The Situation in Italy of Building Energy Labelling

COMISIÓN DE LAS COMUNIDADES EUROPEAS
DIRECCIÓN GENERAL DE LA ENERGÍA (DG XVII)

SEMINARIO EUROPEO:
CERTIFICACIÓN ENERGÉTICA DE EDIFICIOS EN PAÍSES DEL SUR DE EUROPA

EUROPEAN SEMINAR:
ENERGY LABELLING OF BUILDINGS IN SOUTHERN EUROPEAN COUNTRIES

LIBRO DE PONENCIAS

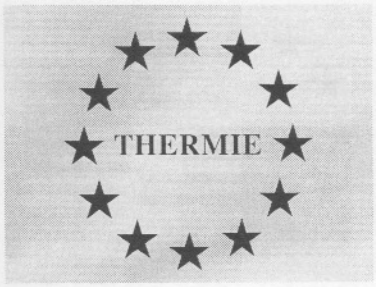
Una Acción del Programa THERMIE

SEVILLA, 7 y 8 de SEPTIEMBRE de 1995

ISBN: 84-605-4808-2

Depósito Legal: SE-441-96

Imprime: SAND, S.L.



THE SITUATION IN ITALY OF BUILDING ENERGY LABELLING

ROBERTO PAGANI

SOFTECH (Italia)

ÍNDICE GENERAL

ROBERTO PAGANI

SOFTECH. Italia

Abstract

In 1991 an Italian law, named Law 10, was approved by the Parlament, giving an improved framework to the problem of energy in the building sector.
This law includes a variety of very innovative prescriptions concerning energy use in the building sector, that may be classified in different areas:

- energy planning
- building certification and survey
- building energy labeling

Energy planning

- With the Law 10 /Ref.I/, each Region of Italy and all towns with more than 50,000 inhabitants shall develop an energy plan for maximizing energy conservation and the exploitation of renewable energy sources (art. 5 - Regional and urban energy plans).

- This is a very qualified and important tool for improving the access of regions and cities to energy and environmental planning, leading to a more rational energy utilization. In fact, energy planning studies, since 1991, are not anymore a voluntary activity of local authorities, but a specific obligation for Italian regions and cities.

Building certification and survey

- A technical report on the building involves into close responsibility both the owner, the designer, and the builder. Municipalities shall eventually organize specific surveys on new and renovated buildings (art. 29 - Building Certification and Surveys).

- The performances of building components shall respond to the requirements and codes approved by European Standardization Institutes - like CEN and CENLEC - through the performance certification of components, released by authorized national laboratories. (art. 32 - Certification and consumers information).

- The municipalities shall be responsible for the application of the law, including all types of surveys on the conformity of the building to the design specifications, all necessary checks on the proper maintenance of equipments, and finally on the energy performances (art. 33 - Survey and Assessment).

Building energy labeling

- The Law 10 introduces the obligation of producing the energy certificate, in addition to all other necessary documents, when a building (or a dwelling) is to be sold or rented (art. 30 - Building Energy Labelling).

This building certification, promoted by the Law 10/91, anticipated the European Directive SAVE no. 93/76/EEC which imposes to the member states the extensive application of energy labeling. Nevertheless, after more than four years, the package of application criteria and norms concerning the building labeling has not yet been delivered! /Ref. 3/

Since neither indication, nor prototype schemes came from the ministerial level, the debate on appropriate assessment methods to be adopted is still open:

- Some experts assume that the labeling procedure will follow the calculation method adopted for assessing the thermal performances of new buildings (FEN), since other

methods, based on real energy utilization, seem to be less reliable, due to the lack of actual information on energy bills and to the interference of users' behavior. /Ref.3/.

- Some others reasonably think that appropriate predictive methods, based on limited information of actual consumptions and other parameters, could reduce the effort/cost of the assessment and provide even more reliable results. /Ref. 5/.

Since, the eventually coming Certification procedure shall be based on norms delivered by the National Standardization Institute (UNI) - which are not yet developed - we may expect the full application of energy labeling procedures after 1996.

Case Study 1. - Energy planning

An example of building energy labeling of a whole regional building stock is represented program that was promoted by the Region of Umbria in 1990. /Ref.4,5/.

The TEP Project - Ten Years Energy Planning for the Residential Sector of Umbria Region very pragmatical, but very ambitious goal:

- to provide to the Region and to the towns of Umbria the guidelines of a multi-annual energy and environmental planning for the residential sector, which shall encourage energy substitution and emission reduction, by promoting local investments, marketing of energy technologies and new employment.

❒ Energy System Analysis

A *dwelling energy code* was developed in order to classify the regional building stock in various categories, each of them representing a particular building type. The *dwelling energy codes* could be seen as *energy labels* worked out for each building category. They are the basic references for implementing the energy balance of the residential sector. (Fig. 1).

❒ Energy & environment policy simulator

Once developed the energy balance for the residential sector, a new tool for energy policy simulation, at the regional and town level, was implemented. The simulation pointed out the energy conservation and substitution potential, taking into account: investment costs, local resources exploitation, and environmental benefits. Energy conservation and substitution strategies were selected and implemented through the *energy code* method: every dwelling *energy code* was matched with the most compatible package of *Energy Conservation and Substitution Opportunities*, so that the effects of any policy could be easily estimated for the whole building stock.. The TEP environmental database was appropriately linked with the energy supply data, providing for each town the environmental balance. (Fig. 2).

❒ Result of energy substitution and building maintenance strategies

Energy & building policies were implemented at the local level, to determine appropri-

ate guidelines for each town. The regional territory was subdivided in various *homogeneous territorial units*, which better reflect the land peculiarities and the local characters.

The following results are available for the regional policy makers:

- energy conservation/substitution potentiality on the local and regional scale;
- costs related to different energy policies for the residential sector;
- environmental assessment of the alternative energy conservation/substitution policies.

❒ Impact and application

The result of the Ten-years Energy Policy for the residential sector in Umbria Region consists of a global budget to be invested of more than 1,000 billion Liras, which corresponds approximately to 500 million ECUs.

Such a very effective policy could reduce of more than 38% the global energy dependency of the residential sector on conventional fossil fuels (2,000,000 MWh/year).

The environmental benefits of the fossil substitution strategy are also significant in the medium term: the abatement of C02 totals 400,000 tons per year, while 2,500 tons per year is the equivalent of particulate pollutants reduction, and 332 ton/y that of nitrogen oxides.

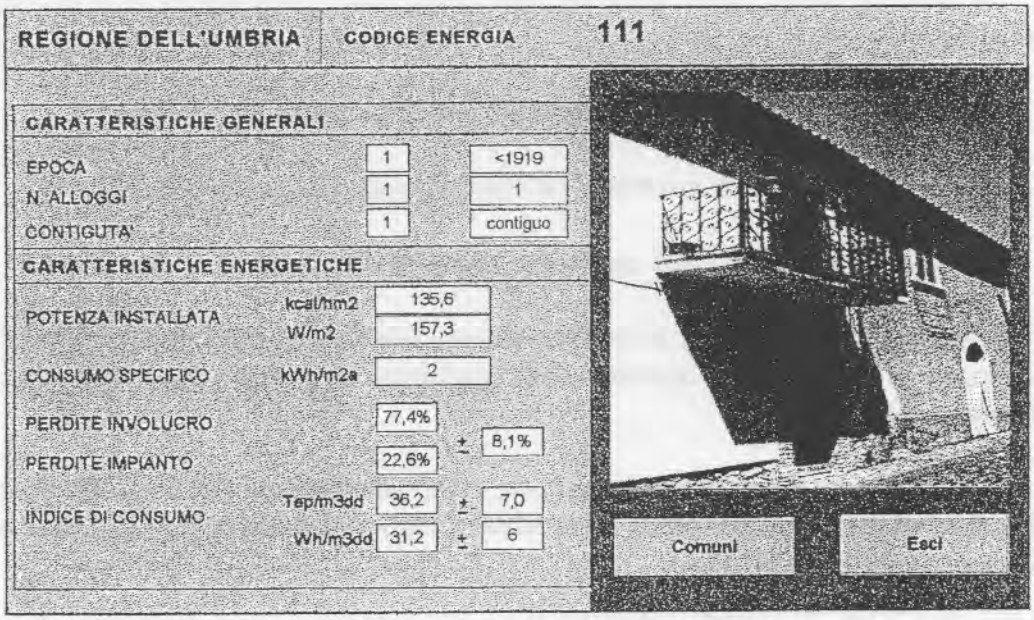


Figure 1. TEP Model - Dwelling Energy Code.

REGIONE DELL'UMBRIA				COMUNE DI	TODI									POLITICHE DI INTERVENTO			
Codici	Superfici abitazioni	Consumi termici	Consumi elettrici	Consumi globali	Pacchetti di intervento										Risp.	Risparmio energetico	Costo	
	m^2	MWh/anno	MWh/anno	MWh/anno	1	2	3	4	5	6	7	8	9	10	%	MWh/anno	M.Lit.	AOI
111	33536	6905	702	9011	x		x			x		x	x	x	32	2921	1627	
112	63392	13460	1796	18848	x		x			x		x	x	x	34	6320	2853	
121	11417	1698	528	3280	x		x			x		x	x	x	24	786	510	
122	56531	7845	1328	11828	x		x			x		x	x	x	22	2641	1938	Totali
131	0	0	0	0											0	0	0	
132	310	37	8	60	x		x			x		x	x	x	49	29	9	
141	0	0	0	0											0	0	0	
142	0	0	0	0											0	0	0	Input
211	13121	2431	203	3040	x		x			x		x	x	x	36	1106	491	
212	10485	2077	189	2645	x		x			x		x	x	x	40	1051	592	
221	5492	849	473	2269	x		x			x		x	x	x	31	700	337	
222	8758	1079	269	1885	x		x			x		x	x	x	37	691	477	Salva
231	190	17	1	20	x		x			x		x	x	x	47	10	441	
232	80	7	0	7	x		x			x		x	x	x	52	3	4	
241	0	0	0	0											0	0	0	
242	0	0	0	0											0	0	0	Esci
311	59241	6924	1307	10845	x					x		x	x	x	26	2790	1777	

Figure 2. TEP Model - Energy policy simulator.

Case Studies - Building certification and energy labeling

- Concerning the global certification of buildings, some enlighten municipalities already implemented the first steps of the environmental quality assessments, introduced by the Law 10. The example of the City of Modena, with the activities listed below, is one of the most interesting:
  - ❒ survey of installed heating equipments in the urban area
  - ❒ mandatory maintenance service of all heating systems
  - ❒ controls of maintenance and operation of equipments
- A relevant activity in the field of building energy labeling in Italy was developed by the Municipality of Milano, in co-operation with Lombardy Region and the Polytechnic School of Milano. /Ref. 6/.
  - ❒ The subject was the implementation of a computer model concerning the energy certification of dwellings, based on a calculation method developed by CEN, now adopted by the Italian energy code.
  - ❒ The output of this program, called CENED, consists of an energy Certificate, which reports the global energy requirements of the building (MJ/y), and the consumption index (MJ/m3 y), both in delivered energy and primary energy. A graduation of the index, from I to 10, allows the surveyor classifying the building.

- An innovatory software prototype for building energy auditing, which could easily represent a powerful tool for energy labeling, as well, is BEAMES (Building Energy Auditing Management Expert System) developed by SOFTECH in co-operation with the Joint Research Centre of the European Commission. /Ref. 7/.

  - The method of BEAMES consists of the full expression of a knowledge based recognition system of maintenance needs of buildings.

  - The tool operates with the support of a neural network to select of Energy Conservation Opportunities (ECO) and to predict the effects due to candidate ECOs, in account of the "experience" coming from the results of a high number of building energy audits stored in the system, which constitute the knowledge reference. (Fig.34).

  - This model has a strong opportunity to become a full package for public authorities and private auditors; it could support them in assessing energy use, specific consumptions, conservation opportunities, cost factors of building retrofit programs on large urban stocks, where accurate energy auditing and labeling could lead to unaffordable costs.

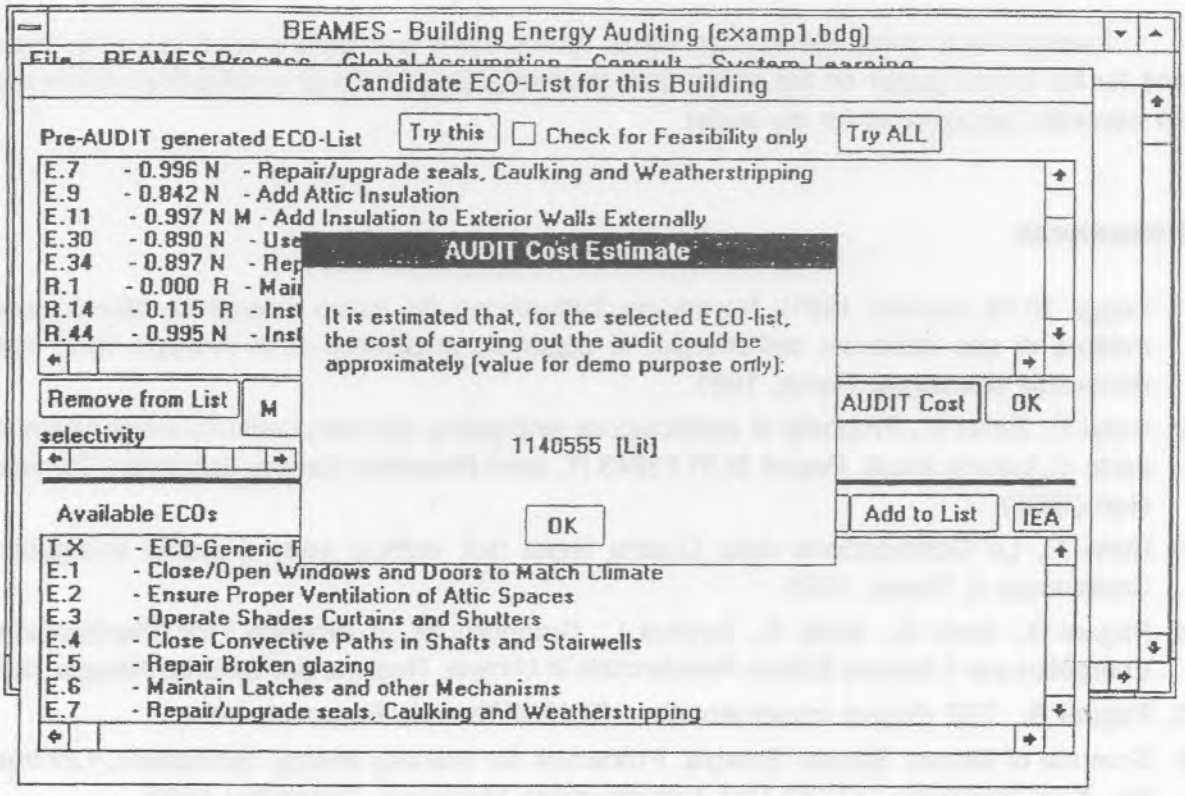


Figure 3. BEAMES - list of candidate ECOs.

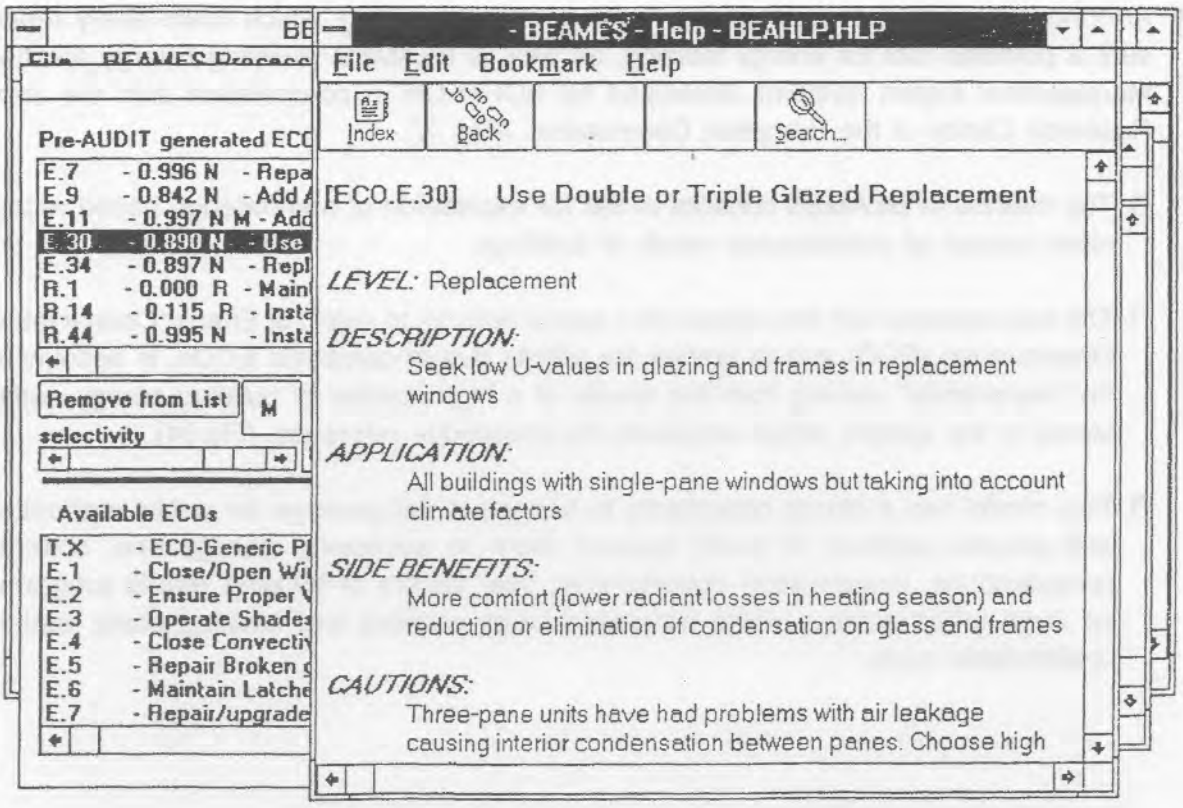


Figure 4. BEAMES - Help on-line.

Acknowledgments

I would like to thank Flavio Conti, JRC, for the many discussions we had on this topic, and for his former paper on the Italian path towards building energy certification, which was an essential background for my paper.

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