money saving declared by ACEA should actually be drastically redimensioned since (1) ACEA considered equal to 100% the coincidence factor of lamps switched on in the evening, (2) they considered all saved power as avoided power over-the-peak (which costs four times more than ordinary one) and (3) they didn't take account of DSM campaign costs (this is reasonable because the advertising campaign was paid by ANIE). In any case taking account of lower incomes due to saved power would give a minimum coincidence factor of 45% (authors' estimation): this is low enough to say that the campaign had a positive effect also for the utility.

It must be noted that Italian energy tariff system would encourage DSM actions on renewables and efficiency, due to generally high prices. In particular for domestic electric customers[3] prices are structured such as to increase progressively with consumption. Moreover, at the end of 1993 a mechanism of payback of cheapest kWh as long as monthly consumption increases[4] has been implemented. This has caused a sharp increase of domestic electric bills (Italian electric tariffs are the highest in Europe). Unfortunately no explicit communication of the changed tariff structure was given to the customers through their bills. Therefore no advantage towards dissemination of saving/efficiency mentality has been achieved by the tariff structure modification.

5.3. Incentives to energy saving and renewable technologies

It has been also underlined that law 10/91 establishes public funding to improve energy efficiency in Italy: programme-agreement with ENEA, pilot projects, retrofit of building, installation of cogeneration plants, promotion of systems employing renewable sources. Except for 1991 the actual allocated budget has been drastically reduced in next years respect to those established by law 10/91: 173 MECU in 1992 against expected 509 MECU; 5 MECU in 1993 against expected 611 MECU; 12 MECU in 1994 against expected 174 MECU. Presently most funding is dependent on regional administrations. Due to this situation many projects have been slowed down or even not carried out. Unfortunately this has not coincided with the activation of other forms of funding (for example third party financing).

5.4. The Energy Manager

The energy manager should be responsible for energy conservation and energy rational use but nobody controls what the energy manager does. From our direct contacts with FIRE[1] (Federation of Italian Energy Managers) the energy manager is not quite keen on renewables or energy saving actions, except for cogeneration. We also suppose that the energy manager is often an institutional character but it actually does another job. Just an example: Valle d'Aosta Region has an energy manager but all people who answered the questionnaire of the campaign on energy saving in offices told that they didn't know his existence; moreover the energy manager refused to participate in the campaign; and till know no saving action in the public buildings of the region Valle d'Aosta has been promoted by the energy manager.

5.5. Energy Efficiency in Buildings

The intentions proposed by Decree 412/93 have been partially implemented till now. A great effort has been directed towards safety and efficiency of heating system burners (both in the domestic and in the tertiary sector). Municipal utilities have been directly involved with information campaigns and controls. Penalty have been established for systems which do not comply with the regulations This has pushed a lot of people and public administration to improve the quality of their heating systems. On the other side almost no implementation of evaluation of building energy requirements has been carried out. In this case controls or penalties are not applied.

Slowness in implementation of laws 9/91, 10/91 and DPR 412/93 is of course not justified by a high level of efficiency in Italian final energy uses nor by the lack of cost-effectiveness for DSM actions (see next section). The problem is the absence of controls (to apply laws), there is no deep consciousness of energy saving potentials[5] among customers and policy makers, and the dissemination of information is not enough.

6. The Case Study of Rome

What could we expect as potential savings in Italy due to efficiency increase in final energy end-uses? What kind of DSM actions are cost-effective in Italy? We want to answer presenting the results obtained in the case study of Rome Municipality, which can be said to be representative of the Italian situation.

6.1. The Energy Plan

At the end of 1995 the energy plan for the city has been drafted. ACEA was commissioned by the Municipality to provide the plan. The plan was then drawn up by Ambiente Italia Institute of Research. The IRP approach was extensively applied: after drawing up the energy balance of the city, the potential of renewable sources (and assimilated ones) has been evaluated together with the energy saving potential in final end uses (thermal, electric and water sectors). Analysis of electric final end uses in the residential and tertiary sector[6] shows that lighting, household appliances, office equipment, heat water systems and conditioning are the final end uses where consumption is highest. End uses analysis is shown in Table 6-1 and Table 6-2.

Table 6-1 End uses in the domestic sector (Rome)

End uses/Appliances	Percentage of total consumption in the domestic sector	Consumption (GWh/y)
Water Heaters	28,8	891
Cold appliances	19,0	587
Wet appliances	12,9	399
Lighting	12,8	395
Computer & other office equipment	11,0	339
Other uses	15,5	479

Table 6-2 End uses in the tertiary sector (Rome)

End uses/Appliances	Percentage of total consumption in the tertiary sector	Consumption (GWh/y)
Lighting	25,0	777
Cooling	15,0	455
Computer & other office equipment	13,5	415
Refrigeration systems/food conservation	7,0	199
Washing systems biancheria/stoviglie	3,0	85
Other uses	36,5	1.149

After estimating present efficiency level in most relevant end uses, the accessible savings potential has been evaluated looking over available efficient technologies. Cost of Conserved Energy (CCeE) evaluation has been performed to evaluate cost-effectiveness. Results are shown in Table 6-3.

Table 6-3 Accessible Saving Potential in Electric End Uses (Rome)

SECTORS	END USES	Energy Saving Potential (GWh/y)	Load Reduction Potential (MW)	CCE (ECU/kWh)
Domestic	Lighting	74	25	0,0179÷0,0513
	White Appliances	209	24	0
	Hot Water Syst. (1)	298	34	0÷0,0769
	TV-Videorec.	70	5	0,0487
	Total	651 (2)	88	
Tertiary	Interior Lighting	230	50	0÷0,0769
	Street Lighting	24	6	0,0205÷0,0462
	Cooling (3)	140	39	0÷0,0769 (4)
	Office equipment	125	26	0
	Food conservation/ refrigeration syst.	80	9	0÷0,0513 (4)
	Total	599 (5)	130	
Industry	Lighting	18	4	0,0103÷0,0769
	Motors	41	5	0,0077÷0,0308
	Total	59 (6)	9	
	TOTAL	1,309 *(7)*	227	

(1) subsitution of electric water heaters with solar systems and use of efficient water faucets

(2) 21% of total domestic consumption

(3) total saving of 30%: 15% bulding envelope & *equipment*15% HVAC systems

(4) here CCE is only indicative since it varies due to many factors

(5) 19% of total tertiary consumption

(6) 10% of total industry consumption

(7) 16% of total consumption in Rome

In Figure 6-1 we also report the supply curve for the tertiary/industry case.

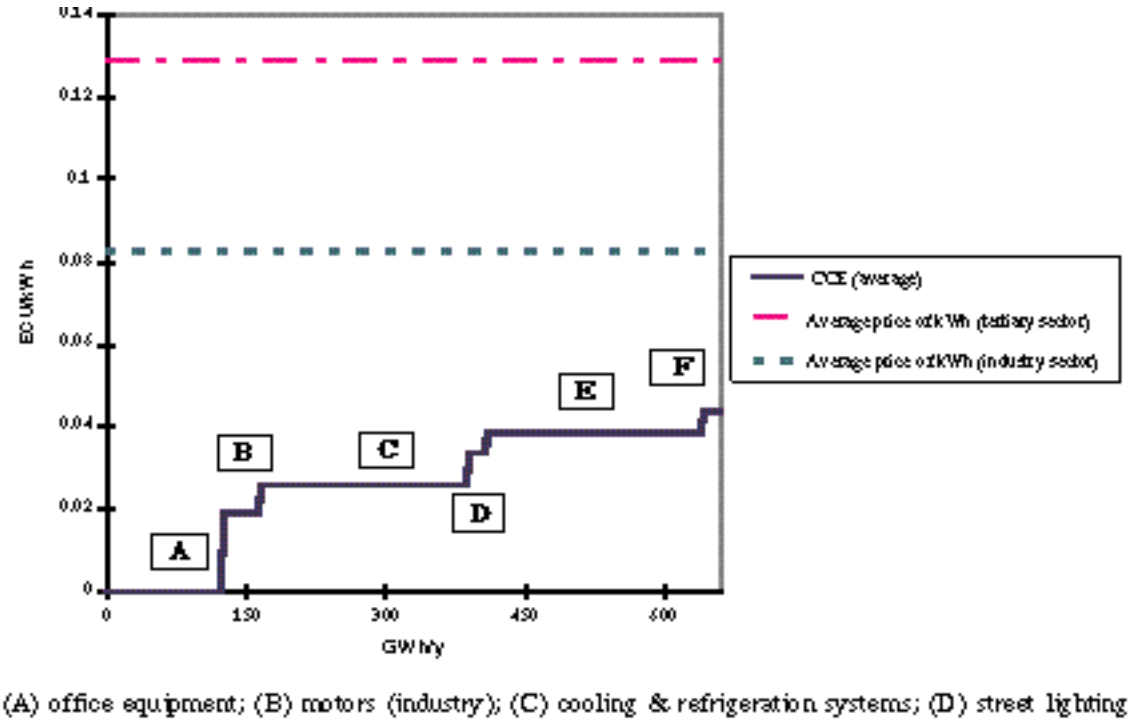

Figure 6-1 Supply Curve for Electric Energy Savings in the Tertiary & Industry Sectors (Rome).

Looking at the Tables there is no doubt on high potential savings for the city of Rome. This must be considered as a clear signal of great possibilities all over Italy. All local energy plans drafted till now confirm high potential savings.

The energy plan of Rome included also an Action Plan suggesting to local authorities feasible DSM actions. The Action Plan has been drawn with simple forms presenting all information needed to implement the action (duration & description of the action, actors, environmental benefits, energy savings, social & economic benefits, interactions with other actions or plans for the city). Untill today no action has been implemented by the local government.

In the case of Rome the behaviour of Municipal authorities has pointed out all problems cited in the previous section: lack of information and lack of controls which lead to difficulties in communicating between different sectors of public administration and difficulties to achieve a final decision.

Another important aspect of the case of Rome is the scarce difference between winter and summer peak electric load. This is thought to be due to the diffusion of compact/movable electric conditioning systems. As a consequence of the energy plan an investigation of available tools and possible actions to reduce electric consumption due to summer cooling in the city of Rome has been carried out. The next section contains the results of the work.

6.2. The Study about Cooling

The feasibility to implement the most promising building cooling technologies and strategies to reduce energy and power demand in urban areas, has been evaluated in the framework of a project funded by the UE and pointed out by Ambiente Italia and others (Ambiente Italia et al. 1996).

Two buildings were selected, one in each city. Both buildings were selected because of their representativeness with respect to service sector buildings, major consumers of energy for cooling, and because they are owned by public bodies. Both buildings might undergo major renovation works in the near future. The building in Rome is a 9 storey, 30.000 m^2 floor surface office building, with a relatively complex geometry, equipped with a conventional HVAC plant, utilized as head office of the Municipal electric and water utility (ACEA).
Some options from the available cooling technologies and strategies suitable to the specific climate and the building typology were selected. They have been also analysed with respect to energy performance, environmental impact, costs, and market constraints. Table 1 shows the list of proposed measures.

Table 6-4 Actions tested in Acea building

Class	Name	Brief Descr.
BASE CASE	Base	Base Case
ENVELOPE	Albedo	Roofs, Concrete, Marble and Plaster Surfaces will have Solar Absorptance = 0,2
ENVELOPE	Double clear	Installation of double pane clear glasses on new Al frames with thermal break (only glass costs are considered)
ENVELOPE	Al Overh.	Installation of Aluminum external overhangs in south facades
ENVELOPE	Acrylic Overh.	Installation of Acrylic external overhangs in south facades
ENVELOPE	Overh. & Double	Installation of acrylic external overhangs in south facades + double glasses
ENVELOPE	Insulation	Retrofit Insulation on roofs and parts of external walls
ENVELOPE	Selective	Installation of selective glass (Tvis = 66) in all the facades (office spaces)
ENVELOPE	Louvers	Installation of reflective louvers (SC=0.4)
ENVELOPE	Mix-Env	Albedo + Double Clear + Overhangs + Insulation (frame costs not included)
HVAC SYSTEM	VSD	Frequency inverters to drive hot & chilled water pumps
INTERNAL LOADS	Lights 1a	New luminaries with electr. ball. and Lamps in office rooms (2x36W) and corridors (1x36W)
INTERNAL LOADS	Lights 1b	New luminaries with electr. ball. and Lamps in office rooms (1x58W) and corridors (1x36W)
INTERNAL LOADS	Lights 2a	Lights 1a + occupancy sensors
INTERNAL LOADS	Lights 2b	Lights 1b + occupancy sensors
INTERNAL LOADS	Equip-CH	Swiss Standards for off. equip.
INTERNAL LOADS	Equip-EPA	EPA Standards for off. equip.
ENV+LOADS	Dayl. A	lightshelves on south facades + lights1b + dimmers in rooms facing south + double clear
ENV+LOADS	Dayl. B	lightshelves on south facades + lights1b + on/off daylighting & occupancy sensors in all office rooms + equip-ch + selective in rooms facing north + double clear elsewhere

Impacts on either energy consumption either power demand, resulting from the application of the technologies/-actions was thoroughly examined. The evaluation of these effects was carried out by using two different simulation tools. DOE-2.E simulation program was utilised in order to simulate hour by hour the changes in electricity consumption, power demand and fuel consumption of the two buildings. Performances of some technologies

concerning an integrated approach about daylighting and passive cooling were simulated by means of LUMEN-MICRO.

The Cost of Conserved Energy, as well as other economic indexes were computed for each one of the candidate actions and for each working assumption. Subsequently, rankings of the different options according to the above mentioned indices were also carried out. Cost of Conserved Energy for each action and per working assumption was compared with the respective costs of the other actions as well as with the overall baseline cost of energy (overall cost of energy in the reference case).

The largest part of actions has CCeE lower than 0.112 ECUs, that is the price of the electric energy unit.

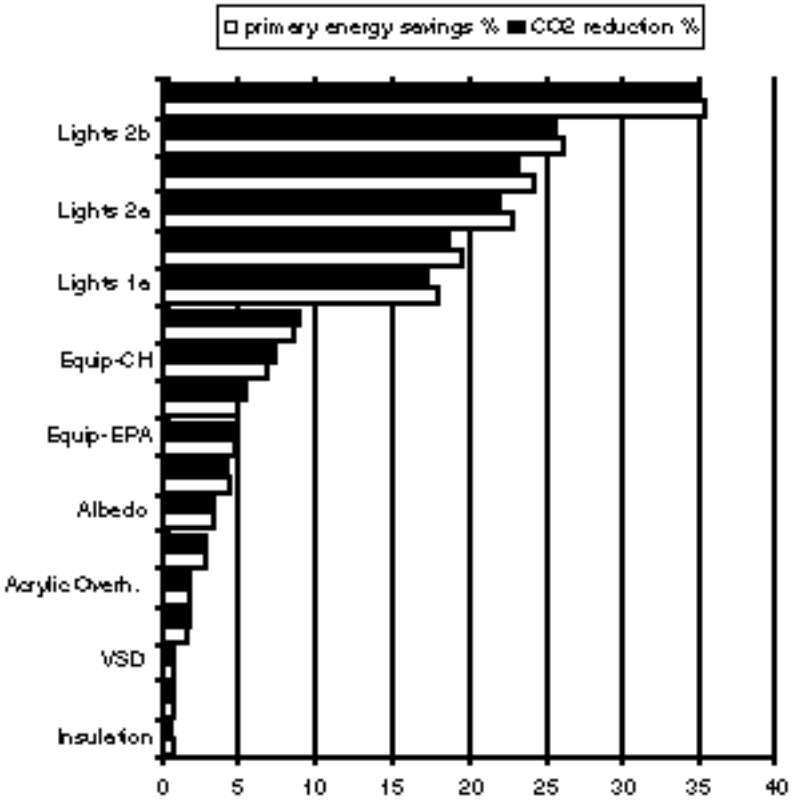

Figure 6-2 Allowable percentage savings on Annual Fuel and Electric Energy Consumption for the Tested Scenario in Acea Building (Rome).

As can be noted in Figure 6-2 primary energy saving up to 35 % are possible together with cost effectiveness. In particular better results have been stated for all the actions concerning the rationalisation of electric uses (new luminaries, high efficiency lamps, occupancy and light sensors) while too high cost are associated to envelope retrofit when new windows frame or walls and roof insulation must be installed.

7. Conclusions

Even though Italian laws provide for tools and measures toward a better use of energy, there is an evident lack of their application at several levels. In Italy there is no wide dissemination of information about energy saving and renewables, which goes together with the absence of a deep consciousness of the accessible potential (which is huge and costeffective as the case study of Rome shows). Energy plans which should be implemented by all

Municipalities with more than 50.000 inhabitants are few so that DSM actions are fragmented and occasional. The absence of administrative and political controls is evident so that measures provided by laws are often not implemented (energy label, building auditing, energy manager). Incentives for electric power production by means of renewables and for energy saving in buildings were less than established and often addressed to contradictory initiatives. In the framework of present economic moment public funds availability has been suspended or left to local administration. This points out that energy policy is not considered as a part of a global improvement of national economy.

8. Endnotes

(1) Public Research Institute for nuclear and alternative energies
(2) *Risparmio Energetico, Energia e Innovazione*
(3) In Italy almost all people have a contract which avoid a power load over 3 kW
(4) The mechanism starts when the threshold of 220 kWh/month is exceeded
(5) G. Gatti, Speech at meeting *Integrated Resource Planning and Third-Party Financing: Experiences Abroad, Opportunities ans Goals for Italy*, Vicenza, January 25-26 1996
(6) Only 7% of total electric consumption in Rome is due to the industrial sector

9. References

AEM (Turin). 1993. *Piano Energetico Comunale della Città di Torino*

Istituto di Ricerche Ambiente Italia. 1994. *Piano di riduzione delle emissioni di gas climalteranti della Città di Bologna.* EU Programme "REGIONAL AND URBAN ENERGY PLANNING"

Istituto di Ricerche Ambiente Italia. 1995. *Eco-piano energetico comunale di Livorno.* EU Programme "REGIONAL AND URBAN ENERGY PLANNING"

Istituto di Ricerche Ambiente Italia. 1995. *Piano integrato energetico-ambientale per la Città di Rovigo.* EU Programme "REGIONAL AND URBAN ENERGY PLANNING"

Istituto di Ricerche Ambiente Italia. 1995. *Bilancio energetico della città di Padova e studio di prefattibilità di un sistema di cogenerazione e teleriscaldamento*

Istituto di Ricerche Ambiente Italia, ACEA (Rome). 1995. *Ricerca per l'attuazione del Piano energetico ambientale del Comune di Roma*

Istituto di Ricerche Ambiente Italia. 1996. *Piano energetico comunale di Sesto S.Giovanni*

Istituto di Ricerche Ambiente Italia, ACEA (Rome), EETAA (Athens), LDK (Athens), Municipalities Of Athens, Rome and Graz. 1996. *Building Cooling Technologies and Strategies to Reduce Energy and Power Demand: Feasibility Studies for the Implementation of Concrete Interventions in Rome, Athens And Graz.* (EC Programme "REGIONAL AND URBAN ENERGY PLANNING").