# Impact assessment study on a possible extension, tightening or simplification of the framework directive 92/75 EEC on energy labelling of household appliances

## A report by Europe Economics and Fraunhofer-ISI with BSR Sustainability and FfE

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# 1 EXECUTIVE SUMMARY

1.1 This report was commissioned by DG Energy and Transport (DG TREN) in order to identify and evaluate possible ways of achieving the Commission's policy objective of promoting energy savings by pulling the market towards more energy efficient products by raising consumers' awareness through the compulsory labelling of products at point of sale.

1.2 Our approach to this work, agreed with DG TREN, has been to:

(a) review evidence on the achievements of energy labelling under the existing schemes and establish a baseline of energy consumption by product category;

(b) Carry out technical studies of selected products to identify the scope for energy savings from the use of higher efficiency models and the extent to which labelling might be expected to encourage greater use of these models;

(c) Carry out a series of stakeholder interviews in seven Member States;

(d) Review the options for future action identified by DG TREN in the light of our research.

*Achievement of labelling to date*

1.3 There have been a number of studies of the impact of the labelling directive. These track the increased take up of higher efficiency appliances over the past decade. Of the appliances covered by implementation directives the impact has been greatest for white goods, particularly refrigerators, freezers and washing machines. The majority of these products sold today carry an A or B rated label or better compared with the majority of products sold in 1994 carrying a D rated label or worse. The take up of higher energy efficient appliances has been greater in the EU15 than in the newer Member States but even in the new Member States sales of A and B rated products predominate.

1.4 The increased take up of higher efficiency appliances has led to significant improvements in the average efficiency of newly purchased appliances. For refrigerators and freezers, washing machines and dryers the improvement in average efficiency since 1996 is estimated to be in the range 20 – 35 per cent. This move to higher efficiency appliances contributed to annual energy savings over this period in the order of 24 TWh to 34 TWh. That is a reduction of around 10 to 12 per cent in the energy consumed by these products. It is estimated that with the current policies already in place, 65 TWh to 75TWh per year could be saved by 2010. While it is difficult to separate out the impact of labelling from other factors it has been estimated that the labelling schemes could account for up to half of the increased take up of higher energy efficient products, contributing savings of 12 – 17 TWh per year.

*Scope of existing policy instruments*

1.5 There are four main policy instruments which address different aspects of the labelling of a range of energy using products. These are:

(a) Council Directive 92/75/EEC which provided the framework for the compulsory provision of information on energy consumption and other features by means of labelling for specified household appliances.

(b) European Parliament and Council Regulation (EC) 1980/2000 on a revised Community eco-label award to promote products which have the potential to reduce negative environmental impacts. This is referred to here as Eco-labelling.

(c) European Parliament and Council Directive 2005/32/EC which established a framework for setting minimum ecodesign requirements for energy using products. This was followed by Regulations designating specific products to be researched and covered by these requirements. Referred to here as the Ecodesign Directive

(d) European Parliament and Council Regulation (EC) 2422/2001 on a voluntary Community energy efficiency labelling programme for office equipment based on an agreement with the United States government for the use of its Energy Star label. Referred to here as Energy Star.

*Options for action*

1.6 The principal options for extending the scope of labelling that we have considered are:

**Action 1:** Extending labelling to additional household appliances, such as televisions and other consumer electronics.

**Action 2:** Extending labelling to non-household appliances, such as electric motors.

**Action 3:** Extending labelling to non-energy using products, such as windows and tyres.

1.7 The principal options for improving the operation of existing labelling schemes that we have considered are:

**Action 4:** Development of dynamic labelling with periodic reviews and rescaling of the A – G ratings;

**Action 5:** Provision of additional product information as part of the label, such as annual energy consumption, emissions and running costs;

**Action 6:** Increasing provision of labels on internet sales;

**Action 7:** Tighter tolerances in the technology standards for A – G ratings;

**Action 8:** Better enforcement of the labelling requirements in respect of both manufacturers meeting the set standards and retailers displaying correct information;

**Action 9:** Legal protection of the label;

**Action 10:** Implementation through Regulation rather than Directive.

1.8 We also considered the possible repeal of the Directive, reliance on voluntary agreements and the do-nothing action. (**Actions 11, 12 and 13**)

1.9 Where possible we have taken into account quantitative estimates of the potential impact of particular policy actions but this has not been possible for all the relevant areas of costs and benefits. The final evaluation of the balance of costs and benefits is therefore qualitative.

1.10 The Table 1.1 sets out the overall benefits of each action cross-tabulated against the policy options of working within existing legislation, amending or appealing the existing provisions. This is based on our assessment of the overall degree of impact which the actions might be expected to have taking into account both the costs and the benefits identified. The 'Do nothing' option – that is to continue with labelling in the forms currently in place is considered as a baseline. These costs and benefits are set out in more detail in section 7 of the report.

1.11 Significant positive gains can be made through actions which can be taken now using existing legislation. Labelling by both manufacturers and retailers can be extended to additional household appliances in this way (Action 1) using the Energy Labelling and Ecodesign Directives. This is listed against the 'No amendment' policy option in Table 1.1. Labelling of non-household products (Action 2) could be extended to manufacturers using the Ecodesign Directive, but extending labelling of these products to display by retailers, which might offer some additional benefit, would require an amendment of the Energy Labelling Framework Directive. Action 2 is therefore listed against both the 'No amendment' and the 'Amendment' policy options in Table 1.1. Extension of labelling to non-energy using products (Action 3) would require amendment of existing Framework Directives. Development of dynamic labelling schemes (Action 4) could largely be achieved with existing legislation but might be enhanced with amendment to the Framework Directive. Actions 1, 2 and 4 are the areas where we have identified the most significant potential for net benefits. These are highlighted in green in the table with particular emphasis on actions which can be taken without further legislation. Other possible actions deliver benefits on a smaller scale. The main areas of benefit in this category are highlighted in yellow in the table.

**Table 1.1: Summary of costs and benefits for each action***

| | Action[1] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Policy Option** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **No amendment** | +++ | ++ | | ++ | + | + | + | + | = | | | | |
| **Amendment** | | ++?<br>+ | +? | ++?<br>+ | + | + | + | + | | = | | | |
| **Repeal Directive** | | | | | | | | | | | -? | | |
| **Do nothing** | | | | | | | | + | | | | -? | + |

** Where +++ = very large overall benefit, ++ = large overall benefit, + = moderate overall benefit, = = benefit is the same as cost or ambiguous, - = moderate overall cost. ? indicates particular uncertainty about likely outcome.*

1.12 This simplified table masks some complexities between the policy options. "No amendment" shows the potential for benefits which could be achieved without major new legislation. There may be further benefits that could arise from the "amendment" policy option. The scoring shown here for the 'Amendment' option is our assessment of the combined effect of taking advantage of the actions available under 'no amendment' and any additional benefits resulting from 'amendment'. It is not the incremental benefit from the further gains from taking forward the 'Amendment' option on top of actions under existing provisions. Going down the 'Amendment' route in addition to the 'No amendment' options could incur time as well as additional implementation costs. These may deliver additional benefits but should not get in the way of taking forward beneficial actions which do not require this new legislation.

1.13 There is a strong rationale for policy intervention to encourage energy efficiency. The potential for further benefits from intervention are far from being exhausted and the 'Do Nothing' baseline would not take advantage of these opportunities. The other options considered nearly all offer some benefits over and above this baseline and this assessment provides the basis for setting an order of priorities for the next stages of work.

1.14 The principal benefits from new actions should come in the form of reduced energy consumption delivering lower costs to consumers and reduced emissions. The cumulative nature of these benefits means that quite small initial improvements have a substantial impact over a period of years. A ranking of options can be made on the basis of identifying products which account for high levels of electricity and other energy

1.1

[1] Where 1= extending label to additional household appliances, 2= extending label to non-household appliances, 3=extending the label to non-energy using products, 4=development of a dynamic label, 5=provision of additional information, 6=increasing provision of labels on the internet, 7=tighter tolerances, 8=better enforcement of the label, 9=legal protection of the label, 10=implementation through Regulation instead of Directive, 11=repeal of Directive, 12=reliance on voluntary actions and 13=no action.

consumption particularly where, in the absence of further information provided by labelling, consumers may be expected to make their choice based on lowest installed cost and not on energy savings.

1.15 As Table 1.1 shows the overall benefits from actions which can be implemented using the policy option of No Amendment clearly yield the greatest overall benefit (with the above caveat). The no amendment implementation route is also attractive because it allows the Commission to focus immediately on issues and address them swiftly.

1.16 The actions which appear likely to deliver the greatest potential benefit are the extension of labelling to boilers and to a wider range of household appliances using the Energy Labelling Directive and Ecodesign, the extension of labelling to non-household products using Ecodesign and the development of dynamic labelling in place of the current static A – G scale using a combination of powers under the two Directives.

# 2 INTRODUCTION

2.1 This report was commissioned by DG Energy and Transport (DG TREN) in order to identify and evaluate possible ways of achieving the Commission's policy objective of promoting energy savings by pulling the market towards more energy efficient products by raising consumers' awareness through the compulsory labelling of products at point of sale.

2.2 Our approach to this work, agreed with DG TREN in our inception report has been to:

(a) review evidence on the achievements of energy labelling under the existing schemes and establish a baseline of energy consumption by product category;

(b) Carry out technical studies of selected products to identify the scope for energy savings from the use of higher efficiency models and the extent to which labelling might be expected to encourage greater use of these models;

(c) Carry out stakeholder interviews in seven Member States;

(d) Review the options for future action identified by DG TREN in the light of our research.

2.3 At the conclusion of our study we compare the various options for action and make recommendations as to what Commission priorities should be in this area.

# 3 RATIONALE

3.1 The first step that one needs to conduct when carrying out an impact assessment is to determine the rationale for intervention. In the case of the European Commission this means two things: first to identify the problem with the status quo and the reason why public action is required and second to determine why the Commission is better placed to intervene than Member States.

3.2 There are a number of good reasons why public intervention is required in the field of energy efficiency in general and in energy labelling in particular. Increased efficiency in use of energy reduces costs to consumers and business and reduces emissions; has social, competitiveness and environmental benefits. In addition it can be a very cost effective way of fulfilling the Kyoto commitments of the EU and help put the Union firmly on the road of its goal for a sustainable energy future.

3.3 An increase in the use of energy efficient products requires consumer and user awareness as well as the provision of clear and easily understandable information from manufacturers and retailers. Such information is unlikely to be provided in the form and on the scale required without some degree of government intervention.

3.4 The main economic problem that is present in the market for energy using products and, in some cases, non-energy using but energy saving products is that the price paid by the consumer at the time of buying the products does not reflect the total of energy and other resources[2] used or the amount of emissions attached to the use of energy and other resources through the entire life of the product. Therefore consumers do not take into account the lifetime costs of their appliances when making purchasing decisions as they often lack the relevant information on which these decisions should be based.

3.5 Therefore the buying price of the product does not reflect its true cost to society. Furthermore, it is possible that more energy efficient products would be more expensive to build as they may require more expensive materials or a more elaborate manufacturing process. Thus, if we assume that consumers/users base their decision only on the purchasing price of the appliance it is straightforward to see that we would end up in a situation where society has too many “non-efficient” products compared to a situation where more information on the energy efficiency of the products was available.

3.6 In this respect however it is important to distinguish between appliances for domestic use and machines for industrial use. It is reasonable to assume that households would be

1.1

[2] For instance in the case of washing machines and dishwashers the amount of water used in a standard cycle.

more inclined to make their purchasing decisions simply on the basis of the price of an appliance (assuming that no other information is provided at the time of the purchase) given that it is unlikely that they would be fully informed on the running costs in terms of energy use or emissions of the appliance they are buying. Large industrial and commercial users on the other hand are likely to know (or at least to have a reasonable estimate) of the running costs associated with the machinery they buy given that they are more likely to use these machines in their production process and should know the costs associated with them.

3.7 An additional difference, within the category of household appliances, may be found between those appliances that are directly bought by consumers such as TV sets, washing machines etc. and those chosen by a professional such as boilers or heating system. In the latter case it is likely that the decision maker is better informed on the lifetime costs of the appliances installed but may be more concerned about the initial installed cost of the product and not its operating regime.

3.8 It is therefore likely that for domestic consumers there would be a number of win-win situations where the net cost of purchasing a more energy efficient appliance is negative when energy efficiency is taken into account. This may happen because the energy saved by the more energy efficient appliance more than offsets the higher purchasing cost of the appliance itself. Adoption of more energy efficient technologies can therefore result in a Pareto-improved situation: some households would be better-off but nobody would be worse off.

3.9 It is interesting to note that this is the example used by the Commission in its annexes to the Impact Assessment guidelines to describe imperfect information. The annex reads:

> If consumers are unaware of factors such as the energy consumption of different models of household appliances, or the nutritional content of foodstuffs, they are unable to make well informed choices in their own interest or the wider interests of society.

3.10 Although it is possible that similar situations also exist in the industrial and commercial sectors, for example in public sector projects where there is capital rationing – which may limit spending on non-core items such as energy efficiency, it is reasonable to expect that they would be less pervasive. The choice of adopting a more energy efficient technology may have to be based more on environmental grounds than on cost savings grounds..

3.11 Given the above considerations it is not surprising that the past interventions from the Commission focused on the household sectors where the bulk of the problem resided. The success of the energy labelling directive in encouraging a move to higher efficiency products (discussed in more detail in the following section) indicates that this was an appropriate decision. However, as specified in the section of this report that deals with the available options for further interventions, the Commission is now considering an extension to the non-domestic sector.

3.12 The framework directive on energy labelling is now 15 years old and a number of technological advances as well as changes in consumer awareness and tastes (e.g. more importance given to “greenness” of products) suggest that it may be time to consider an extension to the labelling scheme to non domestic appliances. In addition other legislation has been developed, notably the Ecodesign Directive and Energy Star, which provide alternative mechanisms for developing new initiatives.

3.13 There are good reasons to believe that an intervention at a community level is preferable. Firstly, a well functioning internal market requires that manufacturers are faced with common standards so that products can be easily compared by consumers. Secondly a common framework for the EU would be more efficient for manufacturers who would face a single EU-wide standard rather than a plethora of different provisions from the member states. Finally consumers would need to be familiar with a single set of interventions improving the transparency of the process and the degree of understanding of the various measures. However this does not rule out the possibility of voluntary action at national or European level which may either substitute for of complement action at the EU level.

# 4 OBJECTIVES AND SCOPE FOR FURTHER ACTION

4.1 The general objectives for an intervention to increase energy efficiency in the EU can be found in the recent Action Plan for Energy Efficiency.[3]

4.2 The major scope of the action plan and other policies related to increasing energy efficiency is to intensify the process of realising the over 20 per cent estimated savings potential in EU annual primary energy consumption by 2020. This will contribute to the EU's wider objectives of increasing the competitiveness of the EU economy, improving energy security and reducing harmful emissions in line with the EU's Kyoto commitments.

4.3 Further action on energy labelling either under existing powers or through amendment of the framework directive 92/75 EEC would therefore need to contribute to the overall objective stated above. Such actions could achieve the following outcomes:

(a) Increasing consumer awareness of the energy consumption of the products they buy;

(b) Encouraging manufacturers to develop and adopt more energy saving technology;

(c) Increase transparency in the market for energy using and energy saving products;

(d) Improve the enforcement and monitoring procedures;

(e) Develop a set of common standards for a number of products not currently covered by the directives.

4.4 Our starting point for assessing the potential impact of further action to meet these objectives has been a review and of the present levels of energy consumption from household products which are or could be covered by the labelling directive and of the achievements of labelling to date.

## Energy consumption

4.5 The EC Action Plan for Energy Efficiency identified potential for energy savings by 2020 of up to 30 per cent in the household and commercial sectors. In 2006 annual residential consumption of electricity in the EU25 is estimated to have been in the region of 800 TWh and growing at just under 2 per cent a year.

1.1

[3] Action Plan for Energy Efficiency: Realising the Potential, Communication from the Commission COM(2006) 245

4.6 The consumption attributable to the main categories of appliances currently covered by the labelling directives is shown in Table 4.1. However we only have detailed data available for a subset of appliances that account for roughly 300 TWh of electricity consumption.[4] Lighting, for which labelling has had a relatively low impact is a major area of consumption, almost double the level for televisions which are not subject to mandatory labelling. Heating equipment and consumer electronics account for the bulk of electricity consumption not itemised in this table.

**Table 4.1: Stock and energy consumption of household appliances – EU 25, 2004**

| | Stock (No of units, million) | Average energy consumption (kWh/year) | Total energy consumption (TWh/year) | Sales (No of units, million) |
|---|---|---|---|---|
| Refrigerators | 199.2 | 305.1 | 60.78 | 13,977 * |
| Freezers | 93 | 383.1 | 35.63 | 4,170 * |
| Washing machines | 169.5 | 217.5 | 36.87 | 13,745 * |
| Dishwashers | 71.9 | 286.1 | 20.57 | 5,809 * |
| Electric ovens | - | - | 15.00 | - |
| Lighting | - | 509.4 | 92.33 | - |
| TVs | - | 177.7 | 48.42 | 30,675** |
| Other residential use | - | - | 457.4 | - |
| **Total** | - | - | **767** | - |

**The figures are the sum of sales in 2004 for West European countries and CZ, HU, PL and SK.*

***Figures are for EU25+, 2003*

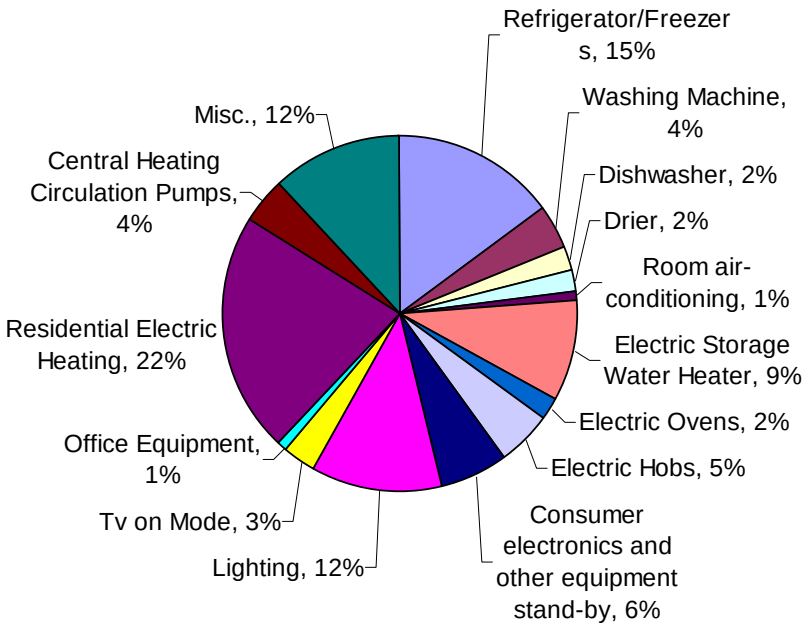
*Source: Odysee, NMC, Eco-design studies*

4.7 The breakdown of electricity consumption by all categories of end use equipment is shown in Figure 4.1 for EU15 and in Figure 4.2 for the new Member States in 2004. Heating equipment, TVs and consumer electronics represent the main equipment not currently subject to mandatory labelling.

1.1

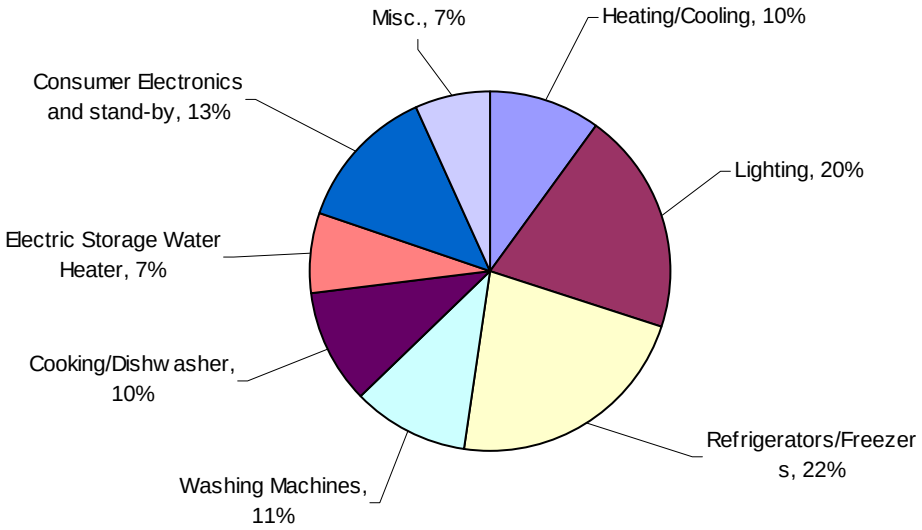
[4] We do not have detailed data regarding electric heating, office equipment, driers, air conditioning, water heaters, electric hobs, etc. However Figure 4.1 and Figure 4.2 report a breakdown of consumption for more categories.

**Figure 4.1: Breakdown of 704 TWh of electricity consumption among residential end-use equipment – EU15, 2004**




*Source: European Commission Status Report 2006, "Electricity Consumption and Efficiency Trends in the Enlarged European Union"*

**Figure 4.2: Breakdown of 63 TWh of electricity consumption among residential end-use equipment – New Member States, 2004**




*Source: European Commission Status Report 2006, "Electricity Consumption and Efficiency Trends in the Enlarged European Union"*

4.8 In addition to the electricity consumed in operating household appliance account also needs to be taken of other energy consumption by household. This is principally in the

form of gas and oil used in boilers and water heaters. Some 270 m tonnes of oil equivalent are used for space heating in the EU 27 of which over 75 per cent was consumed in the residential sector. This is equivalent to over 3,000 TWh of electricity.

4.9 Overall the residential sector in the EU 27 consumes about 3800 TWh of electricity equivalent.

## The achievements of energy labelling to date

4.10 There have been a number of studies of the impact of the labelling directive.[5] These track the increased take up of higher efficiency appliances over the past decade. Of the appliances covered by implementation directives the impact has been greatest for white goods, particularly refrigerators, freezers and washing machines. The take up of higher energy efficient appliances has been greater in the EU15 than in the newer Member States. The application of labels to lighting appears to have had less impact.

4.11 The scale of the current take up of higher efficiency appliances can be seen in Table 4.1 and Figure 4.3 for the EU15.

**Table 4.1: Energy rating of household appliance - percentage of sales – EU 15, 2004-05**

| | % A or above | % B | % C or below |
|---|---|---|---|
| Refrigerators | 61 | 30 | 9 |
| Freezers | 47 | 26 | 27 |
| Washing machines | 79 | 11 | 10 |
| Dishwashers | 81 | 11 | 8 |
| Electric ovens | 47 | 37 | 16 |
| Lighting (households) | 54% households with some CFLs | | |

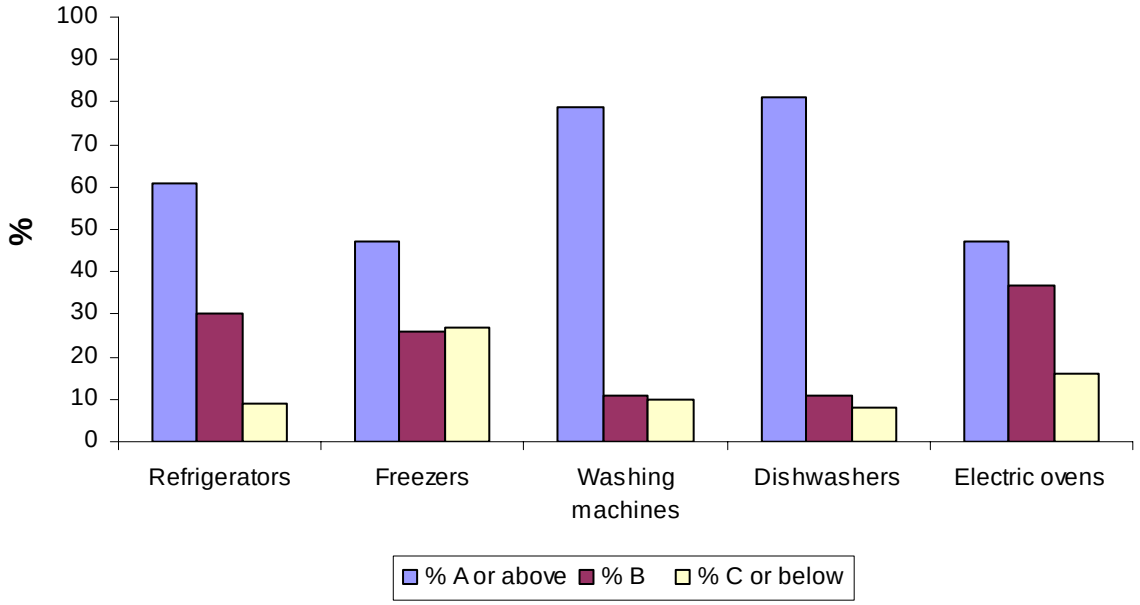
*Source: EC Status Report 2006*

4.12 As one sees for all household appliances (excluding lighting), the majority of products are either rate B or above. (We discuss the new Member States below).

1.1

[5] See for instance, GSK and Fraunhofer ISI, 2001, Evaluating the Implementation of the Energy Consumption Labelling Ordinance; Atkins ad ATN, 2006, Impact Assessment on the Future Action Plan for Energy Efficiency.

**Figure 4.3: Energy rating of household appliance - percentage of sales – EU 15, 2004-05**



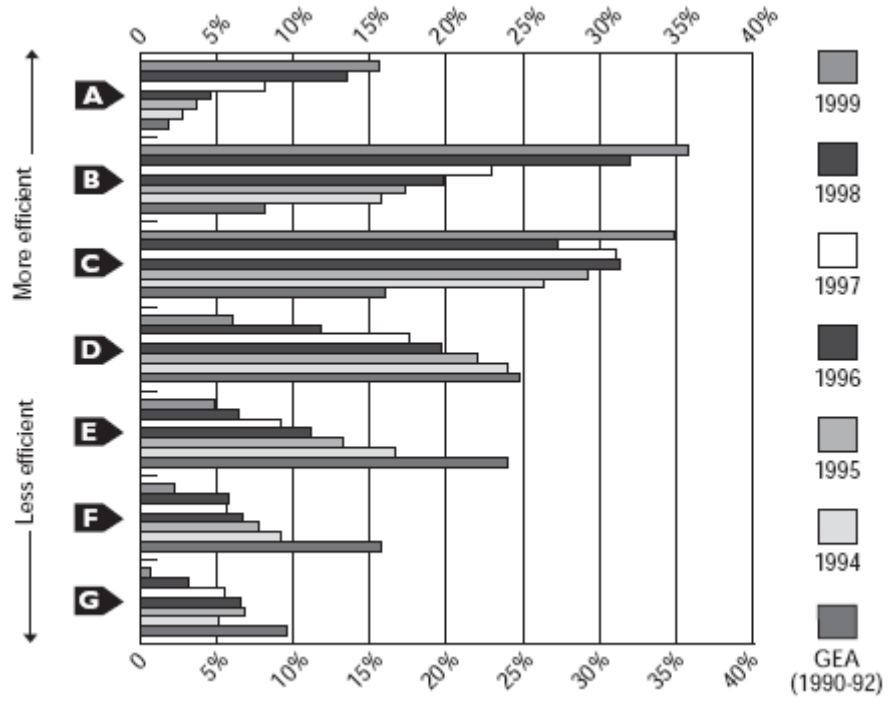

*Source: EC Status Report 2006*

4.13 As has been emphasised in an IEA report[6], the introduction of the labelling programme has shown a marked progression towards the more efficient categories (A appliances). The figure below illustrates this, with fewer and fewer products being sold in the less efficient classes of D or below.

1.1

[6] IEA, 2003, Cool appliances: policy strategies for energy efficient homes

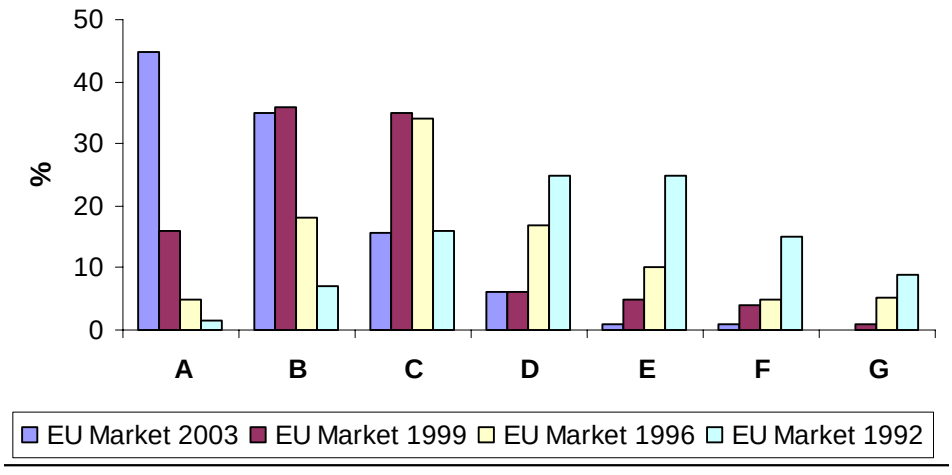
**Figure 4.4: Share of EU cold appliance market by labelling class from 1990-92 to 1999**




*Source: Waide 2001*

4.14 As an example we can look at refrigerators. Recent market data on the share of energy efficient appliances suggests that the EU market for refrigerators is moving towards a higher share of most efficient classes of appliances (i.e. the impact of labels on refrigerators seems to have been quite important).

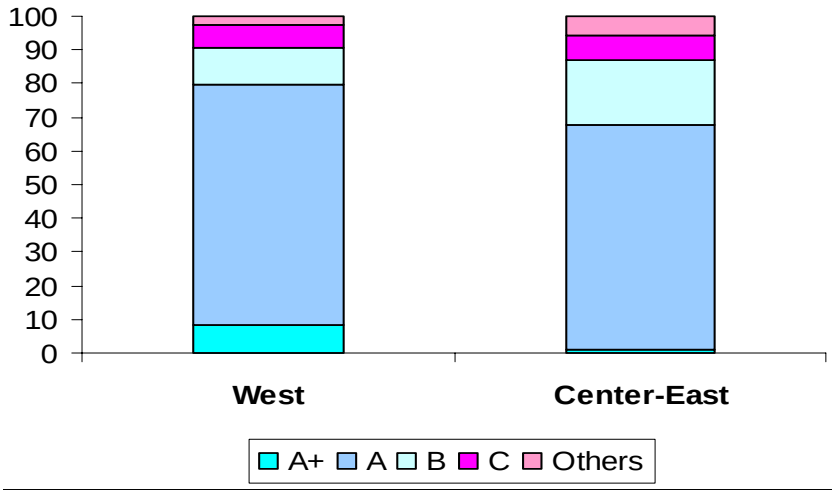
**Figure 4.5: Labels impact on EU refrigerators market**




*Source: Waide 2004*

4.15 Encouragingly, within the new Member States the number of A rated appliances sold is also high, as can be seen in the case of washing machines.

**Figure 4.6: Breakdown of 13.8 millions of sales per washing machines classes in EU, 2004**




*Note: 8 Countries East: PL, CZ, SK, BG, SI, RO, HU, and HR;*
*10 Country West: AT, BE, DE, ES, FR, GB, IT, NL, PT, SE*
*Source: Overview of sales and trends for main appliances, GfK 2004*

4.16 The benefit of more efficient products being sold also has an impact on the stock of products. As older products are replaced, the flow of new, more efficient, products adds to the existing stock of products. This means over time the entire stock of products becomes more efficient and so energy savings accumulate.

4.17 It has been estimated that between 1996 and 2004/05, the average efficiency of newly purchased cold appliances improved by 30 per cent, dishwashers by 35 per cent and washing machines by 23 per cent. This move to higher efficiency appliances contributed to annual energy savings over this period in the order of 24 TWh to 30 TWh. It is estimated that with the current policies already in place, 65 TWh to 75TWh per year could be saved by 2010.[7] A separate report by CECED estimated that annual electricity consumption by appliances installed in European households fell by 34 TWh between 1995 and 2005, a fall of 12 per cent.[8]

1.1

[7] Electricity Consumption and Efficiency Trends in the Enlarged European Union – Status Report 2006. P Bertoldi, B Atanasiu. 2007
[8] Energy Efficiency, A shortcut to Kyoto Targets. The Vision of European Home Appliance Manufacturers. Ceced 2006

4.18 During our stakeholder consultations, it was reported by some that the existence of the energy labelling scheme could account for up to 50 per cent of the shift to sales of higher grade products. This is consistent with an older survey which sought consumer views on energy labelling.

**Table 4.2: Overall effectiveness of labelling**

| | Compliance | Importance of energy efficiency | Influence of label on purchase |
|---|---|---|---|
| Denmark | *** | *** | 56 |
| Netherlands | *** | *** | 45 |
| Austria | ** | *** | 39 |
| Sweden | ** | *** | 39 |
| Finland | ** | ** | 41 |
| Portugal | * | ** | 35 |
| UK | *** | * | 24 |
| France | ** | * | 32 |
| Ireland | ** | * | 15 |
| Spain | * | * | 19 |
| Greece | * | * | 4 |

*Note: ***>70%; **50-70%; *<50%*

*Source: Shiellerup, Winward, Boardman, Cool Labels 1998*

4.19 We also note that the European energy label design has been successfully copied in a number of other jurisdictions for a number of products.

4.20 Nonetheless, one must be careful not to attribute the increase in sales of energy efficient products wholly to energy labelling. Given the range of policy instruments directed at encouraging the take up of energy efficient products and the financial benefit to consumers from reduced energy costs, it is difficult to attribute a specific degree of influence to the introduction of the mandatory labelling schemes. One study[9] suggested that the impact of labelling was closely linked both to the level of compliance and to general awareness of the importance of energy efficiency. We were told that In favourable circumstances the existence of the label could account for over half of the take up of the higher efficiency appliances.

1.1

[9] Shiellerup, Winward, Boardman, Cool Labels 1998

4.21 These studies also identified problems with labelling. In the early years compliance, in terms of failure to display labels or incorrect labelling, was an issue. The situation has improved but compliance remains a concern. The design of the label has generally been commended for its effectiveness in signalling relative efficiency of products but there has been concern that consumers can be confused by a mix of formal and informal advice.

4.22 More recently criticism has focused on the fixed nature of the A-G scale and the need to recalibrate the scale to allow for improvements in technology which have taken place since the scale was first set which mean that A rated products are no longer at the leading edge of energy efficiency.

4.23 A more detailed description of the directives and of the main evaluation studies is given in Appendix 1.

4.24 At present 10 categories of household appliances are covered under the energy labelling directive. A further 14 studies are being carried out on products to be covered by the Ecodesign directive. The EU Ecolabelling scheme provides for voluntary labelling of 24 product groups. The EU Energy Star scheme provides for voluntary labelling of 24 office products. There have also been a number of voluntary initiatives either in support of the products covered by the labelling directive or separately (such as windows which are discussed later in this report.

4.25 Taking this background material as a starting point, this study has explored the potential for further action on energy labelling in two ways. First we carried out a number of studies of individual products in both the household and commercial sectors in order to identify the scope for energy saving from the use of more efficient products and to highlight any issues of particular relevance to energy labelling of these products. These studies covered boilers, electric motors, servers, tyres and windows. Second we interviewed a range of stakeholders from government, consumer groups and manufacturing in seven Member States together with a number of representative bodies at European level, to discuss their experience and assessment of the existing labelling schemes and their views on a range of possible future developments.

4.26 We have drawn on the findings of this research to arrive at quantitative and qualitative assessments of the likely impact of a range of policy options as set out in the following section.

4.27 The full product studies and our reports on stakeholder discussions are set out in Appendices 2 and 3.

# 5 REVIEW OF EXISTING POLICY INSTRUMENTS

## Scope of existing policy instruments

5.1 There are four main policy instruments which address different aspects of the labelling of a range of energy using products. These are:

(a) Council Directive 92/75/EEC which provided the framework for the compulsory provision of information on energy consumption and other features by means of labelling for specified household appliances. This was followed by a number of product specific implementation Directives. This Directive is referred to here as the Energy Labelling Directive.

(b) European Parliament and Council Regulation (EC) 1980/2000 on a revised Community eco-label award to promote products which have the potential to reduce negative environmental impacts. This is referred to here as Eco-labelling.

(c) European Parliament and Council Directive 2005/32/EC which established a framework for setting minimum Ecodesign requirements for energy using products. This was followed by Regulations designating specific products to be researched and covered by these requirements. Referred to here as the Ecodesign Directive

(d) European Parliament and Council Regulation (EC) 2422/2001 on a voluntary Community energy efficiency labelling programme for office equipment based on an agreement with the United States government for the use of its Energy Star label. Referred to here as Energy Star.

5.2 In addition there have been a number of voluntary labelling initiatives at both national and EU level aimed at promoting the use of more energy efficient products which are commented on later in this report.

5.3 This section provides a brief overview of the main features of these policy instruments and other initiatives in order to identify the scope for additional action to be taken within the existing policy framework and actions which would require amendments to the existing legislation.

## The Energy Labelling Directive

5.4 The Energy Labelling Directive introduced in 1992 superseded a number of largely voluntary energy labelling initiatives at Member State level. It provided for the harmonised provision of product information related to energy consumption and use of other essential resources by household products in order to allow consumers to choose more energy efficient appliances. The focus of the Directive is on appliances whose aggregate use of energy is significant and which afford adequate scope for increased efficiency.

5.5 Seven types of household products were identified as being covered by the Directive:

(a) Refrigerators, freezers and their combinations;

(b) washing machines, driers and their combinations;

(c) dishwashers;

(d) ovens;

(e) water heaters and hot water storage appliances;

(f) lighting sources;

(g) air-conditioning appliances.

5.6 The Directive provides (Art 1.2) for further types of household appliance to be added to this list by Committee decision.

5.7 The measurement standards for assessing the energy efficiency of each product and the information to be provided to customers are set out in separate implementing directives for each product. Once these are established manufacturers are required to provide the information and appropriate labels with each product and retailers are required to display this information in a specified way at point of sale. Implementing directives are in place for all of the products listed above apart from water heaters and hot water storage appliances. New implementing measures for Water heaters and Boilers are foreseen in the Energy Action Plan. Existing implementing measures for all other products can be expected to be revised in parallel with Ecodesign measures. The implementing directives are also required (Art 5) to address the provision of information in situations such as mail order where the customer cannot be expected to see the appliance displayed. This provision appears to be equally applicable to the more recent development of internet shopping.

5.8 Although the main focus of the Directive is on energy consumption it also covers (Art 2) the provision of other information related to consumption of other essential resources and supplementary information which is helpful in evaluating the use of energy and other resources.

5.9 Member States are required to 'take all necessary steps' to ensure that suppliers and dealers comply with their obligations under the Directive

## Eco-label

5.10 The Eco-label scheme initially introduced in 1992 was revised in 2000. It is a voluntary scheme designed to promote products with a reduced environmental impact over their whole life cycle compared to other products in the same group. It has been described as a 'best in class' label.

5.11 The scheme covers all goods and services with significant sales and significant environmental impact. Environmental impact over the life cycle includes the use of energy and other natural resources.

5.12 Under the scheme the Commission develops eco-label criteria for selected product groups and it is open to manufacturers and others to apply for the use of the eco-label on their products. Individual products are assessed against the criteria which the Commission has developed.

5.13 The scheme can operate alongside national schemes, e.g. those operated by the Danish Electricity Saving Trust, with both logos being displayed.

## The Ecodesign Directive

5.14 The Ecodesign Directive provides a framework for setting the Ecodesign requirements which energy using products (including imported products) must meet if they are to be sold or used in the EU. It is aimed both at improving energy efficiency and at ensuring the free movement of those products.

5.15 Under the Directive the Commission is required to prepare and regularly update a working plan with an indicative list of products which should be considered for Ecodesign implementation measures. The Directive also set out an initial list of products to be considered during the transitional period. These are:

(a) Heating and water heating equipment;

(b) Electric motor systems;

(c) Lighting in both the domestic and tertiary sectors;

(d) consumer electronics; and

(e) heating, ventilating and air conditioning systems.

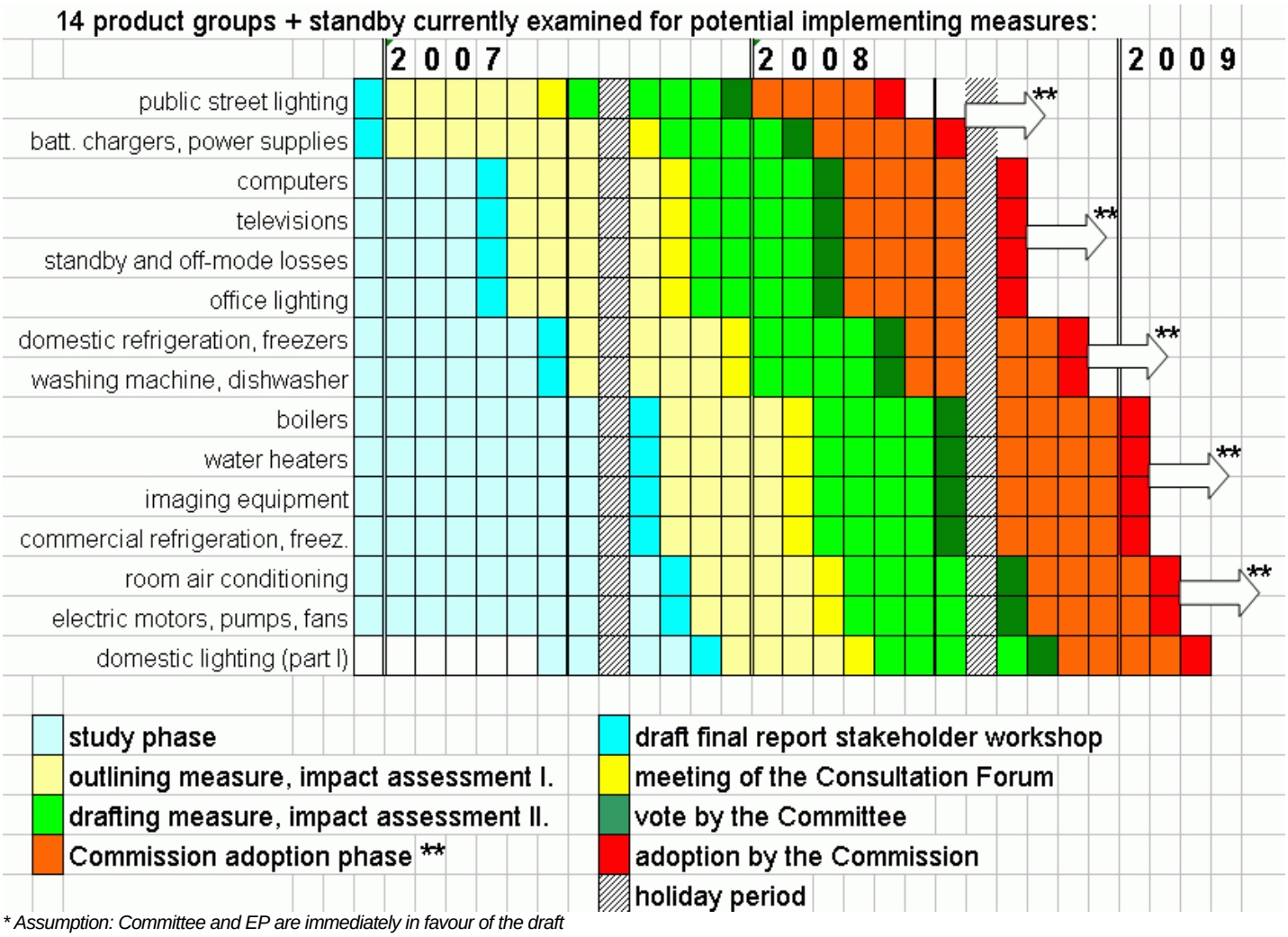
5.16 Implementing measures are drawn up by the Commission in consultation with interested parties and set out the Ecodesign requirements which products must satisfy. They can also include additional information to be provided by the manufacturers, such as the energy label format developed under the Energy Labelling Directive, showing the relative efficiency of the product. Voluntary agreements or other self-regulation measures can be considered as an alternative to full implementation measures.

5.17 Once the implementing measures have been brought into effect those products sold in the EU must carry the CE label to show that they conform to the minimum standard. This is an obligation on the manufacturer or importer of the product not on the retailer.

5.18 Products which have received an eco-label will generally be considered to meet the Ecodesign requirements.

5.19 Studies on 15 product groups are currently underway. The products covered and the timescale for this work is shown in the table below.

**Figure 5.1: Planning for the adoption of Ecodesign implementing measures***




** Assumption: Committee and EP are immediately in favour of the draft*

*** Could take from 4 to 12 months depending in particular on reinforced scrutiny by EP — includes WTO notification and translations*

5.20 The Commission has started, or is about to start on another five product areas:

(a) solid fuel small combustion installations (in particular for heating)

(b) laundry dryers

(c) vacuum cleaners

(d) complex set top boxes (with conditional access and/or functions that are always on)

(e) domestic lighting

5.21 The Directive requires Member States to designate authorities responsible for market surveillance to ensure compliance with the provisions of the Directive. Possible actions include an adequate scale of checks on compliance, provision of necessary information and spot checks on products. Member States are required to report their market surveillance findings to the Commission.

## Energy Star

5.22 The Energy Star label was designed in the United States for use on higher efficiency equipment. It has been adopted by the EU to use the Energy Star for office equipment on the basis of an agreement with the United States government. The aim is to bring about a coordinated energy efficiency labelling programme on for office equipment that is traded worldwide. The scheme is coordinated with other Community labelling schemes, including the eco-label scheme to ensure consistency. Participation in the scheme and the use of the Energy Star label is voluntary.

5.23 The agreement between the EC and the US government contains provision for revising the specifications on which qualification for use of the label is based.

## Voluntary initiatives

5.24 Voluntary initiatives by industry coupled with self-regulation may be an alternative to the use of legislation or may be a complementary measure which reinforce the achievement of the legislative objective.

5.25 The voluntary initiatives taken by CECED to set energy reduction targets for refrigerators, freezers and washing machines and dishwashers have complemented the compulsory energy labelling schemes for these products. While the provision and display of the energy label gave consumers the information necessary to make informed choices, the industry was able to focus on:

(a) The elimination of the lowest efficiency products;

(b) The development of technology for improved products; and

(c) Marketing strategies to encourage take-up of the higher rated products.

(d) The existence of a compulsory energy label makes self policing by the industry easier (it was a problem for electric storage water heaters, where there was no label).

5.26 CECED is not currently proposing any new voluntary agreements as part of the Ecodesign process as they consider Ecodesign is doing the work.

5.27 In other areas manufacturers have developed voluntary labelling schemes in the absence of any legal requirement. One example of this which we have identified in our assessment of the labelling of non-energy using products is the voluntary labelling of windows in order to give consumers a better understanding of the relative efficiency of different forms of glazing. Schemes of this sort operate in Finland, the UK and Denmark and the consumer response has generally been positive. However the overall impact on consumer choice of product is not clear.

5.28 One problem that can arise with voluntary schemes of this sort is the use of different standards applied to labelling in the different countries. This can affect trade between countries and was one of the factors that led to the development of the Energy Labelling Directive in 1992.

## Summary

5.29 Because these policy instruments have developed over a period of years with changing objectives they provide a variety of opportunities for developing new policy initiatives but also raise the question of whether greater consistency in policy might be achieved by some rationalisation of the available instruments.

5.30 The main issues to be considered in deciding on which policy instrument is best suited to taking forward particular actions are:

(a) Product coverage – Energy Labelling is currently confined to household products whereas Ecodesign has a much wider remit covering all energy using products;

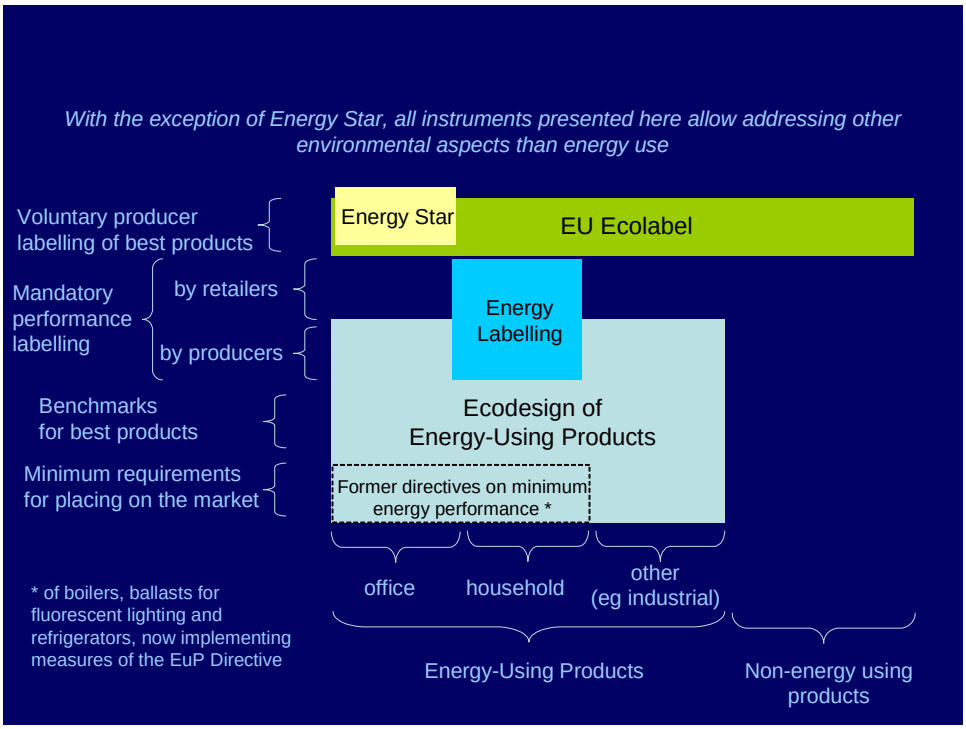
(b) Operator coverage – Energy Labelling puts obligations on both manufacturers and retailers, Ecodesign only applies to manufacturers;

(c) Compulsory or voluntary – Energy Labelling and Ecodesign are compulsory (although there is a voluntary option in Ecodesign), Energy Star, Eco-label and self-regulation are voluntary;

(d) Ease of implementing change – extension to new products and revision of standards involve Directives for which each of the 27 Member States must adopt implementing legislation, Ecodesign can be implemented and extended by Regulations which have direct effect in Member States. Amendment of Framework Directives involves Council agreement and a full Co-decision procedure with the European Parliament

5.31 The relationship between the policy instruments in terms of their coverage is shown in the chart below.

**Figure 5.2: Relationship between different policy instruments**



# 6 ACTIONS UNDER CONSIDERATION

6.1 In this chapter we consider the actions that are available to the European Commission in relation to the policy rationale and objectives discussed above. Each action can be implemented by one or more policy options and these are also outlined here. The following chapter conducts a preliminary impact assessment using the EC's IA Guidelines.

## Overview of actions

6.2 There are a number of actions available to the European Commission to address the problems at hand. These fall into two broad categories – extending the scope of the existing labelling provisions and enhancing the effectiveness of the existing provisions. These can all be compared with a 'do nothing' scenario under which work in hand continues but no new initiatives are taken and also a de-regulatory option of withdrawing from some compulsory labelling activities. There are also the "actions" which involve repealing the legislation and relying more heavily on voluntary industry initiatives such as codes of best practice.

6.3 The principal actions for extending the scope of labelling are:

**Action 1:** Extending labelling to additional household appliances, such as televisions and other consumer electronics.

**Action 2:** Extending labelling to non-household appliances, such as servers and electric motors.

**Action 3:** Extending labelling to non-energy using products, such as windows and tyres.

6.4 The principal actions for improving the operation of existing (and extended) labelling schemes are:

**Action 4:** Development of dynamic labelling with periodic reviews and rescaling of the A – G ratings;

**Action 5:** Provision of additional product information as part of the label, such as annual energy consumption and emissions;

**Action 6:** Increasing provision of labels on internet sales;

**Action 7:** Tighter tolerances in the technology standards for A – G ratings;

**Action 8:** Better enforcement of the labelling requirements in respect of both manufacturers meeting the set standards and retailers displaying correct information;

**Action 9:** Legal protection of the label;

**Action 10:** Implementation through Regulation rather than Directive.

6.5 There are also actions such as the repeal of the Directive and reliance on voluntary actions by industry and retailers (**Actions 11, 12 and 13**).

6.6 It is possible to extend the scope of the energy label or its implementation via a number of routes or "policy options". The policy options by which these actions can considered are:

(a) Use of existing Framework Directives;

(b) Amendment of Framework Directives;

(c) No action; and

(d) Repeal of the Directive.

6.7 We now discuss the actions in more depth.

## Extending the scope of labelling

### Extension of the label to further domestic appliances (Action 1)

6.8 At present the energy label is required on nine products and is generally regarded as having made a significant contribution to the take-up of higher efficiency appliances. The greatest impact has been in the increased use of A (and higher) rated cold appliances and in the washer/dishwasher market. The impact has been smaller in the lighting sector, which accounts for a significant proportion of electricity consumption, where other measures have been used to encourage take up of low energy light bulbs.

6.9 The breakdown of electricity consumption by all categories of end use equipment has been shown in Figure 4.1 for EU15 and in Figure 4.2 for the new Member States in 2004. Heating equipment, TVs and consumer electronics represent the main equipment not currently subject to mandatory labelling.

6.10 In addition to the electricity consumed in operating household appliance account also needs to be taken of other energy consumption by household. This is principally in the form of gas and oil used in boilers and water heaters. Some 66 m tonnes of oil equivalent are used in this way in the EU 27. This is equivalent to about 760 TWh of electricity.

6.11 An obvious option is to extend the energy label to additional household appliances.

6.12 The extension of the label could to be domestic appliances such as televisions and other audio-visual appliances, computers and VDUs, other IT appliances, boilers, water heaters and standby consumption of appliances.

### Boilers

6.13 Boilers and water heaters are already within the scope of the Labelling Directive but have not been the subject of an implementing directive. Boilers are also the subject of a study

under the Ecodesign Directive and that work will provide the technical basis for defining an A – G (or other) rating.

6.14 We carried out a study of the scope for energy saving from the use of higher efficiency boilers (see Appendix 2). This study focused on the potential for efficiency improvements in boilers used in owner occupied houses. This is the sector where the choice of boiler could be most influenced by a labelling scheme and which is not effectively covered by the provisions of the Energy Performance of Buildings Directive (EPBD).

6.15 This study suggest that that if boiler losses in owner occupied premises could be reduced by 70 per cent via an energy label then around 20Mt $CO_2$ can be saved per year.

**Table 6.1: Energy losses of the whole heating systems and gas- or oil–fired boilers in owner occupied dwellings**

| Technical potential of labelling in dwellings | | Gas | Oil |
|---|---|---|---|
| Heating System Loss | Stock | 32.2% | 36.9% |
| Boiler Loss | Stock | 13.6% | 18.2% |
| *Reduction potential space heating referring* to reduction of boiler losses up to 70 % | | 10% | 13% |
| *Technical potential (residential)* | *Mt $CO_2$ / a* | *10.1* | *7.8* |

6.16 This technical potential of around 20 Mt $CO_2$ (with a calculated reduction of about 10 per cent in case of gas fired and about 13 per cent in case of oil fired heating systems) should be compared with the potential of the "extended" EPBD calculated at 330 Mt by ecofys. The result is that up to 10 per cent of the realisable technical potential of the "extended EPBD" could be reached just by labelling the boiler quality (without changing the energy source or shifting to renewables). An approach which addressed the wider heating system losses and not just the boilers (as is being considered in the Ecodesign work) could be more effective than simply adopting a labelling scheme for boilers.

6.17 Taking into account the lifespan of boilers, the technical potential of labelling boilers could amount to cumulative reductions of one million tonnes $CO_2$ each year building up to the full 20 Mt $CO_2$ potential over a full boiler replacement cycle.

6.18 The Ecodesign study on boilers has estimated considerably higher energy and related carbon savings from the full Ecodesign programme of minimum standards and associated labelling and information provision across all domestic and non-domestic uses of boilers. This could amount to annual savings of around 120 Mt $CO_2$ equivalent by 2020 based on energy savings of 50 Mtoe. A labelling scheme might therefore contribute to achieving around 15 per cent of the overall reduction in energy use and emissions identified in Ecodesign.

6.19 Completion of the Ecodesign work on boilers in 2008 should lead to the compulsory labelling of boiler efficiency by manufacturers. Work is already in hand to take that work

forward. Any further action under the Labelling Directive would allow compulsory labelling to be extended to the dealer (usually the heating installer) who sells the boiler to the end user. We have not been able to evaluate the additional take-up of energy efficient boilers that would be stimulated by this action. However, as with other household appliances, the installer may not have any incentive to provide energy efficiency information to the customer, particularly if the initial cost of the product is higher. Compulsory labelling at this level does appear to be in line with the rationale for intervention which we have outlined. Given the scale of energy use in domestic boilers even a small increase in take up of more efficient appliances would deliver a significant level of saving.

**TVs and other electronic appliances**

6.20 It has not been part of our remit to carry out a detailed evaluation of the energy saving that might be achieved by the labelling of additional household products such as TVs and electronic appliances. However we can indicate the value of potential savings in terms of reduced energy consumption and the associated reductions in $CO_2$ emissions.

6.21 At present these appliances account for around 10 per cent of domestic electricity consumption in the EU. A 1 per cent reduction in electricity consumption because of a move to higher energy efficient products would give an annual saving of around 240GWh of electricity. This saving would be worth around €30 million a year to consumers at today's electricity prices. This would also translate (if the reduced electricity demand is not offset by increased use in other ways) into an annual reduction of around 0.5 million tonnes of $CO_2$ emissions.[10] The value of larger improvements in energy efficiency would be scaled up accordingly.

6.22 Ecodesign work on computers and televisions is already in hand and is likely to lead to a compulsory requirement on manufacturers to provide an energy label for these products. Since these products are largely sold through retail outlets (including the internet which is discussed separately below) there would appear to be a strong case for taking the further step of including these products in the coverage of the Energy Labelling Directive and developing an implementation directive. Voluntary action by manufacturers and retail chains could provide an interim step in developing the use and awareness of the new labels but given the disparate nature of the retailing of consumer electronics this is unlikely to be as effective as a compulsory scheme in achieving the objectives.

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1.1

[10] This estimate is based on total EU electricity consumption of 800 TWh of which about 30 per cent is in the residential sector (see *European Commission Status Report 2006, "Electricity Consumption and Efficiency Trends in the Enlarged European Union"*). An average price of electricity for households of €0.135/kWh and power station $CO_2$ emissions of 1,512 m tonnes have been taken from Eurostat.

**Extension of the label to non-domestic appliances (Action 2)**

6.23 Industry and the tertiary sector together account for about two thirds of EU energy consumption. As noted above we would generally expect these businesses to be more aware of the energy costs associated with the products they are purchasing. Nonetheless the studies we have carried out into electric motors and servers indicate that there is still considerable potential for increased energy efficiency. One factor which may affect the take up of more efficient products is that they are often purchased as part of a system rather than as stand alone items. In addition most motors are sold to original equipment manufacturers not to end users who may, as a result, not have access to energy efficiency information.

6.24 Drawing on our studies (see Appendix 2) we are able to provide some quantification of the potential savings to be made.

**Electric motors and motor systems**

6.25 Electric motor systems account for about 70 per cent of electricity consumption in industry and about 38 per cent percent in the commercial sector (Almeida et al. 2001). According to De Keulaner et al. (2005), the economic energy saving potential in electric motor systems represents 7% of total EU electricity consumption based on EU15 data.

6.26 Electric motors and motor systems can be defined in three groups:

(a) The electric motor itself, including its cooling system, which is normally a built-in fan and counted as part of the motor.

(b) The core motor system including the motor controls such as adjustable speed drive plus the mechanical transmission system and the directly driven equipment (e.g. a pump or a fan). In most cases, this core motor system is sold as one distinct product.

(c) The entire motor driven system: whole systems such as building air conditioning systems with ventilation and cooling equipment, heating systems with pumps and valves, transportation systems such as elevators, escalators, lifts and conveyor belts, etc.

6.27 In general, it can be observed that the complexity and heterogeneity of the system increase considerably from (a) to (c), as do the achievable energy savings. In this analysis, attention was focused on the first of these groups. There is a brief discussion of group (b) but group (c) is not assessed given the extreme heterogeneity of the systems used in industry. This heterogeneity would make a labelling scheme too complex to be efficient and a systematic analysis of saving potentials impossible. Nonetheless, it must be kept in mind that significant energy savings can be realised in many cases by optimising the entire system and by better matching it with the required energy service.

6.28 The stakeholder interviews indicated the same fact: Saving potentials for the whole motor system are estimated as much higher than for motors only (estimations go up tenfold).

But none of the interviewees considered labelling an appropriate instrument for tackling motor system efficiency because the systems are too heterogeneous.

*Legislation for electric motors*

6.29 The European Commission and the European Committee of Manufacturers of Electrical Machines and Power Electronics (CEMEP) have agreed on a voluntary labelling scheme which has been in operation since 1999 and groups electric motors into three distinct classes (Most efficient: eff1, least efficient: eff3). The sole criterion used for this classification is electric motor efficiency, tested according to EN 60034-2. In line with its voluntary character, manufacturers can classify their own products and compliance is only monitored by competitors. Penalties, besides exclusion from the scheme, do not exist.

6.30 The voluntary labelling scheme succeeded in reducing the market share of the least efficient motors (EFF3) by replacing them with EFF2 motors. But the scheme did not promote the diffusion of more efficient motors, as does seem possible when comparing US and European market shares. The market share of EFF1 motors increased only slowly by about 1 percentage point per year.

6.31 It is worth noting that the European “high efficiency class” EFF1 can be regarded as standard efficiency when compared with efficiency classes abroad in countries with the strictest MEPS efficiency levels. For example, in the US, this efficiency level has already been enforced as a minimum standard since 1997.

*Characteristics of the European motor market*

6.32 The purchasing costs represent only a small share of the total life cycle costs of electric motors and electric motor systems. Running costs represent by far the largest share. Thus, in general, investments in energy-efficient electric motors typically pay off after one year when buying a new motor, and after one to three years when replacing an old motor with a more efficient one (Brunner et al. 2007).

6.33 Still the market share of EFF1 motors increases only slowly in Europe. As a reason for the weak development of EFF1 sales, Almeida et al. (2007) refer to the price premium for EFF1 motors which is 20-30% above EFF2 motors in combination with the fact that the motor market is basically an OEM market.

6.34 Brunner et al. (2007) report that 80 to 90 per cent of electric motors in the low and medium power range were not directly sold to end-users, but to original equipment manufacturers (OEMs) who incorporate the electric motors in another product such as, e.g. a fan, a compressor etc. Thus, the market structure for electric motors is fundamentally different than for the products already covered by the labelling directive, like dryers or washing machines where households directly purchase the labelled product.

6.35 Two main consequences can be identified from the high share of sales to OEMs:

(a) There is a considerable loss of information when OEMs incorporate the motor in another product. End-users may not know which or even how many motors are integrated in the product that they actually purchase.

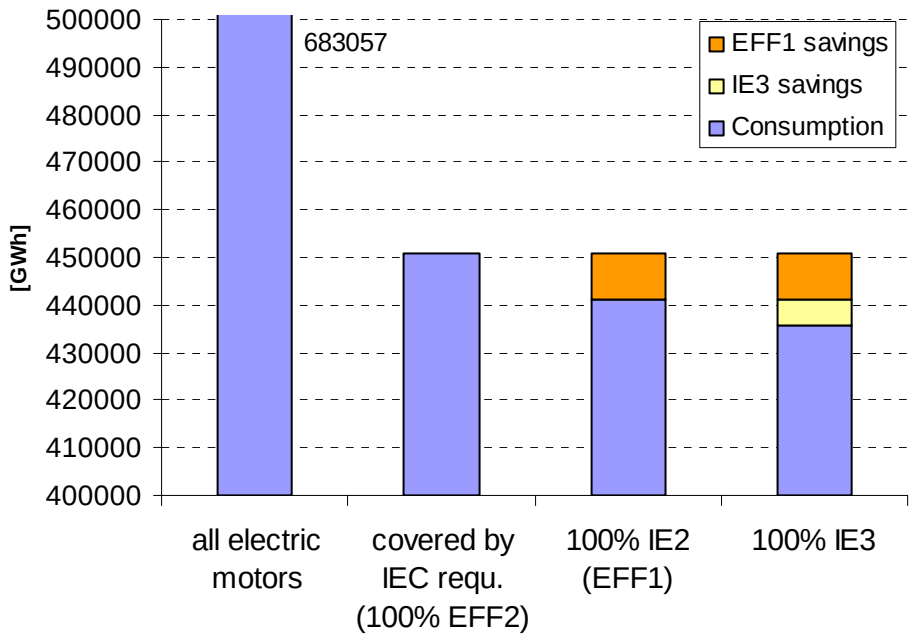
(b) OEMs are more interested in the purchase cost of the motor than in low running or even life cycle costs.

6.36 Labelling the core motor system (i.e. the product) in which the motor is included would not solve the problem completely because they are often not directly sold to end-users either. In any case, these peculiarities of the motor market have to be considered when creating an effective labelling scheme.

*Impact assessment*

6.37 We have estimated the potential savings from labelling electrical motors. The assumptions underlying our results are fully described in the annex to this report. We acknowledge that our results are based on a number of simplifying assumptions and therefore should be interpreted carefully. Possible differences to the results of comparable studies on saving potentials in electric motor systems are also discussed in the annex. The impacts from a labelling scheme are very difficult to estimate as its success depends directly on the level of compliance, which in turn depends upon many different factors that are hard to estimate.

**Figure 6.1: Energy saving potential in industry (EU-25)**




Source: own calculations based on (Almeida et al. 2001)

6.38 We estimate that replacing all the existing motors in the industrial sector with EFF1 motors could save 9548 GWh/a and replacing EFF1 motors with IE3 could save an additional 5532 GWh/a. These figures amount to a total of roughly 2.2 per cent of industrial electricity consumption.

6.39 For the services sector, the potential savings are 7859 GWh/a and 3654 GWh/a respectively, or 4.6 per cent of total consumption in the tertiary sector.

6.40 These figures only give the savings that could be realised when replacing EFF2 motors in the motor stock with IE3 (above EFF1 standard) motors. How much of these saving potential will be realised by a labelling scheme is difficult do estimate. Several barriers exist that counteract the diffusion of high efficient motors, like the high share of sales to OEMs but as well the price premium for more efficient motors.

6.41 For illustrative purposes we have taken a maximum contribution of 3 TWh per year across both sectors. This is equivalent to about one third of the potential for efficiency improvement above a minimum standard set at the IE2 level. If the minimum standard is set at a lower level then the potential saving from labelling would increase. The actual outcome will depend on the degree of market transformation induced by the label. Such a saving would be worth around €200 million a year and reduce CO2 emissions (based on today's fuel mix in electricity generation) of about 6 m tonnes.[11]

**Servers**

6.42 The operation of servers and data processing centres is essential for the supply of data and online services. There has been enormous growth in these activities. Both the number of servers and respective energy consumption has increased. In addition the specific electrical power consumption for each server has increased with the use of more powerful components. Growth in server use and related energy consumption is expected to continue.

6.43 There is little public awareness of energy costs in the IT sector. Availability and safety are the most important drivers and energy costs for processing are rarely billed separately from other building services. A labelling scheme for servers could provide a means of raising awareness of the energy costs involved and of influencing choice of server in future.

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1.1

[11] This estimate is based on total EU electricity consumption of 800 TWh of which about 67 per cent is in the industrial and tertiary sectors (see *European Commission Status Report 2006, "Electricity Consumption and Efficiency Trends in the Enlarged European Union"*). An average price of electricity for industry of €0.074/kWh and power station $CO_2$ emissions of 1,512 m tonnes have been taken from Eurostat.

6.44 It is estimated that there are some 7 million servers installed in the EU 27, 95 per cent of these are Volume Servers in the price range up to $25,000. Total estimated electricity consumption by servers is 16.1 TWh a year, 80 per cent of which is accounted for by the Volume Server group.

6.45 Servers incorporate a number of components each of which uses energy. The central processing unit (CPU) is the component with the highest energy demand, consuming around 30 per cent of overall energy demand. In the past, increases in processing power could only be achieved by using faster components which used more energy. However in recent years it has become possible, through the use of multi-core technologies, to enhance computing power while reducing the use of electrical power. Quad core processors introduced in 2007 offer a 35 per cent increase in computing power while using 20 per cent less energy. There is scope for developments of this sort.

6.46 Power supply, power management systems and cooling fans also offer the potential for further energy savings although these are heavily dependent on operating conditions and the user profile of the server.

*Potential energy efficiency improvements*

6.47 With existing technology it is theoretically possible to reduce the electrical consumption of servers by up to 40 per cent using energy optimised components and without affecting the processing performance. However it is not possible at this stage to identify how much of this saving could be delivered through the use of a labelling scheme. Further improvements in server performance per unit of energy of up to 50 per cent could be delivered by technological development of components compared to those available today. If labelling were to be introduced it would be necessary for the standards to be adjusted frequently, perhaps every one or two years to allow for this technical progress.

6.48 Other improvements in energy efficiency may be achievable through better utilisation of servers. That is likely to be based on software solutions – eg virtualisation or demand switching - which do not lend themselves to product labelling in the same way.

6.49 Apart from energy used by components, the efficiency of a server is mainly dependent on its direct and indirect environment and utilisation. Servers currently operate at only 5 – 10 per cent of their capacity while power consumption in stand-by mode is around 70 per cent of full capacity. Air conditioning requires about the same amount of energy as the server itself. Optimisation of these aspects of server use can offer savings which are as great as or greater than the savings available from optimisation of components.

*Assessment*

6.50 Optimisation of components in servers has the potential to save some 6 TWh of electricity a year if all servers were replaced with the highest efficiency products available today. Technological developments are already moving in the direction of increased energy efficiency (in contrast to earlier years). Awareness of the scale of energy used in servers is not high and it is difficult to judge how far labelling would contribute to greater take up of

more efficient products. In addition there is considerable scope for energy saving through system optimisation which would be difficult to capture in a label.

6.51 If labelling of servers is to be taken forward the main options are either to develop a compulsory labelling scheme for manufacturers through an ecodesign standard or to build on voluntary schemes such as Energy Star or industry initiatives.

**Extension of the label to non-energy using (but "energy relevant") products (Action 3)**

6.52 The energy label might also be applied to non-energy using products that still have a bearing on energy efficiency. These are products that do not directly use energy in day to day operation but where more efficient products have the potential to contribute to energy saving.

6.53 Examples of non-energy using products include windows, tyres, energy efficient paint (such as low-e paint which can block heat loss) and various types of building insulation materials.

6.54 Of course, the nature of the energy label would have to be different in this option from other options as non-energy using products can only indirectly affect energy efficiency in a given space/product.

6.55 We carried out reviews of the potential for energy saving from higher efficiency windows and from low rolling resistance tyres based on published information.

**Windows**

6.56 It is estimated that windows can account for as much as 30 per cent of a building's heat loss and that this can be significantly reduced by the use of higher efficiency glazing. Voluntary labelling schemes already exist in a number of countries and it is estimated that conventional double glazed windows now account for about half of the stock of windows in the EU 15 countries.

6.57 Nonetheless there is scope for further savings by the installation of low-e double glazing. Trade association estimates suggest that a move to low-e from conventional double glazing could reduce energy costs by around €4 billion per year and reduce $CO_2$ emission by 25 m tonnes per year. Since window replacement takes places relatively infrequently such savings could not be achieved immediately but studies suggest that at present consumers are not well informed about the efficiency benefits when replacing windows and a labelling scheme could stimulate a higher take-up.

6.58 The rationale for a labelling scheme is similar to that for energy using products – that consumers tend to make their purchase decisions based solely on the price of the product and give inadequate weight to the energy saving potential. However the technical features of windows that are relevant to labelling are likely to vary geographically and this would need to be studied further to establish whether an EU wide label along the lines developed for household appliances.

### Tyres

6.59 It is estimated that the use of low rolling resistance tyres can reduce fuel consumption by as much as 7.5 per cent. However that is dependent on tyres been kept at the right pressure.

6.60 On the basis of industry estimates we calculated the potential savings if all car trips were taken on energy efficient trips after 2008. This suggests a potential saving between 2008 and 2030 (in net present value terms) of €100 billion and $CO_2$ savings of 600 million tonnes over the same period. However at the user level the average annual saving would only be in the region of €35 per year.

6.61 A concern expressed about the development of labelling based solely on energy efficiency is that this may involve a trade-off with other important tyre characteristics such as handling, wet traction, noise and ride. This could reduce the likely impact of any labelling scheme compared to products such as refrigerators with rather simpler characteristics.

6.62 A voluntary labelling scheme for low rolling resistance tyre operated in Canada has been withdrawn because of lack of interest from manufacturers.

6.63 Tyres are mentioned in the Action Plan on Energy Efficiency as a potential way of improving fuel efficiency. The action plan also states that the Commission will issue a mandate for a recognised European Norm and possible international standard for maximum rolling resistance limits and labelling for road vehicle tyres. Tyres could either be included into car label legislation or have their own separate label.

*Implementation for non-energy(but 'energy relevant') using products*

6.64 At present non-energy using products are not covered either by the Energy Labelling or the Ecodesign Directives and either new legislation involving co-decision would have to be developed or amendment to either or both of these Framework Directives would be required in order to develop a compulsory labelling scheme.

6.65 To a large extent the products being considered here are sold direct to consumers or to installers who are dealing directly with consumers. It does therefore appear important that any labelling scheme should cover labelling at the retail level as well as manufacturers. That would suggest using amendment to the Energy Labelling Directive if this option is to be pursued.

## Improving the operation of existing schemes

### Dynamic labelling (Action 4)

6.66 One common criticism of existing energy labels is that there is a preponderance of A grade products for a number of white goods. For example, in the Czech Republic by

2004 over 80 per cent of all washing machines for sale were of A grade and in Denmark nearly all sold refrigerators are either A grade or A+ and A++.[12]

6.67 The fact that many products are now rated A or above is of course a reflection of the success of the original policy but it is now also seen as suggests a weakness in the current energy labelling regime — that it is a static rating that does not keep up with technological advances. In the years since the introduction of the label, products have been improved with respect to their energy efficiency to such an extent that many now meet the highest energy label grade. Products which meet what is now the best available levels of energy efficiency do not receive the same degree of credit under the labelling classification and the incentive on manufacturers to continue to innovate is reduced. This suggests one option to revise the Directive is to incorporate a dynamic element into its rating criteria.

6.68 Having a dynamic label would mean that it is periodically reviewed for all products to take account of technological developments. The merits of moving to dynamic labelling are generally recognised by consumer groups and by manufacturers. This has been identified as a key point in the Commission's Energy Efficiency Action Plan. However the mechanism for redefining the rating scale has not yet been agreed. The scope for continued improvement will vary from product to product. The Ecodesign studies will help to identify both the best available technologies and the minimum acceptable technologies. These effectively define the top and bottom of any labelling range at a particular point in time. The studies can also identify the scope for further improvement beyond BAT which might also be built into the top end of the scale.

6.69 Manufacturers have expressed concern about an approach under which products which may be rated A by today's technological standards may only be rated C, all other things being equal, under revised standards. Their preference is for additional rating points above A as have been developed with the A+ and A++ marks for refrigerators. Consumers, on the other hand, find A+ and A++ confusing with limited awareness of the existence of ratings above A.

6.70 One of the strengths of the existing energy label that has been identified both in research studies and in stakeholder consultation is its simplicity. This seems most likely to be maintained by retaining the A – G scale as the indicator of relative efficiency and adjusting the underlying scale from time to time.

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[12] Other examples abound, such as 95 per cent of washing machines in Germany being A or A+ and nearly all white goods in the Netherlands being of grade A or above.

6.71 We have not carried out detailed research to assess the impact of moving to a dynamic rating scale but, in line with our estimates of the potential impact from labelling of consumer electronics, it is possible to provide some indicators of the scale of possible benefits.

6.72 As shown in Figures 4.1 and 4.2 above electricity consumption by appliances covered by existing labels account for about 30 per cent of household electricity consumption in EU 15 and a rather higher percentage in the other Member States. Refrigerators and freezers which may have the greatest potential for improving energy performance above today's A rating account for about half of this consumption.

6.73 A further 1 per cent improvement in the energy performance of all of these appliances would result in annual savings of about 720 GWh of electricity with a value of nearly €100 million a year to consumers. The associated reduction in $CO_2$ emissions would be of the order of 1.4 m tonnes per year.

6.74 In order to introduce dynamic labelling in some form it would be necessary to recalibrate the technical requirements defining each point on the A – G scale. This work can build on the work being carried out in the Ecodesign studies of the various products for which labels already exist.

6.75 In order to bring these into effect it would be necessary to amend the implementing directives for each of the products. These amendments would define the revised scale and also include provision for future changes to the scale as technology develops. Similar provisions for up-rating should be built into any new implementing directives covering products such as consumer electronics as discussed above.

6.76 Such reclassification need not lead to revisions of existing technical standards or require re-testing of existing models. The existing standards could simply be attached to a different point on the A-G scale with new standards being set at the higher end.

**Provision of additional product information (Action 5)**

6.77 The Energy Labelling Directive requires the provision of information relating to the consumption of electric energy, other forms of energy and other essential resources and supplementary information to be provided in the fiche and label attached to the designated appliances. 'Other essential resources' are defined as water, chemicals, and any other substance consumed by an appliance in normal use.' 'Supplementary information' means other information concerning the performance of the appliance, which relates to, or is helpful in evaluating, its use of energy or other essential resources.

6.78 This provides a wide-ranging power to specify information to be included in the label and fiche. In addition Article 6 allows implementing directives to make provision for ' other public information relating to the relevant appliance, which is provided pursuant to other Community legislation. This would appear to provide scope for including in the fiche and label information which manufacturers are required to provide under the Ecodesign Directive.

6.79 The main types of additional information which have been suggested for inclusion in the label are:

(a) Annual running costs of appliances. However concerns have been raised about the difficulty of allowing for changes in fuel costs both between countries and over a period of years.

(b) the $CO_2$ emission levels and other environmental information. Again standardised information my be misleading at Member State level where the fuel mix for electricity generation may be very different from the EU average

6.80 An increase in information may (in theory) lead to more informed decision making and a higher level of energy saving. At the same time there is a danger of overloading the label with information and undermining its simplicity.

6.81 If any of these options is to be implemented it appears that these could be achieved by amending existing or new implementation directives and should not require amendments to the Framework Directive.

**Labelling for internet sales (Action 6)**

6.82 Article 5 of the Framework Directive provides for situations where the customer cannot be expected to see the product displayed and therefore see the attached label. These include mail order and catalogue sales or 'other means'. In these circumstances the implementing directives are required to make provision to ensure that customers are provided with the essential information in the label before making a purchase.

6.83 This provision appears to apply as much to internet sales as to any other form of distance selling and if necessary implementing directives should be updated to ensure that information provided on these sales of these products are consistent with other channels so that consumers do not face information asymmetries similar by their choice of vendor.

**Tighter tolerances (Action 7)**

6.84 It has been contended that the existing energy labelling scheme has too generous tolerance levels (15 per cent) in the technical measurement standard on measure values, which give rise to a distorted picture of the performance of the appliance.

6.85 Thus in order to give a more accurate assessment of an appliance's efficiency, one option would be to tighten tolerance levels to improve consistency of comparison. This again would require amendment to implementing directives.

6.86 However, the Ecodesign directive would allow for the setting of tighter tolerances in the implementing measure itself (based on existing standards, that is, limiting the tolerances of existing standards while still using them for testing) when setting minimum energy efficiency standards.

**Better enforcement of the label (Action 8)**

6.87 The current Directive mainly requires Member States to ensure that:

(a) Suppliers (manufacturers) make fair declarations;

(b) Dealers (retailers) display the labels on the appliances at the point of sales; and

(c) They ban other confusing or misleading labels.

6.88 From our analysis it is clear that compliance varies between EU Member States.[13] Non-compliance can take the form of non-display of the label or mis-labelling. Non-compliance has an impact on consumers, reducing their information. It may also give an unfair advantage to manufacturers who flout the requirements.

6.89 To an extent, differing levels of compliance are a function of the level of enforcement by authorities. One option is therefore better enforcement of the use of existing labels by manufacturers and tighter policing of labels displayed by retailers, ensuring they are accurate.

6.90 Although there is an obligation on Member States to ensure compliance there is no specification of levels of resource to be devoted to this activity, the degree of inspection required or the form of reporting to be adopted. Any tighter specification of enforcement requirements, including any requirement for this to be carried out at EU level, is likely to require amendment to the Framework Directive. We are aware at the time of writing that the EC has put out a tender to carry out a study to survey compliance.

**Legal protection of the label (Action 9)**

6.91 As noted in the project TOR, the design of the energy label has been copied by many States around the world, within the EU for both EU and national labels and to a smaller extent in private voluntary labels. The TOR further note that other than the prohibition of "confusing" labels on products covered by implementing Directives the legal position of the label design is unclear.

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[13] Examples of poor implementation included a particular problem with small shops, especially those that do repairs who do not display labels (as well as fiches). However, supermarkets only stocking a single product in a given category were also singled out as having poor levels of compliance.

6.92 While the issue of copying is not a problem for other States, it is a problem if private companies seek to copy the scheme as they may abuse it and undermine its credibility, which in turn reflects badly on the EU scheme.

6.93 One option is then to increase the legal protection of the energy label, perhaps making it a legally recognised trademark or by registering it.

**Change from Directives to Regulations (Action 10)**

6.94 Currently the (Framework) Directive provides for implementing Directives (under article 9). This is in contrast to Directive 2005/32 EC which allows for implementing measures to be either decisions or regulations. This has the advantages of reducing the legislative burden on Member States and allowing for a level playing field for manufacturers who will no longer be affected by divergent progress on transposition across the EU27.[14]

6.95 Any move to the use of Regulations to implement Energy Labelling measures would require an amendment to the Framework Directive. The benefits from this need to be balanced against the time and effort required and the extent to which progress on the main actions considered here can be achieved by the combined use of the existing Energy Labelling and Ecodesign Directives.

## Other actions

**Repeal of Directive and other voluntary options (Actions 11 and 12)**

6.96 This action considers repealing the Directive 92/75 on energy labelling completely and integrating its elements into existing legislation such as Eco-Labelling and Ecodesign. The Ecodesign Directive provides a more flexible approach to developing new actions but would need to be amended to include the provision of information by retailers if it was to replace the existing labelling regime. Merging the energy labelling provisions into the Ecodesign Directive could involve creating a new type of label with wider environmental coverage of the whole life of the product than exists at present. The impact on this at the retail level where simplicity of presentation is a virtue would need to be assessed. Revision of the Ecodesign Directive could take time and delay implementation of existing measures but could provide longer term benefits in faster implementation of follow on provisions.

6.97 Voluntary schemes to replace energy labelling might also emerge under this option.

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[14] One might also consider a "generic" Directive with substance in Ecodesign implementing measures.

**No EU action (Action 13)**

6.98 As is good practice, we consider the baseline counterfactual, i.e. what is the impact of maintaining the status quo. Some further improvements in energy saving might be expected to occur with the continued operation of the present energy labels as take-up of A rated product moves towards 100 per cent. The gains from this transition would tail off over the years. There will also continue to be some product innovation in respect of energy efficiency. However the additional potential for savings associated with the actions described above would not be released.

## Implementing policy options

6.99 We have considered four policy options for the EU in taking forward any of the actions described above. These are:

(a) No amendment to the existing Energy Labelling framework Directive. Under this option full use would be made of existing powers including regulations under Ecodesign and new or amended implementing directives under Energy Labelling.

(b) Amendment of the Energy Labelling Framework Directive (92/75).

(c) Repeal of the Energy Labelling Directive with provisions being incorporated into an amended Ecodesign Directive and voluntary activity.

(d) No new actions with continuation of the existing Implementing Directives under Energy labelling.

6.100 The table below sets out the route by which each of the 13 actions identified above might be implemented. As an example, consider non-energy using (but energy relevant) products that are not covered either by the Energy Labelling or the Ecodesign Directives. Dedicated legislation (involving co-decision) would have to be developed or amendment to either or both of these Framework Directives would be required in order to develop a compulsory labelling scheme for these products.[15] By contrast extension of labelling to televisions could be achieved using the Ecodesign studies and a new implementing Directive under Energy Labelling.

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[15] To a large extent the products being considered here are sold direct to consumers or to installers who are dealing directly with consumers. It does therefore appear important that any labelling scheme should cover labelling at the retail level as well as manufacturers. That would suggest using amendment to the Energy Labelling Directive if this option is to be pursued.

6.101 As the table shows that for some actions it is possible that substantial progress could be made with the use of existing powers but this could be taken further if Directives were amended.

**Table 6.2: Actions and Policy options**

| | Action | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Policy Option** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **No amendment** | X | X | | X | X | X | X | X | X | | | | |
| **Amendment** | | X | X | X | X | X | X | X | | X | | | |
| **Repeal Directive** | | | | | | | | | | | X | | |
| **No action** | | | | | | | | X | | | | X | X |

# 7 IMPACT ASSESSMENT

7.1 This section conducts a preliminary impact assessment for each action. We have followed the guidance set out in the EC's Impact Assessment Guidelines, i.e. identifying the costs and benefits across economic, social and environmental themes. The final part of the chapter compares the various options and draws conclusions on priorities for action.

7.2 We first set out the administrative burden of the actions.

## Administrative costs

### For Member States and the Commission

7.3 From the discussion on implementation options above it appears that there are four areas in which the actions might generate administrative costs for Members States and the Commission. These are:

(a) Work within Ecodesign programmes to define new labelling parameters. Our assumption here is that this work will be undertaken under existing plans and that there will be no additional cost related to the actions considered here;

(b) Work to amend the existing Energy Labelling implementation directives for products already subject to labelling. Stakeholders have found it difficult to estimate the work involved. One estimate put the administrative burden at 200 man hours per country to upgrade standards and include new appliances. In addition to time devoted to changes in technical standards, time would also be required for Impact Assessments (e.g. procurement processes, contract management, report drafting, Impact Assessment Board meetings, translations, etc.)

(c) Another suggested a cost of €75,000 for the administrative time involved in negotiating changes and a further €150,000 if national legislation was required for transposition. We cannot be precise about the time and costs involved but as a guideline we have assumed that amending an implementing directive would require six months full time equivalent work from Commission officials and equivalent amounts of time from officials in at least 10 Member States (it is unlikely that all Member States would be involved in the detailed discussions). Valuing this time at the monthly rate for a Grade 8 Commission official of €5,500 gives an estimated administrative cost of around €360,000 per implementing directive amendment. This does not include any add on for overhead costs.

(d) Work to introduce new implementing directives for additional household appliances. This is likely to require more administrative work than the amendment of existing directives. We suggest an indicative cost of €720,000 based on twice the time for amendments.

(e) Work to amend the Energy Labelling Framework Directive. Any significant change to the Framework Directive or other Directives is likely to take longer than changes to the implementing directives. As an indicative estimate we have assumed this process would require three times the level of administrative resource with a cost of around €1,000,000.

(f) There would also be costs associated with Council meetings related to amendments and other changes. We estimate that there would be some 5 such meetings with around 50 participants (including interpreters and delegates from 27 Member States). Using the same salary range as before (€5,500 per month or €275 per working day), this gives an overall figure for 5 meetings as €68,750. In addition to this cost would be Parliament Meetings of a similar size. Thus the cost of meetings would be approximately €150,000.

7.4 There may also be other costs associated with passing and amending legislation. If the Framework Directive continues to require implementation Directives it must follow the standard process for amendment and then transposition. However, given this is the role of many European institutions, one would not expect there to be significant additional financial costs incurred. However, there might be significant time delays which may cause uncertainty in the market.

7.5 Even if the Directive is changed to allow implementation through Regulation, this would require a one-off legislative process with possible savings on subsequent implementation work.

7.6 Converting the label to a legally recognised trademark would also incur a one-off (EU and Member State level) legal cost so that it is recognised as such across the EU. There would also be associated monitoring and enforcement costs. One other consequence flowing from the option to legally protect the label could be the impact on product sales with similar labels. Consumers may only wish to purchase those products with the legally recognised label.

**For manufacturers and retailers**

7.7 In addition to administrative costs for Member States and the Commission, manufacturers and retailers may face higher administrative costs in testing and provision of labels.

7.8 These costs are likely to vary considerably depending on the product involved, the number of models subject to testing and the degree of testing already carried out for other purposes. For those actions that involve the extension of the energy label to other household products, one estimate suggested that if new equipment needs to be labelled this could take manufacturers between three and four months per product to do necessary tests. However, certain products such as televisions may take longer, others such as vacuum cleaners could take less time.

7.9 Estimates of the cost to manufacturers of the development of labelling for products covered by Directive 92/75 cover a wide range. In a Position Paper in 2003 ,on the

development of the Ecodesign Directive CECED, representing domestic appliance manufacturers, stated that:

> "Establishing the energy label alone cost our industry more than €250 million. If we take into account the running costs to keep the system updated, we would double this figure over the last ten years. This represents some 5-8 % of the investments of the whole sector." [16]

7.10 In contrast, impact assessments of the introduction of labelling requirements in the UK considered that the additional costs to industry would principally be the costs of providing labels for use by retailers. This cost would be very small. In these assessments it was assumed that:

> "The information required for the label and brochure is derived from measurements manufacturers already carry out in the course of product development and quality control. Most manufacturers already publish the basic information in their brochure or technical literature but not in easily accessible form for consumers."[17]

7.11 For boilers it has been estimated that testing could cost €2,500 - €3,000 per model family. For electric motors the costs to industry will depend on the type of standard chosen for labelling and the extent of testing work already carried out. Further work would be needed to provide firm estimates but it appears likely that the annual cost of testing new models of electric motors would be less than €1 million.

7.12 The 2006 status report on energy consumption and efficiency trends prepared for the Commission commented that:

> "Most of the energy efficiency measures are cost-effective. This means that they will results in net money savings for the users, as the reduced electricity cost over the life time of the appliances will be bigger than any additional purchasing cost for the more efficient model. In many cases there is an increase in manufacturing cost to manufacturers, which can be passed on the users or can be compensate by productivity gains (and in many case will decrease over time when the most efficient components will be mass produced). Over the last ten years the EU white goods manufacturers have become more profitable, appliances cost less, and the efficiency has improved, this despite fears by manufacturers that the policy action introduced in the 90ies could have had a negative impact. Therefore

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[16] Position Paper on the Proposal for a Framework Directive on eco-design requirements of Energy-using-Products (EuP) CECED 2003

[17] Compliance cost assessment, The energy labelling (refrigerators and freezers) regulations 1994, Department of the Environment

it can be concluded that energy efficiency measures and in particular standards and labels are cost effective for society and reduce CO2 emissions at a negative cost."[18]

## Economic impacts

7.13 As set out in the Commission's Impact Assessment Guidelines, economic impacts can be split into a number of themes. We summarise them below.

(a) Competitiveness, trade and investment flows: issues such as whether the proposed options have impacts on the competitive position of EU firms with their non-EU rivals.

(b) Competition in the internal market: questions such as whether a particular option has an effect on competition policy and the functioning of the internal market.

(c) Operating costs and conduct of business: what the impact on businesses might be in terms of compliance, transaction and operating costs, as well as the general business environment.

(d) Administrative costs on business: do the options impose additional administrative burdens on business?

(e) Property rights: the question here is whether there is an impact on property rights and their application.

(f) Innovation and research: do the options promote or hinder research?

(g) Consumers and households: will prices for end-users rise and other consumer issues associated with each option. With energy saving policies consumers should save money.

(h) Specific regions or sectors: do the options have a particular effect on a specific group or region of the EU?

(i) Third countries and international relations: do the options have any implications for international and bilateral agreements by the EU and Member States?

(j) Public authorities: what is the budgetary consequence for public authorities associated with each option?

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[18] Electricity Consumption and Efficiency Trends in the Enlarged European Union - Status report 2006, Bertoldi and Atanasiu, 2007

(k) The macroeconomic environment: what are the overall consequences for economic growth and employment?

7.14 Of course not all of these impacts are applicable for all options, and they should be read as indicative themes, i.e. there may be other economic impacts. Further, one should also be aware of the duration of the effects, some may only be transitory others may be cumulative over time.

7.15 Table 7.1 sets out the main areas of economic impact including both costs and benefits across the options we have considered.

**Table 7.1: Economic impacts of actions**

| Option | Economic impact |
|---|---|
| **Extending the scope of labelling** | |
| Extension to boilers and further domestic appliances (action 1) | Reduced energy consumption from increased efficiency –<br>Boilers annual potential savings from full Ecodesign €29 bn in 2020, est saving from labelling 20% of total<br>Indicative 1% reduction for consumer electronics, €30m pa These reductions are cumulative over the installed product life. NPV to 2020 c€1.5 bn<br>Administrative cost of change – estimated at €720,000 per product group<br>Cost of testing and labelling for newly included products – indicative €3,000 per model for boilers<br>One-off cost of developing test – within Ecodesign<br>Greater innovation to keep up-to-date - +ve (benefit)<br>Administrative cost of compliance for retailer - -ve |
| Extension to non-domestic appliances/systems (action 2) | Reduced energy consumption from increased efficiency – illustration electric motors cumulative up to 3 TWh value rising to €200m pa. Servers potential for energy saving but impact of labelling uncertain +ve<br>Improved competitiveness +ve<br>Administrative cost of change – within Ecodesign unless extended to retailers<br>Cost of testing and labelling for newly included products - +ve<br>One-off cost of developing test – within Ecodesign and use IEC standards<br>Greater innovation to keep up-to-date - +ve (benefit)<br>Administrative cost of compliance for retailer – nil unless extended to ELDir |
| Extension to non-energy using products (action 3) | Administrative cost of change – amend Directive €1,150,000<br>Cost of testing and labelling for newly included products - +ve<br>One off cost of developing test - +ve<br>Greater innovation to keep up-to-date - +ve (benefit)<br>Administrative cost of compliance for retailer - +ve |

| Option | Economic impact |
|---|---|
| | Consumer choice issues - ambiguous |
| | Reduced energy consumption from increased efficiency – high potential but take-up unclear |
| | For windows there would also be a saving, similar but smaller to boilers. However, this would depend on the rate of replacement. |
| | Tyres potential saving NPV €100 bn over 20 years |
| **Improving the operation of existing schemes** | |
| Dynamic labels (action 4) | Administrative cost of change – amend implementing directive €360,000. Shared cost with other amendments) |
| | Cost of periodic re-evaluation – within Ecodesign |
| | Greater innovation to keep up-to-date - +ve (benefit) |
| | Reduced energy consumption from increased efficiency – indicative 1% reduction for existing products – 720GWh value €100m pa. Cumulative effect by 2020 could be NPV €5.5 bn |
| Additional product information (action 5) | Administrative cost of change – amend implementing directive €360,000. (Shared cost with other amendments) |
| | Increased cost of more information provision on label - +ve |
| | Increased monitoring costs for authorities - +ve |
| | Increased take up of more efficient products +ve |
| Labelling for internet sales (action 6) | Administrative cost of change – amend implementing directive €360,000. (Shared cost with other amendments) |
| | Increased monitoring costs for authorities - +ve |
| | Administrative cost of compliance for retailer - +ve |
| | Increased take up of more efficient products +ve |
| | Saving from increased energy efficiency - +ve. |
| Tighter tolerances (action 7) | Administrative cost of change – amend implementing directive €360,000. (Shared cost with other amendments) |
| | One off cost of adjusting test - +ve |
| Better enforcement (action 8) | Administrative cost of change – amend implementing directive €1,150,000. |
| | Increased resources for authorities - +ve |
| | Increased sales by compliant manufacturers - +ve (benefit) |
| Legal protection of the label (action 9) | Increased monitoring costs for authorities |
| | One-off legal cost |
| | Impact on rival labels |
| Change Directives to Regulations (action 10) | Administrative cost of change – amend Directive |

| Option | Economic impact |
|---|---|
| | €1,150,000. (Shared cost with other amendments) |
| | Earlier implementation of subsequent provisions +ve benefit |
| Repeal of Directive and voluntary options (actions 11 and 12) | Administrative cost of change – amend Directive €1,150,000. (Shared cost with other amendments) Cost of any voluntary replacement scheme |
| | Potential savings in monitoring and enforcement costs - +ve (benefit) |
| | Effect on level of energy efficiency ambiguous |
| No EU action (action 13) | Some continued reduction in energy consumption from increased efficiency of products already covered as a result of existing trends. Declining effect. |

7.16 As the table shows there are unlikely to be any impacts on third country and international relations and the overall macroeconomic environment. Although any reduction in industry's operating costs as a result of increased energy efficiency should improve international competitiveness. We now discuss these impacts in more detail under thematic headings.

**Energy consumption**

7.17 Obviously changes in energy consumption are the main impact of labelling relating to energy efficiency. At a most basic level if the label encourages the development and use of more energy efficiency products, and usage remains constant, then the energy requirement to run these products falls and has an impact on the national consumption of electricity. If electricity is generated via fossil fuels (and one should be aware that in many European Countries it is predicted fossil fuel generation will decline) then a reduction in demand will have a corresponding reduction in harmful greenhouse gas emissions.

7.18 Of course, this rests on the assumption of constant energy use. Consumers and industry may respond to more energy efficient products by still spending the same amount on them, but using more. This is plausible in some cases, e.g. boilers where reduced operating cost may encourage households to opt for warmer homes, but less so in other cases such washing machines and refrigerators.

7.19 As we learnt during our stakeholder consultation one must also be aware of lifecycle emissions. Most products emit greenhouse gases during their production process, and some also do so when disposed of. These must be taken into account. We were informed that some of the most effective non-energy using products (during use), such as windows actually emit the most greenhouse gas during production. However, in round terms, this is offset by reduced energy consumption from other products during the window's lifetime. Nonetheless, lifecycle emissions should be acknowledged.

7.20 With respect to the option of repealing the Directive and relying on other voluntary actions the effect on energy efficiency is ambiguous. Energy efficiency is unlikely to decrease as manufacturers are unlikely to offer new products that will lead to consumers spending more on energy for the same usage. However, it is unclear whether energy consumption will decrease or remain stagnant — this is largely contingent on the effectiveness (or otherwise) of the voluntary measures.

7.21 The provision of additional information such as appliance performance and other essential resources may also have beneficial impacts on water, air and soil quality, e.g. through a reduction in the discharge of harmful materials. However provision of extra information may be counterproductive if confuses the customer.

7.22 A final point to note regarding energy consumption is under the do-nothing or no action option there may still be a future reduction in energy consumption if technological trends continue. Thus, the environmental impact of the other options must be analysed in relation to this environmental baseline.

**Testing and administrative costs**

7.23 The options of dynamic labels and those relating to extension of the energy label would all entail additional testing costs. In the case of dynamic labels this could be an ongoing costs, say every five years, where the testing criteria (and possibly methods) are revised in light of technological advances. However to the extent that revisions simply involve rebasing existing standards the additional costs to industry should be kept low.

7.24 For the other options, the cost for testing products would be a one off cost for designing the testing criteria and methodology. The cost would be proportionally to the number of new products for inclusion. One should not automatically assume that the cost of developing a test is the same for all products.

7.25 One would assume the development costs are equally borne by industry and the authorities. However, there would be costs specific to industry — the actual cost of testing products. The additional cost would arise where products not already subject to testing are involved. This should be less of an issue in the development of dynamic labelling for products which are already covered by the Directive. The Ecodesign Boilers study has suggested that the cost of product testing for boilers should be in the region of €2,500 - €3,000 per product family and that this would have a negligible effect on the final price of the products. Estimates of both past and future costs vary considerably. There is no doubt that there will be costs to be borne by manufacturers but past experience suggests that these will be significantly less than the wider benefits.

7.26 There are also costs involved in the actual production of the energy label (though likely to be small) and any costs involved in training staff (retail and manufacturer) to understand and apply the new labels.

7.27 The enforcement and monitoring authorities would also have to dedicate new resources for any new products included in energy labelling and for any more extensive market surveillance than is carried out at present.[19]

7.28 Retailers may also face some new administrative costs for new products involved in the energy label, e.g. the costs of display.

**Innovation and research**

7.29 In the case of dynamic levels, it is clear that the energy label would stimulate innovation and research into energy efficiency. Given increasing consumer awareness of environmental issues and demand for efficient products, manufacturers will have an incentive to innovate and produce products that achieve higher energy label grades.

7.30 However, one should be cautious in suggesting that there will be large scale, continuous research. At present, consumers express a preference for higher grade products because in real terms prices have declined. If prices are not declining and higher grade products are significantly more expensive than lower grade products, consumers' stated environmental preferences may be limited by their budget constraints — see sub-section on prices below. If consumers are no longer willing to pay for more efficient products, manufacturers may be less tempted to innovate so rapidly. . Innovation comes from the market – in the medium term there is no evidence that innovation increases prices rather the reverse.

7.31 On the basis of past behaviour following the introduction of labelling there is, nonetheless, likely to be, at least one-off, innovation where the energy label is extended to new products. The development of dynamic labelling should also stimulate continuing innovation. This is in one sense the main benefit of labelling, it creates an incentive for innovation, increases the market for the new more efficient products and so dynamically increases investment.

**Cost of monitoring and enforcement**

7.32 A number of options entail greater enforcement and monitoring by the relevant authorities. We have received confidential information relating to authority budgets dedicated to the cost of monitoring and enforcement. While we cannot disclose this, one can estimate that for those options that involve the extension of the label to new products, there would be significant additional costs if they are to be adequately monitored.

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[19] This is based on the assumption that the authorities are already at maximum capacity. This seems reasonable given stakeholder comments to us.

7.33 Increased information provision may also lead to higher enforcement cost, as would the label being extended to online sales.

7.34 It is unlikely that dynamic label would cause any change in monitoring and enforcement costs because the actual number of labels and products to inspect would remain the same — only the ratings change.

7.35 In the case of repealing the Directive and relying on voluntary actions, monitoring and enforcement costs related to energy labelling would fall as the authorities rely on industry to police their own voluntary schemes.

**Effect on product prices**

7.36 According to our stakeholder consultation, product prices are said to be unrelated to energy efficiency. Price is more a function of brand name and product features. Indeed, there was a multiplicity of views as to whether energy labelling had caused prices to change. Some stakeholders claimed prices increased as manufacturers sought to recover costs from more expensive technologies and research costs. In contrast, other claimed that, in real terms, prices had actually fallen — even accounting for an initial price jump caused by the energy label.[20]

7.37 One might accordingly hypothesise that there may be a one-off price increase if the energy label is extended to new products, but that this price increase may be more than offset by market and technological trends. However, this might not be the case in dynamic labelling when technological trends are accounted for in the label.

7.38 Given existing information constraints, one cannot state conclusively the effect on prices.

7.39 During our stakeholder consultation, when asked about extending the energy label to non-energy using products such as tyres and windows it was noted that consumer choice might be affected. This is because making these products more effective in relation to energy efficiency has a trade-off. In the case of tyres, more efficient tyres might mean a reduction in other performance aspects of the tyres. Unless consumers clearly understand the trade-off between energy efficiency and performance (and care about it), it may be the case that manufacturers simply make the trade-off decision on behalf of consumers, reducing their choice.

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[20] It should be noted that these observations refer to domestic products — the picture may be different with non-domestic products which have different user profiles and preferences.

## Social impacts

7.40 As are set out in the Commission's Impact Assessment Guidelines, social impacts can be split into a number of themes. We summarise them below.

(a) Employment and labour markets: do the options facilitate job creation or lead to a reduction in jobs? What other labour market impacts are there?

(b) Standards and rights related to job quality: the options may have an impact on job quality and associated issues.

(c) Social inclusion and protection of particular groups: do the options improve the access to jobs from previously excluded groups? Are particular groups affected?

(d) Equality of treatment and opportunities, non-discrimination: do the options affect the equal treatment and equal opportunities for all?

(e) Private and family life, personal data: do the options affect family life or the legal, economic and social protection of the family?

(f) Governance, participation, good administration, access to justice, media and ethics: here issues to do with civic engagement are discussed vis-à-vis the options.

(g) Public health and safety: do the options have a public health and safety dimension?

(h) Crime, terrorism and security: do the options improve security and reduce crime?

(i) Access to and effects on social protection, health and educational systems: do the options have an impact on services in terms of their quality and user access?

7.41 Of course not all of these impacts are applicable for all options, and they should be read as indicative themes, i.e. there may be other economic impacts. Further, one should also be aware of the duration of the effects (some may only be transitory) while other effects may not occur immediately.

7.42 Table 7.2 below sets the main social impacts across our options

**Table 7.2: Social impacts of actions**

| Option | Social impact |
|---|---|
| **Extending the scope of labelling** | |
| Extension to boilers and further domestic appliances (action 1) | If successful, the labelling promotes new product development – this has a dynamic continuing employment effect (more R&D) |
| | One-off additional employment to develop testing methodologies and implement tests for new products. - +ve |
| | Recruitment of staff for testing more products and in R+D departments. - +ve |
| | Recruitment of staff for enforcement and monitoring. - +ve |
| Extension to non-domestic appliances/systems (action 2) | One off additional employment to develop testing methodologies and implement tests for new products. - +ve |
| | Recruitment of staff for testing more products and in R+D departments. - +ve |
| | Recruitment of staff for enforcement and monitoring. - +ve |
| Extension to non-energy using products (action 3) | One off additional employment to develop testing methodologies and implement tests for new products. - +ve |
| | Recruitment of staff for testing more products and in R+D departments. - +ve |
| | Recruitment of staff for enforcement and monitoring. - +ve |
| **Improving the operation of existing schemes** | |
| Dynamic labels (action 4) | Possible additional employment relating to the updating of labels in R+D departments. - +ve |
| Additional product information (action 5) | Possible recruitment of staff by manufacturers to provide information - +ve |
| | Recruitment of staff for enforcement and monitoring. - +ve |
| | Better informed consumers +ve |
| Labelling for internet sales (action 6) | Recruitment of more staff. - +ve |
| | Increased consumer confidence in information +ve |
| Tighter tolerances (action 7) | Increased consumer confidence in information +ve |
| Better enforcement (action 8) | Better informed consumers +ve |
| Legal protection of the label (action 9) | (One off additional employment to develop testing methodologies and implement tests for new products. - +ve?) |
| | Recruitment of staff for enforcement and monitoring. - +ve |
| | Increased consumer confidence in information +ve |
| Change Directives to Regulations (action 10) | Na |

| Option | Social impact |
|---|---|
| Repeal of Directive and voluntary options (actions 11 and 12) | Possible reduction in enforcement/monitoring staff --ve |
| No EU action (action 13) | Na |

7.43 As the table shows there are unlikely to be any impacts with regard to job quality, social inclusion, equality, privacy, governance, public health and safety, crime and access to social services. Indeed, our analysis suggests relatively few social impacts for the options under consideration — the majority being potential employment impacts.[21] However, one should not assume that all these jobs would be created in the EU. Many manufacturers are not European based and so the additional research jobs might be created outside the EU.

**Environmental impacts**

7.44 As are set out in the Commission's Impact Assessment Guidelines, environmental impacts can be split into a number of themes. We summarise them below.

(a) Air quality: do the options have an effect on emissions of harmful pollutants?

(b) Water quality and resources: do the options have an impact on the emission of harmful pollutants in water systems?

(c) The climate: do the options affect the emission of ozone-depleting substances?

(d) Renewable or non-renewable resources: do the options affect the use of different resources for energy production?

(e) Biodiversity, flora, fauna and landscapes: do the options impact about the wider environment, such as the number of species/varieties?

(f) Land use: do the options have the effect of bring new lands into use? Do they affect existing land?

(g) Waste production/generation/recycling: do the options affect waste processing?

(h) The likelihood or scale of environmental risks: do the options increase or decrease the probability of environmental disasters?

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[21] But one should be careful to distinguish between net employment effects and gross effects.

(i) Mobility and the uses of energy: this refers to issues related to transport, such as the demand for personal transport modes.

(j) The environmental consequences of firms' activities: do the options lead to changes in natural resource inputs required per output?

(k) Animal and plant health, food and feed safety: do the options have implications for the health of animals and plants?

7.45 Of course not all of these impacts are applicable for all options, and they should be read as indicative themes, i.e. there may be other economic impacts. Further, one should also be aware of the duration of the effects (some may only be transitory) while other effects may not occur immediately.

7.46 Table 7.3 below sets out the main areas of environmental impact across our options.

**Table 7.3: Environmental impacts of actions**

| Option | Environmental impact |
|---|---|
| **Extending the scope of labelling** | |
| Extension to boilers and further domestic appliances (action 1) | Reduction of $CO^2$ from boilers potential from full Ecodesign programme 120Mt$CO^2$ pa in 2020. est reduction from labelling 20 Mt$CO_2$ |
| | Also reduced emissions of particulates, NOx, CO etc.) |
| | Potential reduction in energy consumption and $CO_2$ emissions for other appliances – indicative 1% reduction for consumer electronics, 0.5 mt $CO_2$ pa cumulative |
| Extension to non-domestic appliances/systems (action 2) | Potential reduction in energy consumption and $CO_2$ emissions. Illustration electric motors 2 mt $CO_2$ potential over period of years. Some impact from labelling servers but less certain. |
| Extension to non-energy using products (action 3) | Potential reduction in energy consumption and $CO_2$ emissions. Significant potential but take-up unclear |
| **Improving the operation of existing schemes** | |
| Dynamic labels (action 4) | Potential reduction in energy consumption and $CO_2$ emissions. Indicative 1% reduction for existing products, 1.4 mt $CO_2$ pa cumulative.. |
| | Also savings in water consumption |
| Additional product information (action 5) | Potential reduction in use of other resources - +ve |
| Labelling for internet sales (action 6) | Potential reduction in energy consumption and $CO_2$ emissions + water etc - +ve |
| Tighter tolerances (action 7) | Potential reduction in energy consumption and $CO_2$ emissions + water etc+ve |
| Better enforcement (action 8) | Potential reduction in energy consumption and $CO_2$ emissions - + water etc+ve |
| Legal protection of the label (action 9) | Na |
| Change Directives to Regulations (action 10) | Earlier implementation of subsequent provisions brings forward $C0_2$ reductions +ve |
| Repeal of Directive and voluntary options (actions 11 and 12) | Effect on energy use and emissions - ambiguous |
| No EU action (action 13) | Further reduction in emissions due to trend technological development and existing directives. Declining over time. |

7.47 As the table above shows we do not expect that any of the proposed options will lead to land use, mobility, renewable/non-renewable and animal/plant safety impacts.

7.48 Further details of how individual products' energy consumption profile might change are provided in the product studies in Appendix 2.

## Stakeholder views

7.49 As part of our analysis of the impacts of each option, we carried out a stakeholder interview exercise across a number of representative EU member states. The stakeholders we spoke to include government officials, industry and consumer associations and other agencies involved in energy labelling and energy efficiency promotion schemes. Nearly all the interviews were conducted by at least two members of staff and the majority were done face-to-face.

7.50 The countries in which we spoke to stakeholders were the Czech Republic, Denmark, France, Germany, Italy, the Netherlands and the United Kingdom. We also spoke to a number of representative pan-European associations. The full list of stakeholders consulted is in Appendix 3.

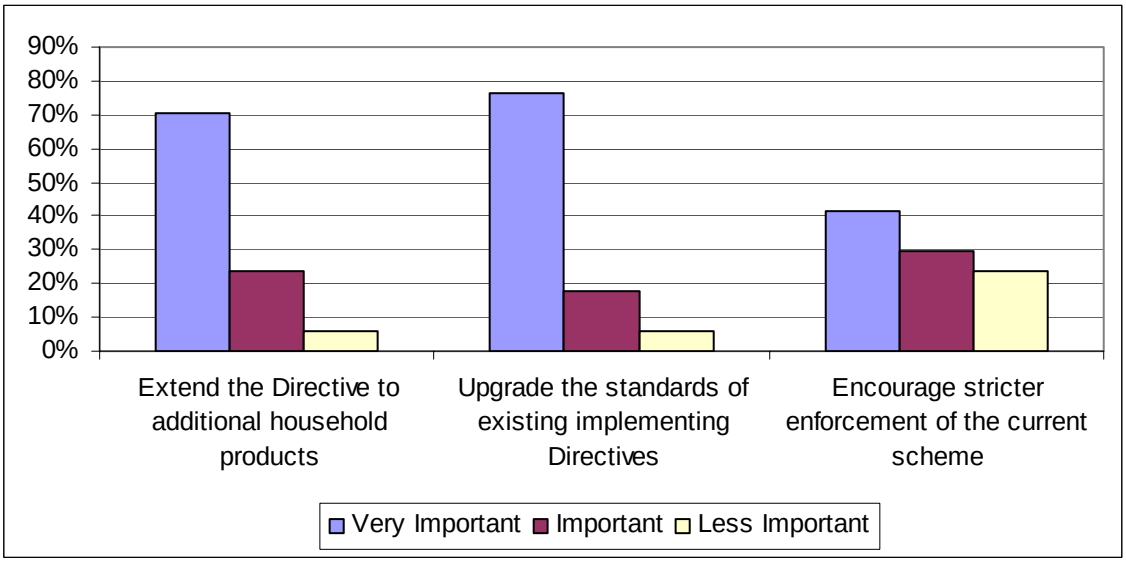
7.51 It should be noted this section is a high level summary of views. By and large we heard very similar views across the EU. In this summary section we set out the main areas of consensus and highlight any material differences between the Member States or groups of stakeholders.

7.52 We stress these are the opinions of a sample of stakeholders and do not represent a scientific analysis.

### No amendment of Directive

7.53 There were varying views as to which policy option was the most important. (Note the option of dynamic labelling and higher tolerances are captured under the category of upgrading the standards of existing Directives).

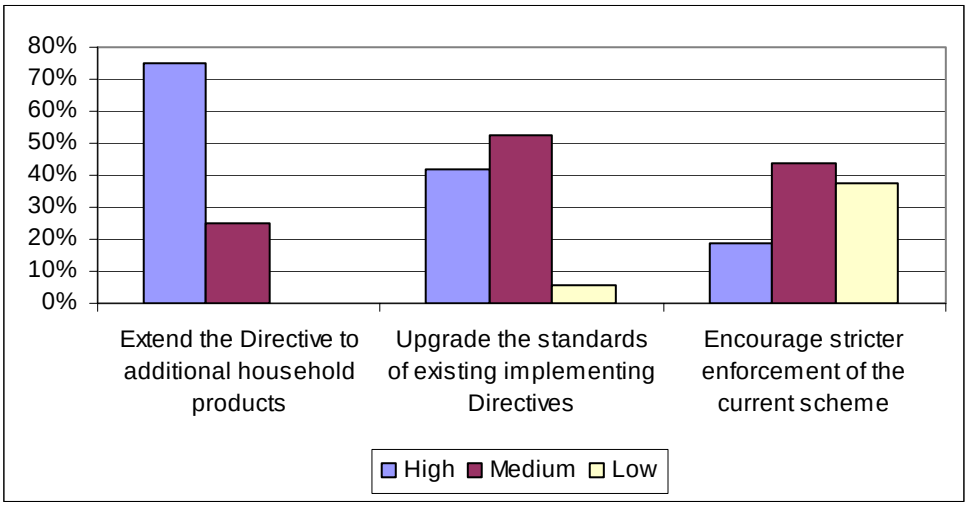
**Figure 7.1: Improvements without amending the current legislation**



7.54 Clearly, stakeholders felt all the proposed options were "very important"; the inference being that they regard the options as complementary not substitutable. However, as reflected in discussions, encouraging stricter enforcement of the legislation was not as important as the other two options.

7.55 The figure below shows perceptions from stakeholders on which of the above options would yield the largest energy savings.

**Figure 7.2: Energy savings from each option**




7.56 The predicted energy savings are consistent with preferences for the improvements of the previous graph.[22]

*Extension to additional household appliances*

7.57 Extension to additional household appliances such as televisions, audio-visual appliances, computers and screens, other IT appliances, boilers, water heaters and standby consumption of appliances was considered a useful extension by most stakeholders. However, as the graph below shows the distribution of responses varied according to the usefulness placed on each product. It is interesting to note a sizeable number of stakeholders do not regard the extension of the label to cover standby as useful. A number suggested that standby would be better addressed through a minimum

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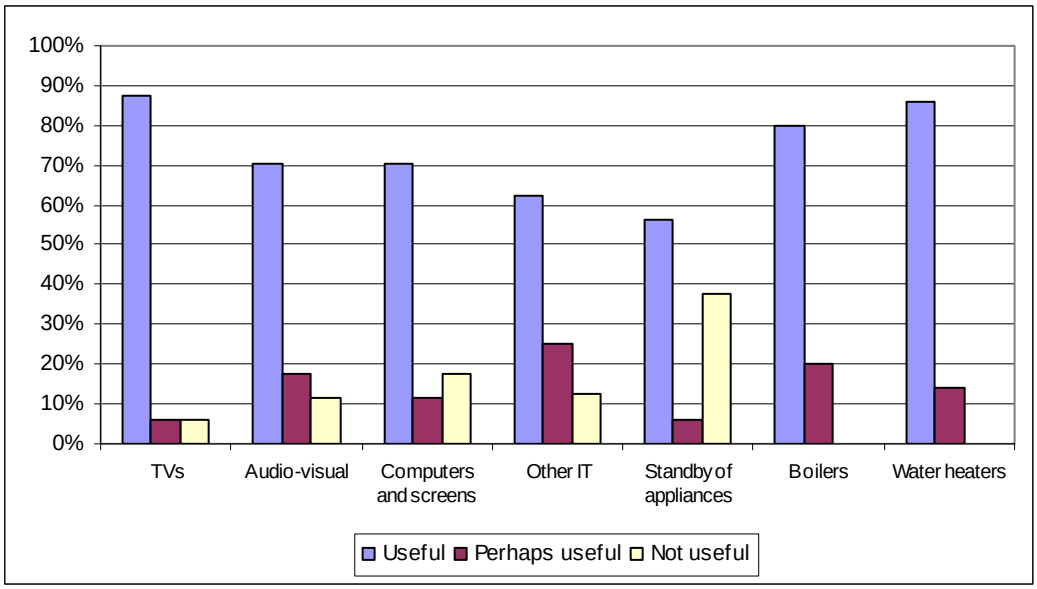
[22] One notes that to no option did stakeholders reply "negligible" (even though it was a saving option offered).

performance standard. Minimum efficiency standards for standby modes are in any case being pursued under Ecodesign.

**Figure 7.3: Extension to other household products**




7.58 Examples of other products mentioned included set-top boxes for satellite and cable television.

7.59 Non-energy using products were also considered and thought a useful extension, especially for windows — although, as noted below, this would entail legislative change.

*Upgrading and revising the standards of existing implementing directives*

7.60 As discussed above, nearly all stakeholders expressed a desire for the energy labelling scheme to be revised to take account of technological developments. As Figure 7.1 shows, this is seen as a crucial amendment by stakeholders.

*Encourage a stricter enforcement/implementation of the current scheme*

7.61 This was seen as the least important (though not uniformly) by stakeholders. The high level of take up of A rated products means that the energy efficiency benefits from stronger enforcement activity may be less than for the other extensions.

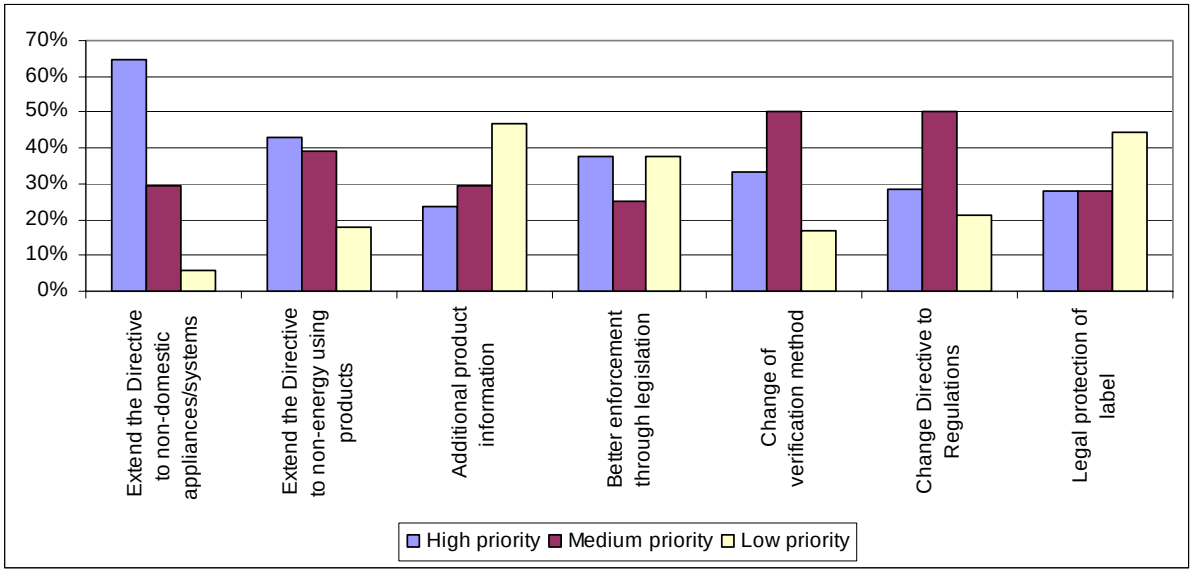
*Transposition costs*

7.62 When asked, the majority of respondents saw the costs from each option as being "acceptable". We received only one response saying the costs of upgrading standards would be "too high" and unacceptable.

### Amend Directive

7.63 The table below shows the distribution of favourability to each option across stakeholder responses.

**Figure 7.4: Improvements via amendments to the current legislation**




7.64 It was noted that any amendments (and new legislation) should respect the principles of subsidiarity.

7.65 As the graph shows, respondents expressed that the view extension of the energy labelling regime to non-domestic products, such as computer servers and motors should be treated as a high priority for the EC, and also to a lesser extent, including non-energy using products.[23] Other amendment options were not deemed such high priority.

7.66 Another salient issue raised was that any revised legislation should include an obligation for manufacturers and importers to register all products in a central database and also deal with aspects related to the internet sales.

7.67 Regarding an increase in the level of legal protection of the label, a view was expressed that the energy label fiche itself should become a registered trademark. This, it was

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[23] However, there was an acknowledgement by some stakeholders that the problem with including certain products, e.g. motors, commercial refrigeration and servers is that there is a lack of knowledge and data on energy efficiency.

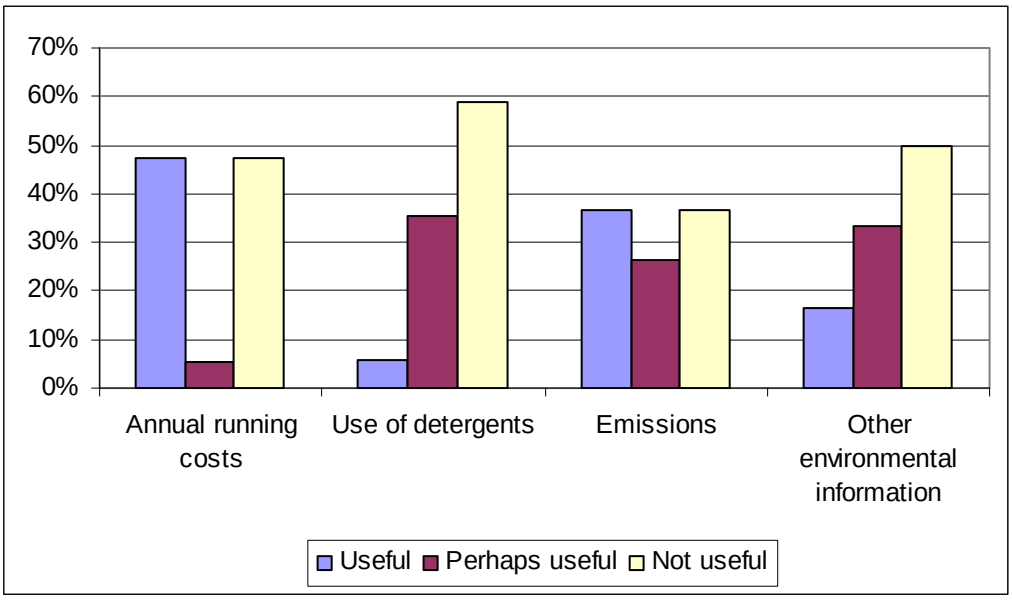
stated, would benefit the Commission by allowing it to apply sanctions in the case of improper use of the energy label other than the cases indicated in the labelling framework directive 92/75/EC.

7.68 An increase in information, it was noted, should encompass a clear statement on the appliance's total energy consumption, including possible energy consumption in connection with standby functions. One further suggestion was made that any revision of standards should take account of the energy used throughout the product's life-cycle, i.e. during the manufacturing process. Provision could also be made if the product's manufacture included consumption of other scarce resources such as water.

7.69 However, it should be noted that some stakeholders cautioned against providing too much information. There was a view that consumers are not particularly interested in items such as $CO_2$ emissions. Information on annual running costs was not considered useful as consumer prices differ between EU Member States.

7.70 The table below shows the breakdown of responses.

**Figure 7.5: Additional information on products**




7.71 The risk of compromising the label's simplicity was also noted

**Repeal Directive**

7.72 The Eco-Design directive prohibits the less energy efficient appliances from the market and the remaining appliances would be classified. So the consumer has the guarantee that whatever appliance he buys, it fulfils minimum standards. Most stakeholders believe that the Labelling directive and the Eco-Design are potentially complementary to one another.

7.73 Eco-Design is viewed as being aimed at industry, whereas Energy Label focuses on consumers — thus complementarity is achieved. Assuming that the Eco-Design standards are dynamic, it would have the effect of removing less efficient products from market, giving manufacturers an incentive to produce more efficient products.

7.74 It was stressed that both schemes should contain the same technical analytical framework to achieve consistency.

7.75 If the two Directives were to co-exist, then some stakeholders argued that the Eco-Design directive should be taken as the superior scheme to the Energy Labelling Directive.

7.76 There was a disparity of views as to whether the Energy Labelling Directive should be repealed and complete reliance be placed on Eco-Design. Some stakeholders, while considering that greater harmonisation was desirable, did not see any benefit from repealing the Energy Labelling legislation rather than repealing, combining it or just relying on the Eco-Design directive.

7.77 Others argued that since Eco-Design contains recommendations or obligations made for manufacturers, and, additionally, obligations for retailers to display the label, this would be better implemented via one Directive and one label. It was acknowledged by some advocates that the combination of Eco-Design and Energy Labelling while it might appear sensible would not bring about a simplification. As noted above (7.69), a number of stakeholders were concerned about extending labelling to include additional information which was not of direct interest to consumers.

## Summary of impacts

7.78 A comparison of actions is tabulated below. The first table sets out the respective costs and benefits of each action compared against other actions. The second table contains a overall assessment of the costs and benefits measured against the different policy options for implementation.

**Table 7.4: Comparison of costs and benefits from each action**

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | Economic | Social | Environmental | |
| **Extending the scope of labelling** | | | | |
| **Extension to boilers and further domestic appliances (action 1)** | **Costs**<br>Administration **-** est €0.7m per product group<br>Testing and labelling for newly included products – est €3,000 per model but will vary by product<br>One-off cost of developing test – cost covered in Ecodesign<br>Administrative cost of compliance for retailer +ve<br>**Benefits**<br>Reduced energy consumption from increased efficiency – indicative savings; boilers savings from full Ecodesign, €28bn pa in2020; est saving from labelling 20% of total<br>Indicative 1% reduction for consumer electronics, €30m pa Cumulative effect to 2020 NPV €1.5bn<br>Greater innovation to keep up-to-date +ve | **Costs**<br>**No costs identified**<br>**Benefits**<br>One-off additional employment to develop testing methodologies and implement tests for new products. +ve<br>Recruitment of staff for testing more products and in R+D departments. +ve<br>Recruitment of staff for enforcement and monitoring. +ve | **Costs**<br>**No costs identified**<br>**Benefits**<br>reduced annual $CO^2$ emissions; est reduction from full Ecodesign 120 Mt $CO_2$ pa by 2020, est reduction from labelling 20 Mt $CO_2$<br>Potential reduction in energy consumption with reduced $CO_2$emissions from other appliances; indicative 1% reduction for consumer electronics, 0.5mt $CO_2$ pa cumulative | Very high priority<br>TVs boilers and water heaters most favoured; AV and computers strongly supported; mixed response on standby energy use, may be better dealt with by minimum standard<br>High expectation of additional energy savings from extension to favoured products<br>Costs generally seen as acceptable |
| **Extension to non-domestic appliances/systems** | **Costs** Administrative cost of change – within Ecodesign unless extended to retailers | **Costs**<br>**None identified** | **Costs**<br>**None identified** | Strong support for extending labelling to non-household products but caveat that impact needs further evaluation |

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | **Economic** | **Social** | **Environmental** | |
| **(action 2)** | Cost of testing and labelling for newly included products +ve possibly up to €1mpa<br>One-off cost of developing test – within Ecodesign<br>Administrative cost of compliance for retailer – nil unless extended to Dir 92/75<br>**Benefits**<br>Reduced energy consumption from increased efficiency – illustration electric motors cumulative up to 3 TWh value rising to €200m pa. Servers potential for energy saving but impact of labelling uncertain +ve<br>Improved competitiveness +ve<br>Greater innovation to keep up-to-date - +ve (benefit) | **Benefits**<br>One-off additional employment to develop testing methodologies and implement tests for new products. +ve<br>Recruitment of staff for testing more products and in R+D departments. +ve<br>Recruitment of staff for enforcement and monitoring. +ve | **Benefits**<br>Potential reduction in energy consumption with reduced $CO_2$emissions – illustration, electric motors cumulative up 2mt $CO_2$ pa. Benefits from servers but less certain. | Case studies suggest considerable scope for energy saving<br>Costs generally seen as acceptable |
| **Extension to non-energy using products (action 3)** | **Costs**<br>Administration – amend directive €1.2m<br>Increased cost of testing and labelling for newly included products +ve<br>One off cost of developing test +ve<br>Administrative cost of compliance for retailer +ve | **Costs**<br>**None identified**<br>**Benefits**<br>One off additional employment to develop testing methodologies and implement tests for new products. +ve | **Costs**<br>**None identified**<br>**Benefits**<br>Potential reduction in energy consumption with reduced $CO_2$emissions +ve but uncertain | Support but less strong than for no-household EuPs<br>Case studies suggest case by case consideration rather than general scheme<br>Costs generally acceptable but some concerns |

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | **Economic** | **Social** | **Environmental** | |
| | Consumer choice issues ambiguous<br>**Benefits**<br>Greater innovation to keep up-to-date +ve<br>Reduced energy consumption from increased efficiency +ve but uncertain | Recruitment of staff for testing more products and in R+D departments +ve<br>Recruitment of staff for enforcement and monitoring. +ve | | |
| **Improving the operation of existing schemes** | | | | |
| **Dynamic labels (action 4)** | **Costs**<br>Administration – amend implementing directives €0.4m per directive (shared with other amendments)<br>Cost of periodic re-evaluation –cost within Ecodesign<br>**Benefits**<br>Greater innovation to keep up-to-date +ve<br>Reduced energy consumption from increased efficiency – indicative – 1% reduction for existing products – 720 GWh pa value €100m pa. Cumulative by 2020 NPV€5.5bn | **Costs**<br>**None identified**<br>**Benefits**<br>Possible additional employment in R+D departments related to the updating of labels +ve | **Costs**<br>**None identified**<br>**Benefits**<br>Potential reduction in energy consumption and $CO_2$ emissions. Indicative 1% reduction for existing products 1.4mt $CO_2$ pa cumulative.<br>Savings in water consumption | Very high priority.<br>Good level of energy saving expected but not as high as from extending to new products |
| **Additional product information (action 5)** | **Costs**<br>Administration – amend | **Costs**<br>**None identified** | **Costs**<br>**None identified** | Seen as low priority<br>Scope for additional information on annual |

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | **Economic** | **Social** | **Environmental** | |
| | implementing directives €0.4m per directive (shared with other amendments)<br>Increased cost of more information provision on label +ve<br>Increased monitoring costs for authorities +ve<br>**Benefits**<br>Increased take up of more efficient products +ve | **Benefits**<br>Possible recruitment of staff by manufacturers to provide information +ve<br>Recruitment of staff for enforcement and monitoring. +ve<br>Better informed consumers +ve | **Benefits**<br>Potential reduction in use of other resources +ve | energy consumption and emissions but concerns about presentation of information<br>Concern about confusing simple message which is strength of present label<br>Some concerns on costs |
| **Labelling for internet sales (action 6)** | **Costs**<br>Administration – amend implementing directives €0.4m per directive (shared with other amendments)<br>Increased monitoring costs for authorities +ve<br>Administrative cost of compliance for retailers +ve<br>**Benefits**<br>Increased take up of more efficient products with energy savings +ve | **Costs**<br>None identified<br>**Benefits**<br>Better informed consumers +ve | **Costs**<br>None identified<br>**Benefits**<br>Potential reduction in energy consumption and $CO_2$ emissions +ve | - |
| **Tighter tolerances (action 7)** | **Costs**<br>Administration – amend implementing directives €0.4m per directive (shared with other amendments)<br>One-off cost of adjusting tolerances –cost within Ecodesign | Increased confidence in information +ve | Potential reduction in energy consumption and $CO_2$ emissions +ve | Some stakeholder support for reduced tolerances |

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | Economic | Social | Environmental | |
| | **Benefits**<br>Increased take-up of more efficient appliances with energy savings +ve | | | |
| **Better enforcement (action 8)** | **Costs**<br>Administration – amend 92/75 - €1.2m<br>Increased resources for authorities +ve<br>**Benefits**<br>Reduction in non-compliant sales and increased take-up of more efficient appliances +ve | **Costs**<br>None identified<br>**Benefits**<br>Recruitment of more staff. +ve<br>Better informed consumers +ve | **Costs**<br>None identified<br>**Benefits**<br>Potential reduction in energy consumption and $CO_2$ emissions +ve | Seen as important by manufacturers and some MS<br>Not given high priority by some given high take up of A rated products with present levels of enforcement<br>Some concerns about costs |
| **Legal protection of the label (action 9)** | **Costs**<br>Increased monitoring costs for authorities +ve<br>One off legal cost +ve<br>Legal impact on rival labels | **Benefits**<br>Recruitment of staff for enforcement and monitoring. +ve<br>Increased confidence in information +ve | **Costs**<br>None identified | Seen as low priority<br>Concern about cost |
| **Change Directives to Regulations (action 10)** | **Costs**<br>Administration – amend 92/75 - €1.2m<br>**Benefits**<br>Savings on future implementation +ve<br>Earlier implementation of subsequent provisions +ve | **Costs**<br>None identified | **Costs**<br>None identified<br>**Benefits**<br>Earlier implementation of subsequent provisions brings forward $C0_2$ reductions +ve | Seen as medium priority |
| **Repeal of Directive and other voluntary** | **Costs**<br>Administration – amend Ecodesign | Possible reduction in enforcement/monitoring staff | Effect on energy use and emissions – ambiguous | Not generally favoured<br>Labelling and Ecodesign directives seen as |

| Option | Impact | | | Stakeholder views |
|---|---|---|---|---|
| | **Economic** | **Social** | **Environmental** | |
| **actions (actions 11 and 12)** | - €1.2m<br>Cost of any voluntary replacement scheme<br>Effect on level of energy efficiency ambiguous<br>**Benefits**<br>Potential savings in monitoring and enforcement costs +ve | –ve | | complementary<br>Ideally could be combined but operating in tandem can work well |
| **No EU action (action 13)** | **Benefits**<br>Some continued reduction in energy consumption from increased efficiency of products already covered as a result of existing trends. Declining effect +ve | Na | **Benefits**<br>Possible reduction in emissions due to trend technological development. Declining over time | |

7.79 Table 7.5 sets out the overall benefits of each action cross-tabulated against the policy options of working within existing legislation amending or appealing the existing provisions. This is based on our assessment of the overall degree of impact which the actions might be expected to have taking into account both the costs and the benefits identified. The 'Do nothing' option – that is to continue with labelling in the forms currently in place is considered as a baseline.

7.80 Significant positive gains can be made through actions which can be taken now using existing legislation. Labelling by both manufacturers and retailers can be extended to additional household appliances in this way (Action 1) using the Energy Labelling and Ecodesign Directives. This is listed against the 'No amendment' policy option in Table 1.1. Labelling of non-household products (Action 2) could be extended to manufacturers using the Ecodesign Directive, but extending labelling of these products to display by retailers, which might offer some additional benefit, would require an amendment of the Energy Labelling Framework Directive. Action 2 is therefore listed against both the 'No amendment' and the 'Amendment' policy options in Table 7.5. Extension of labelling to non-energy using products (Action 3) would require amendment of existing Framework Directives. Development of dynamic labelling schemes (Action 4) could largely be achieved with existing legislation but might be enhanced with amendment to the Framework Directive. Actions 1, 2 and 4 are the areas where we have identified the most significant potential for net benefits. These are highlighted in green in Table 7.5 with particular emphasis on actions which can be taken without further legislation. Other possible actions deliver benefits on a smaller scale. The main areas of benefit in this category are highlighted in yellow.

7.81 This simplified table masks some complexities between the policy options. "No amendment" shows the potential for benefits which could be achieved without major new legislation. There may be further benefits that could arise from the "amendment" policy option. The scoring shown here for the 'Amendment' option is our assessment of the combined effect of taking advantage of the actions available under 'no amendment' and any additional benefits resulting from 'amendment'. It is not the incremental benefit from the further gains from taking forward the 'Amendment' option on top of actions under existing provisions. Going down the 'Amendment' route in addition to the 'No amendment' options could incur time as well as additional implementation costs. These may deliver additional benefits but should not get in the way of taking forward beneficial actions which do not require this new legislation.

7.82 Where possible we have taken into account quantitative estimates of the potential impact of particular policy actions but this has not been possible for all the relevant areas of costs and benefits. The final evaluation of the balance of costs and benefits is therefore qualitative.

**Table 7.5: Comparison of actions and options***

| | Action | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Policy Option** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** |
| **No amendment** | +++ | ++ | | ++ | + | + | + | + | = | | | | |
| **Amendment** | | ++? + | +? | ++? + | + | + | + | + | | = | | | |
| **Repeal Directive** | | | | | | | | | | | -? | | |
| **Do nothing** | | | | | | | | + | | | | -? | + |

** Where +++ = very large overall benefit, ++ = large overall benefit, + = moderate overall benefit, = = benefit is the same as cost or ambiguous, - = moderate overall cost. ? indicates particular uncertainty about likely outcome.*

## Overall assessment

7.83 The compulsory energy labelling schemes that have been developed since 1992 for household appliances have been successful in encouraging the take up of products with higher energy efficiency. The impact varies between products but it has been suggested that in favourable circumstances half of the move to higher efficiency products could be attributed to the labelling schemes. As a result of the schemes a high proportion of the purchases of products covered by the schemes are now of A rated products — a big increase on earlier years.

7.84 Continuation of the existing labelling arrangements without any further initiatives provides a 'Do Nothing' baseline against which new policy actions can be compared. Under this scenario it is likely that there would be some further increase in the take up of the higher rated products with associated energy savings and emissions reductions. However it is likely that many of the benefits to be derived from existing policies have already been 'banked'. Nonetheless there is scope for further take up of A rated products as old appliances are replaced with associated energy savings but that potential will decline if no new initiatives are taken.

7.85 It is clear from the research and analysis that we have carried out and from the wider research in hand in the Ecodesign studies that there is considerable potential for more energy savings to be achieved. This would come from further initiatives to encourage the take up of higher energy efficient products across a wider range than at present and also from improvements to the schemes that are already in existence.

7.86 Tapping into that potential will require a range of policy initiatives of which labelling is one and it is difficult to attribute benefits specifically to the labelling schemes. However the illustrative valuations of potential benefits that we have provided, together with other estimates from Ecodesign studies, suggest that even quite small contributions to energy saving from the introduction of labelling can provide valuable benefits to users in reduced costs and to society more widely through reduced emissions. These benefits are cumulative over the years since the enhanced efficiency benefits last over the installed life of the product.

7.87 Our focus has been in providing a quantitative and qualitative assessment of the impact of the range of policy options. These also need to be assessed for their practicability and cost in terms of the institutional arrangements necessary to implement each option and associated administrative burdens.

**Setting priorities**

7.88 There is a strong rationale for policy intervention to encourage energy efficiency. The potential for further benefits from intervention are far from being exhausted and the 'Do Nothing' baseline outlined above would not take advantage of these opportunities. The other options considered all offer some benefits over and above this baseline and the issue now is to identify where resources might be most effectively deployed to make a reality of the potential that has been identified. This provides the basis for setting an order of priorities for the next stages of work.

**Extending the scope**

7.89 The principal benefits from new actions should come in the form of reduced energy consumption delivering lower costs to consumers and reduced emissions. The cumulative nature of these benefits means that quite small initial improvements have a substantial impact over a period of years. A ranking of options can be made on the basis of identifying products which account for high levels of electricity and other energy consumption particularly where, in the absence of further information provided by labelling, consumers may be expected to make their choice based on lowest installed cost and not on energy savings.

7.90 In the household sector boilers and water heaters, followed by consumer electronics rank highly in this respect. Electric motors are a key target amongst non-domestic products. The implementation routes are different for each of these products and the extent to which labelling will influence choice will also differ. For example the extent to which the labelling of electric motors, which are usually installed as part of a motor driven system will influence choice of motor requires further research. Similar issues arise with boilers which form part of a heating system

7.91 Nonetheless these are products which account for a high proportion of household, industrial and commercial energy consumption and should be priority targets for further action.

7.92 The principal costs involved in taking actions forward are the set-up costs of any new schemes and the costs for industry of complying with new requirements, in particular the testing and labelling of products.

7.93 Our estimate of administrative costs within government in taking action forwards suggest that these are relatively low and once-off– at most €1 million where framework directives need to be amended. It is clear that in practice much of the potential for further action can be addressed using the existing directives and this will help to keep down the administrative burden.

7.94 It is less easy to identify the costs to be borne by industry. These will vary between products depending on the number of manufacturers and the range of products. It will also depend on the extent to which there is already testing and measurement of energy use being carried out on these products for other purposes. There is no doubt that there will generally be a positive initial cost to industry but it is expected that for new labelling schemes this will be outweighed by the continuing, cumulative, nature of the benefits.

7.95 The potential benefits from extending labelling to non-energy using products are less clear cut. Administrative costs would be at the high end of the range because this would require amendment to the framework directive while the impact on consumers is less clear. This appears to be a lower priority and would benefit from further case by case consideration.

**Improving the existing schemes**

7.96 The costs and benefits of a move to dynamic labelling appear significant and may match those of extending labelling to other household and non-household products. This would give a new impetus to the existing schemes which cover products accounting for a large proportion of household energy consumption. Revised labelling ratings would only need to contribute to a relatively small further increase in energy savings to justify action. If the revision simply involves a recalibration of the A – G scale then the additional costs to industry in testing products should be kept to a minimum.

7.97 Other actions to improve the operation of the existing scheme could be expected to make some contribution to the energy saving objective but this can only be evaluated qualitatively. It is notable that while stakeholders gave strong support to extending labelling to new products and to dynamic labels, there was less enthusiasm for more detailed changes related to issues such as product information, enforcement and legal form along with a greater concern about the costs that would be involved. This range of actions should accordingly be given lower priority.

**Repeal and other options**

7.98 Repeal of Directive 92/75, unless accompanied by its incorporation of similar provisions into an amended Ecodesign Directive, would risk losing the benefits already achieved by the Directive and the potential for additional gains which we have identified from further use of the Directive. Amendment of Ecodesign to incorporate the energy labelling directive could result in a delay in the implementation of existing provisions. It could also lead to a more complex form of energy label which might undermine the simplicity of the existing scheme which is seen as one of its strengths.

7.99 Voluntary schemes could fill some of that gap but we have not seen evidence that these could address the Single Market concerns which were an important driver in the original introduction of 92/75 and remain important.

7.100 Voluntary measures can, however, play an important role, either as a pre-cursor to compulsory action – bridging the gap during the implementation period – or as a

complement to labelling, as a means of further encouraging consumers to adopt higher efficiency products.

**Implementation routes**

7.101 The priority actions we have identified above can largely be implemented with existing legislation and by building on activities under Ecodesign that are already in hand. It is consistent with our prioritisation based on areas of greatest potential benefit that this should also be linked to implementation routes which are lower cost both in administrative terms and in terms of the time required to achieve implementation.

7.102 Initiatives which can be taken forward solely using the existing Ecodesign work are likely to be the lowest cost. However initiatives to extend 92/75 to a wider range of products can also be taken forward without significant cost and delay. These should have significant benefits and should be given similar priority. A high proportion of the actions we have considered here can be taken forward in this way.

7.103 Improvements to the operation of existing labelling schemes can also be beneficial. The development of a dynamic labelling scheme to update the original A –G label has potential to re-invigorate the original schemes and deliver a new round of energy savings. This too can be achieved using the existing implementation directives.

7.104 A number of other improvements could be made such as on information provision and detailed tolerances in technical standards could deliver benefits within existing legislation on a more modest scale.

7.105 Actions which would require more complex and time consuming processes of new directives (with co-decision) include the extension of labelling to non-energy products and more detailed requirements on Member States to carry out implementation activities.

7.106 There is also the option to encourage voluntary action by industry either as an alternative to or in support of European level action. This appears to be a valuable adjunct to but not a substitute for European action.

# 8 MONITORING AND EVALUATION

8.1 The actions proposed are directed at encouraging consumers/users of products to move over time from lower to higher energy efficient products. These follow the form of the energy labelling projects developed over the past fifteen years for which monitoring arrangements have been developed. These can provide the template for the monitoring of new schemes and any upgrading of existing schemes.

8.2 In general it will be important to identify the baseline use of different classes of products prior to the introduction of new arrangements, the time scale over which changes in consumer behaviour can be expected to take place, allowing for the replacement cycles of different products and targets for the uptake of the more efficient products over this period. This will provide a starting point against which progress can be monitored.

8.3 Monitoring will require the collection of market data either on a continuous basis or at discrete points in time in order to provide an objective assessment. This can be supplemented by views from stakeholders.