THE EUROPEAN APPLIANCE LABELLING PROGRAMME

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INTRODUCTION

In just a few years, the appliance energy labelling programme has become a pillar of the European Union's strategy to promote energy efficiency. In Europe, few energy efficient policies present such a positive evaluation as appliance labelling. Initially designed to inform consumers, the energy label has proved to be effective in stimulating appliance manufacturers to produce more energy efficient products and to encourage retailers to display them. The benefits and the impact of the European Appliance label go well beyond the borders of the European Union and spill over to other sectors, such as the car industry, for instance. The label has also become the basis of other energy efficiency policies such as voluntary agreements, minimum energy efficiency standards, procurement programmes and other demand-side management activities. The European energy label proves that a harmonised policy scheme in a regional market is possible and that it can also deliver energy efficient outcomes.

1. APPLIANCE LABELLING: A ELEMENT OF THE EUROPEAN STRATEGY TO PROMOTE ENERGY EFFICIENT END-USE TECHNOLOGY

This section presents an overview of the three main policies implemented in Europe to promote energy efficient appliances.

As of May 2001, the EU requires labels on seven products and has efficiency standards for three products and negotiated agreements for three products.

Labels and Standards	Refrigerators
Labels only	Clothes (tumble) dryers; clothes washers; clothes washer-dryers, dishwashers; electric ovens; and lamps
Standards only	Hot-water boilers (gas), fluorescent lamp ballasts
Negotiated Agreements	Clothes washers; televisions; videocassette recorders, wall packs (plug in power supplies) and audio equipment

1.1 MANDATORY INFORMATION LABELS – HISTORY AND CURRENT PRACTICE

Though appliance labels were used in several European countries as early as the mid-1970s, their widespread use began only in the 1990s with the implementation of the European Union programme.

[1] The following text is an updated version of the recent IEA publication "Energy Labels & Standards". ISBN 92-64-17691-8. From August 2000. Main author, John Newman

France enacted a law allowing the government to develop mandatory labelling of energy consumption information on every "energy consuming apparatus" in 1974, and introduced compulsory labelling of energy consumption for all heating units, boilers, refrigerators, washing machines, televisions, ranges (cookers) and ventilation equipment in 1976. The legislation obliged the manufacturers to provide the label with the product but did not require retailers to display it, so the label was generally only seen when the consumer opened the appliance packaging after the purchase. Moreover, there were no rigorous efforts to enforce the regulations.

West Germany held discussions on a system of product information to promote energy efficiency and assist consumer purchasing decisions in the 1970s, and formed the German Society of Product Improvement (DGPI) to design and implement a suitable system of energy efficiency labelling in 1978. In 1980, manufacturers agreed to an informal voluntary agreement to label refrigerators, dishwashers, and electric and gas ovens. The labelling scheme, which applied only to products manufactured in Germany, not to imports, was supplemented by the testing and reporting of appliance efficiency data by an independent consumer foundation, Stiftung Warentest.

Denmark passed the "Indication by Labelling of Energy Conservation Act" in 1982, but by 1989 had only adopted labels for ovens.

Interest in appliance energy labels at the European Union (EU)[2] level began in May 1976, when the Council of Ministers issued a recommendation to Member States to introduce energy efficiency labelling schemes, following a single EU-wide approach, for certain electrical household appliances.[3] Soon afterwards, the EU's Rational Use of Energy Programme initiated studies on appliance energy labelling, and CENELEC[4] was charged with the development of testing methods. These efforts led to the 1979 Directive 79/530/EEC on the "indication by labelling of the energy consumption of household appliances," a framework directive setting out the general requirements for appliance energy labelling within Member States. The specific labelling requirements for each type of appliance were to be laid out in separate, forthcoming, implementing directives. However, only one such implementing directive -- 79/531/EEC, for electric ovens -- was ever issued. The reason subsequent implementation directives were not issued appears to have been caused by a mixture of apathy, technical disagreements, and opposition from individual countries.

The 1979 framework directive gave Member States the option of issuing their own compulsory labelling schemes, but required national schemes to follow the format prescribed in any of the associated implementing directives. It rendered existing national schemes, such as the French one, potentially illegal because they did not conform to the specifications of the framework directive. It also discouraged the drafting of new national schemes because they might contravene future implementation directives.

Denmark's decision to implement a mandatory energy labelling scheme for household appliances in 1990 broke the deadlock of inaction between the European Commission and the Member States.

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[2] At the time, the European Union was called the European Economic Community (EEC).

[3] 76/496/EEC: Council recommendation of 4 May 1976 on the rational use of energy for electrical household appliances.

[4] The EU's test protocols are the responsibility of the European Committee for Standardisation (CEN) and European Electrotechnical Committee for Standardisation (CENELEC), which are federations of national standards institutes from the nations of the European Economic Area (the European Union and the European Free Trade Area, except Switzerland). The establishment of these standards agencies was an important component of the European market harmonisation process. The Treaty of Rome, the founding agreement of the European Union, established that any good which is lawfully produced and sold in one Member State should be eligible to be freely transported and sold in all other Member States without being further modified, tested, certified, renamed or otherwise changed (Article 30). By law, CEN and CENELEC's technical standards must be based on the international standards of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

When, as required by law,[5] Denmark notified the Commission of its intention to implement its scheme, the Commission was obligated to decide whether the scheme was consistent with EU rules. Such a decision involves investigating whether the proposed scheme presents an obstacle to free trade between Member States and also whether implementation on a EU-wide scale makes sense. Accordingly, the Commission requested that Denmark defer its legislation for a year during which time the Commission proposed to issue a draft Directive for a harmonised Community-wide mandatory energy labelling scheme. The revised framework directive (92/75/EEC) for mandatory energy labelling of household appliances was agreed in 1992.[6] The new directive cancelled the 1979 framework directive (79/530/EEC), and took into its own purview the existing implementing directive (79/531/EEC) on electric ovens. To date, six implementing directives have been issued under the 1992 framework (Table A1-1). The labelling requirements only become mandatory in Member States when the governments have transposed the directives into national law.

Table A1-1 -- EC Implementing Directives Issued Under the 1992 Framework Directive

Appliance	Directive	Issue date	Effective date
Refrigerators	94/2/EC	21 January 1994	1 January 1995
Washing machines	95/12/EC	23 May 1995	1 April 1996
Tumble dryers	95/13/EC	23 May 1995	1 April 1996
Combined washer-dryers	96/60/EC	19 September 1996	1 August 1997
Dishwashers	97/17/EC, amended by 1999/9/EC	16 April 1997	1 July 1998
Lamps	98/11/EC	27 January 1998	1 July 1999

It is the responsibility of each individual Member State to translate directives into law, take all necessary measures to ensure that all suppliers and dealers in their territory fulfil their obligations and ensure that the labelling scheme is accompanied by educational and promotional information campaigns aimed at encouraging more responsible use of energy by private customers. Initial indications are that there are great differences in the degree to which Member States enforce and support the labelling programme.

1.2 MANDATORY ENERGY EFFICIENCY STANDARDS

Appliance efficiency standards have been discussed in several individual Member States, but never actually implemented. EU standards for domestic gas- or oil-fired hot-water boilers were adopted in 1992 and became effective 1 January 1998 (the directive came into force on 1 January 1994, but those countries with existing national efficiency standards in place for efficiency of gas and oil boilers at the date the EU directive was issued may allow products that comply with these national requirements to be sold until 31 December 1997). Consideration of additional standards was prompted, as in the case of labels, by a proposed unilateral action by a Member State. In January 1992, the Netherlands notified the Commission of its intention to introduce domestic minimum efficiency standards for refrigerators. The Commission reviewed the Dutch proposal and blocked it on the grounds that unilateral standards would contravene the free-trade terms of the single European market. To help develop its required counter proposal, the Commission hired a consortium of national energy and environmental agencies, later known as the Group for Efficient Appliances (GEA), to conduct an analysis and make recommendations on appropriate standards levels. Based on this analysis, the Commission issued a proposed directive on refrigerator efficiency standards in November 1994. The proposed directive was debated and revised by the European Parliament and the Council of Ministers, and Directive 96/57/EC on regulatory standards

[5] The 1986 Single European Act and the resulting legislation for the Single European Market, Directive 83/189/EEC, stipulate that any country wishing to implement new rules which may affect trade between Member States must notify the European Commission, and authorise the Commission to either block the proposed rules for a six-month period or for one year, provided it releases its own proposal for harmonised legislation.

[6] Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances.

for refrigerators was approved on 3 September 1996, and took effect 3 September 1999. The standards exclude the majority of D, E, F and G class refrigerators from sale.[7]

On September 2000 was published the Council & European Parliament Directive 2000/55/EC: Energy Requirements for Ballasts for Fluorescent Lighting introducing mandatory energy efficiency standards for fluorescent lighting ballasts. There have been studies and technical proposals for EU standards on other products, namely clothes washers and dryers, but none have been enacted to date.

Unlike energy labelling, there is no framework legislation giving the Commission or other competent body the authority to introduce or revise energy efficiency standards on an on-going basis. Instead, for mandatory minimum energy efficiency standards to be passed it is necessary to seek separate approval on an appliance-by-appliance basis from the Council and the Parliament. In the future, the Commission intends to focus on negotiating voluntary agreements before developing additional regulatory standards (IEA 1994) (Waide, 1997).

1.3 NEGOTIATED AGREEMENTS

There have also been attempts to improve appliance efficiencies in a non-regulatory manner. In January 1980, the German Federal Ministry of Economic Affairs reached an agreement with appliance manufacturers to improve the efficiency of specific energy-intensive products by up to 20 per cent by 1985. (IEA, 1989) The appliance efficiency goals were twice increased voluntarily by the appliance industry, in order to pre-empt government regulation.

In August 1994, Denmark notified the European Commission that it intended to establish domestic standards for energy efficiency standards of clothes washers and dishwashers. The Commission rejected the proposal on some technical points, the principal one being that the standards were defined in terms of an outdated energy test protocol. The Commission had already contracted members of the GEA to conduct analysis of wet appliances. The GEA study was completed in June 1995, and the Commission used the results to pursue voluntary agreements with the European Federation of Domestic Appliance Manufacturers (CECED) to improve the energy efficiency of washing machines and dishwashers.

The CECED voluntary agreement on clothes washers, announced in October 1997, seeks to improve the European average consumption of new models by 20 per cent (in relation to the new models of 1994) by the end of 2000. It allows for sales of higher consumption machines in Southern countries to be offset by the marketing of more efficient appliances in the Northern countries. The first stage phased out clothes washers in the label classes G, F, and E by the end of 1997; the second stage seeks to phase out machines in class D having spin speeds greater than 600 rpm or capacities greater than 3 kg by the end of 2000. In addition, the agreement contains some "soft targets" relating to certain features that may only be appropriate for certain groups of customers or regions, or which present particular marketing problems.

The European Commission is pursuing energy efficiency improvements on other appliances as well. Agreements have also been negotiated with European Association of Consumer Electronics Manufacturers (EACEM) to cut the power consumption of televisions, videocassette recorders and audio equipment when they are in standby mode. The Commission is continuing to pursue negotiated agreements on dishwashers, domestic electric storage water heaters, electric motors, external power supplies and set top boxes.

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[7] The maximum allowable energy consumption is somewhat higher for subtropical and tropical climate class models.

2. THE FORM OF THE ENERGY LABELS

The EU appliance energy-labels all follow a similar format. The energy efficiency of a given appliance is ranked into one of 7 bins graded from A to G. The information is presented with the seven efficiency classes (A to G) shown as vertically stacked horizontal-pointed, coloured bars. The stack of bars is always aligned to the left margin of the label with the A bar being at the top and the G bar at the bottom. The length of the bars increases incrementally from A to G while above the A bar is written *More efficient* and below the G bar *Less efficient*, so the respective length of the bars is intended to enforce the message that A means lower consumption (shorter) while G means higher consumption (longer). Similarly, the G bar is coloured bright red while the A bar is coloured deep green, while the other bars are coloured in a progression between the two hues. The colour scheme is again chosen to enforce the efficiency message as red is associated with danger and green with being environmentally friendly. The efficiency of the specific appliance model is indicated by attaching a larger black arrow that is aligned to the right and points back at the stacked efficiency class pointed-bars. The efficiency class bar it points to indicate the efficiency of the model.

In order to solve the problem of designing an unique energy label for all European market where there exist eleven official languages, the label presents two parts: a coloured background expressed in a given language (in English in Figure 1 below) and a narrow sticker, in black and white containing technical and rating information related to the particular model itself. The narrow sticker is now shipped with the appliance when it leaves the manufacturer. The coloured background is provided to the retailer within each country. When receiving a new model for display, the retailer places first the coloured background in the language of their customers and then places the information sticker to the right of the coloured label. This process is summarised in the figure 1 below.

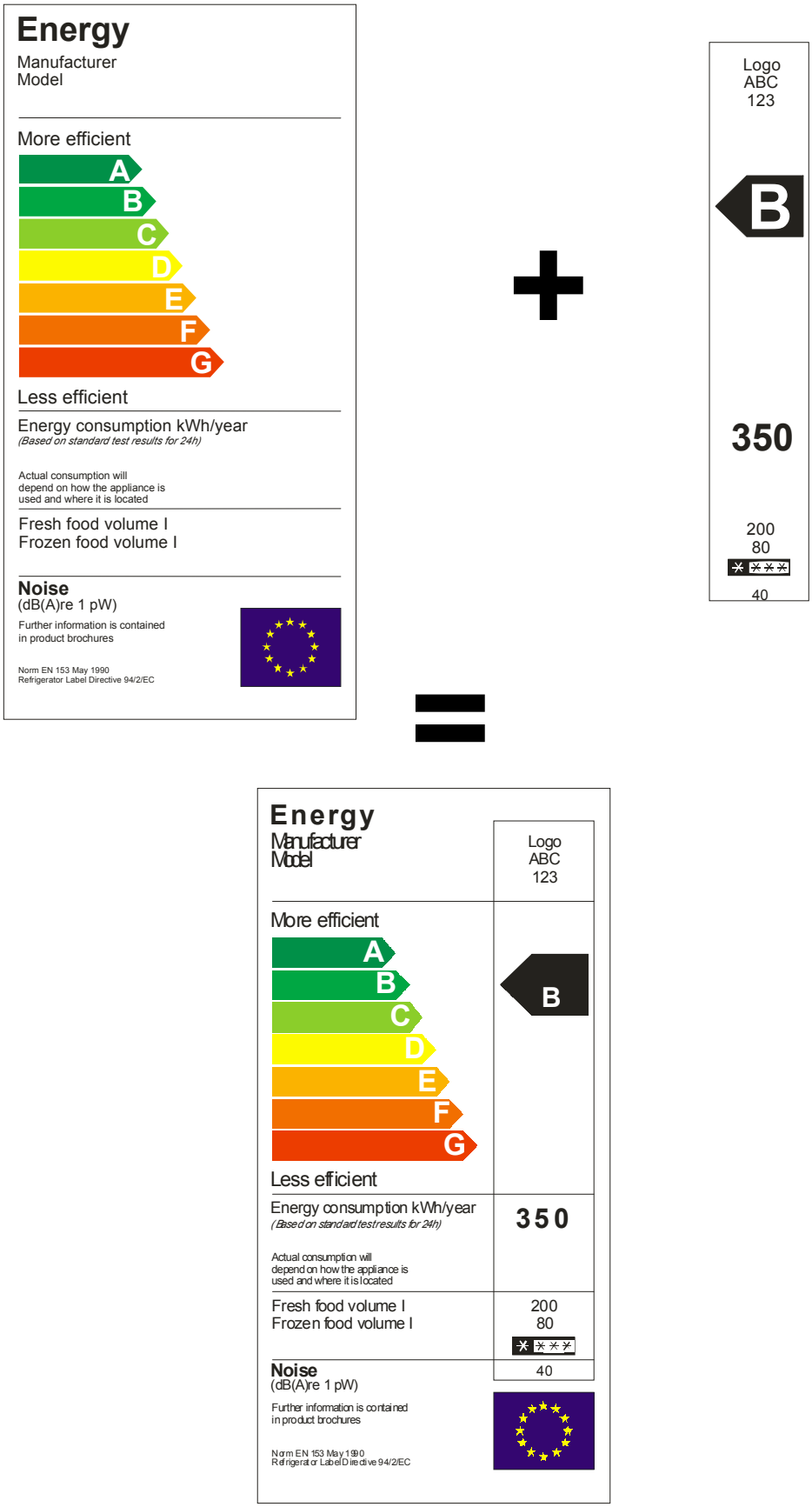

Figure 1: The EU Label comprises two parts: a coloured background in a given language and a narrow sticker containing the information of the appliance.

In addition to indicating the appliance efficiency, the energy labels for the larger appliances contain other information to indicate product performance. For cold appliances the energy consumption under standard test conditions is shown, expressed as kWh/year, the net storage volume of the refrigerator and the freezer compartments are indicated and the star-rating (temperature and performance) of the freezer compartment is shown. The compressor noise in dB is an optional extra, For clothes-washers the energy consumption is given as the kWh/wash-cycle tested under a standard 60°C wash programme. Although most European consumers use lower wash temperatures (40°C is most common), appliance manufacturers prefer to test at 60°C so that the tests are more reproducible; it is argued that the results are directly proportional to the energy consumed under a 40°C wash-programme in the same machine. One of the most interesting features of the EU clothes-washer energy-label is that the cleaning and spin-drying performance of the machines are also indicated using two separate A to G scales. The format used is a horizontal listing of the performance scale written A B C D E F G where the model performance ranking is highlighted in bold text, e.g. A B C D E F G. The EU energy label is the only label which has such an explicit link between the appliance energy efficiency and it's performance. It is also mandatory to indicate the spin speed, water consumption and washing capacity on the energy label, while noise may be indicated at the manufacturer's discretion; see Figure 2.
For clothes-dryers the energy consumption is given in kWh/drying-cycle measured under Norm EN 61121. The capacity and noise (discretionary) are shown and whether the dryer is an air-vented or condenser type is indicated, see Figure 2.

The washer-dryer label shows both the energy consumption in kWh/wash-cycle tested under a standard 60°C wash (for the wash-only mode) and also shows the energy consumption in kWh/wash-dry cycle to wash and dry a full capacity wash-load at 60°C. The washing performance is indicated in the same manner as the clothes-washer label, ranked from A to G. Spin-speed (rpm), washing capacity (kg), drying capacity (kg of cotton wash) and water consumption (litres per full wash-cycle) are shown. The noise is again discretionary for the manufacturers and has a separate entry for the washing, spinning and drying cycles.. The test method requires that half the load be removed before the dry cycle starts. The dishwasher label is reminiscent of the clothes-washer label. Energy efficiency if grade from A to G on the colour bar scale but wash performance, and drying performance are also graded from A to G using emboldened horizontal lettering. Energy consumption is indicated in units of kWh/wash-cycle using a large font while the number of standard place settings, water consumption in litres/wash-cycle and noise (dB) are shown in smaller fonts, see Figure 2.

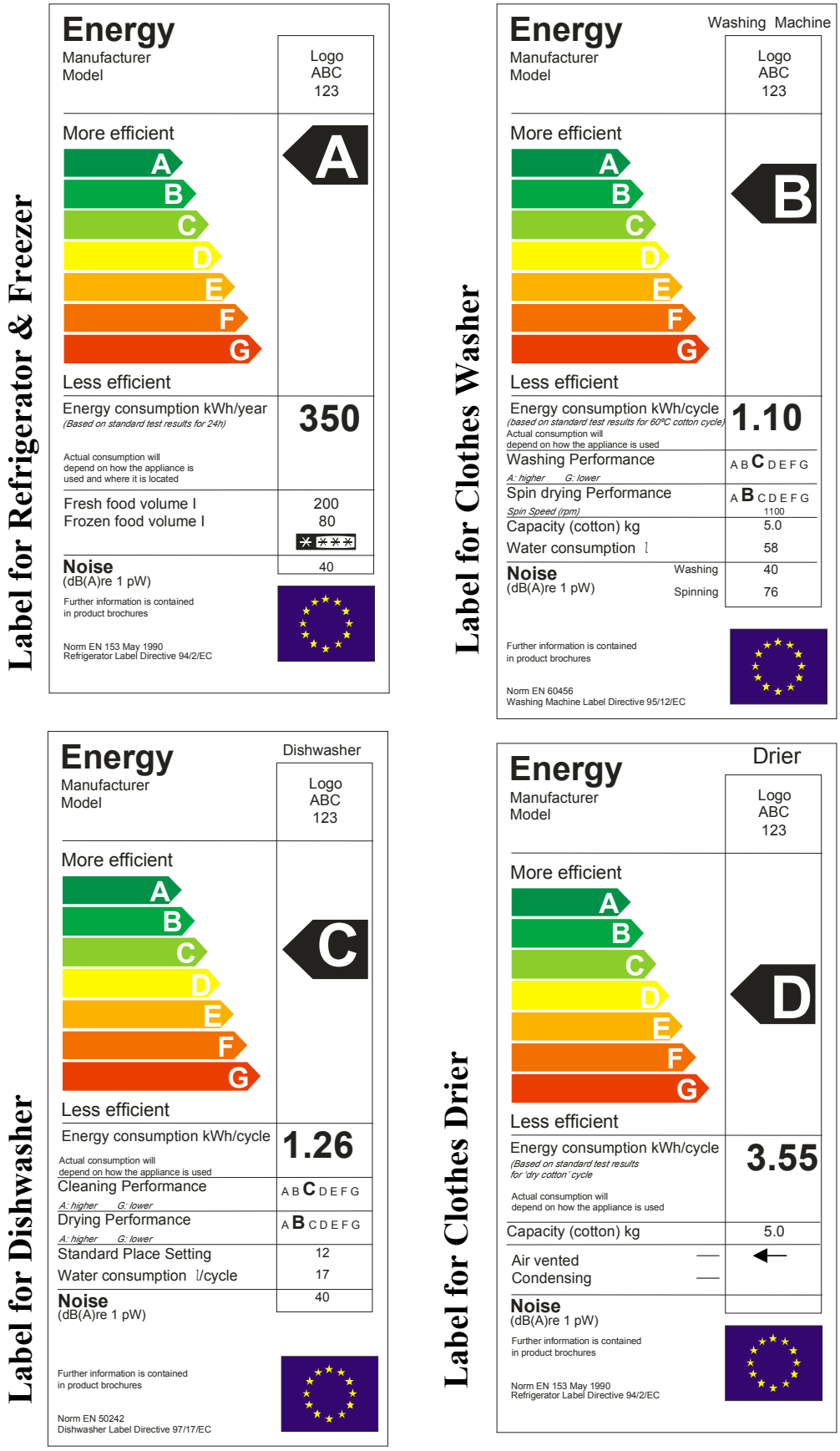

Figure 2: The EU Energy Labels for Cold Appliances, Clothes Washer, Dishwasher & Clothes Drier

The appliance brand and model number are clearly indicated on all the above energy-labels. Energy labels for household lamps have posed a unique problem because lamps are generally a small, low value item compared to white goods. Additionally, there is a huge amount of trade and resale of lamps across European boundaries, which has meant that it was not practical to use an energy label comprised of two parts that are need to be separately attached to the product at the point of sale. In response to this the Commission proposed a greatly simplified energy label that resembles the energy labels for white goods but has much less text and information in order to enable a generic language label to be produced. The result is shown in Figure 3. The Commission dispensed with applying a separately produced label to the product but requires the label to be printed on the lamp packaging. The label must be printed in colour (the left hand image) if the lamp packaging is polychromatic but can be monochrome (the right hand image) if the packaging is also monochromatic. The word *energy* is written at the top of the label with a variety of endings that spell energy in 9 of the 10 EU languages. The Greek spelling is written above the main word. In addition to indicating the lamp's energy efficiency from A to G the label also indicates the light output in Lumens, the rated power in watts, and the average lamp lifetime in hours. The problems of language means that this label even more than the other EU labels is a compromise between clarity and practicality. It is hoped that at least some consumers will know that the Lumen, Watt and h terms refer to light output, rated power and average lifetime respectively although this has not yet been tested. It is also hoped that the high purchasing rate of lamps will greatly add to consumer recognition of the energy label and that this will help to reinforce the message from all the labels.

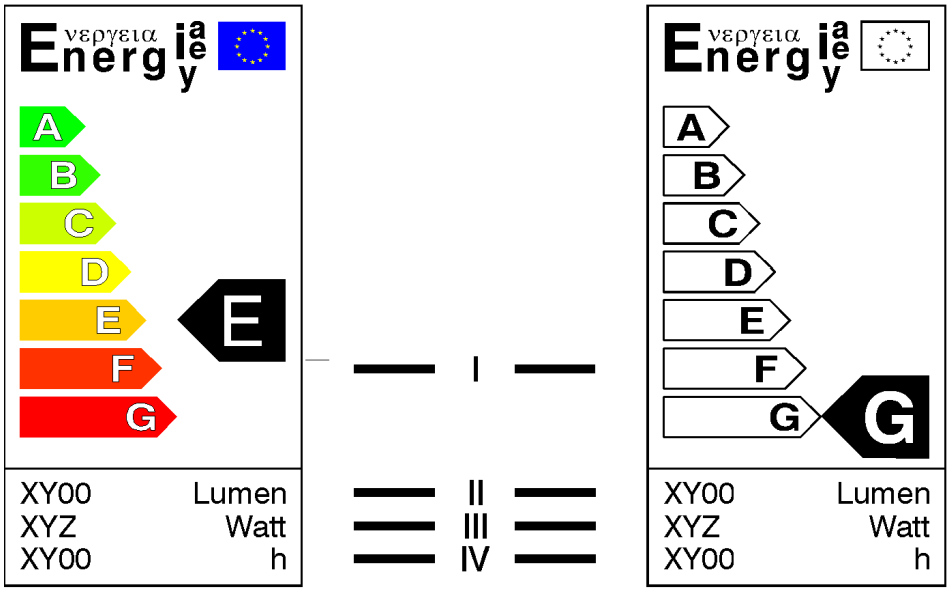

Figure 3: The EU Energy Labels for Lighting Sources

3. CALCULATING EU ENERGY-LABEL EFFICIENCY CLASSES

For cold-appliances the efficiency class grades A to G are defined for each product category in terms of an energy efficiency index I (defined as the tested model electricity consumption divided by the prescribed "average" model consumption for a unit of the same adjusted volume) as given in Table 1.

Table 1. Relative efficiency grades used in the EU energy label for cold-appliances

Energy Efficiency Index I	Energy Efficiency Class
$I < 0.55$	A
$0.55 \leq I < 0.75$	B
$0.75 \leq I < 0.90$	C
$0.90 \leq I < 1.00$	D
$1.00 \leq I < 1.10$	E
$1.10 \leq I < 1.25$	F
$1.25 \leq I$	G

Thus, a G class model uses 125% or more energy of an "average" cold-appliance of the same type and the same adjusted volume, while an A class model uses less than 55% of an average appliance of the same type and adjusted volume. The energy consumed by an average appliance of a given type and adjusted volume is calculated from the appropriate average performance reference line equation given in Table 1 and based on the values measured under the norm EN 153.

The efficiency spread indicated in these classes is based on several considerations. Firstly, that the efficiency of models on the EU cold-appliance market tends to be distributed[8] like a slightly skewed gaussian function except that there is a long tail on the side of the inefficient models while the efficiency of the most efficient model is bounded. Secondly, that the aim of the label is to encourage people to buy more efficient appliances - this means that it is not necessary to set the width of the efficiency classes such that there are an equal number of models in each class, but rather in such a way that it is a compromise between reflecting the real efficiency distribution of the market at the time that the label is introduced and the efficiency distribution one may hope to achieve after some years. Thirdly, that the highest efficiency class needs to be theoretically attainable even if it is not attained by any model at the time the label is introduced.

When the cold-appliance energy label was introduced in 1994 there were almost no models in the A efficiency class available on the market; however, a detailed engineering analysis had shown that it was quite possible to manufacture A class models. Since that time several hundred A class models have become available on the EU market, justifying the principle of leaving the top efficiency class almost empty when a new labelling benchmark is set.
For clothes-washers the efficiency class grades A to G in terms of their specific energy consumption (kWh/kg) at rated capacity for a 60 ^{o}C wash cycle as given in Table 2 and as measured under norm EN 60456.

[8] The efficiency distribution refers to the graph one would see if one plotted a frequency distribution showing the number of models (on the y-axis) within any bracket of the energy efficiency index, I, on the x-axis.

Table 2. Relative efficiency grades used in the EU energy label for clothes-washers

Energy consumption 'C' in kWh per kg washed for standard 60 °C cotton cycle using the CENELEC harmonised test standard	Energy Efficiency Class
$C \leq 0.19$	A
$0.19 < C \leq 0.23$	B
$0.23 < C \leq 0.27$	C
$0.27 < C \leq 0.31$	D
$0.31 < C \leq 0.35$	E
$0.35 < C \leq 0.39$	F
$0.39 < C$	G

For the clothes-dryers the efficiency class grades A to G in terms of their specific energy consumption (kWh/kg) for a dry cotton drying cycle as given in Tables 3a and 3b and as measured under norm EN 61121. A distinction is made between air-vented dryers and condensing dryers because the air-vented dryers provide a slightly lower service as the moisture extracted from the clothes remains in the vented air for these dryers while it is condensed by a dehumidifier for the condenser dryers. On average the air-vented dryers have slightly lower energy consumption and are typically 36% less expensive than the condenser dryers.

Table 3a. Relative efficiency grades used in the EU energy label for air vented clothes dryers

Energy consumption 'C' in kWh per kg of load for a 'dry cotton' drying cycle, determined using the CENELEC harmonised test standard	Energy Efficiency Class
$C \leq 0.51$	A
$0.51 < C \leq 0.59$	B
$0.59 < C \leq 0.67$	C
$0.67 < C \leq 0.75$	D
$0.75 < C \leq 0.83$	E
$0.83 < C \leq 0.91$	F
$0.91 < C$	G

Table 3b. Relative efficiency grades used in the EU energy label for condensing clothes dryers

Energy consumption 'C' in kWh per kg of load for a 'dry cotton' drying cycle, determined using the CENELEC harmonised test standard	Energy Efficiency Class
$C \leq 0.55$	A
$0.55 < C \leq 0.64$	B
$0.64 < C \leq 0.73$	C
$0.73 < C \leq 0.82$	D
$0.82 < C \leq 0.91$	E
$0.91 < C \leq 1.00$	F
$1.00 < C$	G

For washer-dryers the efficiency class grades A to G in terms of their specific energy consumption (kWh/kg) at rated capacity for a 60 °C wash cycle and dry cotton drying cycle as given in Table 4 and measured according to norm EN 50229.

Table 4. Relative efficiency grades used in the EU energy label for washer-dryers

Energy consumption 'C' in kWh per kg complete operating (washing, spinning and drying) cycle using standard 60 °C cotton cycle, and 'dry cotton' drying cycle, determined using the CENELEC harmonised test standard	Energy Efficiency Class
$C \leq 0.68$	A
$0.68 < C \leq 0.81$	B
$0.81 < C \leq 0.93$	C
$0.93 < C \leq 1.05$	D
$1.05 < C \leq 1.17$	E
$1.17 < C \leq 1.29$	F
$1.29 < C$	G

For dishwashers the efficiency class grades A to G in terms of the energy consumption on the normal programme (kWh/cycle) based on Norm EN 50242. Both the cleaning and drying performance are ranked from A to G. The number of standard place settings and water consumption are also indicated on the energy label. The energy efficiency is determined by defining a reference energy consumption value C_R from:

$C_R = 1.35 + 0.025 \times S$ when $S \geq 10$

$= 0.45 + 0.090 \times S$ when $S \leq 9$

where S is the capacity of the appliance in standard place settings. An energy efficiency index E_I is then defined as:

$$E_I = \frac{C}{C_R}$$

where C is the energy consumption of the appliance. The efficiency classes are then given according to Table 5.

Table 5. Relative efficiency grades used in the EU energy label for dishwashers

Energy efficiency index, E_I	Energy Efficiency Class
$E_I < 0.64$	A
$0.64 \leq E_I < 0.76$	B
$0.76 \leq E_I < 0.88$	C
$0.88 \leq E_I < 1.00$	D
$1.00 \leq E_I < 1.12$	E
$1.12 \leq E_I < 1.24$	F
$E_I \geq 1.24$	G

For household lamps the energy efficiency of a lamp is classed as A if:
for **Fluorescent lamps** without integral ballast (i.e. those requiring a ballast and/or other control gear

$$W \leq 0.15 \times \sqrt{\Phi} + 0.0097 \times \Phi$$

to connect them to the mains)

And for **other lamps** if:

$$W \leq 0.24 \times \sqrt{\Phi} + 0.0103 \times \Phi$$

where Φ is the lumen output of the lamp and W is the power input into the lamp in watts.
If a lamp is not in class A then a reference wattage W_R is calculated from:

$$W_R = 0.88\sqrt{\Phi} + 0.049 \times \Phi$$

when Φ > 34 lumens

when Φ ≤ 34 lumens

$$W_R = 0.2 \times \Phi$$

The energy efficiency index of the lamp is then set as:

$$E_I = \frac{W}{W_R}$$

where W is the power input into the lamp in watts. The energy efficiency classes are then set as indicated in Table 6.

Table 6. Relative efficiency grades used in the EU energy label for household lamps

Energy efficiency index, E_I	Energy Efficiency Class
$E_I < 0.60$	B
$0.60 \leq E_I < 0.80$	C
$0.80 \leq E_I < 0.95$	D
$0.95 \leq E_I < 1.10$	E
$1.10 \leq E_I < 1.30$	F
$E_I \geq 1.30$	G

The household lamps directive does not cover low voltage halogen lamps or reflector lamps, both of which have growing market shares in the EU.

All the product energy efficiency classifications used in the labels described have been chosen as a compromise between the desire to reflect the efficiency distribution in energy performance of models on the market at the time the labelling structure is introduced and the goal of encouraging the market to move into higher efficiency classes. The selection of limits for the upper efficiency classes in the EU has generally been chosen in the light of a comprehensive product engineering analysis to determine the scope of untapped cost-effective high-efficiency design modifications. In the case of the cold appliances, clothes-washers and clothes-dryers for example, there were virtually no models in the A class when the labels were first introduced.

4. CONCLUSION: BEYOND THE EUROPEAN APPLIANCE ENERGY LABELLING

In 1999, Europe introduced the directive 1999/94/EF regarding consumer information on fuel economy and CO_2 emissions for passenger vehicles. EU Member States are free to choose the format for labelling car fuel economy and CO_2 emissions. Denmark and The Netherlands are the first European countries to implement the directive and they chose to adapt the appliance labels. Figure 4 presents the new Dutch car label. Other EU countries are likely to also adapt the convenient A to G label for this car directive. In Austria, the same A to G label is used for labelling energy performance of buildings. Hence the effect of the European Appliance label goes well beyond the appliance market.

This wider use of energy labels is believed to reinforce consumers' attitudes and awareness of the energy consumed by appliances and equipment in all sectors and thus stimulate the demand for more efficient products which will have ongoing benefits for the global environment.

Figure 4: The Dutch label for fuel economy and CO_2 emissions for passenger vehicles.

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Council Directive 96/60/EC: Energy Labelling of Washer-Driers, European Commission.

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