# The new energy label: assessing consumer comprehension and effectiveness as a market transformation tool

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## Keywords

energy label, market transformation, consumers, assessments, consumer understanding

## Abstract

The EU's energy labelling programme dates back to the mid-1990s. The design of the label was the first leading energy label design to be informed by consumer research and this guided the adoption of key elements of the design. This iconic design was applied to refrigerators, then other domestic appliances and has since been adopted in EU energy labels for lighting, cars and buildings. Many countries around the world have adopted key elements of the design. In recent years the design of the label for household refrigerators, washing machines and dishwashers has been modified to include the introduction of additional efficiency classes up to the A+++ class. There has also been a move away from a two part label with a language specific background to a single language-neutral label that is the same across the whole EU. Given such significant changes and the active debate which preceded them, it is important to establish how well the revised labels work with consumers to assess their likely energy saving impact. This paper presents the preliminary findings of a comprehensive consumer research study which does exactly this. Consumer focus groups and questionnaires were conducted in ten cities across the EU and were complemented by three sets of in-depth interviews held in London, Prague and Paris. The methodology involved a mixture of qualitative and quantitative market research techniques that was designed to extract the maximum amount of information in an unbiased and non-leading way. The research was carried out by Navigant Consulting and funded by CLASP. Sowatt and SEVEn also contributed to the research in the data collection phase.

## Introduction

The European Union (EU) has implemented a highly effective and internationally influential energy labelling programme for household appliances since 1995. The original energy labelling framework directive was first reviewed in the late 1990s (Winward *et al.*, COLD II, 2000, 1998; Waide, 2001). In 2010 the energy labelling directive was recast: its scope of applicability was broadened; many of the existing labels, specifically those applying to refrigerators and freezers, washing machines and dishwashers were redesigned; and a new label was launched for televisions. All four of these new labels were implemented in November 2011.

Much discussion preceded the adoption of the new labels. This concerned both the design and specific questions regarding how to effectively address the concentration of the markets in the highest label classes, already observed in relation to products labelled for some time (DGET, 2009; Heinzle & Wüstenhagen, 2010; Ipsos Marketing, 2008; Which?, 2009). The discussion centred on whether it would be better to redraw the old A-to-G energy efficiency scale or to add new higher efficiency classes above class A. In the end a decision was made to add higher efficiency classes for products where markets were concentrated in the highest label classes. It was also decided to include an important design change to move from a two-part label with a language-specific background to a single, language-neutral label that is the same across the whole EU. This latter change, which allows the label to be printed on a single backing and thereby helps minimise the risk of retailers failing to assemble and display the two components of the old label correctly, has been achieved by using illustrative icons (pictograms) in place of the former explanatory text to indicate which product performance parameter is being indicated. The main changes in the new labels compared to the earlier EU designs are that:

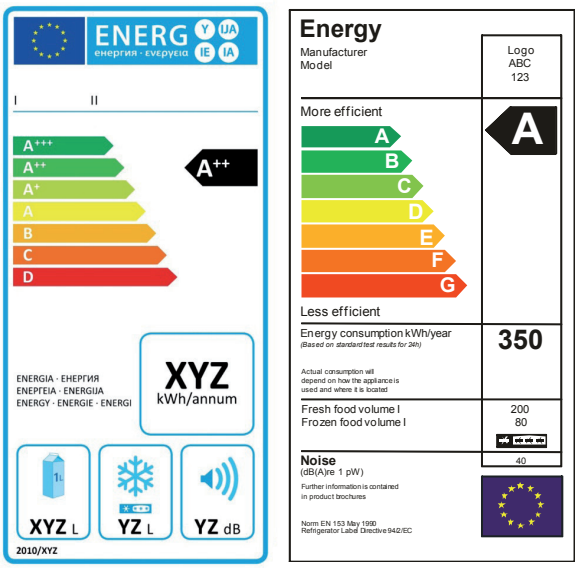


*Figure 1. Comparing the new (left) and the old (right) energy labels (refrigerator-freezer).*

- They are issued as single labels (as opposed to the old two-part labels).
- They are the same for all markets, i.e. they no longer contain national language-specific information (except for the word 'Energ[y]', which is written in all major EU languages).
- They make use of icons to communicate a variety of performance factors.
- The energy efficiency classification used in the revised labels ranges from A+++ to D (the scale for the new television label is A to G).[1]

Against this background the research presented in this paper examines the effectiveness of the new labels with regard to how well they work in practice with consumers. The research was designed to examine the effectiveness of the current designs in relation to their purpose: to support consumers in making informed choices about the energy efficiency of appliances when making a purchase decision. The effectiveness of alternative designs was therefore not examined. Figure 1 shows the new label and the old label side by side in the case of a refrigerator-freezer. Figure 2 provides an example each, of the new refrigerating appliances, washing machines, dishwashers and televisions labels.

The paper is structured in the following manner: first, the methodology followed is briefly set out; second, the findings are reported in some detail, and then, third, summarised; fourth, the principal policy conclusions are drawn out. These are of particular relevance in light of the upcoming review of the energy labelling framework directive, required to take place by the end of 2014 at the latest. This means that most of the preparation of the evidence base for this, will need to be done during 2013 and early parts of 2014.[2]

## Methodology

A mixed research methodology was applied that used questionnaires, consumer focus groups and consumer in-depth interviews to gather quantitative and qualitative data on how consumers use, understand and are motivated by the new and revised labels.

Ten consumer focus groups and 30 in-depth interviews were conducted at ten different locations across the EU to determine the degree to which consumers comprehend and make use of the new and revised energy labels introduced at the end of 2011.[3] The research was conducted, in chronological order, in London, Prague, Madrid, Athens, Warsaw, Frankfurt, Paris, Copenhagen, Milan and Sofia.[4]

After preparation of the research methodology and the related moderator guides,[5] questionnaires and show cards, ten hour-long in-depth interviews and a focus group were conducted in London as a pilot exercise. This was repeated with minor refinements in the remaining locations: focus groups were conducted in all the locations while a set of ten in-depth interviews was conducted in each of Prague and Paris. Questionnaires were completed by all participants and DVDs were made of the focus groups and/or in-depth interviews. English transcripts of the conversations recorded on the DVDs were produced from the simultaneous translation soundtrack that was produced for all locations except the UK, and were then verified to ensure that all the details were correctly captured prior to the final detailed analysis stage by a researcher fluent in the original language. The resulting questionnaires and transcripts were then analysed transversally to determine the responses to a broad yet targeted set of questions designed to determine the effectiveness of the labels and probe how consumers use and understand them. Table 1 gives an overview of the timing, location, and number of participants in the focus groups and interviews.

1. There are, even with the new energy label design, seven classes, either A–G or A+++–D and these are adjusted to the colour scale. The exception is absorption type refrigerating appliances, which represent only a very small part of the market. The label does not give any information about the requirements of the ecodesign directive. It would therefore be useful to explore how the timing of known ecodesign criteria might best be indicated on the label in the future.

2. In this context, the studies conducted in support of the first evaluation of the original energy labelling framework directive are of continued relevance (see Waide, op. cit., Winward et al., op. cit., COLD II, op. cit.).

3. Focus group participants were chosen in accordance with a screener which is used to ensure that there is as a representative blend of appliance purchasing public as possible. The screener was constructed making use of data we had on who buys appliances in each economy differentiated by age, sex and socio-economic category and is designed to ensure the sample of participants matches the broader distribution of appliance purchasing public as closely as possible within a sample of 8 to 10 people. Locations were chosen to ensure a good geographic and cultural/linguistic mix of European consumers (e.g. North, South, East, West, Centre) within the available resources. See forthcoming report for a fuller description of the methodology.

4. The main distinction between the present survey and the consumer related aspects of Winward et al. 1998, is that while the former study was able to examine consumer response to labels already in the shops, due to the very recent nature of the new label designs, the present study had to examine consumer response outside of the shopping environment.

5. Available as an annex to the forthcoming report of the study.

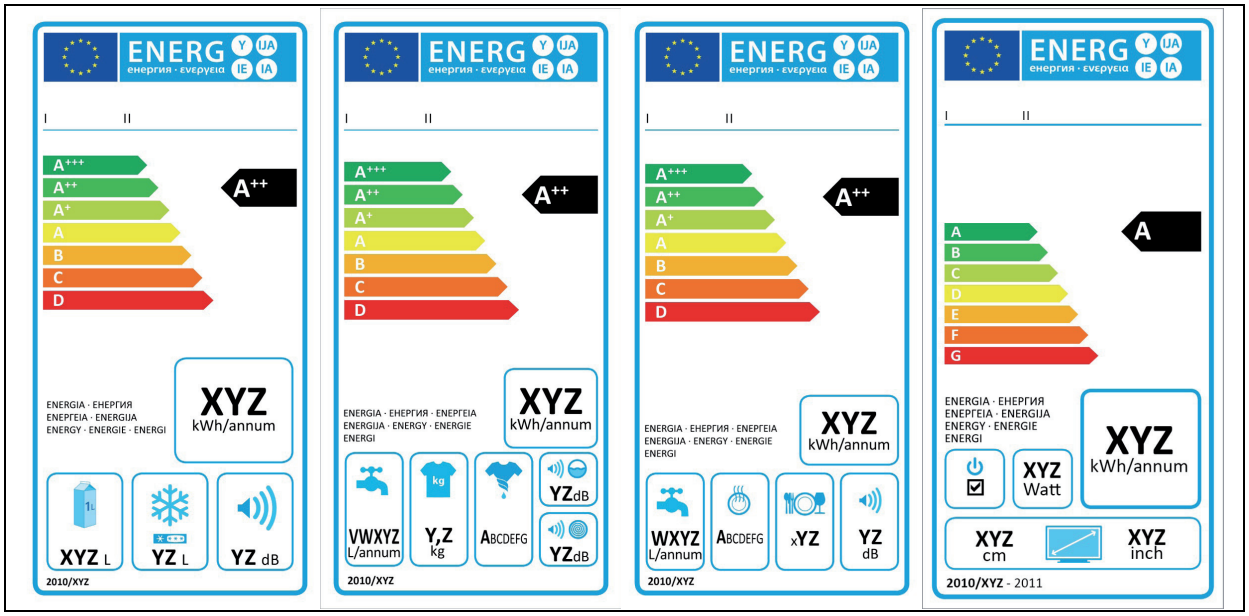


*Figure 2. The new labels (left to right) for refrigerator-freezers, washing machines, dishwashers, televisions.*

**Table 1. Dates and locations of in-depth interviews and focus groups.**

| Session type | Country | City | Date | No. of participants |
|---|---|---|---|---|
| **In-depth interviews** | UK (Pilot) | London | 7–8 November 2011 | 10 |
| | Czech Republic | Prague | 14–15 November 2011 | 10 |
| | France | Paris | 28–29 November 2011 | 10 |
| **Focus groups** | UK (Pilot) | London | 11 November 2011 | 10 |
| | Czech Republic | Prague | 16 November 2011 | 10 |
| | Spain | Madrid | 21 November 2011 | 9 |
| | Greece | Athens | 24 November 2011 | 9 |
| | France | Paris | 30 November 2011 | 8 |
| | Poland | Warsaw | 5 December 2011 | 10 |
| | Germany | Frankfurt | 8 December 2011 | 10 |
| | Denmark | Copenhagen | 14 December 2011 | 10 |
| | Italy | Milan | 15 December 2011 | 9 |
| | Bulgaria | Sofia | 16 December 2011 | 10 |

## Findings

In this section the results of the in-depth interviews and focus groups are reported together. The section is structured in the following way: first, the extent to which European consumers understand the energy related content of the label is reported, in particular whether they understand its purpose, specific energy related label elements, whether consumers can understand the energy efficiency classification and recognise the highest energy efficiency class that an appliance may have. Consumer perceptions of the relative merits of the old and the new energy labels are also reported. Second, the extent to which consumers understand other important, but not specifically energy related, information on the label is reported. In particular, comprehension of the different label icons. Third, the results of a set of more generic questions posed to interviewees and focus groups are reported. These included probing into consumers' understanding of who is behind the energy label, what they like/dislike about the new label, if they think anything is missing, confusing or should be changed, and finally the overall usefulness of the energy label.

### DO CONSUMERS UNDERSTAND THE ENERGY RELATED CONTENT OF THE NEW ENERGY LABEL?

In this section we take a close look at whether consumers understand the energy related content of the new label.

#### Understanding of the purpose of the energy label

When asked about the primary purpose of the label prior to any discussion or leading information, 55 % of participants answered 'energy consumption and/or energy efficiency', 35 % 'technical specifications and features of the product', and 9 % 'how "green" the product was/environmental information'. 'Energy class' was noted by 8 % of participants. Thus a majority appreciate that the primary purpose of the label is to inform people about the product's energy performance, but a sizeable minority see the label as a general technical label.

**Understanding of specific energy related label elements**

*The word 'Energy'*
Only a minority of participants, with a strong variability by focus group, understood right away that the word at the top of the label is 'Energy' in all European languages. This may have affected the share of participants who were correctly able to determine the primary purpose of the labels. In particular, many participants did not make a connection between the language-specific suffixes in the bubbles and the preceding prefix 'Energ'.

*Colours in the energy efficiency scale*
Almost all participants found the colour graduations used in the efficiency scale to be salient with desirable, environmentally friendlier or energy efficient products being at the green end of the scale and the less desirable, less energy efficient being at the red end. The colours were often compared to traffic lights and clearly had a very strong influence on participants' views of the product concerned, such that some even doubted whether products in the red part of the efficiency scale are still produced or permitted for sale.

*Significance of the length of the arrows*
The lengths of the arrows were often described as looking like a pyramid, which seemed to reinforce the notion that the scale should be read from the top downwards, with the highest efficiency products at the top. The majority of participants were unsure what the length of the arrows signify, but most said that the longer the arrow the more energy they expected the product to consume, which is a correct interpretation. Some speculated that the difference in energy consumption between classes should be proportional to the difference in arrow length (which it is not), but others thought that the difference in energy consumption is less between the most efficient classes than between the lower efficiency classes. This was especially the case for the A+++ to A part of the scale on the refrigerator-freezer label. Most participants who speculated on this issue seemed to think a consistent approach would be used across the labels, although this is not currently the case. The issue of whether the revised energy labels should use a constant increment of energy or a constant increment of efficiency to demarcate the efficiency steps between classes was first considered in the COLD II study in 2000 and has yet to be resolved in a consistent manner.

*Significance of the letters*
Nearly all participants recognised that the letters represent the coding of the energy class and constitute an alphabetical ranking. They were often described as 'differentiators'. It was understood that A stands at the top of the group and is the best class and that G is the worst. Many spontaneously linked the A-to-G scale to school grades and other pre-existing/familiar ratings. There seemed to be no specific difficulty in interpreting the significance of these letters in countries that do not use Latin characters, i.e. Greece and Bulgaria.

*Significance of the black arrow and letter*
Around 90 % of the in-depth interviewees and all those vocal in the focus group discussions were able to link the letter in the black arrow to the product itself, showing very high comprehension that it indicates the product's actual efficiency. In some cases, explored more individually in the in-depth interviews, it was apparent that participants did not always connect the ranking in the black arrow with the ranking of the specific product in question, nor did they associate it with the alphabetical rankings in the efficiency scale on the left of the label. It is possible that failure to associate the two elements in the scale has been slightly compounded by the design change in the revised labels, where the letters within the coloured arrows are now at the left edge and no longer at the right end of the arrow. This increased gap between the letters on the coloured arrows and that in the black arrow has potentially weakened the cognitive association between the two.

*Interpretation of the efficiency range*
Usually participants were not informed about either the range in efficiency of products on the market or about eco-design requirements, so they often imagined that the label shows the same range of efficiency classes that can be found on the market. In reality, however, this is often not the case as lower efficiency classes may be prohibited from sale because of Ecodesign regulations. Whether the labels should be modified in some manner to indicate when classes are no longer permitted for sale is a point for discussion, but it is clear that at present many consumers will falsely interpret an efficiency class as being present on the market if it is indicated on the label. This could weaken the market transformation effectiveness of the eligible classes.

Many consumers anticipated that the highest efficiency classes might be too expensive for them and that the bottom classes would not meet their requirements, thus it was common for them to state they would be satisfied with a product at the bottom of the green-arrowed label classes.

*Significance of the plus (+) signs*
Most participants appreciated that the inclusion of a + sign next to the letter A indicates it is a higher grade than an A alone; however, they were often unsure why three options (+/++/+++) are mentioned, why the plus signs are only applied to the A class, and why this is used for only some appliance types. Some participants seemed to find it slightly difficult to see exactly how many plus signs were included, sometimes mixing up ++ and +++. Some participants queried the point of the plus signs and could even find them annoying or patronising.

In general, while almost all participants were able to correctly interpret the top and bottom of the efficiency scales, there was some evidence that participants found the A to be a more definitive top of scale when used on an A-to-G scale compared with the A+++ used on an A+++-to-D scale. Equally there was a tendency for the difference in energy efficiency between A and D (as applied to televisions) to be considered more significant than the difference between A+++ and A (as applied to the other products); however, participants also often said they did not know what the difference between classes is, i.e. how big the difference is between them.

There was often an interpretation that there is less difference in energy efficiency between adjacent A, A+, A++, A+++ classes than between adjacent classes using different letters. Some seemed to think the plus signs indicate subdivisions within a class rather than a whole new class, and some asked

why there are plus signs for the A class but not for the other lettered classes. With regards to terminology, most participants referred to the + signs as 'plusses' but many referred to them as 'stars'. Some participants also queried why the plus sign is used for some products but not others, and found this usage to be inconsistent.

*Annual energy consumption*

Annual energy consumption is written as 'kWh/annum' on the label. Almost all participants recognised that 'kWh' refers to energy, although many used the term 'kilowatts' rather than 'kilowatt-hours'. Most participants also understood that 'annum' refers to 'year' and that the whole value is annual energy consumption; however, there were specific difficulties in understanding this term in the Czech Republic and French focus groups (although not so much in the in-depth interviews). It is therefore possible that there will be a systematic difficulty in the Czech Republic in understanding that the figure refers to annual energy consumption.

*Comprehension of the magnitude of the numerical values*

When presented in isolation, the absolute figures on the labels (whether expressed in watts, kWh/annum or dB) have little meaning to most participants; however, almost all participants found this information helpful when they could compare the values to those for other products, i.e. the relative values were much more salient than the absolute values. Participants were most likely to express an understanding of the magnitude of the wattage values (given only for the on-mode power of televisions), which they could relate to more familiar entities such as the power used by light bulbs. Some also had an understanding of what the absolute magnitudes of kWh/annum implied. In general, while there was a certain level of recognition that 'dB' indicates decibels and a minority expressed awareness that it is a logarithmic scale, none of the participants had any idea what value constituted a high noise or a low noise. Thus its informational value was only through relative comparison with the noise indicated on other products and whether consumers thought noise was likely to be significant (which for most appliances they did not).

#### Ability to correctly understand energy efficiency classifications

Three tests were administered to understand the extent to which consumers are able to correctly rank products in terms of their energy efficiency class. The first test was a more simple test where participants had the choice between three products and where the annual energy consumption showed also followed the energy efficiency ranking so that the more energy efficient, the smaller the annual energy consumption. A second test was also administered to simulate a more challenging purchasing decision. In this second test four labels were shown where the increase in energy efficiency did not necessarily translate to a decrease in annual energy consumption. Finally a third test was administered to understand whether consumers might be confused by the presence of both the A-to-G scale and a new scale. In this case televisions where the new scale is A+ to F.

Each test was administered with no prior discussion among participants, and then again after discussion. Below the results of each of the tests are briefly reported.

*Simple ranking test*

When presented with a choice among three labelled products, averages of 85 % and 81 % of participants were able to correctly identify the products with the highest and lowest energy efficiency classes, respectively, on first exposure to the labels without assistance or discussion. The share of participants who correctly identified both the highest and the lowest efficiency products was 77 %. Re-exposure to the label made little difference to the results, with a slight but statistically insignificant increase in the share of correct values.

*Complex ranking test*

The above test was performed with simple choices where the energy consumption rank order followed an inverse relationship with the energy efficiency class order. While this will sometimes be the case when shopping for appliances, there are many instances where the efficiency rank order is not simply inversely related to energy consumption because of differences in the capacity (size or volume) and features of an appliance. To test this more complex but common situation, the rank order comprehension tests were repeated with a more complex example comprising four labelled products where the efficiency order did not follow a simple inverse relationship with energy consumption. In this case, with regard to refrigerator-freezers, 73 % of participants were able to correctly identify the model with the highest energy efficiency class and 63 % were able to correctly identify the model with the lowest energy efficiency class without assistance or discussion. For the television label, 78 % of participants were able to correctly identify the model with the highest energy efficiency class and 71 % were able to correctly identify the model with the lowest energy efficiency class.

The share of participants who correctly identified the energy efficiency ranking of all four models was 55% for the refrigerator-freezer label and 47 % for the television label. In a real shopping environment it is likely that the rank order comprehension rates would be somewhere between the simple three-label execution and the more complex, four-label execution levels, i.e. 51–77 % without the benefit of discussion or assistance.

Questions to probe participants' interpretation of the energy efficiency classifications found that they would generally rank product efficiency through inspecting the coloured bar scale, the letter and plus signs (if present), and the annual energy consumption. The explanations given by those who misunderstood the efficiency ranking did not reveal any clear patterns for why they misunderstood, except that in some cases participants had focused purely on the annual energy consumption to make their rankings and had ignored the energy efficiency class. It was clear, however, that the relative focus given to the label information varied among participants such that some would make a decision by looking at which product had the highest vertical rank on the scale, some through the colour coding (where deeper green was almost always seen to be more efficient), some by the grade of the letter and plus signs and some by the annual energy consumption.

The share of correct responses to the test was found to be statistically inseparable for the television energy label (which uses a simple A-to-G efficiency scale) and the refrigerator-freezer label (which uses an A+++-to-D efficiency scale), suggesting that there is no significant difference in consumer ability to

comprehend either scale. It is possible that significant differences would be discovered if larger sample sizes were used, but the results already indicate the average difference is likely to be small.

*Mixing the new scale and the old scale*

A four-label efficiency rank order comprehension test was also conducted for televisions using a mix of products such that most were on the current A-to-G scale but with one being on an A+-to-F scale (this is already permitted if a product meets the A+ requirement, but will be the mandatory scale for televisions from 2014). The share of correct answers for all four labels was 63 %, but was 71 % for each label individually (much the same as for the more complex, four-label test). There was no evidence from this test that mixing the A+-to-F scale with the A-to-G scale created significant difficulties in comprehending the order of the efficiency class ranking.

*Improvements in comprehension following discussion*

The proportion of correct answers for all the efficiency ranking tests improved significantly when the tests were repeated after participants had discussed their thinking as a group. On average the proportion of incorrect answers fell by 54 % following group discussion. The increase in correct comprehension is statistically significant in all cases that were compared.

Much smaller and statistically insignificant improvements in the proportion of correct answers were found when participants were simply presented with another label rank order test without discussion or assistance. Thus, simple familiarity with the labels was not shown to increase comprehension rates.

In general, these findings support a thesis that consumer education would be likely to improve the effectiveness of the energy labels through explaining how to use them, thereby lowering the proportion of incorrect rank order decisions.

### Ability to recognise the highest energy efficiency class an appliance may have

The highest energy efficiency class it is possible to have was correctly identified by 80 % of participants without conferring. After discussion among focus groups, the share of correct answers rose to 92 %. No significant difference was found between the refrigerator-freezer and television label cases.

### Old versus new energy labels

None of the participants appeared to be aware that the new labels represent a change in the labelling scheme (new design for most products and a wholly new label for televisions). When comparing the new and old energy labels, the new labels were often considered to have a better design (nice layout, big icons), but the old label was often considered significantly better in the following aspects.

*Energy consumption (cycle/annum)*

Energy or water consumption per cycle was considered to be more relevant by most participants than yearly consumption, as many people commented that they did not understand how their real household usage patterns could be estimated and averaged and that in any case such an average would be meaningless for them. Not all agreed with this, however, and some expressed a preference for annual values in order to gain a sense of the overall importance of the energy or water use for a particular product compared with others, including those that might serve a different function. The Greek focus group expressed a preference for the use of 'per annum', because the Greek word for 'cycle' means 'revolution' and is confusing.

*Annum*

Comprehension of the word 'annum' was often low (it varied strongly by focus group) and hence many participants were unsure what value was being reported for the annual energy consumption or water use figures. The responses suggest that there are likely to be systematic differences in comprehension of this issue by market depending on national cultural and educational factors. 'Annum' was least well understood in the Czech Republic.

Participants also mixed the terms 'kWh' and 'W' (both being considered to indicate consumption).

*Textual information*

When asked to compare the old and new refrigerator labels, the focus groups did not often agree as to their preferred label although it was generally acknowledged that the design is better in the new label, in terms of the icons and the orientation, but that the information is less easy to understand. With regard to the old label, the design was described as more cluttered and containing too much text, but the information was considered much simpler to understand, particularly for those who were not 'technical'. This is mostly because the old label included national language-specific explanatory text.

On balance, more people expressed a preference for the old label to the new one for these reasons, but most said they would like the new design with more textual explanation added. Many participants reported that they would welcome an explanatory legend or key in their language to explain key elements on the label.

## DO CONSUMERS UNDERSTAND THE OTHER (NON-ENERGY) INFORMATION ON THE NEW ENERGY LABEL?

As noted in the introduction, there were important design changes to the label, and not all of these related to the energy specific content. They nevertheless have an impact on the overall usability and therefore effectiveness of the energy label. The findings, that mainly concern the comprehension of the energy label icons, are summarised below.

### Comprehension of label icons

*Noise icons*

The meaning of the noise icon on the refrigerator-freezer and dishwasher labels was correctly identified by 80 % of in-depth interviewees.

In the case of washing machines, noise icons are indicated separately for the noise during washing and during spinning, respectively. For the washing cycle noise icon, 66 % of the in-depth interviewees and all the focus groups made the correct interpretations. Among the incorrect answers, half made a connection between the symbol and sound levels. However, they thought 'noise' related to water supply/discharge, to when the drum is stationary or to when the drum is half full, or they did not have any explanation. Other participants who could not

make correct interpretations did not know what the symbol meant but thought it was related to water, the speed of the rotating drum, the rinse cycle or the temperature of the cycles.

With respect to the spin cycle noise icon, 73 % of the in-depth interviewees and all the focus groups ascertained the correct interpretation. Among the in-depth interviewees, 13 % appreciated that the icon indicates noise in decibels but were unable to correctly specify that it relates to the spin cycle of the machine.

*Refrigerator-freezer capacity icons*
In general, most participants were able to correctly interpret the volume, capacity and noise icons. The meaning of the refrigerator compartment and freezer compartment volume icons was correctly interpreted by 75 % and 86 %, respectively, of the in-depth interviewees. The most common error by those who misinterpreted them was in thinking that refrigerator volume refers to the volume of the entire appliance rather than just the refrigerator compartment. By contrast, half of the focus groups incorrectly concluded that the refrigerator compartment volume refers to the volume of the whole appliance, even though they all correctly interpreted the sense of the freezer capacity icon.

*Water use icon*
All of the focus groups and two-thirds of the in-depth interviewees correctly identified the meaning of the annual water use icon on the dishwasher and washing machine labels. Among those who did not make correct interpretations, while most knew the icon relates to water, they either did not understand what 'annum' means or did not appreciate that it specifically indicates water consumption.

The majority of participants had an opinion on how the information on water consumption should be displayed. Most queried how the figure was calculated and assumed it was based on an average family's usage pattern, which many doubted was of direct relevance to them. It seems that only a minority appreciated that the primary value is in having information on the relative consumption of one product compared to another. Some participants thought that an icon showing water consumption per cycle would be more meaningful and useful to them, while a smaller proportion (of those who reflected on this issue) expressed a preference for average annual water consumption, as is currently shown.

*Washing machine capacity icon*
All participants correctly interpreted this icon.

*Dishwasher capacity icon*
This icon was generally well understood, with 70 % of in-depth interviewees and all the focus groups correctly understanding the icon. Of those interviewees who did not understand, 63 % simply said they did not know and did not attempt to guess, while the remaining 37 % thought the icon refers to a particular washing cycle for delicate objects such as china and glassware.

*Washing machine spin-drying efficiency icon*
Interpretation of this icon was generally correct. The t-shirt icon appears to effectively communicate laundry, and the twisting of the t-shirt and water droplet at the bottom of the t-shirt effectively communicates drying. For the A-to-G scale, the majority of responses showed an understanding that there is a sliding scale/best to worst in performance, and most participants correctly understood that it refers to the drying efficiency of the spin cycle rather than to its energy efficiency.

*Dish-drying efficiency icon*
This icon on the dishwasher label was more difficult for participants to interpret than most of the other icons. Dish drying was correctly mentioned in only two of the ten group discussions and in approximately eight of the 30 in-depth interviews. Many participants said they had no idea, while others advanced diverse theories about what the icon could mean.

In some cases participants correctly interpreted the function being alluded to but imagined that the A-to-G classification refers to the energy efficiency of that function rather than the quality with which the service is performed (the correct interpretation).

*Television screen size*
This icon was universally understood. Most participants understood that the size was given in inches and centimetres, but in some countries the younger age groups were not familiar with inches; however, this did not prevent them from understanding the icon in metric units.

*On/off icon on the television label*
The on/off icon on the television label caused the most confusion among all the icons, with only a minority of participants correctly interpreting it as indicating the presence of an on/off switch. Many either thought it refers to the presence of standby mode functionality or had no idea of its meaning.

*Television on-mode power demand icon*
This icon was rather poorly understood. Only 30 % of the in-depth interviewees and two of the ten focus group discussions correctly interpreted its meaning. The most common incorrect answer was that the figure represents energy consumption in standby mode. Other incorrect answers linked the figure to energy and power consumption but could not categorically say what the figure refers to.

#### Directive number
The directive number on the bottom left of the label was correctly interpreted by only a very small proportion of participants.

### HOW EFFECTIVE IS THE NEW LABEL AS A MARKET TRANSFORMATION TOOL?
In the end of course, the issue of most importance for policy is the effectiveness of the new labels as a market transformation tool. Consumer understanding of all aspects of the energy label is a contributing factor in this and was examined in the preceding sections. This section examines how important energy efficiency is when consumers go shopping for a major household appliance, what information consumers see as most important on the energy label, what the minimum acceptable energy efficiency class was considered to be, and the appeal to consumers of appliances in the top energy efficiency class as opposed to the middle energy efficiency class. It also examines the degree

to which the label design influences consumers' willingness to pay extra for a more efficient appliance.

#### How top-of-mind is energy efficiency?

When asked to mention up to seven criteria they would consider when purchasing a major household appliance, 53 % of participants spontaneously mentioned energy, energy efficiency or a closely related parameter. Among these, 30 % mentioned such aspects within the top two criteria. Energy efficiency had not been raised as a topic at this point in the focus groups or interviews and nor had any energy labels been seen.

#### Most salient information on the label

The majority of participants in the focus groups considered the most important information on the label to be the energy rating/class (90 % of the groups discussed this). Energy consumption and capacity were also discussed more than other elements of the label, such as size, colours and 'energy' as a general term. The in-depth interviews also showed the energy efficiency or energy class of the product to be the most important piece of information on the label (40 % of participants for both the refrigerator and the television). Energy consumption was the second most popular answer. Other answers were size, capacity, freezer stars and brand. This confirms that most users of the label focus upon the energy and energy efficiency information.

#### Minimum acceptable energy efficiency class

When asked about the minimum energy efficiency class they would consider acceptable when purchasing an appliance for their own use, the majority of participants indicated a level among the top three classes (91 % for televisions and 82 % for refrigerator-freezers). A very common answer to justify this response was that they would only choose an appliance in the green range of the efficiency scale. This finding is extremely important as it indicates that the position of the green to yellow colour threshold might have the largest impact on purchase decisions.

There was a significant difference in the choices participants made for the television labels as opposed to the refrigerator-freezer labels. In the case of televisions, the A class was comfortably the most common choice, with 45 % of participants saying that they would not accept anything less. The B class was the next most common choice, with 25 % of participants indicating they would find this the minimum. In the case of refrigerator-freezers the third class from the top (A+, occupying a position on the refrigerator-freezer energy label equivalent to that of the C class on the television label) was the most common choice, at 39 %. The top two classes (A+++ and A++) were selected as the minimum acceptable class in 15 % and 28 % of cases, respectively. These results indicate that:

- The label efficiency classification has a large influence on consumer decisions regarding the acceptability of products.
- The large majority of consumers will only consider selecting a product in the green part of the efficiency scale (this covers the top three label classes on all the labels).
- The top efficiency classes of the television label, which uses the A-to-G scale, are significantly more motivating for consumers than the top classes of the refrigerator-freezer label, which uses the A+++-to-D scale.

The last point is further reinforced by a body of comments where consumers made it clear that they considered energy consumption and efficiency to be more important for refrigerator-freezers than for televisions.

#### Appeal of the top energy label class compared to the middle class

When asked to compare the A class to the D class for televisions and the A+++ to A for refrigerator-freezers, most participants appreciated that appliances at the top of the scale, whether it be A or A+++, are the most efficient. Participants were more expressive when discussing the merits of an A+++ appliance, calling it 'superior' and 'positive'. However, the difference between A+++ and A caused some confusion and some referred to the colour rather than the letters to make sense of the scale. One or two participants expressed a preference for the A-to-G scale, describing it as 'nice and easy'.

Comparisons were drawn between the television and refrigerator-freezer labels, with some participants describing them as being the same; others considered the mid-point better for refrigerators (A class) when compared to televisions (D class).

The difference perceived by participants with regard to efficiency between the middle and top classes appeared to be greater for televisions than for refrigerator-freezers. Participants were more likely to describe the difference between A and D as being 'big' or 'great'. For the A to A+++ scale, they were more likely to say there is no difference or that there is a difference but they did not know what it was.

#### Willingness to pay for higher energy efficiency

When asked how much more they would be prepared to pay for a higher efficiency appliance compared to a mid-range efficiency model costing the equivalent of €300 in rounded local currency units, on average participants stated that they were willing to pay 44 % more (with a standard deviation of 30 %) for the higher efficiency refrigerator-freezer and 50 % more (with a standard deviation of 59 %) for the higher efficiency television (Figure 3). The base-case model was a class D for televisions, while the higher efficiency model was a class A. For refrigerator-freezers, the base-case model was a class A and the higher efficiency model was a class A+++. Thus the higher efficiency model was three classes higher than the base case for each appliance type. In both cases the same fictional brand was used, and all the non-energy related information on the labels was identical for the two choices.

This finding confirms that consumers are indeed prepared to pay significantly more for a product that is clearly more energy efficient than another one. The extra amount that consumers expressed a willingness to pay in this study is less than the incremental amounts reported in the St Gallen study (Heinzle & Wüstenhagen, 2010) but is still appreciable and shows that when information on efficiency is clearly communicated, consumers are willing to invest in it.[6]

6. The relationship between declared willingness to pay and consumer behaviour in the context of actual purchase decisions is of course a subject of debate. There is however, evidence that people are prepared to pay more for higher efficiency appliances both in the market an in this kind of research.

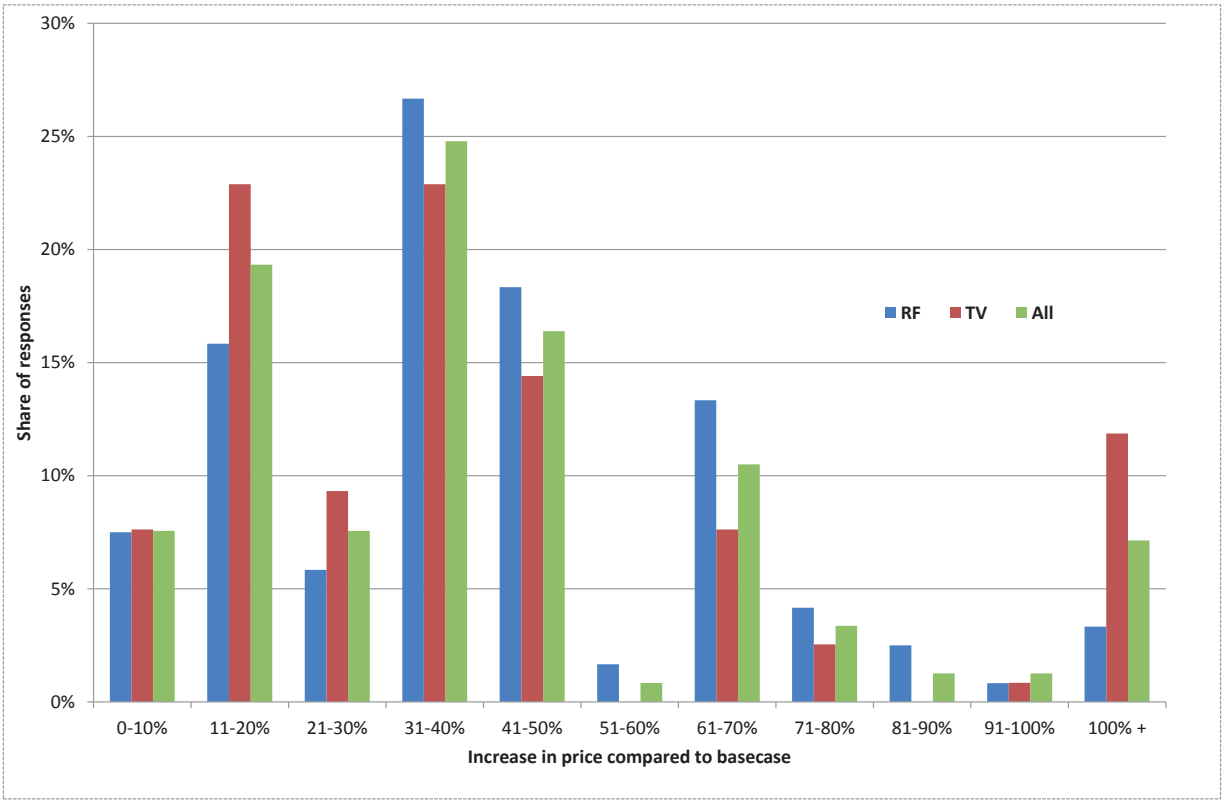


*Figure 3. Share of participants willing to pay incremental increases in price for a highest energy efficiency class product compared to a mid-range energy efficiency class product costing €300 in rounded local currency units (RF = refrigerator-freezers, n = 120; TV = televisions, n = 118).*

It is also pertinent that the average increase participants said they were prepared to pay for higher efficiency televisions was greater than it was for refrigerator-freezers, despite the fact that they frequently commented that they considered refrigerator-freezer energy efficiency to be more important than television energy efficiency as the former was 'on constantly' and 'used more energy'. This evidence supports the related hypothesis expounded in the discussion of minimum acceptable efficiency class: that consumers are more motivated by the top efficiency classes in the A-to-G label executions than they are by those in the A+++-to-D label executions. The finding was a consistent conclusion across focus group locations.

The discussions to probe participants' thinking about the relative difference in efficiency between classes often provided corroborating evidence for this. Many participants asserted that A was already a good grade and that better classes are very impressive and desirable but that the difference between them is not likely to be as great as it is between lower efficiency classes.

## GENERIC ISSUES

In this final section addressing research results consumer perceptions regarding a set of more generic issues are considered such as: who consumers think is behind the label, what is liked and disliked about the labels, whether consumers think that the label is missing anything, if anything is confusing or should be changed, and finally the overall usefulness of the label to consumers.

### Who is issuing the energy label?

Many expressed confusion over who was behind the labelling scheme, and there was a wide variety in responses to a question regarding which body had issued it. On average, across all the responses, the majority of participants thought that manufacturers issued the labels (27 %), closely followed by the EU (26 %). Other common choices were standardisation bodies, consumer bodies and national government agencies. When participants who stated that they thought the EU had issued the label were asked why they thought this, their rationale was the presence of the EU flag in the top left corner of the label. Some of those who said that manufacturers had issued the label recognised that they would have to be guided or monitored by an independent organisation to control the information, but an important minority of participants queried the trustworthiness of the label information, which suggests that the label's credibility would be enhanced if it were more generally understood that national governments are responsible for the implementation of an EU-wide scheme.

### What is liked and disliked about the labels?

Participants in all the countries said that they found the label informative, clear and often easy to use. The most common reason stated for this was the use of the graded colours, which seemed to be appreciated in all the markets. The colours were considered to make the label easy to use when comparing across products and to help determine the relative performance of the product quickly. They also stated that the fonts and layout

are clear and sometimes remarked that the labels are easy to interpret at a glance, which is useful in a real shopping environment when comparing goods. Many participants also said that they appreciated the selection of information presented on the labels.

Participants tended to dislike label elements that they had difficulty understanding or for which they could not see the point. In general, participants did not understand some of the label elements, most commonly some of the icons and the foreign languages at the top of the label, but also the word 'annum' and the efficiency scale. To address these problems, participants often requested for more explanation to be included on the label or for guidance about how to read the label to be offered. The most frequently disliked element of the label across the focus groups was that they did not understand the rating scale and energy classes (an average of 30 % of the groups across both questions did not understand this); the second least liked element was the plus signs on the refrigerator-freezer labels (25 %). The third most unfavourable element commented upon was the difference in the scales between the television and refrigerator-freezer labels, and that the A+++-to-D scale for the latter is too complicated. The label layout was rarely criticised, but some participants mentioned that they thought there is too much white space above the efficiency scale for the television label.

#### Is the label missing anything?

In summary, the items most commonly suggested as being missing from the label, by appliance type, were:

- Refrigerator-freezers – size, cooling temperatures, price.
- Washing machines – energy and water consumption per cycle, size.
- Dishwashers – calculation of per annum figure, water consumption per cycle, size.
- Televisions – price, explanation of the icons, product features.

Throughout all responses, size was mentioned most frequently, with the exception of televisions, the labels for which already include this information. Price was often mentioned with regard to refrigerator-freezers and televisions, and energy and water consumption per cycle was mentioned in respect to products with 'cycles'. In both cases, many participants in the group discussions countered that this information was likely to be present in brochures or adjacent to the label and hence need not be included on the label.

Participants were more likely to reply that there is sufficient information on the labels for refrigerator-freezers and washing machines (36 %) than for either dishwashers (29 %) or televisions (24 %). This could mean that they understood more of the elements on the label and why they appear on the label.

#### Is there anything on the label that is confusing or should be changed?

The most likely element that participants wanted to change or have explained more was the icons, specifically the ones which were poorly understood. The text on the label was also the subject of confusion, and some participants wanted all the language to be country-specific. The items that were most commonly cited as missing from the current label design were pricing information, price ratio and cost per cycle data.

#### Overall usefulness of the label

The large majority of participants thought that the energy labels were useful. They particularly appreciated the energy grades and coloured scale and found these to be the most useful element to use as a comparator with other labels, even if they did not understand the entire contents of the label.

Some people expressed confusion over some elements of the label, mainly the icons, and said that if they fully understood those elements they would find the labels more useful. They thought that they would need to ask for more information from a shop sales assistant.

## Key findings

It is clear that the new labels are generally appreciated and have a reasonably high level of comprehension thanks to the overall effectiveness of the label efficiency scale, use of colour, efficiency classification and energy consumption information. Most consumers were able to use them to correctly rank the efficiency of products in simple, three-label tests, but a significant minority had difficulty in doing this. However, there was evidence that this could be overcome through explanation, which implies that public education programmes to better explain how to use the energy labels would be useful. Efficiency was a reasonably important parameter for participants, with the majority being strongly motivated by the information on the label such that they would not consider buying products in lower efficiency classes and were prepared to pay roughly half as much again on average for higher efficiency products compared to those with mid-range efficiency.

The choice of colours, especially green, in the efficiency scale had a large impact on consumer preference, such that the single most important division in motivating consumers was the division in the efficiency classification scale between the three green classes and the rest. This implies that the demarcation of the efficiency threshold between the green grades and the rest will have a larger market transformation impact than any other efficiency threshold demarcations on the label and should therefore merit very careful consideration when devising efficiency thresholds.

There is no significant difference in comprehension between the A-to-G label executions and the A+++-to-D executions, but there is evidence to suggest that the higher efficiency classes in the A-to-G label executions are more motivating than their corollaries in the A+++-to-D label executions. The labels were generally well liked and appreciated, and participants preferred the look of the new labels compared to the old; however, the aspects of the new labels that they expressed most dissatisfaction with were elements that they had difficulty in understanding. These were often easier to understand in the old label because nationally specific language was used in each country to explain the parameters. The decision to move toward a universal language-independent energy label was taken to address different issues, and policy-makers must have always thought it likely this would result in some loss of comprehension. The results from this survey support this but demonstrate that in many cases the icons used to convey what

was previously conveyed in words are successfully understood and that it is only certain icons that present significant difficulties. In principle, these deficiencies could be addressed in part through targeted educational efforts such as in-store leaflets and sales staff training.

Difficulty in comprehension was also found with regard to the word 'annum', which was understood in many markets but barely at all in others.

Somewhat surprisingly, most participants were unaware that the energy labelling scheme is an EU-wide initiative initiated by the European Commission, and many thought the labels are issued or managed by other entities such as manufacturers. This suggests there may be benefit in promoting the role of government in authoring and managing the labelling scheme to increase its credibility among consumers. Many were also unclear that the label is principally about energy and efficiency, although most made this connection; however, this did not seem to greatly hinder how participants used or understood the label.

## Principal policy conclusions

In general, this research demonstrates that most consumers are able to understand the more important elements and use this information to inform their purchasing decisions. The use of icons and language-neutral imagery works for the majority of users in most instances, but creates a problem for an important minority. Furthermore, some icons are appreciably less self-explanatory than others. Overall, the evidence from the research shows that comprehension rates measurably increased with explanation by peers; it is likely that if Member States strengthened their education and outreach efforts, labelling comprehension rates, and therefore label market transformation impacts, would be raised. Outreach and educational efforts are also likely to increase confidence in the label as most consumers are unsure who operates the scheme, and this causes its independence and credibility to be questioned.

Most consumers find the information on the label helpful and informative and generally appreciate the aesthetics of the design. The colour scale is particularly appreciated and important to consumers, and it is clear that the single most important threshold on the energy label, from a motivational perspective, is not the lowest or highest efficiency class, but the point at which the label turns from yellow to green. Most consumers said they would only consider purchasing a product in one of the green efficiency classes. Thus, if market transformation, impacts are to be maximised, much more attention needs to be focused on the choice of efficiency threshold that delineates this boundary in future label design exercises.

It is clear that consumers generally thought that if a label class was shown on the label, products in that class were still available on the market. The fact that in some cases lower efficiency classes indicated on the label are prohibited from sale by Ecodesign regulations was not understood by any of the participants. Thus it would be appropriate for efforts to be made to either discard redundant classes or use some other means to indicate when efficiency levels are no longer permissible, in order to avoid misleading consumers and to maximise market transformation effects.

While there was no significant difference in the ability of consumers to comprehend the label efficiency rank order if either an A-to-G scale or an A+++-to-D scale is used, there is a significant difference in the motivational effect that this scale has. When A is the top of the label scale it is much more motivating to consumers than when A+++ is. This conclusion may be unwelcome, but the research findings are definitive that this change has weakened the market transformation impact of the label. It is therefore proposed that the Commission's recently commissioned study to evaluate the revised energy label should explicitly examine this effect and if its findings confirm those in the current study, reconsideration should be given to moving to a regular redrawing of the A-to-G scale in preference to adding new, higher efficiency classes. The current research indicates that the majority of consumers are willing to purchase higher efficiency products that are two label classes lower when A+++ is the highest efficiency class on the label compared to when A is the highest class.

Appreciable problems in comprehension were also identified with three specific icons used on different labels and with the word 'Energ' and its associated national language suffixes. It is therefore proposed that work be undertaken to develop and test improved means of communicating the information these elements are intended to convey.

Based on these findings, the following recommendations are made:

- For future label revisions, consider redrawing the A-to-G efficiency scale in preference to adding more plus signs.
- Maximise the impact of the demarcation between the green and yellow parts of the scale.
- Ensure all efficiency classes indicated on the label are still permitted for sale.
- Review problematic icons.
- Revisit the 'Energ[y]' text.
- Raise awareness that labelling is an EU scheme operated by the European Commission with support from Member States.
- Strengthen label comprehension through educational communication campaigns.

Finally, it is strongly recommended that all future proposed design modifications for the energy label be tested for efficacy with consumers prior to any decision being made on their deployment.

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## Acknowledgements

This paper is based on a larger study which reports more fully the findings. The study was funded by the Collaborative Labelling and Appliance Standards Program (CLASP). At the time of writing, March 2013, the study is in the final phases of completion. When finalised, the full study can be downloaded from http://www.clasponline.org/. Sowatt and SEVEn contributed to the research in the data collection phase and their contribution is warmly acknowledged.