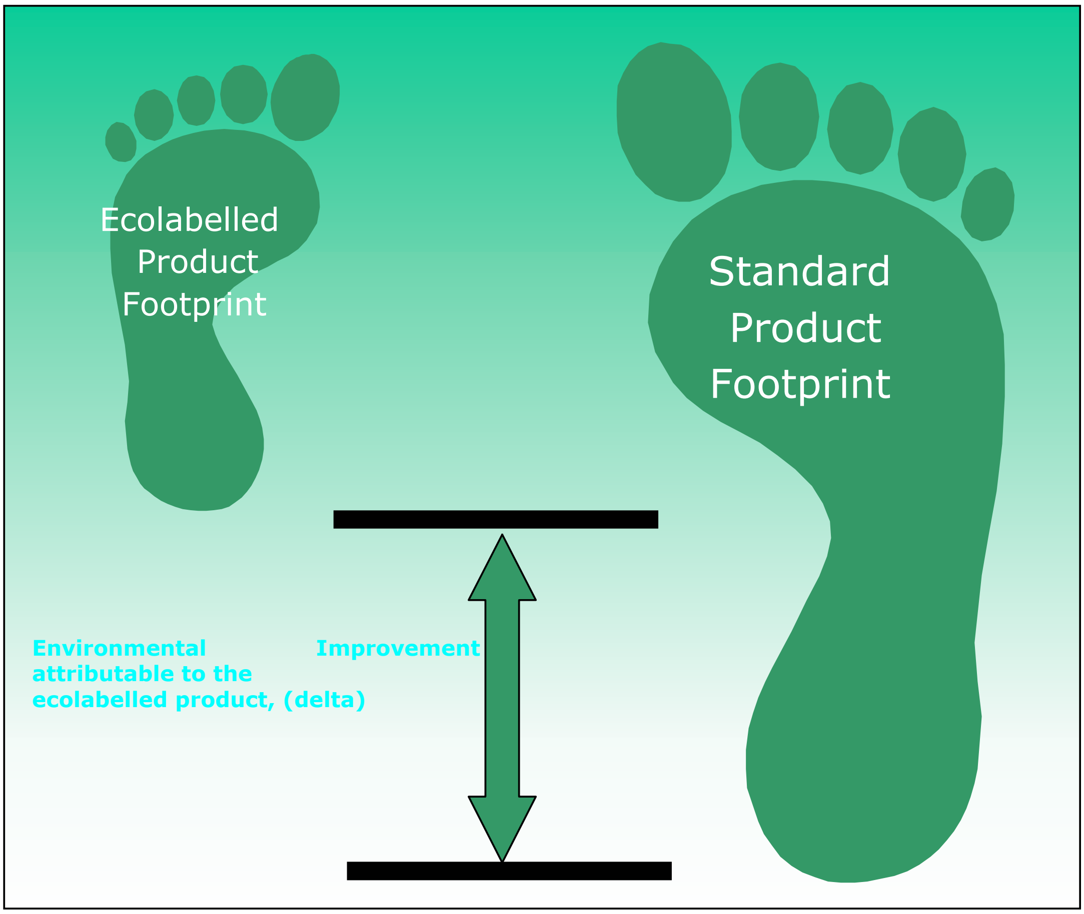
The Direct and Indirect Benefits of the European Ecolabel – Final Report



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Executive Summary

This Final Report details the findings from evaluating the *"Direct and Indirect Benefits of the European Ecolabel"*.

The **Direct Benefits** to the environment that can be gained by using an ecolabelled product instead of a typically performing version can be quantified in terms of a lower consumption of energy, water and raw materials as well as the minimisation of emissions to the environment during production and use. The criteria set for each product group were studied and the most suitable ones that could be quantified were assessed further. An analysis was undertaken by comparing the environmental footprint of the ecolabelled product with that of a typical, non-labelled equivalent, giving rise to a difference in performance, *delta*. Incorporated into the calculation were sales statistics and a market penetration scenario percentage (5, 20 and 50%), representing the potential market share for a given product type that ecolabelled products *could* hold. An environmental benefit was then derived from these elements.

It should be noted however, that these calculations attempt to estimate the potential savings that *could* be achieved if the market share of ecolabelled products increased to 5, 20 or 50%. They are *not* trying to calculate the savings that *have* already been won through the sale of ecolabelled products during the last decade or so.

Direct benefits have been determined for all product groups covered by the ecolabel on an individual basis at the time of starting the study[1]. The calculated potential environmental benefits or savings (rounded) are displayed in the table below. These are presented in terms of saved resources such as energy, water and materials as well as reduced pollution to the air and surface waters by the three market take-up scenarios.

Direct Environmental Benefits of using Ecolabelled Products[2]

RESOURCE SAVED /AVOIDED PER YEAR	AMOUNT SAVED PER YEAR BY SCENARIO %		
	5% Take-up	***20% Take-up***	***50% Take-up***
Electricity, GWh	14,700	59,000	147,600
CO_2 produced from energy use, tonnes	9,318,000	37,270,000	93,175,000
Water Use[3], Megalitres	12,285,000	49,138,000	122,846,000
Reduced Hazardous Substance Use, tonnes	13,800	55,400	138,400
Material Savings (other than Hazardous Substances), tonnes	530,700	2,122,700	5,306,700
Reduced discharges to water, tonnes COD	30,400	121,700	304,200
Reduced Air Pollution, tonnes	17,500	70,100	175,300

[1] i.e. tourism accommodation and campsite service are not included as they had not been voted upon when the project was initiated.
[2] The values are rounded so individual product group savings may not tally to the totals shown.
[3] Water Use includes savings due to more efficient appliances and savings due to the reduced CDV_{tox} value of ecolabelled detergents.

This table shows that there are appreciable savings and benefits to the environment that could be gained through the wider use of products meeting the ecolabel standard, even at a modest 5% market share.

Due to the presence of the ecolabel in the market place and its influence there are also **Indirect Benefits**. For example, ecolabel criteria for one product group may be transferred and subsequently used by another national ecolabelling scheme, or they may be used in procurement calls for tender by Government and/or private companies, likewise a private firm may use criteria as a benchmark for their own products.

Whereas the direct benefits forecast solely the environmental savings that could be won if the market share of ecolabelled products increases, the indirect benefits estimate the positive effects the ecolabel *has had* and could *potentially have* in future. The historical indirect benefits have come largely through known instances and success stories of where the ecolabel has been used as a model by other organisations and hence helped to transform the market. The forward-looking scenario has taken these examples and anecdotal evidence and expanded them to estimate the further potential the indirect benefits have through replication.

Our methodology was to devise a list of indirect benefits, incorporating feedback from the consultation with EUEB members, that could then be quantified in terms of environmental and/or financial savings derived from the indirect use and presence of the ecolabel Ecolabel and its criteria sets. The result is that nine key indirect benefits have been highlighted as indicated below.

Indirect Benefits of the Ecolabel

1. The use of the Ecolabel criteria by another eco-label scheme. Criteria may be copied directly or used as a reference point before local adaptation.
2. The use of the Ecolabel criteria in public procurement calls for tender.
3. The use of the Ecolabel criteria in private procurement calls for tender.
4. The use of the Ecolabel criteria by companies as a benchmark for their own products or as a target to improve their environmental performance.
5. The use of the Ecolabel criteria to generate Type III labels (environmental product declarations), or recommendations on how to make green claims (Type II).
6. The use of the Ecolabel criteria and procedures/structures to generate minimum environmental requirements applicable to all products of a product category on the market.
7. The use of the Ecolabel criteria in the “new approach” as a basis for establishing whether companies have complied with “essential requirements”
8. The use of the Ecolabel logo, eco-label criteria and related discussion, to raise stakeholder awareness of the environmental impact of products, with stakeholders including manufacturers retailers, consumers, environmental NGOs and public administrations.
9. The use of the Ecolabel and its criteria as a basis for establishing fiscal measures to promote green products, (e.g. criteria for energy rebate schemes)

The headline figures from our calculations are given in the following table. These are largely <u>potential</u> savings that could be gained by taking measures to drive forward the indirect benefits on a larger scale. So for example, the UK ecolabel Competent Body, Defra, has used ecolabel criteria to devise public procurement specifications, with the result that an indirect benefit <u>has accrued</u> to the ecolabel. However, the <u>potential</u> indirect benefit is considerably higher if each Member State were to do something similar. There are other examples of relatively small indirect benefits being realised now that have the potential to be replicated thus achieving greater product related environmental improvements.

Indirect Environmental Benefits of the Ecolabel within the EU25

Item	Amount saved per year
Money	€763 million
Energy saved	43 TWh
CO_2 saved	27 million tonnes
Water saved[4]	35 Tera litres
Hazardous substances avoided	39 thousand tonnes
Materials saved	1.5 million tonnes
Reduced discharges to water	85 thousand tonnes COD[5]
Reduced air pollution	49 thousand tonnes

Indirect Environmental Benefits of the Ecolabel Outside the EU25[6]

Item	Amount Saved per Year
Energy saved	2.9 TWh
CO2 saved	1.9 million tonnes
Water saved	2.5 Tera litres
Hazardous substances avoided	2.8 thousand tonnes
Materials saved	106 thousand tonnes
Reduced discharges to water	6 thousand tonnes COD[7]
Reduced air pollution	3.5 thousand tonnes

Marketing studies have shown that consumers recognise the ecolabel and what it stands for suggesting that the ecolabel does raise consumer awareness of environmental issues. Quantifying the effect is difficult but in the longer term it could be enormous with the associated benefit that better informed consumers will demand more effective environmental legislation.

This all suggests it is appropriate to find alternative approaches to promoting the adoption and use of the ecolabel and the information it is based upon. It may be, for example, that promoting the use of ecolabel criteria to Member States' governments (and their agencies, health services, schools and colleges etc) as a resource to help define procurement specifications is a worthy alternative (or an addition) to raising awareness amongst consumers and industry.

The financial saving that could be derived from Member State government's devising procurement specifications derived from ecolabel criteria is in excess of €25M. In the absence of information detailing the products that governments purchase, the environmental benefit this could drive can only be guessed at. However, the potential is highly significant

[4] Water Use includes savings due to more efficient appliances and the reduced CDV_{tox} of ecolabelled detergents.
[5] Chemical Oxygen Demand
[6] Considers the EU Ecolabel to influence the national schemes of Australia, Canada, New Zealand and the United States.
[7] Chemical Oxygen Demand

given that public procurement accounts for 16% of EU GDP[8]. If we assume public procurement could achieve environmental benefits equal to the 5% market share scenario presented earlier, then a further 9Mt of CO2, for example, could be avoided.

As a further example, ecolabel information and the processes used to devise criteria proposals could be used to devise product specific minimum standards. We estimate this measure would realise a benefit of some €3M in terms of avoiding budget that otherwise would need to be spent on new studies. Given that minimum standards would be compulsory and applicable to all products within a given category, the potential environmental benefit that could be derived is higher than in other examples of Indirect benefits. We estimate a benefit equal to twice the 5% market share scenario presented earlier. This would, for example, achieve CO2 savings of some 18 Mt.

Clearly, the ecolabel has within itself the potential to achieve a great deal more. With the revision of the ecolabel regulation being imminent, it is appropriate to explore new avenues that would breathe new life into the ecolabel to secure greater environmental benefits.

The ecolabel has potential to be highly cost-effective. Considering the Direct benefits and the 5% market penetration scenario, the amount of CO2 emissions saved is 9Mt. We estimate that the ecolabel scheme costs €3.4M per year to operate. Hence the ecolabel could potentially achieve CO2 abatement at a cost less than €1 per tonne. The cost of abating a tonne of CO2 has been estimated elsewhere by the ECCP[9]. ECCP's data suggests that, considering a basket of policy measures and instruments, the cost is €12 per tonne. Comparing the figures, the ecolabel could be a highly cost effective programme.

In all the calculations performed for this study, assumptions and extrapolations have had to be made where data was unavailable. This should be kept in mind when reading this report. As and when newer information comes to light it can be fed into the calculations. To illustrate this point a recently published report by the European Environmental Bureau on the EU Ecolabel[10] outlines the difficulties in calculating benefits attributable to the Ecolabel.

"What the Ecolabel actually delivers in terms of reduction in environmental impacts and overall ecological burden is difficult to calculate. It delivers through a number of mechanisms. Some of these mechanisms are direct, such as a shift in production processes and product composition or design. Also, good promotion can increase market share for the more ecological products.

Other mechanisms are more indirect, such as the creation of a product benchmark that puts pressure on non-licensed manufacturers to evolve (mimicking all or some of the Eco-label criteria), or simply guides them as to what is expected of them, even though they may not apply for the Ecolabel. For example, in the case of washing machines, the Eco-label has certainly resulted in creation of a standard, although it is difficult to establish how much this is due to the Eco-label and how much it is also thanks to the EU energy label."

[8] EU Ecolabel, The Ecolabel News, Issue #2, 2004.
[9] European Climate Control Panel
[10] *EEB Evaluation of the European Eco-label Criteria and Scheme 'What we wanted – what we got...'* July 2004; Philippe Schiesser, ECOEFF consultant & Melissa Shinn, EEB Eco-label co-ordinator
http://www.eeb.org/activities/product_policy/EEB-Ecolabel-evaluation-What-we-wanted-what-we-got-July2004.pdf

Acknowledgement

We wish to take this opportunity to thank all those who lent their experience and guidance to ensure the successful completion of this study.

In particular we would like to thank the members of the European Union Ecolabelling Board (EUEB) for their helpful input.

We also extend our thanks to Mr Javier Yaniz-Igal and Mr Simon Goss of the European Commission who supervised the work and without whose dedication and vision this study would not have been possible.

Contents

1 Introduction

The European Ecolabel has been in existence now for over ten years and has grown dramatically in that short period of time. Over the years, various remarks and observations have been made regarding the ecolabel's influence on product performance and the environmental improvement this has given rise to. The remarks, many and varied as they are, are important in terms of the justification they provide for the Commission's continued efforts to drive the ecolabel forward.

This issue was captured by the revised Ecolabel Regulation (EC) No 1980/2000 and the Working Plan it established. The Plan included the following implementation measure;

"The EUEB should develop and improve the methodology and parameters for estimating the direct and indirect environmental benefits of the ecolabel during the first three years of this plan. The maximum potential benefits should be systematically estimated for each product group when establishing new or revised criteria. A strategy should be set in place for monitoring, evaluating and increasing the indirect environmental benefits of the ecolabel criteria."

To meet the objective, the Commission funded this study to investigate the potential environmental benefits that have been or could be gained through the purchase and use of ecolabelled products.

Our work programme consisted of two main areas of research, to assess;

- Direct Benefits of the Ecolabel
- Indirect Benefits of the Ecolabel

Allied to this, a third, briefer activity was to prepare a small number of case studies.

Direct benefits are perhaps the easiest to understand but not necessarily the simplest to calculate. Our approach was to quantify the *potential* savings through using an ecolabelled item, in terms of lower consumption of energy, water and raw materials and also the reduction in emissions to the environment during production and use, such as discharges of toxic substances to water and emissions of VOCs[11] to air. These are the actual environmental savings that can be won by using an ecolabelled product in preference to a market average product. It should be remembered however, that these calculations are attempting to estimate the savings that *could* be achieved if the market share of ecolabelled products increased to 5%, 20% or 50% i.e. they are potentials. They are *not* trying to calculate the savings that *have* already been won through the use of ecolabelled products during the last decade or so.

In order to achieve this the individual product group criteria were studied to identify those that characterise the bulk of the product's environmental impacts. The study's nature meant that examining all the environmental issues related to a product was unnecessary. Greater detail of the method is given in section 2 with further elaboration being provided for each product group.

[11] Volatile Organic Compounds, such as solvents

Indirect benefits, while not so easy to quantify in terms of litres of water or kWh of energy saved, are just as important to the success of the ecolabel scheme. We considered the Ecolabel's wider influence in terms of its interaction with national ecolabelling schemes; product design and manufacture (without the manufacturers concerned necessarily applying for the ecolabel[12]).

For example, we identified that production teams producers refer to the Ecolabel to check whether their product complies with its stringent environmental standards. As a result, we noted that some producers declare their product's compliance with the Ecolabel's requirements.,

EUEB members identified indirect benefits from their many years of experience of working with the scheme. We have attempted to quantify these in financial terms as well as further environmental gains above and beyond those in the direct benefits, where appropriate. Section 3 goes into more detail as to the principle behind each of the nine indirect benefit types identified as well as providing an estimate for each. The estimates are based on assumptions. This is unavoidable. Nonetheless, the estimates show the significant potential the ecolabel could achieve and perhaps suggests new routes to promoting the ecolabel in a very focussed way – for example, to EMS and/or EMAS registered companies and national ministries responsible for government procurement.

Whereas the direct benefits only forecast the environmental savings that could be won if the market share of ecolabelled products increased, the indirect benefits estimate the positive effects the Ecolabel *has had* and could *potentially have* in future. The historical indirect benefits have come largely through known instances and success stories of where the Ecolabel has been used as a model by other organisations. The forward-looking scenario has taken these examples and anecdotal evidence and expanded them to estimate the greater potential the indirect benefits have through replication.

Case Studies

As the study unfolded, the focus for the case studies in Section 4 changed. Originally envisaged as providing examples of companies that have benefited from using the ecolabel, it became apparent that the indirect benefits provided new insights regarding the ecolabel's wider influence. Consequently the case studies are overviews of some of the indirect benefits.

[12] The question of why individual companies have gone down the route of making their product compliant with the ecolabel without applying for it is an interesting one (possibly due to reasons of marketing and cost) but not something covered by the scope of this study.

2 Direct Benefits

2.1 Methodology

Each Product Group (PG) covered by the ecolabel was assessed in turn to determine which of their many criteria are key to characterising their environmental performance. For some PG such as appliances this was often straightforward. For other PG it was more complicated however, with footwear for example considering t discharges to water and emissions to air. A summary of the key PG criteria is given in Table 1.

Common to all PG was the basic equation for calculating the direct benefit attributable to an ecolabelled version of that product, as indicated in Equation 1. This consists of three key elements;

- Scenario percentage (i.e. the assumed percentage of EU annual sales)
- Sales figure
- Delta (which is the difference between the performance of the ecolabelled and market average products)
- Additional factors included where appropriate (e.g. the frequency of using a washing machine[13])

Equation 1 Basic Direct Benefit Equation

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \times F$$

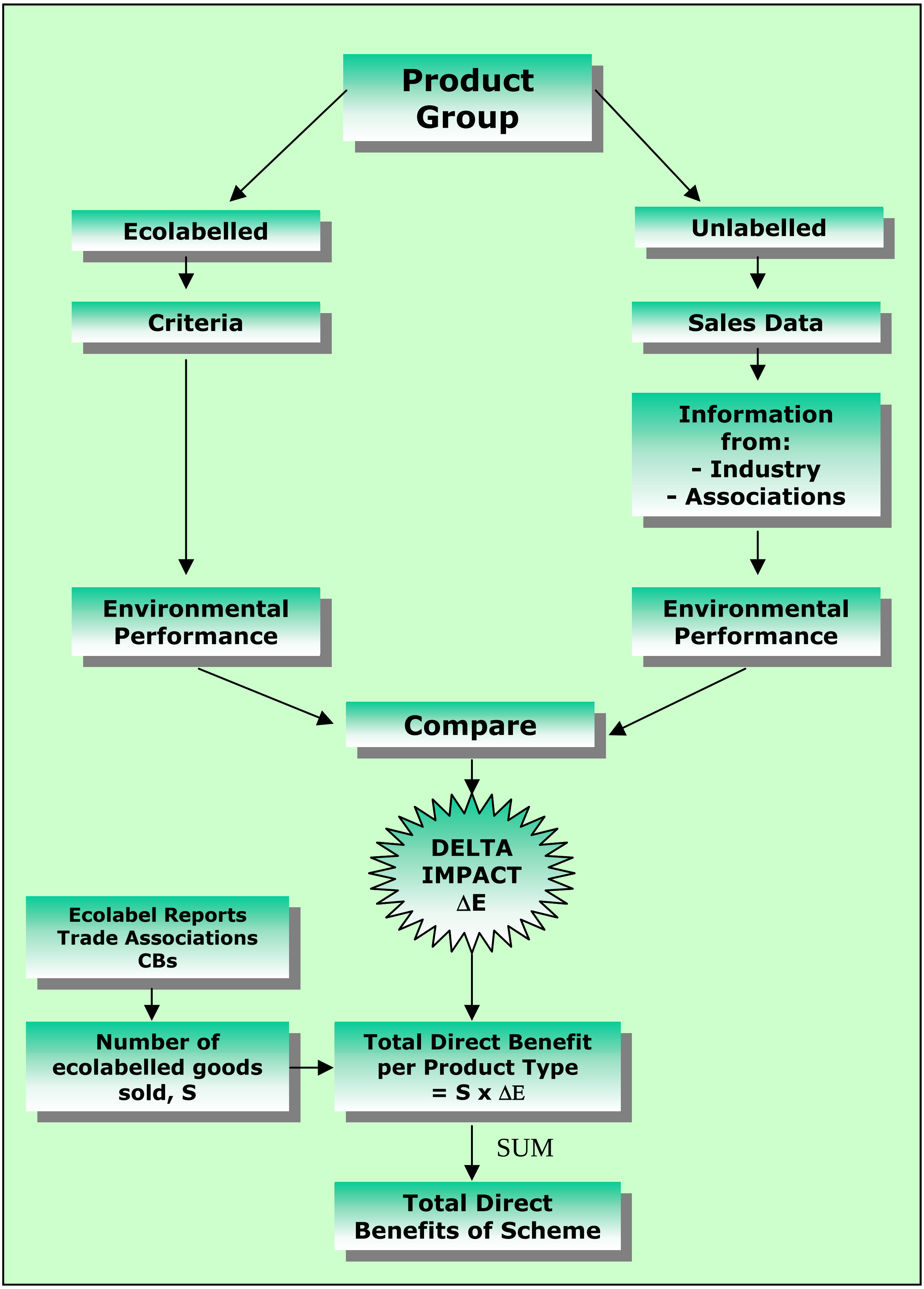
Three scenarios were discussed and agreed with the Commission in which a certain percentage of total market sales were assumed to be of ecolabelled products, namely 5%, 20% and 50%. These percentages give an indication of what environmental benefits could be achieved if steadily more purchased products were ecolabelled.

For sales information, we used a variety of sources including European Commission statistics and company or trade association web-sites. This information was not always available and in such cases we used UK data from sources as the Office of National Statistics where available, scaling the data to make provision for the larger EU population or devised our own estimates based on assumed consumption patterns per head of population. This was usually expressed as the number of units sold in a given calendar year.

Delta accounts for the key differences between market average and ecolabelled products. This can be couched in terms of the products' environmental footprint (as depicted by the diagram on the title page but in more detail in Figure 1). The ecolabel criteria requirements were compared to the analogous characteristics for the market average product, obtained or derived from the market discussion section within ecolabel reports or other data sources such as trade association web-sites and contacts we have in industry. Hence a difference could be calculated to give the difference or 'benefit.

[13] These issues are discussed in more detail against relevant product groups.

Figure 1 Calculation of Difference in Environmental Performance, Δ



Once delta had been determined, an equation was then derived for each chosen criterion in order to calculate the benefit for the environment from reduced resource use, emissions etc. This included the scenario percentage and annual sales figure. For some product groups, we had to introduce factors to take into account the number of times a product may be used in a year.

Washing machine water use is a good example. The ecolabel's water use criterion is given as the number of litres of water used per kg of washload and thus Delta is the number of litres of water *saved* per kg of washload. So that the volume of water saved per year across the EU could be derived, Delta was multiplied by 4.5 kg/wash and 104 washes per year[14], along with the annual sales figure, thus giving water savings in litres per year for ecolabelled washing machines bought in the EU.

The equation for washing machines' water saving is

Water Saving = Scenario % *x* Sales *x* Δ *x* 4.5 *x* 104

To include the actual numbers;

Ecolabelled washing machine water use per kg of washload	12L/kg
Standard Washing machine water use per kg of washload	13.25L/kg
Delta	1.25L/kg
Sales in EU15	11,300,000
Use pattern	4.5 kg/wash *x* 104 washes/year
Scenario A[15]	5%

Thus, Scenario A = 5% *x* 11,300,000 *x* 1.25L/kg *x* 4.5 kg/wash *x* 104 washes/year
= **330,525,000 Litres per year *saved* across the EU15**

The details of the specific calculations and corrective factors are described under each PG along with any assumptions behind them. In this way the derivation of the calculations can be clearly seen. We adopted this approach because if at some future date other, perhaps more definitive data becomes available, then the Commission will be able to readily update the calculations.

[14] The inherent assumption in this calculation was that, on average, a washing machine load weighs 4.5 kg and that a machine will be used twice a week.
[15] Assume 5% of all machines operating in the EU15 are ecolabelled rather than average

Table 1 Key Criteria by Product Group

Product Group	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Copying and Graphic Paper	Emissions to air	Emissions to water	Energy use in production (represented as CO_2 emissions to air)		
Tissue Paper	Emissions to air	Emissions to water	Energy use in production (represented as CO_2 emissions to air)		
Cleaners for sanitary facilities & All-purpose Cleaners	Emissions to air	Emissions to water	Chemical ingredients		
Detergents for Dishwashers	Emissions to air	Emissions to water	Chemical ingredients		
Hand Dishwashing Detergents	Emissions to air	Emissions to water	Chemical ingredients		
Laundry detergents	Emissions to air	Emissions to water	Chemical ingredients		
Washing Machines	Energy use	Water consumption in use	Noise	Washing performance	Spin Drying performance
Dishwashers	Energy use	Water consumption in use	Noise	Washing performance	Spin Drying performance
Refrigerators	Energy use	Ozone depletion potential	Global warming potential	Noise	
Televisions	Energy use: On-mode	Energy use: stand-by	Use of harmful substances		
Personal Computers (System Unit and Monitor)	Energy use: sleep state	Energy use: off-mode	Use of harmful substances		
Laptop Computers	Energy use: sleep state	Energy use: off-mode	Use of harmful substances		
Light Bulbs	Energy use	Lifetime: Material Saving	Mercury content		
Footwear	Emissions to air	Emissions to water	Use of harmful substances		
Indoor Paints and Varnishes	VOCs, VAHs	Hazardous Subs	Spreading rate	White pigment content	
Hardfloor Coverings	Raw material extraction	Energy use in production	Water use in production	Emissions to air	Emissions to water
Mattresses	Use of harmful substances	VOCs			
Soil Improvers	Natural resource depletion	Hazardous ingredients	Nutrient loading, N		
Textiles	Emissions to air	Emissions to water	Use of harmful substances		
Vacuum Cleaners	Energy use				

2.2 Product Groups

The next sections describe the direct benefits of the ecolabel on a product-by-product basis, explaining the reasoning behind the calculations made.

2.2.1 Copying and Graphic Paper

Because different process technologies are used to make paper, the product group was split into the two main types namely chemical and mechanical productions.

Data for the ecolabelled products was taken from the current criteria set[16] and the example calculation available[17]. Data for standard paper was taken from the SIS Background Report[18] as well as from AHWG discussion minutes. Sales data for 1999 also came from the SIS Report in the form of tonnes produced per year in Europe. Delta, in kg of pollutant emitted per air-dried tonne of paper produced, was calculated by subtracting the values for the ecolabelled paper from those of the standard paper.

The three scenarios were calculated by multiplying the scenario percentage by the difference Δ (kg/air-dried tonne of paper), by the annual sales (tonnes per year) and then dividing the result by one thousand to get an answer in tonnes of ‘pollution’ avoided per year, COD, AOX to water and NOx, CO_2, SO_x to air.

The scenarios are represented by Equation 2 below.

Equation 2 Potential avoidance of pollution to water and air for Copying and Graphic Paper

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \div 1000$$

This answer is in tonnes of pollution avoided each year for paper bought in the EU.

Table 2 shows the calculations for chemical process whilst Table 3 shows the analogous calculations for the mechanical process.

16 http://europa.eu.int/comm/environment/ecolabel/product/pg_copyingpaper_en.htm
17 http://europa.eu.int/comm/environment/ecolabel/pdf/copying_paper/calculation_nov2001.pdf
18 http://europa.eu.int/comm/environment/ecolabel/pdf/copying_paper/background_rep_draft1.pdf

Table 2. Direct Benefits of Ecolabelled Copying and Graphic Paper – chemical process

Copying and Graphic Paper – Chemical Process	Production Emissions, kg per air-dried tonne of paper				
	to water		to air		
	COD	AOX	NO_x	CO_2	SO_x
ECOLABELLED Copying and graphic paper	27.0	0.25	1.2	1000	0.6
STANDARD Copying and graphic paper	28.3	0.50	2.0	2000	1.0
Difference Δ	1.3	0.25	0.8	1000	0.4
PG Sales EU15	23,259,000	23,259,000	23, 259,000	23,259,000	23,259,000
PG Sales EU25	27,888,443	27,888,443	27,888,443	27,888,443	27,888,443
Scenarios – EU15	Emissions avoided, tonnes per year				
	COD	AOX	NO_x	CO_2	SO_x
SCENARIO 1a: *5%*	1,500	290	930	1,162,900	470
SCENARIO 2a: *20%*	6,000	1,160	3,720	4,651,800	1,860
SCENARIO 3a: *50%*	15,120	2,910	9300	11,629,500	4,650
Scenarios – EU25	COD	AOX	NO_x	CO_2	SO_x
SCENARIO 1b: *5%*	1,810	350	1,120	1,394,400	560
SCENARIO 2b: *20%*	7,250	1,390	4,460	5,577,700	2,230
SCENARIO 3b: *50%*	18,130	3,490	11,110	13,944,220	5,580

Table 3. Direct Benefits of Ecolabelled Copying and Graphic Paper – mechanical process

Copying and Graphic Paper – Mechanical Process	Production Emissions, kg per air-dried tonne of paper			
	to water	to air		
	COD	NO_x	CO_2	SO_x
ECOLABELLED Copying and graphic paper	11.1	0.14	1000	0.01
STANDARD Copying and graphic paper	30.0	0.45	2000	0.17
Difference Δ	18.9	0.31	1000	0.16
PG Sales EU15	24,154,000	24,154,000	24,154,000	24,154,000
PG Sales EU25	28,961,583	28,961,583	28,961,583	28,961,583
Scenarios – EU15	Emissions avoided, tonnes per year			
	COD	NO_x	CO_2	SO_x
Scenario 1a: *5%*	22,830	370	1,207,700	190
Scenario 2a: *20%*	91,300	1,500	4,830,800	770
Scenario 3a: *50%*	228,250	3,740	12,077,000	1,930
Scenarios – EU25	COD	NO_x	CO_2	SO_x
Scenario 1b: *5%*	27,370	450	1,448,100	230
Scenario 2b: *20%*	109,500	1,800	5,792,300	930
Scenario 3b: *50%*	273,700	4,490	14,480,800	2,320

2.2.2 Tissue Paper

In order to calculate the direct benefits attributable to ecolabelled tissue paper we used the current criteria set[19] and the background report[20].

A different approach for calculating the difference Δ for this product group in comparison to others was necessary because of the way in which the criteria are presented. Rather than a simple threshold value that an applicant's paper must not exceed for, say, emissions of chlorinated organics, there is a system of hurdles and coefficients with equations for working out environmental 'loads'. Due to this system it was not possible to easily state the ecolabelled footprint and that of a standard product.

A methodology was therefore devised to circumvent this problem. Data of average emissions in the tissue production process in Europe were taken from SIS's Background Report and used as the starting point. We then calculated which of the processes would or would not pass the criteria set for ecolabelled tissue paper. For those which failed to pass (Kraft and Sulphite) we recalculated to work out what reductions in emissions would be required for the processes to come below the threshold and thus comply with the criteria. The results from this sum for the two processes were finally averaged giving the results in kg of pollutant avoided per tonne of air-dried paper produced.

Energy followed the more conventional and simple calculation of subtracting the ecolabelled value away from the standard value using the average European data.

In the same way as for copying and graphic paper, the three scenarios were calculated by multiplying the scenario percentage by the difference Δ (kg of pollutant/air-dried tonne of paper), by the annual sales (tonnes per year) and then dividing it all by one thousand to get an answer in tonnes of 'pollution' avoided per year, COD, AOX to water and CO_2 and SO_x to air.

The scenarios can be represented by Equation 3 below.

Equation 3 Potential avoidance of pollution to water and air for Tissue Paper

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \div 1000$$

This answer is in tonnes of pollution avoided each year for tissue paper bought in the EU.

Table 4 shows the calculations and results for tissue paper

[19] http://europa.eu.int/comm/environment/ecolabel/product/pg_tissuepaper_en.htm
[20] http://europa.eu.int/comm/environment/ecolabel/pdf/tissue_paper/evaluation_report_october.pdf

Table 4. Direct Benefits of Ecolabelled Tissue Paper

Tissue Paper	Production Emissions, kg per air-dried tonne of paper				Electricity use in production, kWh/tonne of paper
	to water		to air		
	COD	AOX	CO_2	SO_x	
ECOLABELLED Tissue paper	Not applicable, see explanation above				3,000
STANDARD Tissue paper	Not applicable, see explanation above				3,610
Difference Δ	3.79	0.01	379	0.25	610
PG Sales EU15	4,500,000	4,500,000	4,500,000	4,500,000	4,500,000
PG Sales EU25	5,395,675	5,395,675	5,395,675	5,395,675	5,395,675
Scenarios – EU15	**Emissions avoided, tonnes per year**				**Saved electricity, kWh per year**
	COD	**AOX**	**CO_2**	**SO_x**	
Scenario 1a: ***5%***	850	3	85,310	60	137,250,000
Scenario 2a: ***20%***	3,410	10	341,250	230	549,000,000
Scenario 3a: ***50%***	8,530	30	853,130	570	1,372,500,000
Scenarios – EU25	**COD**	**AOX**	**CO_2**	**SO_x**	**Saved electricity, kWh per year**
Scenario 1b: ***5%***	1,020	4	102,300	70	164,568,100
Scenario 2b: ***20%***	4,090	20	409,170	270	658,272,300
Scenario 3b: ***50%***	10,230	40	1,022,900	680	1,645,680,700

2.2.3 Cleaners for sanitary facilities

There are four detergents ecolabels, each with their own criteria. For the needs of this study we have split out the All-purpose cleaners and cleaners for sanitary facilities product group into its two constituents parts in order to more effectively calculate the benefits accrued from the use of ecolabelled products.

Data was taken from the existing as well as revised criteria documents[21]

There was a proposal in July 2004 that VOCs are present in sanitary cleaners at less than 10% by weight, per functional unit, FU. The FU is 100g, so 10% = 10g. In the absence of other data, we assumed that a 'typical' product has up to twice the VOC content of an ecolabelled product.

For Critical Dilution Volume the proposal in the criteria revision of July 2004 was 100,000L per FU, following the revised calculation method. There was no comparative data available so it has been assumed that the limit is higher for a 'typical' product - equal to the ecolabel's first iteration of 300,000L.

The July 2004 revision proposals for total phosphorous content set the limit at 1g/100g (FU). In absence of other data, it has been assumed that ‘typical’ products contain twice the amount of Phosphorus of an ecolabelled product.

The July 2004 proposals require all surfactants to be readily biodegradable under aerobic and anaerobic conditions. The assumption was that there are 10g per 100g FU of chemicals that are not biodegradable.

There was no sales data available other than the market value for all cleaning/detergent products of €26 billion. We assumed that consumption is based on the number of homes with the consumption figure then being doubled to take into account 'professional users' (non-domestic). The EU15 population is 376 million, assuming four people per house this equates to 94 million homes. The assumed typical use is 200g / year (i.e. twice the FU). Hence the total EU15 use is 94 million x 2 x 2 FUs = 376 million FUs.

The three scenarios were calculated by multiplying the scenario percentage by the difference Δ (tonnes of pollutant per FU), by the annual sales (FUs sold per year) to give answers in tonnes per year of pollution avoided.

The scenarios are represented by Equation 4 below.

Equation 4 Potential avoidance of pollution to water and air for Sanitary Cleaners

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \div 10^6$$

This answer is in tonnes of pollution avoided each year for SCs bought in the EU.

[21] http://europa.eu.int/comm/environment/ecolabel/product/pg_allpurposecleaners_en.htm

Table 5. Direct Benefits of Ecolabelled Sanitary Cleaners

Cleaners for Sanitary facilities	In use phase emissions, grams (litres for CDV) per functional unit (100g of cleaner)			
	To air	To water		
	VOCs	Critical Dilution Volume	Total Phosphorus	Biodegradability of chemicals
ECOLABELLED Cleaners for Sanitary facilities	10	100,000	1	0
STANDARD Cleaners for Sanitary facilities	20	300,000	2	10
Difference Δ	10	200,000	1	10
PG Sales EU15	376,000,000	376,000,000	376,000,000	376,000,000
PG Sales EU25	450,838,584	450,838,584	450,838,584	450,838,584
Scenarios – EU15	**Emissions avoided, tonnes (megalitres[22] for CDV) per year**			
	VOCs	**CDV**	**Phosphorous**	**Chemicals**
Scenario 1a: ***5%***	190	3,760,000	20	190
Scenario 2a: ***20%***	750	15,040,000	70	750
Scenario 3a: ***50%***	1880	37,600,000	190	1880
Scenarios – EU25	**VOCs**	**CDV**	**Phosphorous**	**Chemicals**
Scenario 1b: ***5%***	230	4,508,390	20	230
Scenario 2b: ***20%***	900	18,033,540	90	900
Scenario 3b: ***50%***	2,250	45,083,860	230	2,250

[22] 1 Megalitre = 1,000,000 Litres

2.2.4 All-purpose Cleaners

The method for this sub-product group is the same as for sanitary cleaners. Data was taken from the existing as well as revised criteria documents[23]

The same proposal for sanitary cleaners to have VOCs less than 10% by weight, per functional unit applies to all-purpose cleaners too. The FU is the manufacturer's recommended dosage in grams to create one litre of washing water suds. We have assumed that the recommended dose for mopping kitchen floor's for example, is two capfuls of concentrated cleaner, equivalent to 50mL or 50g, to be diluted into 5L. Therefore 1L of washing water has 10g, i.e. 10g/FU. Therefore there should be less than 1g of VOCs / FU. It was then assumed that a 'typical' product has up to twice the VOC content amount of an ecolabelled product.

For Critical Dilution Volume the proposal in the criteria revision of July 2004 was 20,000L per FU, following the revised calculation method. There was no comparative data available so it has been assumed that the limit is higher for a 'typical' product and is higher than the ecolabel's first iteration of 32,000L. We assumed 50,000L.

The July 2004 revision proposals for total phosphorous content set the limit at 0.02g/FU. In absence of other data, it has been assumed that 'typical' products contain twice the amount of Phosphorus of an ecolabelled product.

In the July 2004 proposals all surfactants are to be readily biodegradable under aerobic and anaerobic conditions, i.e. a value of zero. For the market-average product we assumed that there are 5g per FU of surfactants that are not biodegradable.

There was no sales data available other than the market value for all cleaning/detergent products of €26 billion. It has been assumed that consumption is based on the number of homes, a figure that was then doubled to take into account 'professional users' (non-domestic). The EU15 population is 376 million, assuming four people per house this equates to 94 million homes. The assumed typical use is equivalent to 10 FU/year. Hence the total EU15 use is 94 million x 2 x 10 FUs = 1,880 million FUs.

The three scenarios were calculated by multiplying the scenario percentage by the difference Δ (tonnes of pollutant per FU), by the annual sales (FUs sold per year) to give answers in tonnes per year of pollution avoided.

The scenarios can be represented by Equation 5 below.

Equation 5 Potential avoidance of pollution to water and air for All-purpose Cleaners

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \div \boldsymbol{10^6}$$

This answer is in tonnes of pollution avoided each year for APCs bought in the EU.

[23] http://europa.eu.int/comm/environment/ecolabel/product/pg_allpurposecleaners_en.htm

Table 6 shows the calculations of the benefits attributable to all-purpose cleaners.

Table 6. Direct Benefits of Ecolabelled All-purpose Cleaners

Cleaners for Sanitary facilities	**In use phase emissions, grams (litres for CDV) per functional unit (10g of cleaner/L water)**			
	To air	**To water**		
	VOCs	**Critical Dilution Volume**	**Total Phosphorus**	**Biodegradability of chemicals**
ECOLABELLED All-purpose Cleaners	1	20,000	0.02	0
STANDARD All-purpose Cleaners	2	50,000	0.04	5
Difference Δ	1	30,000	0.02	5
PG Sales EU15	1,880,000,000	1,880,000,000	1,880,000,000	1,880,000,000
PG Sales EU25	2,254,192,918	2,254,192,918	2,254,192,918	2,254,192,918
Scenarios – EU15	**Emissions avoided, tonnes (megalitres[24] for CDV) per year**			
	VOCs	**CDV**	**Phosphorous**	**Chemicals**
Scenario 1a: ***5%***	90	2,820,000	2	470
Scenario 2a: ***20%***	380	11,280,000	8	1880
Scenario 3a: ***50%***	940	28,200,000	19	4700
Scenarios – EU25	**VOCs**	**CDV**	**Phosphorous**	**Chemicals**
Scenario 1b: ***5%***	110	3,381,290	2	560
Scenario 2b: ***20%***	450	13,525,160	10	2,250
Scenario 3b: ***50%***	1,130	33,812,890	20	5,630

[24] 1 Megalitre = 1,000,000 Litres

2.2.5 Detergents for Dishwashers

Information for this product group's footprint characteristics as well as sales data, for both labelled and non-labelled products, was taken from the current criteria[25,26] and discussion papers presented at ad-hoc working group meetings (AHWGs)[27,28, 29]

The current criterion for Critical Dilution Volume is 200L per functional unit, FU, which is defined in the criteria as the quantity of product required to wash 12 place settings with a standard soil (as defined by DIN or ISO standards). There was no comparative data available for the market average product so it has been assumed that the limit is higher for a 'typical' product and set it at twice that of the ecolabel at 400L/wash. Note that the 1995 ecolabel hurdle was set at 13,000 L/wash but without knowing how formulations have developed in the past 10 years it is not possible to be more precise.

The exclusion hurdle for total phosphorous in the criteria is 10g per wash. 'Typical' products are known to contain about 40% phosphates. We have assumed a dosage of 40g for conventional products, and thus obtain a value of 16g phosphates per wash. The hurdle for total chemical content per dose in the criteria is 22.5g. As stated above an average dose of 40g has been assumed. The limit of hazardous substances has been interpreted here as the 0.2g hurdle for phosphonates whilst the average product's equivalent has been assumed as 1g per wash. The exclusion hurdle for non-biodegradable components is 1.2g per wash. It has been assumed that the value for conventional products is double at 2.4g/wash. Delta was calculated as the difference between the labelled and non-labelled product values.

Sales data came from a discussion paper to the 6th December 2001 AHWG in the form of tonnes of dishwasher detergent sold per year in Europe.

The three scenarios were calculated as follows. The scenario percentage was multiplied by the annual sales (tonnes sold per year) and by the difference Δ (litres or grams of pollutant per wash). A factor was needed to convert the annual sales figure into the number of washes, for which a value of 40g/wash was employed. One additional factor of 10^6 was needed to convert grams into tonnes and litres into megalitres. This all gave answers in tonnes per year of pollution avoided, or megalitres per year in the case of CDV.

The scenarios can be represented by Equation 6 below.

[25] http://europa.eu.int/comm/environment/ecolabel/product/pg_dishwashingdetergents_en.htm#newcriteria
[26] http://europa.eu.int/comm/environment/ecolabel/pdf/dishwashing_detergents/finalreport_1102.pdf. Erik Svanes' Report Sept 2002.
[27] http://europa.eu.int/comm/environment/ecolabel/product/pg_dishwashingdetergents_en.htm#studies
[28] ESC paper to the 5th March 2002 AHWG
[29] Discussion paper to 6th December 2001 AHWG

Equation 6 Potential avoidance of pollution to water for dishwashing detergents

$$\text{Scenario A} = \% \; x \; \text{Sales} \; x \; \Delta \div \mathbf{0.00004} \; x \; \Delta \div \mathbf{10^6}$$

This answer is in tonnes or megalitres of pollution avoided each year for dishwasher detergents bought in the EU.

Table 7 shows the calculations of the benefits attributable to dishwasher detergents.

Table 7. Direct Benefits of Ecolabelled Dishwashing Detergents

Cleaners for Dishwashing Detergents	In use phase emissions, grams (litres for CDV) per functional unit (10g of cleaner/L water), to water				
	Critical Dilution Volume	**Total Phosphorus**	**Total chemicals**	**Hazardous ingredients**	**Biodegradability of chemicals**
ECOLABELLED Dishwashing Detergents	200	10	22.5	0.2	1.2
STANDARD Dishwashing Detergents	400	16	40	1	2.4
Difference Δ	200	6	17.5	0.8	1.2
PG Sales EU15	500,000	500,000	500,000	500,000	500,000
PG Sales EU25	599,519	599,519	599,519	599,519	599,519
Scenarios – EU15	**Emissions avoided, tonnes (megalitres[30] for CDV) per year**				
	CDV	**Phosphorous**	**Chemicals**	**Hazardous ingredients**	**Biodegradability**
Scenario 1a: ***5%***	125,000	3,750	10,940	500	750
Scenario 2a: ***20%***	500,000	15,000	43,750	2000	3000
Scenario 3a: ***50%***	1,250,000	37,500	109,370	5000	7500
Scenarios – EU25	**CDV**	**Phosphorous**	**Chemicals**	**Hazardous ingredients**	**Biodegradability**
Scenario 1b: ***5%***	149,880	4,500	13,110	600	900
Scenario 2b: ***20%***	599,520	18,000	52,460	2,400	3,600
Scenario 3b: ***50%***	1,498,800	45,000	131,150	6,000	9,000

[30] 1 Megalitre = 1,000,000 Litres

2.2.6 Hand Dishwashing Detergents

Information for this product group's footprint characteristics as well as sales data, for both labelled and non-labelled products, was taken from the current criteria[31] and discussion papers presented at AHWGs[32].

The current criterion for Critical Dilution Volume is 170L per litre of washing up liquid. The present criteria revision (September 2003) sampled 28 products. The highest was found to be 500 L, with the median at 84 L. The sample however was Danish and is not necessarily representative of EU products as a whole. In the absence of a wider dataset, we have assumed 250 L here for conventional products.

We assumed that only the active ingredients in a formulation could be potentially hazardous. The limit for active ingredients (total surfactants) in the criteria is 0.4g per litre of washing water. Lacking data for conventional products, we have assumed a value of 0.6g per litre i.e a 50% higher level. Ecolabel reports tell us is that typical products have a 30% content of active ingredients in their formulation. Using the 0.4g of active ingredients for labelled detergents results in a total chemicals amount of 1.3g. Likewise for non-labelled versions this equates to 2g of chemicals in the dose.

The ecolabel criteria state that all surfactants shall be readily biodegradable. The UKCPI web-site[33] states that all surfactants used in Hand Dishwashing Detergents are biodegradable. Therefore it has been assumed that for this criterion there is no difference between or ecolabelled and ordinary product. Phosphates are not used in hand dishwashing detergents and thus do not appear in this calculation[34].

Sales data was based on the August 2004 revision study report[35]. The EU Hand Dishwashing Detergents market accounts for €2.6 billion per year. It was assumed that the average cost is €2/L from which an approximate volume of 1.3 billion litres sold per year was derived.

The three scenarios were calculated from multiplying the scenario percentage by the annual sales (litres sold per year) and by the difference Δ (litres or grams of pollutant per wash). A factor was needed to convert the annual sales figure into the number of washes, for which a value of 5mL/wash was employed. One additional factor of 10^6 was needed to convert grams into tonnes and litres into megalitres. This all gave answers in tonnes per year of pollution avoided, or megalitres per year in the case of CDV.

The scenarios can be represented by Equation 7 below.

[31] http://europa.eu.int/comm/environment/ecolabel/product/pg_handdishwashing_en.htm
[32] http://europa.eu.int/comm/environment/ecolabel/product/pg_handdishwashing_en.htm#revision
[33] http://www.ukcpi.org/
[34] Correspondence between CEEP and DG Environment at the Commission
[35] http://europa.eu.int/comm/environment/ecolabel/pdf/hand_dishwashing_detergents/hddfinalreport_0804.pdf

Equation 7 Potential avoidance of pollution to water for Hand Dishwashing Detergents

$$\text{Scenario A} = \% \times \text{Sales} \div 0.005 \times \Delta \div 10^6$$

This answer is in tonnes or megalitres of pollution avoided each year for Hand Dishwashing Detergents bought in the EU.

Table 8 shows the calculations of the benefits attributable to Hand Dishwashing Detergents.

Table 8. Direct Benefits of Ecolabelled Hand Dishwashing Detergents

Cleaners for Hand Dishwashing Detergents	**In use phase emissions, grams (litres for CDV) per functional unit (10g of cleaner/L water), to water**		
	Critical Dilution Volume	**Total chemicals**	**Hazardous ingredients**
ECOLABELLED Hand Dishwashing Detergents	170	1.3	0.4
STANDARD Hand Dishwashing Detergents	250	2	0.6
Difference Δ	80	0.7	0.2
PG Sales EU15	1,300,000,000	1,300,000,000	1,300,000,000
PG Sales EU25	1,558,750,422	1,558,750,422	1,558,750,422
Scenarios – EU15	**Emissions avoided, tonnes (megalitres[36] for CDV) per year**		
	CDV	**Chemicals**	**Hazardous ingredients**
Scenario 1a: ***5%***	1,040,000	9,100	2,600
Scenario 2a: ***20%***	4,160,000	36,400	10,400
Scenario 3a: ***50%***	10,400,000	91,000	26,000
Scenarios – EU25	**CDV**	**Chemicals**	**Hazardous ingredients**
Scenario 1b: ***5%***	1,247,000	10,910	3,120
Scenario 2b: ***20%***	4,988,000	43,650	12,470
Scenario 3b: ***50%***	12,470,000	109,110	31,170

[36] 1 Megalitre = 1,000,000 Litres

2.2.7 Laundry detergents

Information for this product group's footprint characteristics as well as sales data, for both labelled and non-labelled products, was taken from the current criteria[37] and discussion papers presented at AHWGs[38].

The current criterion for Critical Dilution Volume is 4500L per litre of washing up liquid. Considering market-average products, the summary of the AHWG meeting held 4 March 2002, suggests that a value of 6000L is typical[39]. We have adopted this value..

The phosphate limit is 25g per wash, whilst we have assumed that the average conventional detergent has 37.5g[40]. The hurdle for total chemical content per dose is 100g whereas the conventional version is assumed to have 150g. 'Hazardous ingredients' has been interpreted as previously with 0.5g phosphonates per functional unit. A value twice that of the ecolabel hurdle has been assumed for conventional products.

Biodegradability calculations were made on the basis of information in DHI's report[41]. Sales data comes ultimately from AISE, for 2001[42] at 5,000,000 tonnes which equates to 33 billion washes per year.

The three scenarios were calculated from multiplying the scenario percentage by the annual sales (tonnes sold per year) and by the difference Δ (litres or grams of pollutant per wash). A factor was needed to convert the annual sales figure into the number of washes, for which a value of 150g/wash was employed. One additional factor of 10^6 was needed to convert grams into tonnes and litres into megalitres. This all gave answers in tonnes per year of pollution avoided, or megalitres per year in the case of CDV.

The scenarios can be represented by Equation 8 below.

Equation 8 Potential avoidance of pollution to water for Laundry Detergents

$$\text{Scenario A} = \% \times \text{Sales} \div \mathbf{0.00015} \times \Delta \div \mathbf{10^6}$$

This answer is in tonnes or megalitres of pollution avoided each year for Laundry Detergents bought in the EU.

Table 9 shows the calculations of the benefits attributable to Laundry Detergents.

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37 http://europa.eu.int/comm/environment/ecolabel/product/pg_laundrydetergents_en.htm#top

38 http://europa.eu.int/comm/environment/ecolabel/product/pg_laundrydetergents_en.htm#studies

39 The summary notes there is limited data available and that the ecolabel's requirements are therefore based on the consultant's limited dataset of 35 formulations. Nonetheless, these include a range of types including compacts and liquids. Very few of the formulations fail the 6,000 litre hurdle suggesting that it is readily achievable.

40 Taking data from CEEP's web-site that suggests phosphate use is typically between 25 and 50 g per wash.

41 http://europa.eu.int/comm/environment/ecolabel/pdf/laundry_detergents/finalreport_0503.pdf

42 http://europa.eu.int/comm/environment/ecolabel/pdf/laundry_detergents/reportphase1.pdf

Table 9. Direct Benefits of Ecolabelled Laundry Detergents

Cleaners for Laundry Detergents	In use phase emissions, grams (litres for CDV) per functional unit (10g of cleaner/L water), to water				
	Critical Dilution Volume	Total Phosphorus	Total chemicals	Hazardous ingredients	Biodegradability of chemicals
ECOLABELLED Laundry Detergents	4,500	25	100	0.5	2.55
STANDARD Laundry Detergents	6,000	37.5	150	1	8.925
Difference Δ	1,500	12.5	50	0.5	6.375
PG Sales EU15	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000
PG Sales EU25	5,995,194	5,995,194	5,995,194	5,995,194	5,995,194
Scenarios – EU15	**Emissions avoided, tonnes (megalitres[43] for CDV) per year**				
	CDV	**Phosphorous**	**Chemicals**	**Hazardous ingredients**	**Biodegradability**
Scenario 1a: ***5%***	2,500,000	20,830	83,330	830	10,630
Scenario 2a: ***20%***	10,000,000	83,330	333,330	3,330	42,500
Scenario 3a: ***50%***	25,000,000	208,330	833,330	8,330	106,250
Scenarios – EU25	**CDV**	**Phosphorous**	**Chemicals**	**Hazardous ingredients**	**Biodegradability**
Scenario 1b: ***5%***	2,997,600	24,980	99,920	1,000	12,740
Scenario 2b: ***20%***	11,990,390	99,920	399,680	4,000	50,960
Scenario 3b: ***50%***	29,975,970	249,800	999,200	9,990	127,400

[43] 1 Megalitre = 1,000,000 Litres

2.2.8 Washing Machines

Data for ecolabelled machines was taken from the most recent ecolabel criteria[44] and the supporting report and other documentation such as summaries of technical meetings. Information regarding other non-ecolabelled machines in terms of their energy use, water consumption and noise production was gathered[45] for the year 1998, as was sales data, i.e. numbers of washing machines. *Delta* was calculated by subtracting the former from the latter numbers.

Scenario data for energy and water savings were separately calculated by multiplying the scenario percentage by the Sales number and by the Difference Δ, either kWh/kg of energy or litres/kg water saved respectively. This value was then multiplied by 4.5 kg/wash and finally by 104 washes per year. The inherent assumption in this calculation is that, on average, a washing machine load weighs 4.5 kg and that a machine will be used twice a week.

Noise benefits from washing and spinning were also estimated. There is a lack of data for market spread of washing machine noise levels, information is only available for energy efficiency A rated machines. It was therefore assumed that B, C and D machines will drag the average noise higher, greater than 59 dB(A) for washing and 79 dB(A) for spinning, thus giving a benefit of >3 dB(A) per machine in both washing and spinning modes when compared to the ecolabelled machines. As it is not possible to quantify a noise saving in the same way as for energy and water all that can be concluded is that an ecolabelled machine is 3 dB(A) quieter on average than a market average, non-labelled machine, leading to lower noise levels in the built environment.

The scenarios can be represented by Equation 9 below.

Equation 9 Potential Energy and Water Savings for Washing Machines

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \times 4.5 \times 104$$

This gives an energy saving in kWh per year and water savings in litres per year for washing machines bought in the EU

Table 10 shows the energy and water use and noise data for ecolabelled and non-labelled washing machines sold in the EU and the resulting potential savings in these two resources, whilst

Table 11 indicates how much CO_2 emissions could be avoided through the wider use of ecolabelled washing machines.

[44] http://europa.eu.int/comm/environment/ecolabel/producers/pg_washingmachines.htm#criteria
[45] VHK Report for AEAT, May 2002.

Table 10. Direct Benefits of Ecolabelled Washing Machines

Washing Machines	In-use consumption and emission figures			
	Energy, kWh/kg	Water, Litres / kg	Noise, dB(A) wash	Noise, dB(A) spin
ECOLABELLED Washing machines	0.17	12	56	76
STANDARD Washing machines	0.24	13.25	59	79
Difference Δ	0.07	1.25	3	3
PG Sales EU15	11,300,000	11,300,000	11,300,000	11,300,000
PG Sales EU25	13,549,138	13,549,138	13,549,138	13,549,138
Scenarios – EU15	**Energy and water savings**			
	Energy Saving kWh/year	**Water Saving Litres/year**	*Not applicable*	
Scenario 1a: ***5%***	18,509,400	330,525,000		
Scenario 2a: ***20%***	74,037,600	1,322,100,000		
Scenario 3a: ***50%***	185,094,000	3,305,250,000		
Scenarios – EU25	**Energy Saving kWh/year**	**Water Saving Litres/year**		
Scenario 1b: ***5%***	22,193,500	396,312,300		
Scenario 2b: ***20%***	88,774,000	1,585,249,200		
Scenario 3b: ***50%***	221,934,900	3,963,122,900		

Table 11. Potential annual CO_2 savings from reduced electricity use

Scenarios – EU15	Tonnes CO_2 avoided
Scenario 1a: ***5%***	8,080
Scenario 2a: ***20%***	32,340
Scenario 3a: ***50%***	80,840
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	9,690
Scenario 2b: ***20%***	38,770
Scenario 3b: ***50%***	96,930

The data in Table 11 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU15 Member States, 436.8t CO_2/GWh.

Due to better cleaning and drying performance in ecolabelled machines (rated A or B) than in conventional machines (rated A, B or C) there are also potential further savings in water, power and detergents use on the assumption that clothes will not have to be washed as often, at higher temperatures, requiring less tumble drying or with so much cleaning agent. It is estimated that this could amount to an additional 5% benefit from the ecolabelled product for each category of energy, water and detergent use. This estimated benefit is not included in the above calculations.

2.2.9 Dishwashers

Data for dishwashers was taken from the ecolabel criteria[46] and the AEAT report[47] and supporting documentation for the revision of the dishwasher ecolabel.

Energy use was calculated as follows. According to market data, dishwashers with more than ten place settings account for more than 90% of EU sales of available machines, therefore twelve-place dishwashers were taken as the reference for calculations as the standard. The current criteria[48] state that to be ecolabelled dishwashers with more than ten place settings need an energy efficiency index EEI lower than 0.58, i.e. Energy Class A, as defined in Directive 97/17/EEC. The equation in 97/17/EEC for calculating a machine's EEI uses the energy consumption per cycle and the number of place settings along with two constants as per Equation 10 below.

Equation 10 Energy Efficiency Index Calculation

$$EEI = \text{Energy Consumption (C)} / \text{Reference Consumption } (C_R)$$

$$EEI = C / (1.35 + (0.025 \, x \, S))$$

where S is in the number of place settings for machines with ten or more such settings.

Hence for an ecolabelled machine with 12 place settings and an EEI criteria limit of 0.58, the energy consumption C per cycle is derived from;

$C = 0.58 \, x \, (1.35 + (0.025 \, x \, 12))$
Therefore C = 0.96 kWh/cycle

The equivalent number for standard non-labelled machines was obtained by using sales weighted information to derive a value of 1.32 kWh/cycle.

Water efficiency in litres per cycle is calculated from another equation, which again uses the number of place settings, as shown in Equation 11.

Equation 11 Water Efficiency Index Calculation

$$W_{measured} = 9.25 + (0.625 \, x \, S)$$

where S is in the number of place settings for machines with ten or more such settings

A labelled machine with twelve settings has a consumption of 16.75 Litres/cycle, whilst the sales-weighted average of all models on the market gives a consumption figure of 17.01 Litres/cycle.

Scenario data was calculated by multiplying the scenario percentage by the sales figure[49] and by the Difference Δ in kWh/cycle for energy or litres/cycle for water. To achieve an annual

46 http://europa.eu.int/comm/environment/ecolabel/producers/pg_dishwashers.htm
47 Revision of the EU Ecolabel Criteria for Dishwashers, AEAT Environment for Defra, August 2001.
48 Decision 2001/689/EC, OJ L **242,** 28.08.2001, p.23
49 For Austria, France, Germany, Italy, Netherlands, Spain, Sweden, UK, Slovenia and Turkey, taken from AEAT Ecolabel revision report.

figure this value was multiplied by 260. The assumption here is that a dishwasher will be used five times a week, fifty-two weeks per year.

83% of standard A-rated dishwashers with 12 settings have a noise rating of 55 dB(A). There is a lack of market data for dishwasher noise levels, it was therefore assumed that the average with B, C and D machines will drag the average higher, greater than 55 dB(A). For the purposes of this study though we have used the value of 55 dB(A) to compare against the ecolabel criterion of 53 dB(A) for free-standing models. It is not possible to quantify a noise saving in the same way as for energy and water and therefore all we can say is that an ecolabelled machine is >2 dB(A) quieter on average than a standard non-labelled machine, which contributes to lower noise levels in the built environment

The scenarios for energy and water savings are represented by Equation 12 below.

Equation 12 Potential Energy and Water Savings for Dishwashers

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \times 5 \times 52$$

This gives an energy saving in kWh per year and water savings in litres per year for dishwashing machines bought in the EU.

Table 12 shows the energy and water use data for ecolabelled and non-labelled dishwashers sold in the EU and the resulting potential savings in these two resources as well as the reductions in noise possible, whilst Table 13 indicates how much CO_2 emissions could be avoided through the use of ecolabelled dishwashers.

Table 12. Direct Benefits of Ecolabelled Dishwashers

Dishwashers	**In-use consumption and emission figures**		
	Energy, kWh/cycle	**Water, litres/cycle**	**Noise, dB(A) wash**
ECOLABELLED Dishwashers	0.96	16.75	53
STANDARD Dishwashers	1.32	17.01	55
Difference Δ	0.36	0.26	2
PG Sales EU15	5,042,000	5,042,000	5,042,000
PG Sales EU25	6,045,554	6,045,554	6,045,554
Scenarios – EU15	**Energy and water savings**		
	Energy Saving kWh/year	**Water Saving Litres/year**	*Not applicable*
Scenario 1a: ***5%***	23,490,400	16,834,700	
Scenario 2a: ***20%***	93,961,500	67,338,700	
Scenario 3a: ***50%***	234,903,800	168,346,800	
Scenarios – EU25	**Energy Saving kWh/year**	**Water Saving Litres/year**	
Scenario 1b: ***5%***	28,165,900	20,185,400	
Scenario 2b: ***20%***	112,663,500	80,741,800	
Scenario 3b: ***50%***	281,658,700	201,854,400	

Table 13. Potential CO_2 savings from reduced electricity use

Scenarios	**Tonnes CO_2 avoided**
Scenario 1a: ***5%***	10,260
Scenario 2a: ***20%***	41,040
Scenario 3a: ***50%***	102,600
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	12,300
Scenario 2b: ***20%***	49,210
Scenario 3b: ***50%***	123,020

The data in Table 13 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU 15 Member States, 436.8t CO_2/GWh.

Due to better cleaning performance in ecolabelled machines (rated A or B) than in conventional machines (rated A, B or C) there are also potential further savings in water, power and detergents use as crockery will not have to be washed as often, at higher temperatures or with so much cleaning agent. It is estimated that this could amount to a 5% benefit from the ecolabelled product. This estimated benefit has not been included in the above calculations.

2.2.10 Refrigerators

Current ecolabel criteria[50] and AEAT's report[51] were used as prime market and technical data sources.

In 1999 the average Energy Efficiency Index EEI was 74.8%, equivalent to 364 kWh/year consumed in 1999. The ecolabel criterion on energy consumption in fridges is that the EEI is less than 42%, which would equate to 204 kWh/year. As the assumption is that refrigeration systems are permanently on there was no need to add a constant for periods of use. Therefore the scenario calculations were simply a multiplication of the scenario percentage, the sales figure for 1999 and the difference Δ in kWh/year, shown in Equation 13.

Equation 13 Potential Energy Savings for Refrigerators

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives an energy saving in kWh per year for refrigerators bought in the EU.

Table 14 shows the energy use data for ecolabelled and non-labelled refrigerators sold in the EU and the resulting potential savings, whilst Table 15 indicates how much CO_2 emissions could be avoided through the use of ecolabelled refrigerators.

Table 14. Direct Benefits of Ecolabelled Refrigerators

Refrigerators	**Energy consumption in use, kWh/year from EEI**
ECOLABELLED Refrigerators	204
STANDARD Refrigerators	364
Difference Δ	160
PG Sales EU15	17,865,000
PG Sales EU25	21,420,828
Scenarios – EU15	**Energy Saving, kWh/year**
Scenario 1a: ***5%***	142,920,000
Scenario 2a: ***20%***	571,680,000
Scenario 3a: ***50%***	1,429,200,000
Scenarios – EU25	**Energy Saving, kWh/year**
Scenario 1b: ***5%***	171,366,600
Scenario 2b: ***20%***	685,466,500
Scenario 3b: ***50%***	1,713,666,200

[50] http://europa.eu.int/comm/environment/ecolabel/producers/pg_refrigerators.htm
[51] Revision of the EU Ecolabel for Refrigerators, AEAT, December 2003.

Table 15. Potential CO_2 savings from reduced electricity use

Scenarios – EU15	**Tonnes CO_2 avoided**
Scenario 1a: ***5%***	62,420
Scenario 2a: ***20%***	249,690
Scenario 3a: ***50%***	624,220
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	74,850
Scenario 2b: ***20%***	299,380
Scenario 3b: ***50%***	748,460

The data in Table 15 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU 15 Member States, 436.8t CO_2/GWh.

Available data indicated that there was little or no difference in noise outputs between ecolabelled and the average of standard refrigerators. The ecolabel criterion is 42 dB(A) for noise, whereas the UKEPIC database of consumer products' performance characteristics states that the majority of fridges are equal to or less than 43 dB(A)[52], whilst the average to be found in the *Energy+* and *K*onsumentverket databases is 40 dB(A)[53]. Therefore it was felt that there was no real benefit in noise from ecolabelled refrigerators.

Ozone depletion potential ODP and global warming potential GWP were studied but the Ecolabel website states that *"in most markets all new refrigeration appliances now use CFC free refrigerants and insulating foam with low GWP"*. Hence there was no perceived direct benefit in these two areas in using an ecolabelled machine. The primary benefit is therefore energy efficiency.

[52] Database maintained for UK Department of the Environment, Food and Rural Affairs; www.mtprog.com
[53]. Revision of the EU Ecolabel for Refrigerators, AEAT, December 2003.

2.2.11 Televisions

The generic standard was chosen as a 28" (71cm), 100 MHz television[54], and compared to the ecolabel criteria[55]. It is assumed that, on average, a TV is on for four hours a day, 365 days per year.

Scenario data was calculated as follows for energy consumption in use. A typical conventional television, as identified in the ecolabel report, has a power use of 121 Watts when on whilst an ecolabelled television must be below 65% of this base case. Firstly, in order to convert the power figure from wattage into kWh/year the value had to be multiplied by 60 *x* 60 *x* 4 *x* 365 (seconds *x* minutes *x* hours on *x* days in a year) and then divided by 3,600,000 (to convert from Watts to Kilowatt-hours) to get the annual figure in kWh. For an ecolabelled TV a factor of 0.65 was included in the computation. This difference between the two results produced Δ. To find the scenario savings it is merely a case of multiplying the percentage, the sales figure and Δ together. The scenarios are represented by Equation 14.

A similar calculation was performed for passive stand-by mode, in which an ecolabelled TV will use less than 1 Watt and a non-labelled TV 1.5 Watts[56]. The scaling factor to convert Watts into kWh/year was used along with the assumption that TVs are in stand-by mode for twenty hours a day, 365 days per year, on average. The same equation applies to stand-by mode, only using a different Δ value. Table 16 shows the benefit data and results, whilst Table 17 indicates how much CO_2 emissions could be avoided through the use of ecolabelled televisions.

Equation 14 Potential Energy for Savings Televisions

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives an energy saving in kWh per year for televisions bought in the EU.

[54] Development of EU ecolabel criteria for televisions, AEAT Environment for Defra, January 2002.
[55] http://europa.eu.int/comm/environment/ecolabel/producers/pg_television.htm
[56] 70% of 28-inch TVs use between 1 and 2 watts in stand-by mode. AEAT report to the Commission (January 2002), http://europa.eu.int/comm/environment/ecolabel/pdf/televisions/finalreport_jan2002.pdf

Table 16. Direct Benefits of Ecolabelled Televisions

Televisions	Energy consumption in use, kWh/year	
	on-mode	stand-by
ECOLABELLED Televisions	115	7.3
STANDARD Televisions	177	11.0
Difference Δ	62	3.7
PG Sales EU15	22,000,000	22,000,000
PG Sales EU25	26,378,853	26,378,853
Scenarios – EU15	**Energy Saving kWh/year**	
	on-mode	stand-by
Scenario 1a: ***5%***	68,014,100	4,015,000
Scenario 2a: ***20%***	272,056,400	16,060,000
Scenario 3a: ***50%***	680,141,000	40,150,000
Scenarios – EU25	on-mode	stand-by
Scenario 1b: ***5%***	81,551,500	4,814,100
Scenario 2b: ***20%***	326,206,200	19,256,600
Scenario 3b: ***50%***	815,515,400	48,141,400

Table 17. Potential CO_2 savings from reduced electricity use

Scenarios	**Tonnes CO_2 avoided** On-mode	**Tonnes CO_2 avoided** Stand-by	**TOTAL Tonnes CO_2 avoided**
Scenario 1a: ***5%***	29,710	1,750	31,460
Scenario 2a: ***20%***	118,820	7,010	125,840
Scenario 3a: ***50%***	297,060	17,540	314,600
Scenarios – EU25	**Tonnes CO_2 avoided** On-mode	**Tonnes CO_2 avoided** Stand-by	**TOTAL Tonnes CO_2 avoided**
Scenario 1b: ***5%***	35,620	2,100	37,720
Scenario 2b: ***20%***	142,470	8,410	150,880
Scenario 3b: ***50%***	356,180	21,030	377,210

The data in Table 17 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU 15 Member States, 436.8t CO_2/GWh.

2.2.12 Personal Computers (System Unit and Monitor)

Data for computers was taken from the exiting criteria[57] and from other available information sources[58,59]. The average energy consumption for non-labelled machines in sleep state has been quoted as 10.75 Watts. The ecolabel criterion states that machines must have a sleep state energy use of less than 5 Watts. It was assumed that an average PC would be in a sleep state for eight hours a day. Similar to the televisions calculations the wattage was converted into an energy consumption figure per year, quoted in kWh/year, by multiplying it by 60 *x* 60 *x* 8 *x* 365 (seconds *x* minutes *x* hours on *x* days in a year) and then dividing by 3,600,000 (to convert from Watts to Kilowatt-hours) to get the annual figure in kWh. Sales numbers from UK statistics were scaled up using population data to give a figure for the EU15 and EU25. The scenario calculation was then simply a case of multiplying the difference Δ by the scenario percentage and the sales figure.

Off-mode energy use mirrored the calculation for sleep-state, assuming eight hours a day again, the only variation being the starting wattage; less than 2 Watts for ecolabelled machines and 4.9 Watts on average for non-labelled machines.

The same assumptions of usage pattern were naturally made for monitors, using wattage figures of 2W in sleep state for ecolabelled monitors and 4W for non-labelled versions whereas the values were 1W and 2W in off-mode respectively.

Equation 15 shows the formula for calculating energy savings in computers.

Equation 15 Potential Energy Savings for Personal Computers

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives an energy saving in kWh per year for personal computers bought in the EU.

There is no available data on hazardous substances, so an estimate has been made of a saving of 1g per non-labelled machine on average. Likewise the assumption was 2g per labelled monitor and 5g per non-labelled monitor. This is particularly difficult as the definition of what hazardous substances are is not fully clear within ecolabelling, especially with the RoHS Directive. Any definition will also be affected by national priorities.

[57] http://europa.eu.int/comm/environment/ecolabel/producers/pg_personalcomputers.htm
[58] www.hp.com
[59] Revision of the EU Ecolabel Criteria for Computers, AEAT Environment for Defra, August 2001.

Table 18. Direct Benefits of Ecolabelled Personal Computers, system unit

Computers, system unit	**Energy consumption in use:**		
	Sleep state, kWh	Off-mode, kWh	**Hazardous substances,** g/machine
ECOLABELLED PCs	14.6	5.8	0
STANDARD PCs	31.4	14.3	1
Difference Δ	16.8	8.5	1
PG Sales EU15	12,601,450	12,601,450	12,601,450
PG Sales EU25	15,109,627	15,109,627	15,109,627
Scenarios – EU15	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1a: ***5%***	10,578,920	5,335,450	0.63
Scenario 2a: ***20%***	42,315,670	21,341,810	2.52
Scenario 3a: ***50%***	105,789,170	53,354,540	6.30
Scenarios – EU25	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1b: ***5%***	12,684,500	6,397,420	0.76
Scenario 2b: ***20%***	50,738,100	25,589,660	3.02
Scenario 3b: ***50%***	126,845,320	63,974,160	7.55

Table 19. Potential CO_2 savings from reduced electricity use

Scenarios	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1a: ***5%***	4,620	2,330	6,950
Scenario 2a: ***20%***	18,480	9,320	27,800
Scenario 3a: ***50%***	46,200	23,300	69,510
Scenarios – EU25	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1b: ***5%***	5,540	2,790	8,330
Scenario 2b: ***20%***	22,160	11,180	33,340
Scenario 3b: ***50%***	55,400	27,940	83,340

The data in Table 19 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU15 Member States, 436.8t CO_2/GWh.

Table 20. Direct Benefits of Ecolabelled Personal Computers, monitor

Computers, monitor	**Energy consumption in use:**		
	Sleep state, kWh/year	Off-mode, kWh/year	**Hazardous substances,** g/machine
ECOLABELLED PCs	5.8	2.9	2
STANDARD PCs	11.7	5.8	5
Difference Δ	5.8	2.9	3
PG Sales EU15	12,601,450	12,601,450	12,601,450
PG Sales EU25	15,109,627	15,109,627	15,109,627
Scenarios – EU15	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1a: ***5%***	3,679,600	1,839,800	1.9
Scenario 2a: ***20%***	14,718,500	7,359,200	7.6
Scenario 3a: ***50%***	36,796,200	18,398,100	18.9
Scenarios – EU25	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1b: ***5%***	4,412,000	2,206,000	2.3
Scenario 2b: ***20%***	17,648,000	8,824,000	9.1
Scenario 3b: ***50%***	44,120,100	22,060,100	22.7

Table 21. Potential CO_2 savings from reduced electricity use

Scenarios	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1a: ***5%***	1,610	800	2,410
Scenario 2a: ***20%***	6,430	3,210	9,640
Scenario 3a: ***50%***	16,070	8,040	24,110
Scenarios – EU25	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1b: ***5%***	1,930	960	2,890
Scenario 2b: ***20%***	7,710	3,850	11,560
Scenario 3b: ***50%***	19,270	9,630	28,910

The data in Table 21 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU15 Member States, 436.8t CO_2/GWh.

Table 22. Direct Benefits of Ecolabelled Personal Computers, TOTAL Computer

Scenarios – EU15	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1a: ***5%***	14,258,500	7,175,300	2.5
Scenario 2a: ***20%***	57,034,200	28,701,100	10.1
Scenario 3a: ***50%***	142,585,400	71,752,700	25.2
Scenarios – EU25	**Energy Saving kWh/year**	**Hazardous Substance saving, tonnes /year**	**Scenarios – EU15**
Scenario 1b: ***5%***	17,096,500	8,603,400	3.0
Scenario 2b: ***20%***	68,386,200	34,413,700	12.1
Scenario 3b: ***50%***	170,965,400	86,034,200	30.2

Table 23. Potential TOTAL CO_2 savings from reduced electricity use

Scenarios – EU15	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1a: ***5%***	6,230	3,130	9,360
Scenario 2a: ***20%***	24,910	12,530	37,450
Scenario 3a: ***50%***	62,270	31,340	93,610
Scenarios – EU25	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1b: ***5%***	7,470	3,760	11,230
Scenario 2b: ***20%***	29,870	15,030	44,900
Scenario 3b: ***50%***	74,670	37,580	112,250

The data in Table 23 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU15 Member States, 436.8t CO_2/GWh.

2.2.13 Laptop Computers

Benefits for laptops were calculated in exactly the same way as for desktop machines.

Data for computers was taken from the exiting criteria[60] and from other available information sources[61]

Labelled machines in sleep state must have an energy use of 3W or less, whilst non-labelled machines are assessed to have an energy consumption of 6W. These values are 2W and 3W respectively for the off-mode consumption.

As with the desktop calculations, it was assumed that an average laptop would be in its sleep state for eight hours a day and in off-mode for a further eight hours a day. The wattage was converted into an energy consumption figure per year, quoted in kWh/year, by multiplying it by 60 *x* 60 *x* 8 *x* 365 (seconds *x* minutes *x* hours on *x* days in a year) and then dividing by 3,600,000 (to convert from Watts to Kilowatt-hours) to get the annual figure in kWh. Sales numbers came from UK statistics and were assumed to be the same as for desktop PCs. These were scaled up using population data to give a figure for the EU15 and EU25. The scenario calculation was then simply a case of multiplying the difference Δ by the scenario percentage and the sales figure.

For hazardous substances, laptops are limited to 3mg of mercury in backlight lamps. It has been assumed that conventional laptops have a number of lamps and that their combined mercury content is 10mg.

Equation 16 shows the formula for calculating energy savings in computers.

Equation 16 Potential Energy Savings for Laptop Computers

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives an energy saving in kWh per year for laptop computers bought in the EU.

[60] http://europa.eu.int/comm/environment/ecolabel/product/pg_portablecomputers_en.htm
[61] USEPA Database

Table 24. Direct Benefits of Ecolabelled Laptop Computers

Computers, monitor	**Energy consumption in use:**		
	Sleep state, kWh/year	Off-mode, kWh/year	**Hazardous substances,** mg Hg/machine
ECOLABELLED laptops	9	5.8	3
STANDARD laptops	18	8.8	10
Difference Δ	9	2.9	7
PG Sales EU15	12,601,450	12,601,450	12,601,450
PG Sales EU25	15,109,626	15,109,626	15,109,626
Scenarios – EU15	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1a: ***5%***	5,519,430	1,839,810	0.0044
Scenario 2a: ***20%***	22,077,740	7,359,250	0.0176
Scenario 3a: ***50%***	55,194,350	18,398,120	0.0441
Scenarios – EU25	**Energy Saving kWh/year**		**Hazardous Substance saving, tonnes /year**
	Sleep state	Off-mode	
Scenario 1b: ***5%***	6,618,020	2,206,010	0.0053
Scenario 2b: ***20%***	26,472,070	8,824,020	0.0212
Scenario 3b: ***50%***	66,180,170	22,060,060	0.0529

Table 25. Potential CO_2 savings from reduced electricity use

Scenarios	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1a: ***5%***	2,410	800	3,210
Scenario 2a: ***20%***	9,640	3,210	12,860
Scenario 3a: ***50%***	24,110	8,040	32,140
Scenarios – EU25	**Tonnes CO_2 avoided** Sleep state	**Tonnes CO_2 avoided** Off mode	**TOTAL Tonnes CO_2 avoided**
Scenario 1b: ***5%***	2,890	960	3,850
Scenario 2b: ***20%***	11,560	3,850	15,420
Scenario 3b: ***50%***	28,910	9,630	38,540

2.2.14 Light Bulbs

Lightbulb criteria[62] and the AEAT Report[63] were used as the main sources of information. For lightbulbs, 11-Watt ecolabelled compact fluorescent lamps (CFL) were compared with conventional 60-Watt incandescent (tungsten filament) bulbs. Using the assumption that a lamp is on for six hours a day on average over a year. Wattage figures were converted into kWh/year values by multiplying by 60 *x* 60 *x* 6 *x* 365 (seconds *x* minutes *x* hours on *x* days in a year) and then dividing by 3,600,000 (to convert from Watts to Kilowatt-hours) to get the annual figure in kWh. By multiplying the difference Δ between the ecolabelled and non-labelled products with the sales figure and scenario percentage the potential energy savings could be derived, as shown in Equation 17.

Equation 17 Potential Energy Savings for Light Bulbs

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives an energy saving in kWh per year for light bulbs bought in the EU.

On average, a CFL lasts 11,000 hours, whereas a tungsten filament bulb lasts 1,000 hours. Therefore, over the 11,000-hour lifetime of a single CFL, eleven tungsten filament bulbs would be used instead. If a bulb is used for six hours a day, every day, this equates to 2,190 hours per year. Therefore 11,000 hours' use would span approximately five years. A CFL weighs 75g on average whereas a tungsten bulb weighs 40g[64]. Thus, whereas only 75g of materials would be used in the one CFL, 440g would be used in the eleven tungsten filament bulbs to give the same time span. Hence the difference is 365g of materials saved over five years, which equates to 73g/year, or 0.000073 tonnes/year. Materials savings were calculated by multiplying the scenario percentage by the sales figure by 0.000073 tonnes/year.

The mercury content and emissions for the two types of bulb were determined from the electricity consumed during their lifetime. The combustion of fossil fuels gives rise to emissions of mercury to the air. An 11-Watt CFL contains up to 4mg of mercury and will consume 121 kWh over its 11,000 hour lifetime which equates to an emission of 5.5mg of mercury, hence 9.5mg Hg in total over its entire life cycle. A 60-Watt bulb however, will consume 60 kWh of energy over its 1,000 hour lifetime. In order to compare on lifetimes to CFLs, eleven such filament bulbs would total 11,000 hours lifetime, with 660 kWh being consumed, emitting 23.1 mg mercury from power generation.

The scenario figures were calculated to give kilograms of mercury not emitted to the environment from power stations per year. This was achieved by multiplying the difference Δ by the sales figure and by the percentage. This resulting figure was then divided by one million to convert mg into kg and then by five to convert the lifetime figure into an annual figure.

Table 26 shows the potential savings from ecolabelled lightbulbs, whilst Table 27 indicates how much CO_2 emissions could be avoided through the use of ecolabelled lightbulbs.

[62] http://europa.eu.int/comm/environment/ecolabel/producers/pg_lightbulbs.htm
[63] Revising the ecolabel criteria for lamps, AEAT Environment for DG XI.E.4, March 1999.
[64] In-house AEAT Research.

Table 26.Direct Benefits of Ecolabelled Lightbulbs

Lightbulbs	Energy consumption in use, kWh / year	Lifetime: Material Saving / hours	Mercury content & power emissions, mg / 11,000 hour lifetime
ECOLABELLED Lightbulbs	24	11,000	9.5
STANDARD Lightbulbs	131	1,000	23.1
Difference Δ	107	10,000	13.6
PG Sales EU15	2,210,000,000	2,210,000,000	2,210,000,000
PG Sales EU25	2,649,875,717	2,649,875,717	2,649,875,717
Scenarios – EU15	**Energy Saving kWh/year**	**Material saving, tonnes/year**	**Mercury emission reduction, kg /year**
Scenario 1a: ***5%***	11,857,755,000	8,067	301
Scenario 2a: ***20%***	47,431,020,000	32,266	1,202
Scenario 3a: ***50%***	118,577,550,000	80,665	3,006
Scenarios – EU25	**Energy Saving kWh/year**	**Material saving, tonnes/year**	**Mercury emission reduction, kg /year**
Scenario 1b: ***5%***	14,217,908,200	9,670	360
Scenario 2b: ***20%***	56,871,632,600	38,690	1,440
Scenario 3b: ***50%***	142,179,081,600	96,720	3,600

Table 27. Potential CO_2 savings from reduced electricity use

Scenarios	Tonnes CO_2 avoided
Scenario 1a: ***5%***	5,179,000
Scenario 2a: ***20%***	20,715,900
Scenario 3a: ***50%***	51,789,800
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	6,209,800
Scenario 2b: ***20%***	24,839,200
Scenario 3b: ***50%***	62,098,000

The data in Table 27 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU 15 Member States, 436.8t CO_2/GWh.

2.2.15 Footwear

Technical and sales data on footwear was taken from a number of sources including the current criteria[65] and the ecolabel report by AENOR[66].

There is no EU standard or legislation for chemical oxygen demand (COD) emission limits from tanneries. With this in mind, the AENOR report notes that there are national limits and these vary between member states. For the purposes of this study we have used an average COD emission limits from the AENOR report for discharge to sewer at 2,000 mgO_2/L. It has then been assumed that ecolabelled footwear manufacturers apply some treatment to reduce their COD discharges, by 50%, to 1,000 mgO_2/L. Delta is thus 1,000 mgO_2/L.

In order to calculate the potential benefits, Delta (mg/L) was multiplied by the number of pairs of shoes sold in the EU per year and then multiplied by the volume of wastewater (Vol_{ww}) produced per pair of shoes fabricated[67], all of which was divided by one billion, 10^9, to get the value, in tonnes, of COD avoided each year.

The Urban Wastewater Treatment Directive (UWWTD 91/271/EC) states the level of wastewater treatment required by Member States[68]. It has been assumed the majority of tanneries are in towns and cities with good sewage treatment provision and by 2005 all discharges from wastewater treatment works (in communities with over 2,000 population equivalent) to inland surface waters will need secondary treatment. Primary treatment removes ca. 30-35% of the oxygen demand whilst secondary treatment removes between 65 - 80% of the COD[69]. Using the mid-values of 30% and 70% respectively, the two combined will result in an overall 79% removal of COD. Thus under the ecolabelled criteria an extra 6% COD has to be removed (more efficient plant, pre-treatment at the tannery, etc.) to reach the 85% COD removal criterion. Therefore this 6% difference is factored into the Benefit calculation. Equation 18 lays out the calculation for COD.

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[65] http://europa.eu.int/comm/environment/ecolabel/producers/pg_footwear.htm

[66] AENOR Final report, November 2001. http://europa.eu.int/comm/environment/ecolabel/pdf/footwear/finalreport_nov2001.pdf

[67] 450-600kg of solid waste is produced per tonne of rawhide, leaving 400-550kg leather per tonne of rawhide, the average of 475kg was taken. $35m^3$ wastewater is made per tonne of rawhide, i.e. $35m^3$ wastewater for 475kg of leather. It was assumed that there is 0.5kg of leather per pair of shoes on average. Thus $35m^3$ wastewater produced for 950 pairs of shoes or 36.84L/pair. http://www.fao.org.

[68] Member States shall ensure that urban waste water entering collecting systems shall before discharge be subject to secondary treatment or an equivalent treatment as follows:
- at the latest by 31 December 2000 for all discharges from agglomerations of more than 15 000 p.e. (population equivalent),
- at the latest by 31 December 2005 for all discharges from agglomerations of between 10 000 and 15 000 p.e.,
- at the latest by 31 December 2005 for discharges to fresh-water and estuaries from agglomerations of between 2 000 and 10 000 p.e.
http://europa.eu.int/servlet/portail/RenderServlet?search=DocNumber&lg=en&nb_docs=25&domain=Legislation&coll=&in_force=NO&an_doc=1991&nu_doc=271&type_doc=Directive

[69] “Biological Degradation of Wastes" Ed A.M. Martin, Elsevier, 1991.

Equation 18 Potential Energy Savings for Footwear

$$\text{Scenario A} = \% \ x \ \text{Sales} \ x \ \Delta \ x \ Vol_w \div 10^9 \ x \ 0.06$$

This gives the reduction in COD discharges in tonnes per year for footwear bought in the EU.

Formaldehyde has been chosen as a representative compound for the calculation of the reduction of harmful substances in ecolabelled footwear. The Ecolabel criteria state that formaldehyde (HCHO) in textiles should not exceed 75 ppm and in leather 150ppm. This has been averaged to 112ppm for these calculations, i.e. 112mg/kg. Other assumptions were then made that a pair of shoes weighs 1kg and an average shoe contains 250ppm HCHO, based on our own estimate. Multiplication of the scenario, sales figure and Delta and subsequently dividing the answer by 10^9 gave the number of tonnes formaldehyde not emitted each year.

Table 28. Direct Benefits of Ecolabelled Footwear

Footwear	**Emissions to water:** COD, mg O_2 / litre	**Use of substances harmful to environment & residues in final product, mg/pair**
ECOLABELLED Footwear	1000	112
STANDARD Footwear	2000	250
Difference Δ	1000	138
PG Sales EU15	1,640,654,000	1,640,654,000
PG Sales EU25	1,952,654,000	1,952,654,000
Scenarios – EU15	**Reduced COD emissions to water, tonnes COD/year**	**Formaldehyde emission reduction, tonnes/year**
Scenario 1a: ***5%***	180	10
Scenario 2a: ***20%***	730	50
Scenario 3a: ***50%***	1,810	110
Scenarios – EU25	**Reduced COD emissions to water, tonnes COD/year**	**Formaldehyde emission reduction, tonnes/year**
Scenario 1b: ***5%***	220	10
Scenario 2b: ***20%***	860	50
Scenario 3b: ***50%***	2,160	130

VOC emissions were investigated but there was found to be no benefit from ecolabelled footwear in this respect. The criteria in this case are that a maximum of either 20g or 25g of VOCs are to be used in the production of each pair of footwear, depending on the type. The Environmental Protection Act[70] in the UK also sets the limit at 20g/pair too and therefore there is no advantage to be gained.

[70] http://www.biowise.org.uk/docs/2000/publications/RGriggs_Case_study.pdf

2.2.16 Indoor Paints and Varnishes

Annual EU sales of paints and varnishes are reported[71] to be 2.38 billion litres, which is approximately seven litres per person.

The ecolabel limit for VOCs and VAHs is set at 150g/L. The content in normal paint and varnish has been calculated to be 231g/L on average. This has been obtained from the annual sales figure listed above and the estimated emissions of 550,000 tonnes of solvents per year[72], which includes brush cleaning.

By multiplying the difference between the ecolabelled and non-labelled products (Δ = 81g/L) with the sales figure and scenario percentage and then dividing by one million (to convert grams to tonnes), the potential tonnage savings of VOCs and VAHs could be derived, shown in Equation 19.

Equation 19 Potential Material Savings for Paints and varnishes

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta \div 10^6$$

This gives a materials saving in litres per year for paints and varnishes bought in the EU.

A similar process was conducted for hazardous substances. The ecolabel criterion is 50g/L. Hazardous substances in paints and varnishes have been identified as being glycols (which may be used from 3-20% by weight), formaldehyde, alkyl phenol ethoxylates and biocides. In the absence of market data, we assume that such compounds may make up on average 10% by weight of paint. This is a fair estimate reflecting on possible glycol content being 3-20%. Further we assume paint weighs 1000g/litre and therefore contains 100g/L hazardous substances.

Pigment content relates to coverage. The limit for the ecolabel is 38g Titanium dioxide (TiO_2) per square metre. It has been assumed that the average for non-labelled paints is less than twice that of the ecolabel due to the high cost of TiO_2 and thus has been set at 60g TiO_2 / m^2 for the purposes of this report. Using delta and a coverage rate of $8m^2$/L (see below) along with the annual sales figure of litres of paint the yearly saving in materials has been determined.

Spreading rate (SR) was considered but it was found that there was no distinct benefit from using ecolabelled paints as opposed to conventional, non-labelled paints. The former has a SR criterion of $8m^2$/L or more at 98% opacity or hiding power[73]. A market survey of readily available conventional emulsion paints found a SR of 12 - $14m^2$/L, whilst "One-Coat" paints have coverage of 8 - $9m^2$/L.[74] Hence it seems there is little benefit in spreading rate from ecolabelled paints.

Table 29 shows the benefits of ecolabelled paints and varnishes.

[71] Bio-Intelligence Final Ecolabel Report, September 2002.
[72] CEPE Final Report, September 2002.
[73] http://europa.eu.int/comm/environment/ecolabel/producers/pg_indoorpaints.htm
[74] www.crownpaint.co.uk and www.dulux.co.uk

Table 29 Direct Benefits of Ecolabelled Indoor paint and varnishes

INDOOR PAINTS & VARNISHES	VOCs & VAHs content, g/L	Hazardous Substance content, g,L	White pigment content, g/m^2 coverage *(paints only)*
ECOLABELLED Indoor paint & varnishes	150	50	38
STANDARD Indoor paint & varnishes	231	100	60
Difference Δ	81	50	22
PG Sales EU15	2,380,000,000	2,380,000,000	2,380,000,000
PG Sales EU25	2,853,712,311	2,853,712,311	2,853,712,311
Scenarios – EU15	**Tonnes of VOCs & VAHs avoided each year**	**Tonnes Haz Subs avoided each year**	**Tonnes of pigment saved each year**
Scenario 1a: ***5%***	9,650	5,950	20,940
Scenario 2a: ***20%***	38,600	23,800	83,780
Scenario 3a: ***50%***	96,500	59,500	209,440
Scenarios – EU25	**Tonnes of VOCs & VAHs avoided each year**	**Tonnes Haz Subs avoided each year**	**Tonnes of pigment saved each year**
Scenario 1b: ***5%***	11,570	7,130	25,110
Scenario 2b: ***20%***	46,280	28,540	100,450
Scenario 3b: ***50%***	115,710	71,340	251,130

2.2.17 Hardfloor Coverings

In calculating the benefits of ecolabelled Hardfloor Coverings data was taken from the criteria[75] - using upper and lower ecolabel hurdles.

There is no comment in ecolabel reports regarding EU consumption. Production is quoted at 12 million m^2 per year, from which it has been assumed that 50% is consumed within the EU.

There is little data available in the published reports for the block recovery benefit. However, a 'good' rate of recovery of 40% for granite has been assumed for ecolabelled Hardfloor coverings to calculate the amount of recovery achieved. The calculation was performed using this 40% ratio with the sales figure in m^2/year, multiplied by the block thickness of 0.1m and the density of granite[76] at 2.6 tonnes/m^3. The same calculation was performed for non-labelled coverings, assuming a recovery rate of 20% which is below the ecolabel hurdle for marble and granite. The subsequent subtraction resulted in a value of tonnes of material saved per year when the scenario percentage was applied, as shown in Equation 20.

Equation 20 Potential Material Savings for Hardfloor coverings

$$\text{Scenario A} = \% \ x \ \text{Sales} \ x \ 0.4 \ x \ 0.1 \ x \ 2.6$$

This gives a materials saving in tonnes per year for Hardfloor coverings bought in the EU.

Energy use for labelled coverings was taken as an average of the ecolabel hurdles, whilst non-labelled products were assumed to consume twice the energy. Values in megajoules were converted to kWh using a factor of 3.6 to give results in kWh / m^2 manufactured.

There is no data available in ecolabel reports regarding water consumption. Therefore it has been assumed that 100 litres is used per m^2 in manufacture on average, across all products. A recycling rate of 90% has been taken from the criteria for ecolabelled products, (10% of the water is 'consumed'), whilst for non-labelled products this has been set at 75% recycling. A figure for the amount of water saved by labelled product manufacture can then be calculated using the sales figure and the scenario percentage.

In terms of emissions to air, all emissions have been considered as equal in terms of impacts. Hence emissions are dominated by NO_x and SO_2. An average has been taken for all sub-groups as being 2,000mg/m^2 with the non-labelled equivalent value being set at 6,000mg/m^2 in the absence of any other data. The saving was then simply the scenario percentage multiplied by the sales figure, delta and a factor of 10^{-9} to convert from mg to tonnes.

[75] http://europa.eu.int/comm/environment/ecolabel/product/pg_hardfloor_en.htm
[76] http://www.allmeasures.com/Formulae/static/materials/32/density.htm

Table 30. Direct Benefits of Ecolabelled Hardfloor Coverings

Hardfloor Coverings	Block recovery, tonnes/yr	Energy use in production, kWh/m^2	Water saving in production, Litres/m^2/yr	Emissions to air, mg/m^2
ECOLABELLED Hardfloor Coverings	3,900,000	21	540,000,000	2,000
STANDARD Hardfloor Coverings	7,800,000	42	450,000,000	6,000
Difference Δ	3,900,000	21	90,000,000	4,000
PG Sales EU15	6,000,000	6,000,000	6,000,000	6,000,000
PG Sales EU25	7,194,233	7,194,233	7,194,233	7,194,233
Scenarios – EU15	**Block recovery, tonnes/year**	**Energy use in production, kWh/year**	**Water saving in production, Megalitres/yr**	**Emissions to air, tonnes/yr**
Scenario 1a: ***5%***	195,000	6,250,000	5	1.2
Scenario 2a: ***20%***	780,000	25,000,000	20	4.8
Scenario 3a: ***50%***	3,000,000	62,500,000	50	12.0
Scenarios – EU25	**Block recovery, tonnes/year**	**Energy use in production, kWh/year**	**Water saving in production, Megalitres/yr**	**Emissions to air, tonnes/yr**
Scenario 1b: ***5%***	233,810	7,493,990	5	1.4
Scenario 2b: ***20%***	935,250	29,975,970	22	5.8
Scenario 3b: ***50%***	3,597,130	74,939,920	54	14.4

Table 31. Potential CO_2 savings from reduced electricity use

Scenarios	Tonnes CO_2 avoided
Scenario 1a: ***5%***	2,730
Scenario 2a: ***20%***	10,920
Scenario 3a: ***50%***	27,300
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	3,270
Scenario 2b: ***20%***	13,090
Scenario 3b: ***50%***	32,730

The data in Table 31 was calculated using the population weighted average number of tonnes of CO_2 emitted per GWh of electricity generated in the EU 15 Member States, 436.8t CO_2/GWh.

2.2.18 Mattresses

Data for calculating the direct benefits of labelled mattresses was taken from Tauw Milieu Mattress report[77] and the criteria[78].

The reduced VOC emissions were calculated from the criterion value of 0.5mg/m^3 and an assumed value for non-labelled mattresses of 5mg/m^3. The benefit was calculated by multiplying the difference delta by the sales figure given in terms of cubic metres of mattress sold per year, including a factor of 10^9 to convert from mg to tonnes VOC avoided.

The ecolabel reports identify harmful substances as a key impact. However they do not identify 'typical' compositions/content. A myriad of substances may appear in a mattress given there are three principle mattress types. Hence a broad assumption has been made that an ecolabelled mattress has 5g less harmful substances than market-average product. This figure in conjunction with the annual sales value gives the benefit in tonnes per year.

Equation 21 shows the generic method for calculating the direct benefits of ecolabelled mattresses.

Equation 21 Potential Material Savings for mattresses

$$\text{Scenario A} = \% \; x \; \text{Sales} \; x \; \Delta \div 10^9$$

This gives a materials saving in tonnes per year for mattresses bought in the EU.

Table 32 shows the benefits attributable to labelled mattresses.

[77] http://europa.eu.int/comm/environment/ecolabel/pdf/bed_mattresses/bed_mattresses_report.pdf
[78] http://europa.eu.int/comm/environment/ecolabel/product/pg_bedmatresses_en.htm#revision

Table 32. Direct Benefits of Ecolabelled mattresses

Mattresses	VOC emissions avoided, mg/m^3	Harmful substances, grams per mattress
ECOLABELLED mattresses	0.5	N/A
STANDARD mattresses	5.0	N/A
Difference Δ	4.5	5[79]
PG Sales EU15[80]	36,400,000	36,400,000
Volume (m^3) of these sales[81]	36,400,000	36,400,000
PG Sales EU25	43,645,012	43,645,012
Volume (m3) of these sales	43,645,012	43,645,012
Scenarios – EU15	**VOC emissions avoided, tonnes/year**	**Harmful substances avoided, tonnes per year**
Scenario 1a: ***5%***	0.01	9.1
Scenario 2a: ***20%***	0.03	36.4
Scenario 3a: ***50%***	0.08	91.0
Scenarios – EU25	**VOC emissions avoided, tonnes/year**	**Harmful substances avoided, tonnes per year**
Scenario 1b: ***5%***	0.01	10.9
Scenario 2b: ***20%***	0.04	43.6
Scenario 3b: ***50%***	0.10	109.1

[79] The ecolabel reports do not identify typical compositions for the various mattress types. We therefore make an assumption that an ecolabelled mattress contains 5g less harmful materials than a market-average product.

[80] Breakdown is 345 million in houses, 11 million in hotels, 3 million in hospitals, 5 million other. Assume product turnover is 10% per year i.e. sales are 36.4 million / year.

[81] Assume that average mattress surface area is $5m^2$ and an average thickness of 0.2m. The annual sales expressed as a volume is then the sales figure, times $5m^2$, times 0.2m.

2.2.19 Soil Improvers[82]

In calculating the direct benefits of soil improvers, two issues were studied, natural resource depletion and hazardous ingredients using data from the criteria[83] and other reports[84,85]

Ecolabelled soil improvers must get their organic matter from the processing or reuse of waste materials, i.e. no peat is allowed as it is an unsustainable source. Conventional peat-containing composts are consumed in Europe (EU15) each year at a rate of 9.5 Mt. The peat content is ~ 5-10 % for soil improvers, with a ~ 75% market share whilst growing media have a peat content of ~ 50%, and a ~ 25% market share which gives a peat use of 1.89 Mt. The benefit was then simply the scenario percentage multiplied by this value of 1.89Mt.

For hazardous substances we considered heavy metal content, namely, zinc, copper cadmium, lead and mercury. The criteria threshold values were compared with typical average values[86] to show the benefit of reduced heavy metal concentration in soil improvers per year, using the annual sales figures.

Equation 22 shows the generic method for calculating the direct benefits of ecolabelled soil improvers.

Equation 22 Potential Material Savings for soil improvers

$$\text{Scenario A} = \% \; x \; \text{Sales} \; x \; \Delta \div 10^6$$

This gives a materials saving in tonnes per year for soil improvers bought in the EU.

Table 33 shows the benefits attributable to labelled soil improvers.

[82] Includes Growing Media
[83] http://europa.eu.int/comm/environment/ecolabel/pdf/soil_improvers/new_decision_2001/soil_improvers_en.pdf
[84] http://europa.eu.int/comm/environment/ecolabel/pdf/soil_improvers/technical_report2.pdf
[85] http://europa.eu.int/comm/environment/ecolabel/pdf/soil_improvers/technical_report2_annex1.pdf
[86] Rules for authorization of composting plants for treatment of pre-selected organic wastes, including limits about the chemical composition of compost for the Veneto Region of Italy http://www.orbit-online.net/journal/archiv/01-03/0103_04_text.html

Table 33. Direct Benefits of Ecolabelled Soil improvers

Soil improvers	Natural resource savings, tonnes peat/year	Hazardous ingredients: maximum limit, mg/kg Dry Weight of Soil Improver				
		Zn	Cu	Cd	Pb	Hg
ECOLABELLED soil improvers	0	300	100	1	100	1
STANDARD soil improvers	1,890,000	500	150	1.5	140	1.5
Difference Δ	1,890,000	200	50	0.5	40	0.5
PG Sales EU15	9,450,000					
PG Sales EU25	11,330,917					
Scenarios – EU15	**Natural resource savings, tonnes peat/year**	**Hazardous ingredients avoided, tonnes/year**				
		Zn	**Cu**	**Cd**	**Pb**	**Hg**
Scenario 1a: ***5%***	94,500	95	24	0	19	0
Scenario 2a: ***20%***	378,000	378	95	1	76	1
Scenario 3a: ***50%***	945,000	945	236	2	189	2
Scenarios – EU25	**Natural resource savings, tonnes peat/year**	**Hazardous ingredients avoided, tonnes/year**				
		Zn	**Cu**	**Cd**	**Pb**	**Hg**
Scenario 1b: ***5%***	113,300	113	28	0	23	0
Scenario 2b: ***20%***	453,200	453	113	1	91	1
Scenario 3b: ***50%***	1,133,100	1133	283	3	227	3

2.2.20 Textiles

In determining the benefits of using ecolabelled textiles, we considered the following key criteria; pesticide and fertiliser usage in cotton production and VOC Emissions to air in polyester manufacture.

Information on labelled products was gathered from the criteria[87] and other reports[88]

It is reported[89] that on average 0.025 tonnes of pesticides are used per tonne of cotton produced for 100% cotton textiles and clothing. We assume that organic cotton uses zero synthetic pesticides. It was assumed that ecolabelled cotton is 100% organically made if not actually certified organic. The same information source and logic was used for fertiliser use in cotton production (identified as being 0.72 tonnes per tonne of cotton). Cotton products sales figures were calculated[90] for cotton textiles and clothing as Production + Imports – Exports, in tonnes for 2001-2002.

For polyester manufacture the criterion limit is 1.2g VOC emitted per kg of polyester resin made. For conventional resins the average emission of VOC (styrene in this case) is 40g styrene per kg resin used[91,92]. Sales data for the amount of thermoplastic PET (polyester) consumed in Western Europe in 1999 for non-plastic applications, i.e. textiles was used [93].

Equation 23 shows the generic method for calculating the direct benefits of ecolabelled textiles.

Equation 23 Potential Material Savings for textiles

$$\text{Scenario A} = \% \; x \; \text{Sales} \; x \; \Delta$$

This gives a materials saving in tonnes per year for textiles bought in the EU.

Table 34 shows the benefits attributable to ecolabelled textiles.

[87] http://europa.eu.int/comm/environment/ecolabel/product/pg_clothing_textiles_en.htm
[88] http://europa.eu.int/comm/environment/ecolabel/pdf/textiles/background_report_april2002.pdf
[89] http://www.pre.nl/LCAsearch/default.htm , www.autex.org
[90] http://europa.eu.int/comm/trade/issues/sectoral/agri_fish/cottond_en.htm
[91] http://www.ehsni.gov.uk/pubs/publications/GNB4-2_pdf.pdf
[92] http://www.maricopa.gov/envsvc/air/EI/docs/03resin.pdf
[93] http://www.apme.org/media/public_documents/20010731_134910/2002_1999.pdf

Table 34. Direct Benefits of Ecolabelled Textiles

Textiles	Pesticide usage in cotton production, tonnes/tonne cotton	Fertiliser usage in cotton production, tonnes/year	VOC Emissions to air in polyester manufacture, g/kg resin
ECOLABELLED Textiles	0	0	1.2
STANDARD Textiles	0.025	0.72	40.0
Difference Δ	0.025	0.72	38.8
PG Sales EU15	1,052,000	1,052,000	1,369,000
PG Sales EU25	1,261,389	1,261,389	1,641,484
Scenarios – EU15	**Pesticide usage avoided, tonnes/year**	**Fertiliser usage avoided, tonnes/year**	**VOC Emissions avoided, tonnes/year**
Scenario 1a: ***5%***	1,310	37,870	2,660
Scenario 2a: ***20%***	5,260	151,490	10,620
Scenario 3a: ***50%***	13,150	378,720	26,560
Scenarios – EU25	**Pesticide usage avoided, tonnes/year**	**Fertiliser usage avoided, tonnes/year**	**VOC Emissions avoided, tonnes/year**
Scenario 1b: ***5%***	1,580	45,410	3,180
Scenario 2b: ***20%***	6,310	181,640	12,740
Scenario 3b: ***50%***	15,770	454,100	31,850

2.2.21 Vacuum Cleaners

Energy use was studied for vacuum cleaners as their main in-use environmental impact, with data taken from the ecolabel criteria and supporting papers.

It was assumed that ecolabelled vacuum cleaners are more efficient than conventional machines and therefore can use a smaller motor requiring less operating time to clean to a given level. We considered non-ecolabelled vacuum cleaners as possibly using a larger motor and require 25% more time to clean to a given standard.

Sales data was taken from the ecolabel supporting report and included the total number of uprights and sled type vacuum cleaners but not small hand-held, battery powered products.

Benefits were simply the energy saving per machine multiplied by the sales figure and scenario percentage.

Equation 24 shows the generic method for calculating the direct benefits of ecolabelled textiles.

Equation 24 Potential Material Savings for vacuum cleaners

$$\text{Scenario A} = \% \times \text{Sales} \times \Delta$$

This gives a energy saving in kWh per year for vacuum cleaners bought in the EU.

Table 35 shows the benefits attributable to labelled vacuum cleaners and Table 36 shows the CO_2 savings possible.

Table 35. Direct Benefits of Ecolabelled Vacuum Cleaners

Vacuum Cleaners	**Energy consumption, kWh/yr**
ECOLABELLED Vacuum Cleaners	57.2
STANDARD Vacuum Cleaners	84.5
Difference Δ	27.3
PG Sales EU15	14,000,000
PG Sales EU25	16,786,543
Scenarios – EU15	**Energy consumption, kWh/yr**
Scenario 1a: ***5%***	19,110,000
Scenario 2a: ***20%***	76,440,000
Scenario 3a: ***50%***	191,100,000
Scenarios – EU25	**Energy consumption, kWh/yr**
Scenario 1b: ***5%***	22,913,600
Scenario 2b: ***20%***	91,654,500
Scenario 3b: ***50%***	229,136,300

Table 36. Potential CO_2 savings from reduced electricity use

Scenarios – EU15	Tonnes CO_2 avoided
Scenario 1a: ***5%***	8,350
Scenario 2a: ***20%***	33,390
Scenario 3a: ***50%***	83,470
Scenarios – EU25	**Tonnes CO_2 avoided**
Scenario 1b: ***5%***	10,010
Scenario 2b: ***20%***	40,030
Scenario 3b: ***50%***	100,080

3 Indirect Benefits

The project team, in consultation with members of the EUEB, identified nine indirect benefits as listed in Table 37.

This section describes each indirect benefit in turn, providing the reasoning behind them and the estimations used to quantify the positive impacts of the Ecolabel.

Table 37. Indirect Benefits of the Ecolabel

	Indirect Benefits of the Ecolabel
1	The use of the Ecolabel criteria by another eco-label scheme. Criteria may be copied directly or used as a reference point before local adaptation.
2	The use of the Ecolabel criteria in public procurement calls for tender.
3	The use of the Ecolabel criteria in private procurement calls for tender.
4	The use of the Ecolabel criteria by companies as a benchmark for their own products or as a target to improve their environmental performance.
5	The use of the Ecolabel criteria to generate Type III labels (environmental product declarations), or recommendations on how to make green claims (Type II).
6	The use of the Ecolabel criteria & procedures/structures to generate minimum environmental requirements applicable to all products of a product category on the market.
7	The use of the Ecolabel criteria in the “new approach” as a basis for establishing whether companies have complied with “essential requirements”
8	The use of the Ecolabel logo, eco-label criteria and related discussion, to raise stakeholder awareness of the environmental impact of products, with stakeholders including manufacturers retailers, consumers, environmental NGOs and public administrations.
9	The use of the Ecolabel and its criteria as a basis for establishing fiscal measures to promote green products, (e.g. criteria for energy rebate schemes)

3.1 Indirect Benefit 1 - *The use of the Ecolabel criteria by another eco-label. Criteria may be copied directly or used as a reference point before local adaptation.*

This indirect benefit is probably the most straightforward to both understand and quantify. It is known that several national ecolabels within the EU have used the Ecolabel’s criteria, either in their entirety or as the basis for creating their own ecolabels. For example, the Austrian Regulatory Committee has adopted the Ecolabel criteria for detergents for dishwashers and laundry detergents, all-purpose cleaners, for hand dishwashing detergents as well as the criteria for light bulbs, textiles and fridges.

In order to calculate the financial savings that have been made across national labelling schemes we developed the following methodology which considers what is needed to develop an ecolabel;.

- Two people working full-time for 2.5 months each on developing criteria, i.e. 2 x 50 man-days = 100 man-days (this effort may be spread over 18 months or so).
- Three AHWGs, each a day long, attended by 25 people on average, thus 75 man-days.
- Therefore 175 man-days in total, or approximately half a man-year
- It has been estimated that this half man-year equates to €25,000 on average to develop an ecolabel for a product group from start to completion (excludes overheads, travel, and subsistence costs that may add 100% to this figure).
- Calculations for known examples of where EU criteria have been adopted or used as the basis for national ecolabels have then been performed by multiplying the number of product groups used by a national scheme by the €25,000 saving, similarly for the time saving.
- For the technical potential the calculation was performed on the number of national labelling schemes in operation within the EU, assuming each one on average will use the Ecolabel criteria for one product group.
- For some of the examples of known use, factors have been included where they have only used the Ecolabel criteria as a basis i.e. to inform their own developments.

Table 38 now describes the savings that have been made and those that could be made from using Ecolabel criteria within other labelling schemes. There is a potential to save over €1 million and 21 man-years of effort.

Table 38. Calculation of the Indirect Benefits from other labelling schemes using Ecolabel Criteria.

Principle and Examples	Money saved	People time saved / man years
Per Product Group, PG	**€ 25,000**	**0.5**
Known Examples		
The Nordic Swan is planning to adopt the Ecolabel criteria for refrigerators with minor modifications as well as vacuum cleaners, PCs, paper, laundry detergents, all-purpose cleaners/sanitary cleaners and hand dishwashing detergents, 7 PGs.	€175,000	3.5
The Austrian Regulatory Committee has adopted the Ecolabel criteria for dishwasher detergents, laundry detergents, all-purpose cleaners, hand dishwashing detergents as well as the criteria for light bulbs, textiles, fridges, 7 PGs.	€175,000	3.5
The Romanians have used the Ecolabel criteria for their labels for fridges, washing machines, and dishwashers, 3 PGs.	€75,000	1.5
The Slovakian labelling scheme is broadly based on the Ecolabel. It has been estimated that the Ecolabel has had a 50% influence on its 8 PGs.	€100,000	2
The Slovenian scheme uses the Ecolabel criteria to help devise their own. It has been estimated that the Ecolabel has had a 50% influence on its 10 PGs.	€125,000	2.5
ITECO bases its requirements upon the Ecolabel (and other ecolabels). It has been estimated that the Ecolabel has had a 20% influence on its laptop and computer PGs.	€10,000	0.2
Technical Potential		
Technical potential; each of the sixteen European national schemes adopts one Ecolabel set of criteria per year[94]	€400,000	8
Total of savings that have been *and* could be won	**€1,060,000**	**21**

Total saving equals €1 million and 21 man-years

During the course of this study, it became apparent that the EU ecolabel's influence extends beyond Europe. Personal communications with the operators of the Canadian, New Zealand and United States ecolabel schemes revealed that they periodically review EU ecolabel criteria. We believe that the operators of the Australian ecolabel do likewise[95].

Reviews are undertaken for a variety of reasons with perhaps the more prominent one being the desire for harmonisation between ecolabel schemes – in other words scheme operators are seeking to ensure that ecolabel criteria (or standards as they are sometimes called) address and prioritise similar life-cycle issues and, within reason given 'local' conditions and markets, are set at similar levels.

Another important reason why scheme operators review EU criteria is one of pragmatism; they do not wish to repeat work that has been completed elsewhere. Clearly there is an advantage to be had in terms of time and resources if one can use or adopt existing criteria or the ideas that support them.

[94] German Blauer Engel, Nordics Swan, Catalonia, Poland, Romania, Slovakia, Slovenia, Hungary, TCO, French NF Environnment, Netherlands Milieukeur, Spain, Austria, Swedish Bra Miljoval, Croatia, Czech.
[95] We contacted the Australian ecolabel scheme operators but did not receive a response.

With this background we have estimated an indirect benefit due to the EU ecolabel's influence with non-EU ecolabel schemes. The estimate is based upon the direct benefits detailed elsewhere in this report.

We have assumed that:

- Product performance is the same in all countries (and hence that the difference between an ecolabelled product's footprint and that of a standard product is independent of country),
- The indirect benefit is applicable to all EU ecolabelled products,
- Product sales per head of population[96] are the same in all countries (and hence that a ratio can be applied to product sales in the four countries outside of the EU),
- The EU ecolabel's influence is less marked outside of the EU than it is within.

Regarding the last point, we have assumed that the indirect benefit should only be applied at the 5% level of sales and that a further consideration should be applied to not overly emphasise the EU ecolabel's influence. Hence we have applied a further low-gearing factor of 25% that represents an assumed degree of influence the EU ecolabel has had.

Considering population weighted sales data, and applying the above method, it can be shown that the estimate involves the application of a simple constant to the 5% level Direct Benefits (in fact it equates to an indirect benefit of l%). The estimated indirect benefits are provided below as in Table 39.

Table 39: Estimates of the Indirect Benefits Attributable to the EU Ecolabel's Influence with Ecolabel Schemes operating outside of the EU.

Resource	Saving in a 1% scenario	Units
Electricity	2,950	GWh/year
CO_2 produced from energy use	1.9	M tonnes/year
Water Use	2,500	G litres/year
Reduced Hazardous Substance Use	2.8	k tonnes/year
Material Savings (other than Hazardous Substances)	106	k tonnes/year
Reduced Discharges to Water	6	k tonnes COD/year
Reduced Air Pollution	3.5	k tonnes/year

3.2 Indirect Benefit 2 - *The use of the Ecolabel criteria in public procurement calls for tender.*

Whenever local, regional or national government release a call for tender for contracted services they can stipulate the quality or performance of any required materials to be used by the successful contractor. This can include the environmental credentials or performance of the said products, goods or service. An option for government procurement staff is to refer to ecolabel criteria of relevant product groups within third party verified, ISO Type I, labelling schemes. In short they could use existing ecolabel documents and/or criteria to help devise

[96] Where the population of the EU25 is taken as being 451 million and that of Australia, Canada, New Zealand and the USA combined is 350 million.

their own specifications[97]. The Commission published a set of procurement guidelines including the use of ecolabel criteria in tender specifications during August 2004[98].

There is a good example that specifically relates to the use of EU ecolabel criteria to establish public procurement specifications. In the UK the Department for Environment, Food and Rural Affairs (Defra) used EU ecolabel criteria to devise procurement QuickWins[99].

Defra found that EU ecolabel information is freely available in the public domain and provides a valuable overview regarding the variation in environmental performance of particular products. Recognising that it had access to robust information, Defra found that working with it was both efficient and effective in terms of the resources required and results obtained.

To this end we have estimated the time and cost savings to public bodies of using Ecolabel criteria as 'off-the-shelf' sources of product environmental information from which procurement specifications can be devised. Our assumption is that if the ecolabel source did not exist, to generate information as complete and with stakeholder involvement etc would require a similar level of expenditure to that of the ecolabel.

The calculation for potential savings has been based on the UK Government Procurement Guide known as 'QuickWins',

- Using the criteria of the Ecolabel's 22 product groups saves 22 x €25,000 (using the figure from Indirect Benefit 1), which equals €550,000.
- Potentially every Member State could use ecolabel information in this manner. Hence the potential is for savings of €13.7M for the EU25.
- If the ecolabel scheme realises its vision to grow, say by a factor of two, then the potential saving would reflect this and equate to €27.5M.

Total saving equals €27.5 Million

The following is a list of known examples of where Ecolabel criteria have been used in relation to public calls for tender.

- A UK computer manufacturer uses the ecolabel criteria to give them an advantage in Public Green Procurement calls within UK.
- The Belgian cabinet of the State Secretary for Sustainable Development has devised a website with a guide for sustainable procurement intended for public services. If an eco-label for a particular product group exists, the first recommendation is always to give preference to products that fulfill the criteria of the relevant eco-label.
- UK Defra Quick Wins
- A Danish printing house considers the ecolabel to be very important to its operations adding that most of its contracts won within the public sector is due to its products carrying an ecolabel

[97] So long as public procurement directives 2004/17/EC and 2004/18/EC are followed which, amongst other things, states that the ecolabel criteria need to be based on scientific information, that all stakeholders have participated in the adoption of the ecolabel and that a procurers cannot insist on a product being ecolabelled.
[98] http://europa.eu.int/comm/internal_market/publicprocurement/docs/keydocs/gpphandbook_en.pdf
[99] http://www.ogcbuyingsolutions.gov.uk/environmental/downloads/Table_050303.doc

- The example of the Use of Ecolabel in Public Procurement in Ireland[100] "Public Purchasing" that aims to create a demand for the Eco-label through the Government sector by;
    - Having Eco-label criteria included in relevant Government tenders
    - Using government 'multipliers' to influence other Government Departments and producers.

3.3 Indirect Benefit 3 - *The use of the Ecolabel criteria in private procurement calls for tender.*

Similar logic to that applied to Public Procurement above is relevant in the context of Private Procurement. Private companies are at liberty to set specifications for the products and services they wish to buy. Buying 'green' might be part of the organisation's vision or environmental policy.

In the absence of statistics regarding the number of EU companies devising green procurement specifications, we have estimated the number of companies that might reasonably be expected now or in the near future to do so. Our estimate is based on the assumption that companies that are EMAS or EMS registered have a heightened awareness of environmental issues and of the EU ecolabel and that this is reflected to a degree in their purchasing behaviour.

If an organisation were to devise specifications itself it would need to expend resources doing so. An alternative is to use ecolabel criteria. Not only do these offer cost-savings in terms of staff-time saved but they are devised to a known, high standard that involves a market appraisal, identification of life cycle issues and stakeholder consultation. Ecolabel papers and reports prepared during the criteria development process lend confidence that the criteria are justified, based on science and provide a helpful reference source.

Our estimate is based on the following reasoning:

- The number of EMAS registered organisations as at 31 December 2003 was 3500[101]. We assume that twice this number of other organisations follow the principles of EMAS but without actually registering. We further assume that EMAS registered organisations and those adhering to EMAS's principles are fully aware of the EU ecolabel. Hence the number of 'EMAS' organisations aware of the ecolabel is 10,500.
- We assume that these organisations either use, or could be readily persuaded to use, the ecolabel to help them establish product specifications.
- The number of EMS registered organisations as at June 2003 was 50,000. Of these 47.1% are based in Europe[102]. We further assume that EMS registered organisations in the EU are fully aware of the EU ecolabel. Hence the number of 'EMS' organisations aware of the ecolabel is 23,500.

[100] http://europa.eu.int/comm/environment/ecolabel/pdf/market_study/irlpresofresults.pdf
[101] Source: Europa web-site
[102] ENDS Report, 344, September 2003

- We assume that these organisations either use, or could be readily persuaded to use, the ecolabel to help them establish product specifications.
- Consequently we estimate that 34,000 organisations across the EU use or could be persuaded to use the EU ecolabel in devising their procurement specifications.
- It is unlikely that all these organisations would be involved in purchasing products or materials against all ecolabelled product types. An assumption is made that each organisation makes or could make use of the criteria from three ecolabelled products.
- We assume that in the absence of the ecolabel, someone within an individual organisation would need to spend time identifying key life cycle issues for a product, product performance variation in the market place and then developing procurement specifications. This task we conservatively estimate to take four days and that the day-rate of the individual concerned in €500 per day.

The indirect benefit calculation is then 34,000 x 3 x 4 x 500 = €204 Million.

We make a further assumption that the competition for private procurement contracts drives, albeit in a small way, general product improvement. We assume that product improvement is driven across a wider range of products than those that are ecolabelled. For example, aspects of the criteria for Footwear are relevant to other leather goods and certain criteria for any of the electrical and electronic ecolabel products are relevant to electrical and electronic equipment in general.

Our broad brush assumption is that this benefit is best related to the Direct Benefits detailed elsewhere in this report and is valued at 1% of the total Direct Benefits as shown in Table 40.

Table 40. Indirect Benefits Derived from Private Procurement Driving Product Improvement

Resource	Saving in a 1% scenario	Units
Electricity	2,950	GWh/year
CO_2 produced from energy use	1.9	M tonnes/year
Water Use	2,500	G litres/year
Reduced Hazardous Substance Use	2.8	k tonnes/year
Material Savings (other than Hazardous Substances)	106	k tonnes/year
Reduced Discharges to Water	6	k tonnes COD/year
Reduced Air Pollution	3.5	k tonnes/year

3.4 Indirect Benefit 4 - *The use of the Ecolabel criteria by companies as a benchmark for their own products or as a target to improve their environmental performance.*

3.4.1 General Product Improvement

From discussions held in various ecolabel ad-hoc working group meetings, it is known that some companies use EU ecolabel criteria to indicate that their products comply with ecolabel requirements. Indeed at such meetings specific product environmental specification sheets have been presented showing statements to the effect that ‘this product complies with EU ecolabel criteria’.

We do not know how widespread the practice is. Our presumption is that the practice is limited to larger companies; that is those that are more likely to have an Environmental Affairs Manager or equivalent who's remit includes maintaining an awareness of environmental issues, policy, drivers and ecolabels. Smaller companies are unlikely to be able to resource such an individual.

That some larger companies produce product specification sheets declaring a given product's compliance with EU ecolabel criteria, implies that those companies employ someone whose job includes keeping a watchful eye on ecolabel developments and making use of ecolabel information.

The benefit derived from declaring compliance with ecolabel criteria (whilst not actually applying for the ecolabel) is the ability to declare that a product complies with an independently devised, high performance standard that is applicable across the EU. In effect, it lends credence to the producer's own claims for their product. In short, the company can realise a marketing advantage.

With this being the case, one might presume that:

- other companies will observe the practice and will seek to take advantage of the same opportunity
- that those producers who use the ecolabel in this way will want to upgrade their products as the ecolabel criteria are improved over time; they will not want to lose the advantage

Buyers of the product are interested in benchmarking because it provides them with a clear, independent indication that the product in question is of a high standard, that (where relevant) operating costs may be lower and that there is a public relations advantage should they choose to promote the fact that they buy 'green'.

Our assumption is that the benefit derived can be linked to the Direct Benefits identified elsewhere in this report. We value the benefit at 1% of the total direct benefits but there is technical potential to grow the benefit to 10% in the medium to longer term assuming:

- the ecolabel becomes more widely known through its own marketing activities,
- green procurement and the use of ecolabel criteria to devise procurement specifications drives wider knowledge of the ecolabel,
- directives such as the Energy Using Products Directive[103] (presently in draft) raise the ecolabel's profile boosting awareness of it and the ecolabel's uptake,
- the scheme itself realises its potential to expand by a factor of two in the medium term (a desire noted in ecolabel Policy Management Group discussions).

[103] The EuP Directive requires producers to use life cycle thinking to inform the design of their products and to be able to demonstrate this. Ecolabelled products are deemed by the Directive to be compliant with its requirements. Hence it may be attractive to producers to apply for the ecolabel, securing the marketing benefits the ecolabel has to offer and at the same time the ecolabel can be used to prove compliance with EuP requirements.

Table 41. Potential savings from Indirect Benefit 4 (includes the ecolabel expanding to 50 products)

Resource	Saving in a 1% scenario	Units
Electricity	2,950	GWh/year
CO_2 produced from energy use	1.9	M tonnes/year
Water Use	2,500	G litres/year
Reduced Hazardous Substance Use	2.8	k tonnes/year
Material Savings (other than Hazardous Substances)	106	k tonnes/year
Reduced Discharges to Water	6	k tonnes COD/year
Reduced Air Pollution	3.5	k tonnes/year

3.4.2 Cost Benefit to Companies

Here we assume that in the absence of the ecolabel, some companies would still choose to demonstrate that their product(s) are amongst the best in class. We have assumed that 1000 companies would follow this course of action.

To benchmark their product(s) in this way, companies would need to gather appropriate information and data regarding the product's life cycle impacts, the market for the product across the EU25 and the variation in the product's environmental performance (all issues that are covered by the ecolabel). We assume this would require 10 days of effort at a day rate of €500.

We further assume a need to have the results of the benchmarking exercise independently verified for which an independent third-party would need to be employed. This would involve the company in expending additional resources such as issuing an invitation to tender, awarding a contract and managing the work. Our assumption is that this requires five days effort from the third-party and three days effort within the company to award and monitor the contract. All work is at a day-rate of €500.

If we assume each of the 1000 companies benchmark a single product, the indirect benefit calculation is then 1000 x 18 x 500 = €9 Million.

3.5 Indirect Benefit 5 - *The use of the Ecolabel criteria to generate Type III labels (environmental product declarations), or recommendations on how to make green claims (Type II).*

Some Competent Bodies commented that certain companies use Ecolabel criteria to help them develop their own green claims (Type II labels). For example, the criteria for the Ecolabel (and the Swan) are used by some members of the detergent industry, to make claims that they use detergents without certain chemicals[104].

[104] For example, linear alkyl sulphonate (LAS)

In order to calculate the potential savings due to this indirect benefit to the environment, we have used the summary of the calculated direct benefit savings.

We have assumed that of the 22 product groups covered by the Ecolabel, 1% of the entire market for those products includes some sort of green claim (Type II) or have an Environmental Product Declaration (Type III) that is ultimately derived from the Ecolabel's criteria for that product. This factor was then applied to the summary of savings for all product groups from the direct benefits and is shown in Table 42.

Table 42. Potential savings from Indirect Benefit 5.

Resource	Saving in a 1% scenario	Units
Electricity	2,950	GWh/year
CO_2 produced from energy use	1.9	M tonnes/year
Water Use	2,500	G litres/year
Reduced Hazardous Substance Use	2.8	k tonnes/year
Material Savings (other than Hazardous Substances)	106	k tonnes/year
Reduced Discharges to Water	6	k tonnes COD/year
Reduced Air Pollution	3.5	k tonnes/year

3.6 Indirect Benefit 6 - *The use of the Ecolabel criteria & procedures/structures to generate minimum environmental requirements applicable to all products of a product category on the market.*

In 2002/03, the European Association for the Co-ordination of Consumer Representation in Standardisation (ANEC) initiated a project with AEA Technology, to investigate if and how ecolabel criteria and the criteria development process could be used to devise minimum product specifications.

The study found that the ecolabel process of understanding a product's market and sales, variations in environmental performance, and the opportunity for technical advancement, all of which is informed with the co-operation of an ad-hoc working group of experts and interest groups, could indeed be used to establish minimum specifications along with the ecolabel's 'best practice' requirements. The ecolabel's processes were thought to be particularly useful for Energy Labelled products. Whilst the task for other products was more complicated, it was not impossible.

The ecolabel could be used to derive minimum specifications that could then be discussed with industry with a view to implementation, perhaps, for example, via voluntary agreements.

The 'value' inherent in doing this is regrettably limited by the ecolabel's processes – it typically takes 18 months to devise product criteria with the ecolabel 'programme' being limited to three or four new-start products per year. Consequently the ecolabel would not, using its present arrangements, be able tackle a great number of products. Nonetheless, the ecolabel has a valuable asset in the knowledge, expertise and information that it has that could be used to derive greater benefit.

In monetary terms, the indirect benefit is not as great as for some other indirect benefits – it is more the fact that the existing arrangements could provide an additional deliverable without the need for significant additional investment in terms of Commission staff, offices etc[105]. In terms of project costs, the benefit is the avoided cost of approximately €25k per product group to fund the study itself and perhaps as much as €100k in terms of the time that the AHWG members etc invest in participation at meetings and reviewing documents and proposals.

We assume that the background data and information for all the 22 product groups presently ecolabelled could be turned into minimum specifications.

The monetary benefit is therefore: 22 x (25,000 + 100,000) = €3 Million

In terms of environmental improvements, the benefits of establishing minimum specifications could be enormous across the EU 25 and are clearly linked to:

- the number of product groups for which requirements are established
- the level at which the specification is set – in other words whether it is established to remove the worst performing 10%, 25% or whatever from the market.

Other points to consider are the sales profile across the range of performance specifications and that, say, the worst 10% of products are probably responsible for a disproportionately higher level of life cycle impacts (perhaps 20% or more depending on the product group).

We assume that an overall benefit equal to 10% of the Direct Benefits is potentially achievable as shown in Table 43.

Table 43. Indirect Benefits of using the Ecolabel to Derive Minimum Product Specifications

Resource	Saving in a 10% scenario	Units
Electricity	29	TWh/year
CO_2 produced from energy use	19	M tonnes/year
Water Use	25	T litres/year
Reduced Hazardous Substance Use	28	k tonnes/year
Material Savings (other than Hazardous Substances)	1	M tonnes/year
Reduced Discharges to Water	67	k tonnes COD/year
Reduced Air Pollution	35	k tonnes/year

[105] It could argued that in the absence of the ecolabel team within the Commission, a team would need to be established to manage and steer the work. A rough estimate suggests this would be at an annual cost of several hundred thousand euros.

3.7 Indirect Benefit 7 – *The use of the Ecolabel criteria in the "new approach" as a basis for establishing whether companies have complied with "essential requirements"*

The draft Energy Using Products (EuP) Directive states that an ecolabelled product is deemed to be compliant with the Directive's requirements. Thus, if a particular manufacturer already has the ecolabel for a product, they need not undertake extra testing and compliance proving for the Directive, thus saving money.

Those companies without the ecolabel may be encouraged by the need to prove that their products comply with the EuP, to apply for the ecolabel if their product is close to complying with the ecolabel criteria already. Although they would have to pay like any other applicant to gain the ecolabel, they would be automatically gaining compliance with the Directive (should the product pass!) whereas they would have to pay 'twice' if they first sought to achieve compliance with EuP and then at a later stage decided to apply for the ecolabel. In addition to achieving both ecolabel and Directive compliance and gaining the marketing advantage the ecolabel offers, there will be an environmental benefit too as a resulting of product performance being raised to meet the ecolabel standard.

Therefore, this indirect benefit may be attractive to those manufacturers whose products are close to complying with the Ecolabel's criteria who could relatively easily meet the criteria perhaps if some product redesign was undertaken.

A general principle of the ecolabel, is that 25-30% of all products on the market within a particular product group should be able to comply with the ecolabel criteria[106]. We assume that the next 5% of products after the 25-30% that already fulfil the criteria, are close enough to the ecolabel requirements that they could be improved to meet the standard.

To determine the environmental gain of this indirect benefit we started from the direct benefit calculations, at 5% market share, for the energy using products; washing machines, dishwashers, refrigerators, TVs, computers and lamps. However, a further factor was included at this stage to take into account that these products are not the market average; they are towards the upper end of environmental performance. Hence any product design changes will not yield savings as great as the Direct Benefits. We have assumed therefore that these products only produce 10% of the savings attributed to the market average in the Direct Benefits. Results are presented in Table 44.

[106] Policy Management Group, Questionnaire Results, Brussels, 11th May 2004, Robert Nuij

Table 44. Environmental Benefits gained through an additional 5% of products moving towards the ecolabel standard

Energy Using appliance	Washing machines	Dish-washers	Fridges	Tele-visions	Computers	Lightbulbs	Totals
Energy Saved, GWh/yr	2.2	2.8	17.1	8.6	1.9	1,420	**1,455**
CO_2 saved, tonnes/yr	1,000	1,200	7,500	3,800	900	621,000	**635,400**
Water saved, million Litres/yr	40	2					**42**
Harmful substances avoided, kg/yr					80	40	**120**
material saved over bulb's lifetime, tonnes/yr						1,000	**1,000**

3.8 Indirect Benefit 8 – *The use of the Ecolabel logo, eco-label criteria and related discussion, to raise stakeholder awareness of the environmental impact of products, with stakeholders including manufacturers retailers, consumers, environmental NGOs and public administrations.*

The issue considered here is stakeholder awareness of the Ecolabel logo. There have been several surveys regarding awareness of environmental certification and labelling schemes. Each gives varying results depending on the questions posed and the survey group involved.

For example[107], 43% of Danish consumers polled were aware of the EU Ecolabel when aided by prompts, such as visual aids, but in another study where there were no such prompts, the figure was only 16%. In another instance a Norwegian Study[108] (Norwegian Institute for Consumer Research (SIFO)) found that *“seven out of ten Norwegians look for environmental information when buying household paper products and washing machines, but only 14% do so when choosing a hotel. In contrast, 42% of Spaniards select hotels according to green criteria. SIFO’s survey of 4,000 Europeans found that more Norwegians recognise the EU’s ecolabel ecolabel symbol than do Spaniards, Germans and Italians.”*

The European Consumers’ Organisation BEUC has also conducted a study on the awareness of the Ecolabel[109, 110]. The results from their study[111] show that 38% of Europeans know what the Ecolabel is. This study, conducted in 2002, is presumed therefore to relate to the EU15.

What these studies show is that the ecolabel is important in terms of the awareness it creates amongst consumers regarding environmental issues. Quantifying the effect is less than straightforward. However, it could be enormous in the longer term with the associated benefit that informed consumers may demand more effective environmental legislation.

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[107] http://www.mst.dk/homepage/default.asp?Sub=http://www.mst.dk/udgiv/publications/2003/87-7972-866-9/html/kap02_eng.htm
[108] http://www.iema.net/article.php?sid=2296
[109] http://europa.eu.int/comm/environment/ecolabel/pdf/ecolabel_news/sept02/04_ecolabel_newsletter_en.pdf
[110] http://www.beuc.org/Content/Default.asp?PageID=103
[111] http://212.3.246.142/Common/GetFile.asp?ID=3554&mfd=off&LogonName=GuestEN

- 38 % of Europeans considered to be aware of the ecolabel equates to 143 Million people.
- If we assume that only 5% of the EU+10 population are aware of the Ecolabel this equates to an additional 4 Million people.
- We estimate that there is potential to raise awareness to an average overall level of 50% across the EU15 Member States and 15% across the EU+10 Member States in the next five years.
- This equates to an extra 12% of EU15 equalling 45 Million people, plus an extra 10% of EU+10 equalling 7 Million.
- This totals 52 Million people. It is unlikely that all these people act on their knowledge and actually buy ecolabelled goods regularly so we make an assumption that just 20% do on a regular basis (10 Million people).
- We have assumed that each person spends €50 per year on ecolabelled products, on average. This takes into account those who just buy small disposable products such as detergents and those who buy larger, more expensive goods such as refrigerators.
- Therefore there would be an increase in value of the sale of ecolabelled products of €50 x 10 Million = €500 million per year.

Total potential increase in Ecolabelled Product Sales = €500 million per year

These additional ecolabel sales would be associated with an environmental improvement that we estimate to be equivalent to 1% of the Direct Benefits as detailed in Table 45 below.

Table 45: Indirect benefit due to greater awareness of the ecolabel

Resource	Saving in a 1% scenario	Units
Electricity	2,950	GWh/year
CO_2 produced from energy use	1.9	M tonnes/year
Water Use	2,500	G litres/year
Reduced Hazardous Substance Use	2.8	k tonnes/year
Material Savings (other than Hazardous Substances)	106	k tonnes/year
Reduced Discharges to Water	6	k tonnes COD/year
Reduced Air Pollution	3.5	k tonnes/year

3.9 Indirect Benefit 9 – *The use of the Ecolabel and its criteria as a basis for establishing fiscal measures to promote green products, (e.g. criteria for energy rebate schemes)*

Rebate schemes aim to remove, or lessen the impact of, arguably the most significant perceived barrier to the wider adoption of products with high environmental performance – their purchase price. In the UK for example, the Energy Savings Trust has operated rebates for A Energy Rated fridges and freezers and condensing boilers. Similar schemes operate across the EU and, broadly speaking, cover a similar range of product groups.

Feedback from our consultation with Competent Bodies identified a single rebate scheme that had offered a rebate against ecolabelled refrigerators and freezers.

Consequently we have devised a potential benefit on the presumption that the EU ecolabel could be promoted to rebate scheme operators as a mechanism for helping them to identify specifications for high performance products for which rebates could be offered.

Our view is that the potential benefit is relatively small in comparison to other indirect benefits because;

- It is more likely that only energy consuming products are of interest to rebate schemes - and not products such as textiles, paints and shoes,
- Rebate schemes tend to operate for a relatively short period of time (a few months to a year say),
- Rebate schemes operate with limited funds so are unable to have a sustained impact.

As a first approximation we assume that the potential benefit is equivalent to 1% of the direct benefits calculated for energy using products as presented in Table 46 below.

Table 46: Calculation of Indirect Benefits due to Rebate Scheme use of Ecolabel Criteria as an aid to Establishing Product Specifications.

Energy Using appliance	Washing machines	Dishwashers	Fridges	Tele-visions	Computers	Lightbulbs	TOTALs
Energy Saved, GWh/yr	0.4	0.6	3.4	1.7	0.4	284.4	**290.9**
CO_2 saved, tonnes/yr	200	250	1,500	1,000	170	124,000	**127,120**
Water saved, million Litres/yr	8	0.4	-	-	-	-	**8.4**
Harmful substances avoided, kg/yr	-	-	-	-	15	10	**25**
Material saved over bulb's lifetime, tonnes/yr	-	-	-	-	-	200	**200**

4 Case Studies and Success Stories

Originally the idea for case studies was to provide examples of how companies have benefited as a result of adopting the ecolabel. These examples could then promoted to others with the aim of raising awareness regarding the advantage to business of ecolabelling products.

As the work unfolded however, this view altered because:

- There are other mechanisms for capturing and publicising success stories of this type. Notably the EU Ecolabel Marketing Management Group undertakes such work that is now rolling out into the LIFE funded ecolabel promotion campaign. Success stories are captured and communicated by the Commission's own Ecolabel newsletter. Consequently it was not clear that devising case studies as part of this work was helpful.
- The benefit, to both the environment and the scheme itself, that potentially could accrue from the indirect benefits was both large and new in the sense that they have not previously been recorded or discussed.

Hence the case studies that follow draw upon the indirect benefits identified by EUEB members.

4.1 Green Procurement

National governments have immense spending power. In the UK this figure currently stands at approximately £100 billion per year and is predicted to rise to £120 billion by the year 2010.[112] With this level of purchasing government can influence the market place and drive change for the better, should it wish to do so.

Sustainable procurement has come up the agenda in recent times both at local national and international levels[113] and is now an important part of policy.

"Sustainable procurement will not be achieved overnight, but this guidance is a vital first step to put in place the structures to support and encourage all those involved in government procurement in delivering this important commitment."

Margaret Beckett, on behalf of Defra and the Office of Government Commerce, 2003

Presented by defra   OGC buying.solutions

[112] Speech from the UK Minister for the Environment, Elliot Morley, at the National Conference for Implementing Sustainable Procurement, London, October 2004, http://www.govnet.co.uk
[113] See 'Buying green! A handbook on environmental public procurement' Brussels, 18.8.2004 SEC(2004) 1050

In November 2003 the UK's Department for the Environment, Food and Rural Affairs, Defra, in conjunction with the Office of Government Commerce, buying solutions, OGCbs, raised the visibility of sustainable procurement in the public sector. This was achieved by ministers signing up to a set of measures that would promote sustainable purchasing practices. Anything bought by central government must consider and apply a set of minimum environmental performance standards for a range of products from computers to detergents, covering criteria such as energy and water use and recyclability.

To help procurement staff across government departments a list of 'Quick Wins' was devised and published[114] to be used as a quick and easy reference document as to the minimum standards required given by product. This details twenty-seven products, the minimum environmental performance demanded for each and examples of products that comply.

It is now one year since the initial announcement and it is the intention of Government to update the Quick Wins list. The process is being refined and improved by using product information and data from the UK Government's Market Transformation Programme MTP. This is where the EU Ecolabel has imparted an important indirect benefit by making data available on the performance and specifications of the best products in the market place, gained through studies and research in the development of product criteria.

This invaluable information has enabled the performance of products within a specific product group to be pegged out, whereby the ecolabel specifications form the top end of the market's performance and other information has provided the market average and lower specifications. From here, a Government Minimum Procurement Standard, or Quick Win for short can be devised, taking into account that this level of product has to be actually present in the market place and in sufficient quantities to supply large government contracts.

4.2 ECOgent General Purpose Cleaner

ECOgent is the first North American company to gain the Ecolabel for a cleaning product, namely their all-purpose cleaner.

In this example, the Canadian company Cogent are the designers and patent holders of an environmentally friendly cleaning product, that bears the US Green Seal Label, Environment Canada's Environmental Choice Label and the Envirodesic Certification label[115]. They recently applied successfully for the European Ecolabel, via Defra in the UK, to be licensed to put the Ecolabel logo on their General Purpose Cleaner and subsequently distribute it in Europe from the UK.

This is an example of where the EU Ecolabel has an international cachet (there are other examples, from Australia, for instance) and shows the widely-held respect that it enjoys. As manufacturers are

[114] http://www.ogcbs.gov.uk/environmental/products/environmental_quickwins.asp

[115] Envirodesic ™ is concerned with sustainability, environmental impact, indoor air quality and health impact on chemically hypersensitive individuals.

looking further a field for new markets into which to sell their products, many now believe that environmental certification will give them the differentiation that they need to distinguish their product from other more established (and possibly locally produced) products already available.

From the manufacturer and producer's point of view the Ecolabel is widely recognised across Europe and thus makes the task of gaining a badge of environmental credibility easier as only one such label is required, rather than several national labels. The Label is also held in high esteem by manufacturers as it is accepted as proof that the product has top-level environmental credentials for that product range.

Chemspec, distributors of ECOgent products in Europe, are currently running a trial with Oxfordshire County Council (OCC) in England with their ECOgent cleaning product range using OCC's contract cleaners, the purpose of the trial being to prove better environmental performance and workplace health performance. This instance links in with the sustainable procurement issues covered in the previous case study, which discusses how products with a better environmental performance can be stipulated in government procurement specifications (possibly via minimum standards), the Ecolabel being a shortcut to such procurement specifications and simultaneously high environmental accreditation.

The Ecolabel label therefore brings benefits to manufacturers of universal recognition, acceptance in the market place and instant understanding of what the label signifies about the product that displays it.

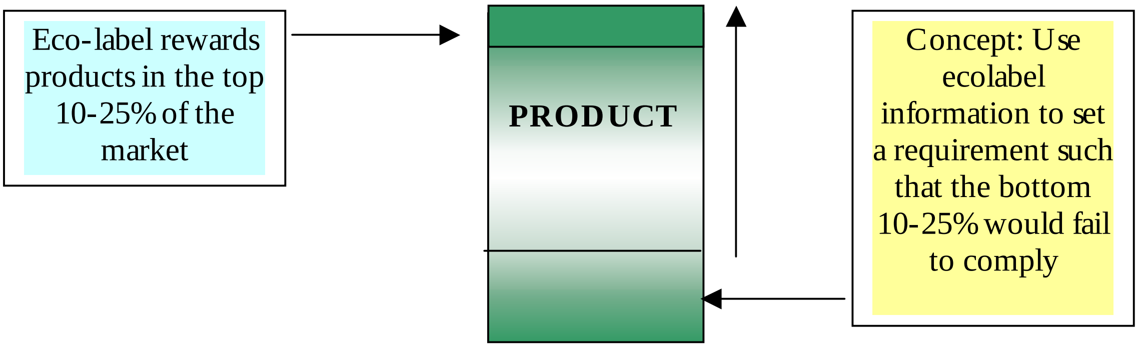
For more information, see
http://www.defra.gov.uk/environment/consumerprod/ecolabel/index.htm ,
http://www.ecogent.ca/index1.htm and
http://europa.eu.int/comm/environment/ecolabel/news/index_en.htm

4.3 Using EU Eco-label Criteria to Develop Baseline Requirements Applicable to all Products on the Market

The EU ecolabel sets its requirements such that only the best performing products and services can attain the award for environmental excellence. Typically criteria are set that means for any given product group, just 5 to 25% of products can comply (although this limit is flexible).

To enable criteria development, the ecolabel uses a broad range of information. Environmental performance related data showing the variation in product characteristics is key to this.

ANEC, which represents the voice of European consumers in standardization, envisaged an opportunity to use the ecolabel's background information to devise minimum performance standards. The concept is illustrated below.



ANEC argued that if minimum performance standards can be identified, then they would provide a useful input to developments surrounding Integrated Product Policy (IPP). IPP aims to reduce product environmental impacts throughout their life-cycle. The use of ecolabel information to devise minimum standards was seen as a helpful and pragmatic step benefiting both IPP and the ecolabel. In addition, it would forge a clear link between the two marking out a clear role for the ecolabel.

Using ecolabel reports and background data, ANEC undertook a study to identify and investigate the key issues affecting the environmental performance of a product. These were:

- Determining the variation in product performance,
- Determining sales for a given product group,
- Using life cycle thinking to identify the product's environmental impacts throughout its life-cycle.

Following an initial assessment of all the products covered at that time by the EU ecolabel, the study focused upon five product groups for more detailed evaluation: dishwasher detergents, dishwashers, paints and varnishes, textiles and vacuum cleaners.

The study found that sufficient information exists in the public domain to devise justified, minimum standards for certain products such as dishwashers. However, for other products, such as paints and varnishes, the available information is comparatively scant. So whilst identifying the principle life-cycle impacts was possible, the available data was less helpful in terms of devising performance requirements.

Nonetheless, if the available information from the ecolabel is used allied to that from other sources, it ought to be possible to fill any remaining gaps by undertaking testing to gauge the variation in product performance and by obtaining input from key stakeholders who would develop a consensus on key issues.

4.4 The Use of EU Eco-label Criteria by National Ecolabel Schemes

There are several national ecolabel schemes operating in different EU Member States with perhaps the Nordic White Swan and German Blue Angel being amongst the most well-known.

Outside of Europe, there are many other national ecolabels with schemes operating in such countries as Australia, Canada, Japan, New Zealand and the United States.

All of these ecolabels share a similar goal – to serve as a market differentiator by making an award available for those products and services that achieve a high level of environmental performance.

Such has been the growth and success of ecolabelling, that in 1994, the ecolabel schemes formed an association called the Global Ecolabelling Network[116] (GEN) to promote, improve and further develop ecolabelling.

Whilst GEN has several important activities, a key one is to encourage co-operation between individual schemes. Co-operation takes different forms, with the exchange of information and working towards harmonisation being prominent. This is a very practical approach to devising product criteria given the international nature of today's market place. Criteria set for a product by one scheme are likely to be as relevant for another country's ecolabel.

Because the EU ecolabel makes both its product criteria and all the background work leading to the development of those criteria available in the public domain, it is a valuable reference source for other ecolabel schemes. Indeed the EU ecolabel's influence extends beyond Europe as far a field as Canada and New Zealand. Here its documentation is used to inform the development of local criteria by, for example, identifying the key environmental impacts associated with a certain product.

As one scheme operator said '*We take a pragmatic approach. We review EU ecolabel criteria and adapt them for local conditions – it saves us time and money. There's no point repeating what has already been done'*.

The EU ecolabel's openness and transparency is not only a great help to other scheme operators but is valuable for raising awareness of the scheme and the product related environmental issues it addresses.

[116] For information regarding GEN activities and membership see http://www.gen.gr.jp/

5 Conclusions

Overview
A criticism levelled at the EU ecolabel from time to time is that its achievements to date are not commensurate with the vision bestowed upon it the early 1990s when it was first devised. Usually such remarks are allied to statistics regarding the number of products licensed or the number of companies adopting the ecolabel.

There is a degree of truth in these remarks. If one were to calculate the environmental benefit, such as energy saved or tonnes of material-use avoided, achieved by the ecolabel's activities to date, it would be small. However, this approach to gauging the impact of the ecolabel does not consider;

- the scheme's nature in that it is targeted towards excellence and hence only a small sub-set of products can meet its requirements,
- it is voluntary
- that the scheme has an appreciably wider influence than it is given credit for.

As is the case with an iceberg, the extent of the ecolabel's wider influence is largely unseen. In those few instances where an influence is noted, it passes by unrecorded and untapped. In itself, this is not surprising. None of these 'indirect benefits' were devised by the scheme or targeted by its activities. They are unplanned for - but need to be recognised, welcomed and developed. They have a role in the ecolabel's ongoing evolution.

As Mme Wallström, Commissioner for Environment, recently remarked *"Since the year 2000 the number of eco-labelled items sold has risen by 300%. The challenge we now face is to build on this progress and further raise the profile of the "Ecolabel"*.

Cost Effectiveness
This study has identified that significant environmental improvements can be achieved by the ecolabel helping to drive forward improvements in product design – even at the 5% market penetration level discussed under Direct Benefits. Considering that the ecolabel only covers 20 or so products at the present time amongst a pool that numbers thousands available on the EU market, there is a clear argument for expanding the ecolabel markedly.

Regarding the cost-effectiveness of the ecolabel, if we consider the Direct benefits at the 5% level it is noteworthy that the ecolabel could save some 9Mt of CO2 through reduced energy consumption. This means the ecolabel's potential is equivalent to saving the annual CO2 emissions of 1M people[117].

Analysis by the European Climate Change Programme (ECCP) working groups in June 2001, suggested that the marginal costs of reducing CO2 emissions in a given year are 12 euros per tonne in 2010 (rising to 16 euros in 2015). The figure considers the average cost of abating a tonne of CO2 given a basket of policy measures and programme activities; in other words

[117] Source – ECCM 2000. UK CO2 emissions equate to 9.4 tonnes per person per annum.

some of these activities will save a tonne of CO_2 at a lower than 12 euros cost, whilst for others the cost is higher.

If we estimate the annual cost of operating the ecolabel scheme, we can make a comparison between its costs per tonne of CO_2 saved and the ECCP's data and thus form a view of the ecolabel's cost effectiveness against a basket of other policy instruments and measures.

Because the actual annual cost of operating the EU ecolabel scheme is not known to us we need to form an estimate based on assumptions;

- the scheme is managed by seven full-time staff at a cost of 100k euros per year each
- the scheme funds 200k euros of research per year
- that each of the 25 member states has the equivalent of one full-time person dealing with ecolabel issues at a cost of 100k euros per year.

Hence the estimated total cost of operating the ecolabel scheme is 3.4M euros.

If the existing range of ecolabel products were to take 5% of the EU market, as in our estimate identified for Direct benefits, this would save some 9Mt of CO_2. In terms of the cost per tonne of CO_2 abated, this equates to less than 1 euro – suggesting the ecolabel is amongst the more cost-effective instruments.

Even at the level of 0.5% of the EU market (somewhat closer to the actual market share at the present time), the ecolabel would achieve CO_2 savings at a cost of under 4 euros per tonne; and hence represents, even at this lower market penetration level, a cost effective measure.

Given that the ecolabel is not a CO_2 specific activity (it addresses a much wider range of environmental issues), its potential cost effectiveness is excellent.

Realising the Benefits

The question posed of the Direct benefits though has always been and remains – how to achieve them? Who or what should be targeted, how, with what message? This study has shown is that the Indirect benefits, which take a number of forms, are significant. We suggest that the Indirect benefits are the key to unlocking and realising the Direct benefits. Their exploitation could succeed in a way that more traditional approaches, such as advertising, are unlikely to. That is not to say that advertising or other approaches to promote the ecolabel should not be considered but that such activities need to be constantly reiterated to achieve real and sustained change - and hence can be expensive.

Such is the magnitude of the Indirect benefits, that ways to drive them forward should be identified with new ideas being formulated, tried and tested. For example, using the ecolabel criteria development process to devise simultaneously an ecolabel criteria set and a product-relevant minimum standard makes sense (as shown in the ANEC case study). The same key stakeholder group needs to be consulted regarding a similar product performance dataset and background life-cycle information. The very same work could also feed into the development of procurement specifications (as per the UK Defra procurement case study). Even the ecolabel's current practice of revising criteria sets every three to five years fits with the concept – the same process could be used to revise the minimum standard and procurement specifications.

Clearly a way needs to be found to taking such ideas forward but the effort is well worthwhile. It would more fully integrate the ecolabel with other instruments and policy measures operating within the framework of Integrated Product Policy (IPP). Indeed such is the extent of the experience and knowledge tied up within the ecolabel (largely within the EUEB) and such is the extent of the ecolabel's information needs, that there is scope for the ecolabel process to become the Commission's engine-room for product related developments. This would present the ecolabel with a significant new role that it could use to benefit the wider remit of IPP.

As Mme Wallstrom has remarked, there is a need to build on the ecolabel's progress and raise its profile. A first step would be explore how to build upon the indirect benefits identified in this study and to review the present procedures which are rate limiting in terms of the scheme's evolution, growth and influence. The revision of the ecolabel regulation presents an exciting opportunity to consider these points.