

# Building energy labelling in existing buildings

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## 1. SYNOPSIS

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The nature of systems to label the energy performance of existing buildings depends greatly on the national historical context in which they developed.

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## 2. ABSTRACT

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Energy labelling is considered to be an important tool for market transformation. Applied to existing buildings, it is seen as a way to encourage owners and renters to invest in energy efficiency retrofits. A SAVE funded study (BELAS, N° XVII/4.1031/Z/99-261) has investigated how this has been done in 5 countries (Denmark, Ireland, Netherlands, UK, Vermont USA). In addition, preliminary information on a system being developed in France is presented. An analysis is made of the technical, institutional and financial characteristics of each of these labelling systems. Measures of the success of each system are presented. Hypothesis on the relationship between the nature of the systems and the historical and political characteristics of the country are developed. Evidence collected is compared to the "market driven" paradigm, which posits that consumers, when properly informed, will be more likely to invest in retrofits. The study concludes that labelling, when used in isolation, has not been effective in modifying individual building users' and owners' decisions. On the other hand, evidence suggests that labelling can be an effective tool as part of an integrated programme of institutional measures to encourage energy efficiency investments in existing buildings.

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## 3. INTRODUCTION

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Buildings are among the most durable products of our activities and account for a very significant proportion of energy use. It has been estimated that buildings standing today in European countries will account for about 2/3 of buildings sector energy use in 2050. It is also clear that there are considerable opportunities for improving the energy performance of existing buildings, which will continue to offer an important source of energy savings for a long time to come. Labelling<sup>1</sup> the energy use of buildings helps bring market pressures to bear on building owners, encouraging them to make energy efficiency investments. This paper describes the results of a study of existing labelling programmes in Denmark, Ireland, Netherlands, United Kingdom, Vermont (USA), as well as some preliminary information on the developing French labelling system<sup>2</sup>.

The rationale underlying the creation of the labelling systems studied could be summarised as follows:

1. An energy label constitutes consumer information on the performance of a product (the building).
2. Consumers of the product (owner-occupiers, buyers or renters) make their decisions rationally, and will thus integrate this information on the product's quality, and its operating expenses, into their decision making.
3. As a consequence, each type of actor will modify his choices. Owner occupiers will make investments if they are profitable, or if they improve the comfort of the home in a substantial way. Prospective buyers and tenants will prefer energy efficient buildings, which will influence the sale or rental value of buildings. Sellers and those offering buildings for rent will thus make those investments that are cost-effective, that is to say which yield a return of more than the cost of the investment. These investments will be reflected also in the value of the buildings, when they are sold.

4. In the absence of energy labels, it is clear that decision making is often impaired by the lack of information on energy performance and the rational economic behaviour described in point 3 above is not realised. Widespread application and general public awareness of labels should significantly improve the availability of information and hence encourage cost-effective investment.

This paper will attempt to analyse how the functioning of existing labelling systems corresponds to this scheme.

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## 4. ISSUES IN DESIGNING LABELLING SYSTEMS

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The design of an energy labelling system poses a number of major questions, the answers to which depend on the context in which the system is to operate.

### **At what point in the energy value chain should consumption be measured?**

Energy used in buildings is delivered by an "energy value" chain, which starts with primary energy and ends with the useful energy required for specific energy services. Energy losses occur at different points in this chain. Carbon dioxide emissions are likely to be the primary underlying reason for wishing to reduce energy use<sup>3</sup>, so it may be best to measure energy impact directly in terms of those emissions. The point at which energy is measured can radically change the comparative advantages of different fuels and heating systems. In practice, we found labels based on primary energy, delivered energy, useful energy and annual energy cost.

### **Which energy end-uses should be included in the label?**

Energy consumed for heating and domestic hot water accounts for the major portion of energy use in individual dwellings even in Southern European countries. This is mainly through central heating systems but stand alone space heaters and water heaters are also important. (See Table 1). Other uses of energy, in particular for lighting and household appliances, also significantly impact energy use. Which of these uses of energy should be included in the label? In practice most labels are based on space and water heating, which are the energy uses most strongly related to dwelling characteristics as opposed to household lifestyles.

**Table 1. End uses of energy by European households (Source: Eurostat, 1995 data)**

End use	Euro-15	Southern-3 (Greece, Spain, Portugal)	Northern-4 (Sweden, Denmark, Netherlands, UK)
Space heating	68.6%	51.4%	58.8%
Water heating	15.1%	14.3%	22.5%
Cooking	5.3%	13.3%	6.1%
Other	11.1%	21.0%	12.5%

### **In what form should energy consumption information be presented to the user?**

Should energy prices and the impact of climate be taken into consideration in the information presented to users? Possible responses vary from a "building quality label" which is independent of both energy prices and climate, to a label that depends on estimated cost for the building, which is of course dependent on both. Some of the systems we studied use quantitative engineering expressions, others use index numbers and some combine the two approaches. Typically, the information presented to the households consists of both a numerical rating (either as an index or in energy units) and specific recommendations on how energy efficiency could be improved.

### **Should investment and operating costs be taken into consideration?**

If the rationale for labelling is based on providing relevant "product information" to prospective consumers, it could be considered logical to base the label on life cycle costing, and to take it into account all investment and operating costs. Furthermore, proposed energy saving measures should also be evaluated over their useful life.

Despite the attraction of life cycle costing, it is not used by any of the systems we studied as their primary basis for calculating a label.

#### **Who pays for labelling? How much does it cost?**

Unlike mass produced goods, such as electrical appliances, existing dwellings are effectively unique and require individual surveys to collect the information needed for a label. Depending on the level of detail required, the cost of collecting the necessary information may be significant. Systems in use vary widely in detail and cost, from those where consumers can produce the label themselves (as in the system that has been proposed for France) to those requiring a detailed survey by a qualified surveyor. Governments may choose to subsidise part of the cost of labelling. We found a very wide range of cost estimates, which depend principally on whether labelling is done as a stand-alone activity or in conjunction with a wider building assessment or survey.

#### **Which institutional measures accompany labelling?**

Labelling can be made obligatory (as in Denmark) or can be made a condition for access to specific financing mechanisms for home improvements (as in Vermont and the Netherlands). It is also usual for governments to intervene in the definition of labelling systems to prevent the consumer confusion which would be caused by having different labels arising from rival systems.

#### **What is the relationship between labelling and building regulations?**

Energy consumption in new buildings is subject to building regulations and codes and some governments have sought to extend those regulations to cover the refurbishment of existing buildings. Energy labelling has been used as a way of showing compliance with regulations, for example in Ireland and the UK.

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## **5. HOW CONTEXT AND STAKEHOLDER STRATEGIES INFLUENCE LABELLING SYSTEMS**

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A number of different stakeholders have actively participated in the development of building energy labels, while others have reacted to their development, both positively and negatively. Researchers, looking for ways of quantifying and demonstrating the benefits of energy efficiency were in some cases the instigators of energy labels, which then found support among special interest groups, such as those campaigning to alleviate problems arising from poor heating in badly insulated houses. Consumer organisations support the principle of labelling, as it enables individual consumers to make better informed choices. Commercial organisations have seen the delivery of energy labelling as a business opportunity, both as way of promoting the sale of energy efficiency related products and as an activity in its own right. Governments (national, regional and local) have shown varying degrees of enthusiasm for labels, attracted by their potential for promoting better understanding, encouraging investment and applying regulation with greater flexibility.

The European Union reflected a broad level of support for the principle of labelling by including it in the COUNCIL DIRECTIVE 93/76/EEC of 13 September 1993, which aimed to limit carbon dioxide emissions by improving energy efficiency (SAVE) - often referred to simply as the 'SAVE Directive'. The Directive requires that 'Member States shall draw up and implement programmes on the energy certification of buildings'. The term 'certification' is in practice not clearly differentiated from 'labelling', although it implies the issuing of a certificate to show that the process has been completed in accordance with an officially sanctioned procedure.

Of the issues identified in chapter 4 above, the cost of labelling and the legal framework surrounding it seem to have been the most prominent. Concern about the cost of labelling has significantly influenced development in several of the countries studied, leading to efforts to simplify data requirements and procedures. In particular, the cost of producing a label as a stand-alone activity appears to be significantly higher than households are willing to pay. Legislation supporting labelling has also been a very important consideration, with governments showing a varying degree of willingness to make labelling mandatory. Where that has been done, governments have usually preferred to make use of existing legislation, such as building regulations. Technical and presentational issues have been debated at length in some countries (for example, the UK) but have not proved difficult to resolve. Descriptions of how these and other issues have been dealt with may be found in the next five sections below.

Almost all the labelling systems studied<sup>4</sup> share a common objective: to encourage energy efficiency retrofits in existing housing. The sole exception is the Irish Heat Energy Rating, which in its present form can only be used to show that new houses comply with building regulations. Furthermore, the systems studied are all applied in roughly similar circumstances: rich industrial countries with climates requiring a substantial amount of heating. One might then expect that the systems would be roughly similar to each other, although they might not be applicable in countries with hot climates or with radically different levels of economic development.

There are indeed similarities between the systems studied. They all use some combination of data collection and calculation to present information to building users about energy consumption. The reliance on calculation is almost inevitable because of the highly disparate nature of existing buildings, as noted above. So, unlike labelling for appliances, it is not possible to determine performance by identifying a model or type, examples of which have been tested and their performance assumed to apply to all. Neither is the measurement of energy use of an existing house a practical proposition: utility meter readings may be accurate but the consumption they show is so dependent on occupant preferences that they relate only loosely to the performance of the house. Therefore the reliance on calculation rather than measurement does not arise from any surprising convergence of ideas - it is probably a simple recognition of the difficulty of doing otherwise. The Danish system for multi-family buildings is the only one that uses metered energy consumption in its calculations: this is possible because such buildings rely on a single heating system and the differences due to individual households are averaged over a large number of cases.

Despite those similarities, closer analysis reveals surprising differences in the technical and organisational details of systems studied. This appears to be due to the widely different contexts in which they operate.

- The objectives, as understood and presented by designers and actors of the systems are in fact quite different.
- While automobile manufacturers can think in terms of a "world car", houses are not internationally traded goods. As a consequence, the building trades and the housing stocks are marked by substantial differences between countries, due to complex interactions between historical, technical and cultural factors.
- Since the institutional contexts differ substantially, the institutional tools used also vary considerably.

In the following paragraphs, we describe the links that the study found between the national context of each system, and its technical and organisational nature.

### **Denmark**

The Danish labelling system was developed in the context of a long history of labelling activities, starting with the heat consultant scheme in 1992, and a labelling programme for public buildings in 1993. These were later extended to large and small private buildings. The current system, which takes different forms for single family and multi-family dwellings, was created by the DTI (Danish Technology Institute) in 1996 for the Danish Energy Agency and continues to be operated by the DTI. It is mandatory, a label being required when a single-family house is sold and annually for a multi-family building. Because it is detailed and thorough, it is relatively costly.

Denmark has worked hard to improve the energy efficiency of its housing stock since the 1970s so it is perhaps not surprising that it has the most ambitious energy labelling system in existence. Public awareness of energy and environmental issues also seems strong in Denmark, which may have helped acceptance of the significant cost that has to be borne by those selling houses. This cost has certainly been seen as a significant barrier to acceptance in other countries, likely to be highly unpopular both with house owners and with professionals engaged in house sales.

It is clear that the prime mover behind the development of building energy labels in Denmark was central government and its agencies. Their involvement predates the SAVE Directive and was probably a key factor leading to inclusion of labelling in the Directive. Compared to the governments of the other countries studied, the Danish government stands out for its willingness to support energy labels by legislation and to accept that significant costs will be incurred as a result. In return, it expects that those costs will ultimately be justified by the benefits they will produce in lower energy consumption and carbon dioxide emissions.

## France

Development of a labelling system was mandated by a 1996 law on Air Quality. After 5 years of development, the system is scheduled to become operational in June of 2001, and will be obligatory for all sales and rental transactions of dwellings. The obligatory nature of the system, linked with low public support for expensive labelling surveys introduced a strong design constraint on development of the French system: it must be simple enough to be able to be carried out by most owners without professional assistance. In particular:

- The data needed to calculate the label must be known to most owners. Data collection must not require any kind of destructive or intrusive investigation, nor depend on any records and documents that would be unavailable for many existing dwellings (in particular precise plans or bills for past improvements).
- The data should be easily verifiable by the buyer or renter, and should be of such a nature as to avoid disputes.
- While computer software will be available to calculate the label, it should be possible (at least for the large majority of dwellings) to carry out the calculation algorithm without a computer, using simple arithmetic and the consultation of simple tables.
- It does not include suggestions for improvements.

It is not yet known what accompanying measures will be put into place. In particular, although the label will be obligatory, there is not yet any enforcement mechanism. It is assumed that a certain number of market actors will put into place labelling services, perhaps as a free service in the context of some other commercial activity.

While the resulting system is rudimentary (when compared to the Danish system), it is hoped that its low cost and simplicity will aid in its rapid dissemination. The system's designers expect that the simple nature of the data involved will prevent a high rate of disputes over the validity of the ratings.

## Ireland

Irish interest in the energy labelling of buildings dates back at least to the early 1990s when the Irish Energy Centre was commissioned by the government to develop the Heat Energy Rating (HER) in time for its incorporation in the 1997 revision of the Building Regulations. The rationale behind the use of HER is given in Clause 0.2 of *Technical Guidance Document L – Conservation of Fuel and Power*, which states:

“The EU SAVE Directive (Council Directive 93/76/EEC) requires all Member States to draw up and implement programmes for the energy certification of buildings. The introduction of a method of Heat Energy Rating in this document is one of the measures being taken to implement this Directive in Ireland.”

This statement clearly identifies the action as a response to the SAVE Directive. It also alludes to further measures to be taken in Ireland. The government also expressed hope that the energy rating system would be widely used to market houses and, if so, the question of introducing compulsory energy rating for houses could be considered later. Thus it may be inferred that the government saw the introduction of HER into the Building Regulations as the start of a process that could lead to further government action. A more recent government reference to labelling was made in the Green Paper on Sustainable Energy<sup>5</sup>. This suggests that labelling might be made compulsory when houses are sold, but expresses reservations about costs.

It concludes that:

“Building labelling is likely to remain expensive even if the costs are lower than the Danish scheme and will only be justified when it will stimulate substantial savings. This is unlikely to be the case for newer buildings conforming to modern regulations. This suggests a buildings labelling scheme is likely to be most applicable to older houses (pre-1980) where, in conjunction with other measures described below, it might be expected to yield large savings.”

It is clear that Irish government has been the prime mover behind building energy labelling in that country, but there has also been a significant input from a commercial organisation called NICER. The founders of NICER were motivated by a strong personal interest in energy efficiency and a desire to develop business activity in the delivery of labels. NICER developed its own labelling system, known as the Energy Rating Benchmark (ERBM), with partial assistance from a SAVE project, and hoped that EBRM would be adopted by the Irish government as its official system. However, that did not happen, at least in part because of the government's

initial focus on a label to be used in conjunction with building regulations, which demanded simplicity and a publicly defined system that anyone could adopt. The EBRM is relatively complex and the software used to calculate it is proprietary to NICER.

Although not used in the context of building regulations, EBRM has contributed to the overall picture in Ireland by exploring the market for voluntary labelling in other areas. Its principal success has been in new gas heated houses, where it has been supported by the principal supplier of natural gas, which sees it as a way of demonstrating the advantages of gas heating.

The Irish government position on building energy labels can best be described as cautious. It has responded to the EU Directive in a limited way but is concerned about imposing additional costs on households, particularly as it is not convinced of the cost-effectiveness of such actions.

### **The Netherlands**

While the current Dutch system, the "Energie Prestatie Advies" (EPA) is very new, it is based on previous schemes run by the electricity utility companies. During the mid 90 's, the "Energie Prestatie Bestaande Bouw" (EPB) method targeted social housing and large renters. The EPA method, put into operation during the year 2000, is thus a successor to EPB. It was developed jointly by the energy utilities and NOVEM.

The report prepared for the BELAS project was strong on technical detail about the Dutch system. On the other hand, information on the policy and institutional context for labels in the Netherlands was not available to the authors of this paper at the time of writing, since this information is being developed through an ongoing evaluation (carried out by Dutch authorities, it should be completed before the end of 2001).

### **UK**

Attempts to introduce energy labelling for houses in the UK date back to around 1980, but took time to gain acceptance. Two sets of actors have been key contributors throughout. Central government, firstly through the Department of Energy and later the Department of the Environment, were strongly instrumental both in funding development of the methods underlying labelling systems and in providing a market for energy labelling through regulations and the procedures it applied. Energy labelling service providers have also been vital to the process of development. Initially, they were typically individuals working within other organisations, including local government and universities, but they later developed into service providers with at least a partial commercial stake in the process of energy labelling. A wide range of other stakeholders have had some part to play in the development of home energy labels in the UK.

- House builders and developers have shown widely differing levels of enthusiasm for labels. Some have taken a very positive interest, seeing labels as a way of showing high quality in their houses, while others have seen labels as an unwelcome additional cost.
- Energy supply companies have used home energy labels as a way of showing the advantage of using their particular fuel (particularly in the case of natural gas) and of meeting their obligations to provide energy advice to householders.
- Manufacturers and installers of insulation materials and other energy efficient products have generally adopted a positive position.
- Consumer organisations have supported the concept of energy labels for providing useful advice to householders.
- Managers of social housing have used labels to assess their stocks of dwellings for 'affordable heating', setting targets and prioritising improvements that benefit both their tenants and themselves as landlords.
- Architects with an interest in energy efficiency have used labelling systems as part of the design process.
- Surveyors have incorporated energy labelling within the range of services they offer.
- Estate agents have generally shown little interest in labels and may have to change their views in response to the proposed legislation.
- Organisations campaigning for affordable heating have used labels to show the need for improvements in the housing stock.

An unusual feature of the British situation was the role played by organisations established specifically to deliver building energy labels, and the intense rivalry that developed between them in the early 1990s. Two organisations, Starpoint and National Home Energy Rating (NHER), developed independent systems, which, although similar, were different enough to be incompatible. The government initially gave encouragement to

both systems but was eventually forced to intervene in 1993 to define a common basis for the numerical rating produced by a label. This is the so-called Standard Assessment Procedure (SAP) which defines a rating method to be used in labels. SAP was adopted by Starpoint and others as the principal basis for its labels, and subsumed within the broader ranging NHER system. This rivalry was probably unhelpful in that it hampered understanding of the labels, but it had a positive effect in forcing the rival providers to refine their systems, both to deliver better service and to reduce costs.

The cost of labelling has been at the centre of the debate about labels in the UK. The government was attracted by the idea of labelling, precisely because it saw it as a market mechanism and a potential alternative to regulation, which it wished to minimise. Ideally, therefore, it was looking for a system that would be market driven and would operate without either legislation to require it or subsidy to encourage it. In practice, it soon emerged that the public was willing to pay little or nothing for the information in the label, especially if the payment was to be made exclusively for the label itself. So attention was focussed on ways of minimising the cost and including it in a more comprehensive assessment of the building. When houses are sold, such a survey commonly takes place, either commissioned by the buyer or, more frequently, by the mortgage lender. There are clear advantages in adding energy labelling to that survey, rather than doing it separately. Firstly, the cost is considerably reduced (as the same surveyor can do both tasks) and the payment for it can be made as a small addition to the price of the overall survey, which is typically much larger. Secondly, the timing is right, as the information is presented to the potential buyer when it can be taken into account both in deciding which house to buy and which improvements may be subsequently required.

Although the government was reluctant to impose costs on either households or industry, it realised that a market for labels would not develop without any intervention on its part. It therefore sought ways of linking labels to existing legislation, particularly building regulations. The regulations were revised to allow a good energy label (specifically a high SAP rating) to be used as a way of showing compliance. The regulations also required that a SAP rating be calculated for all new dwellings. The government also introduced labels into its administrative procedures for dealing with social housing providers. Together, those actions effectively created a market for the service providers and enabled the growth of a small energy labelling industry. It also allowed the passage of legislation introduced to parliament as 'private member's bills', which encourage the use of labels. And, most recently, it has included energy labelling as part of a survey that would apply to most houses when sold. This is part of a proposal for the general reform of the way in which houses are sold in England and Wales and which is currently being piloted in advance of new legislation being passed.

In summary, it may be observed that the home energy labels have found widespread support in the UK, both by government and others. Their ideological appeal as 'market based' has clearly formed part of their attraction to government and their service providers have provided significant impetus to their development. However, sustained efforts to develop a true market for labels have not been successful. A limited market has been generated through government action on building regulations (for new houses) and social housing. Government doubts about cost-effectiveness and unwillingness to impose new costs have, so far, held back legislation to require labels in existing houses.

### **Vermont (USA)**

The Vermont labelling system is one of many similar Home Energy Rating Systems (HERS), which exist in 47 out of 50 states in the United States. The Vermont HERS is one of the oldest and best established, tracing its first elements back to 1987. The system accounted for 650 ratings in 1999, and use is increasing. New construction accounts for 90% of labelling activity.

The USA HERS systems have grown in a somewhat contradictory context. On the one hand, labelling is supposed to be a market activity, which should be (or at least should become) self supporting. On the other hand, the systems which have achieved any degree of success have benefited from strong government support. This support has taken two forms.

- State governments have partially subsidised the labelling operation.
- The labels have benefited from a link with advantageous loans for purchase of an energy efficient home, or for carrying out energy related home improvements.

Several evaluations have concluded that none of the US programmes is on the way to economic viability without government support<sup>6</sup>.

The link with loans corresponds to a specificity of the American financial system for home purchase and improvement. While the loans are made by several thousand independent financial institutions, the loans are refinanced through two federal government institutions (known as "Fanny Mae" and "Freddie Mac"). Therefore the federal government has a ready made instrument for intervention in the housing market. Furthermore, in contrast to the general political tradition which limits or precludes government intervention in private market activities, there is a long and accepted tradition of using home financing as a means to carry out government policy, dating back to the "GI loans" which facilitated home purchase by soldiers returning from World War II.

The US government has used the financial lever to "subsidise" home loans at little or no cost. Private institutions are encouraged to offer reduced interest rates on energy efficiency related loans. When the rate reduction does not benefit from federal government subsidies, it is usually limited to 0.25%. This nominal rate reduction is used by lenders as an advertising tool. Furthermore, the limit on how much a lender can lend for a home loan is higher for energy efficiency loans. This limit is calculated using a government specified procedure based on a family's disposable income. Since the buyer of an energy efficiency home will have lower operating expenses, it is logical to increase the loan limit. Since most buyers borrow up to their limit, this "no cost" measure, by permitting borrowers to borrow more, reorients the market towards the energy efficient homes.

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## 6. HYPOTHESES FOR CONSIDERATION

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It would be presumptuous to draw general conclusions on the basis of the limited study reported in this paper. Rather, we formulate a number of hypotheses, which the project team believes reflect field experience. In particular, they indicate the limitations of the 'rational behaviour' assumptions described in our introduction, which underlie many existing labelling systems.

### **The market alone cannot sustain the use of labels by individual home owners**

Experience seems to show that the "pure market based" theoretical scheme is not a workable basis for a national labelling system. In unsubsidised, non-mandatory systems with no financial accompanying measures, very few individual home owners, buyers or renters are willing to pay the price to have the labelling information. All the labelling systems studied which reach more than a small percentage of individual homes had some other type of driving force.

Furthermore, individuals (as well as large companies) apply rational criteria in a limited way to their economic decisions. Purchase and rental decisions involve a large number of criteria (location, neighbourhood, proximity of services, etc.) which are largely preponderant in an individual decision process. Operating costs (of which energy costs are only a part, albeit a major part) are only marginally taken into account. Thus, in most cases, the causal link between an energy savings investment and an increase in the price of a home does not exist in a visible enough manner to convince sellers and renters to invest.

### **To become successful, labelling must be "pushed" by institutional users, or "pulled" by government accompanying and/or regulatory measures**

In the systems studied, several types of solutions or conditions seem to contribute to the use of labelling.

1. **Use as a basis for reporting and specifying performance.** The UK government's use of labels as a basis for reporting the energy performance of social housing authorities has clearly contributed to the development and uptake of labelling in that country.
2. **Use by major economic agents.** Use by the gas company in Ireland as a sales tool has also helped sustain interest.
3. **Legislation.** Denmark stands apart from the other countries studied in having made labelling mandatory for existing buildings, while in the UK it is mandatory for new houses. Legislation may also be used to encourage labelling by offering it as an optional way of showing compliance, such as in the Irish Building Regulations. The new French system which will go into operation before the end of 2001 is also based on a legal requirement making labelling obligatory.
4. **Financial accompanying measures.** Several systems make labelling a condition for some kind of financial accompanying measure. In the Netherlands, the label is a condition for obtaining additional subsidies for



energy related home improvement investments. In Vermont (and many other places in the USA), the label is a condition for getting special low interest loans for home purchase or home improvement.

5. **General consumer consciousness of energy consumption.** Labelling works better in cold climates where most everyone is sensitive to energy related costs. Furthermore, the whole gamut of government sponsored energy or environment programmes contribute to general awareness, including in the area of building energy use.

### **The institutional context of labelling can contribute to user acceptance of the system**

Training of surveyors as well as quality control are elements which contribute to user acceptance of labelling systems. Stakeholder involvement in the management of the system seems to be a positive element in the Danish system.

### **Energy labelling, when integrated into a well-designed overall approach and programme, can contribute to inducing energy savings investments**

It appears that labelling, in isolation, does not transform market activity in energy savings investments. Rather, it is an information tool, which can become a decision making aid, if there exists:

- A demand for information, resulting from user awareness of energy considerations;
- An institutional framework, resulting from political will, which makes it sufficiently easy for users to act on the information.

In the UK, labelling has been used by social housing authorities to prioritise energy savings investments. In Netherlands, the past programmes including subsidies, did in fact lead to a significant flow of energy savings investments. In Denmark, a survey of home owners indicates that a large proportion has, or intends to, put into practice the energy savings recommendations of the label. The Danish situation is a special case, since, although the label is mandatory, the investments are not subsidised. In Vermont, integration of labelling into financing schemes constitutes a package leading from awareness to the decision to invest.

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## **7. CONCLUSIONS**

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1. There are wide variations in the practice of energy labelling of buildings between the systems we have studied. These variations are technical, such as the choice of the basis for quantifying energy use and calculation of labels, and administrative.
2. There is no consensus about what constitutes best practice, which appears to be strongly influenced by the context applying in the country in which the label originates.
3. The cost of producing labels is a significant factor inhibiting wider application.
4. Study results support the hypothesis that the market alone cannot sustain the use of labels by individual home owners. Such an outcome has not been achieved to date in the countries studied; in the UK this is despite sustained efforts to develop a market model.
5. Legislation has been used to increase the uptake of labelling both directly (as in Denmark) and indirectly (as in the Irish building regulations). It seems likely that only a direct legal requirement can succeed in achieving a high uptake of labels for the foreseeable future. This is the solution adopted in Denmark, and in the French system which is scheduled to enter into operation before the end of 2001.

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## 9. END NOTES

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<sup>1</sup>The terms used in the context of energy labelling are not always precise or uniformly applied. In this paper, the term "labelling" is used to describe the entire operation consisting of an "inspection" or "audit" of a building (or evaluating building plans, in the case of new construction), calculations based on collected data, and presentation of this information to users in an appropriate form. The information given to users may or may not take the form of a label or certificate. Note that in other publications the terms "rating" or "certification" are used for part or all of this operation. The term labelling has been chosen as most appropriate in the context of the SAVE programme, which uses the same term for other energy consuming products.

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<sup>3</sup> Energy production produces many adverse environmental impacts, including nuclear waste, acid rain and oil spills, but CO<sub>2</sub> is the principal focus for EU international environmental policy.

<sup>4</sup> Data on the existing systems (see bibliography) was collected in the course of the SAVE BELAS project by: George Henderson (UK and Ireland); Xavier Loncour, Peter Wouters, Guy Vekemans (Netherlands); Michael Phillips (USA); Henrik Poulson (Denmark). Data on the new French system was furnished by Bernard Sesolis.

<sup>5</sup> A 'green paper' is a document setting out government policy, often with the intention of promoting discussion in advance of drafting new legislation.

<sup>6</sup> Edmunds, Megan; *Will Home Energy Rating Systems Become Market Driven?*; Home Energy Magazine; September/October 1997.