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EFFECTS OF ECO-LABELLING SCHEMES: COMPILATION OF RECENT STUDIES

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EXECUTIVE SUMMARY

Assessing and measuring the actual effects of eco-labels is difficult. The OECD has done extensive work on environmental labelling, some of which has included looking at the economic and environmental effects of eco-labelling schemes. One example is a 1997 study which examined the market, trade and environmental effects of selected eco-labelling schemes operating in OECD countries.[1] Since then, new empirical studies have deepened the analysis of the effects of selected eco-labelling schemes, including the German Blue Angel, the Nordic Swan, the US Energy Star, the Korean Ecolabel, Japan's Eco Mark and New Zealand's Environmental Choice. One recurrent finding in the studies is the difficulty to obtain data, especially for assessing environmental effects. It is also difficult to compare the effects of different schemes, because they use different methodologies and focus on different issues.

Main effects of eco-labelling schemes

Most of the studies looking at the various effects of eco-labelling schemes focus on effects on producers, consumer behaviour, markets, and the environment. These different effects are closely linked: producer and consumer behaviour will, to a certain extent, affect markets, and may in turn lead to effects on the environment. However, few studies examine these various linkages in depth. Some authors point out the difficulties of isolating the effects of an eco-label from effects caused by other factors, such as general technological improvements in a sector, or policy measures adopted in parallel with an eco-label.

Effects on producers

Industries' behaviour worldwide has changed, with many making improvements to their environmental performance as they strive to meet consumers' increased demand for environmentally preferable products. This also has an influence on suppliers since manufacturers are increasingly demanding proof of their products' environmental soundness in order to prevent future liability or negative publicity. Eco-labels may serve as a communication tool, allowing for environmental benchmarking. The criteria of an eco-label may help orient companies' R&D activities and internal requirements for construction departments.

Effects on consumer behaviour

Some studies reveal consumers willingness to pay more for eco-labelled products. The study on the Nordic Swan cited several reasons: consumers seemed to have great confidence in the Government (which certifies the label); environmental issues received substantial attention in the media; and there appeared to be wide acceptance of policies pursuing relatively ambitious environmental goals. Other factors seem to be consumers' levels of education and environmental involvement, and the type of additional information available. There may also be potential negative impacts of environmental labelling on consumer behaviour,

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[1.]   OECD (1997), *Eco-labelling: Actual Effects of Selected Programmes*.

such as increased consumption. Consumers that purchase 'green products' can be led to believe that they have 'done their bit' for the environment, which could result in consumption levels continuing to increase rapidly over time.

Market effects

Assessing the performance and effectiveness of a label by measuring its recognition by manufacturers and consumers does not actually say much about its effectiveness: some product categories chosen for labelling may have failed to meet their objectives, while others may have been useful for fostering other measures to reduce product-related pollution. One of the most important market effects of the Energy Star label is "an enhanced market for energy efficiency". By providing more information to businesses and homeowners, the eco-label contributed to reduced transaction costs and investment risks and was therefore considered to lead to a higher number of energy efficiency projects in the building sector and purchases of energy-efficient equipment.

Environmental effects

When supported by, and complemented with, additional measures and tools, such as "green" public procurement, the effects of an eco-label can improve significantly. This was the case with the Blue Angel label. In addition, labels often prove to be a facilitator and "door-opener" for new, binding regulations. Eco-labels can contribute to the development of a more environmentally conscious market (and market behaviour) and help set standards for product development and manufacturing, directives and support programmes, and contribute to a systematic approach in decision-making (life cycle assessment). They can also have a multiplier effect (raising public awareness for environmentally preferable products beyond the labelled product group), and make the public aware of the environmental impacts of consumption, and can therefore be employed to influence national policies. However, it is often difficult to isolate the effects induced by an eco-label from those of other environmental measures.

When is an eco-labelling scheme successful?

In general, eco-label criteria are set so that only a small percentage of products in a product category (typically, 5 to 30%) can meet these criteria. With a share higher than 30%, eco-labels no longer selectively identify a sub-set of products that are environmentally preferable to other products in the same category. Further preconditions for the successful functioning of a labelling programme, identified in a study on the Blue Angel, include: being informative and easily understood by consumers, reducing product-related environmental pollution through innovation and diffusion of environmentally improved products, and providing sufficient economic incentive to manufacturers to respond to the programme.

INTRODUCTION

At its meeting in November 2003, the OECD's Joint Working Party on Trade and Environment (JWPTE) agreed to carry out a compilation of existing work on the environmental and economic effects of eco-labelling schemes. This compilation was seen as a necessary step before any further work in this field could be carried out under the 2005-6 Programme of Work and Budget.

This report contains an overview of some recent empirical studies dealing with the effects of eco-labelling schemes. All schemes examined in this overview are voluntary, and government-sponsored.[2] The report includes a list of recent studies; describes the different methodologies used in these studies to measure the effects of eco-labelling schemes; and summarises the main findings on the effects of the various studies (effects on consumers, on producers, market effects, and environmental effects). The final section summarises some ideas on when an eco-labelling scheme can be considered successful.

Summary of previous work

The OECD has done extensive work on environmental labelling, some of which has included looking at the economic and environmental effects of eco-labels. An OECD workshop on Life-Cycle Management and Trade held in June 1993 looked at the trade implications of trends in eco-labelling and at eco-labelling schemes as potential barriers to trade.[3] It considered also different policy approaches for minimising the potential negative trade effects of life-cycle-based initiatives such as eco-labelling. The OECD international conference "Eco-labelling for a Sustainable Future in 1998 also studied the effects of eco-labels.[4]

In 1997, the JWPTE examined selected eco-labelling schemes operating in OECD countries (namely the EU Flower, the Swedish Environmental Choice, the Nordic Swan, the Canadian Environmental Choice, the German Blue Angel, the US Green Seal, the Japanese Eco Mark and the French NF Environnement).[5] The purpose of this work was to examine the actual market, trade and environmental effects of these programmes. The study first identified and described the selected eco-labelling schemes in terms of their administrative structure, product selection, criteria development, and application processes. It also examined issues related to transparency and consultation processes. For each scheme, the current and short-term market and trade impacts, and their environmental effectiveness were analysed. The main findings of the study were that:

[2.]   Most information was available on websites of the schemes, and some additional, partly unpublished material was provided by the schemes' representatives and JWPTE Delegates.

[3.]   OECD (1993), *Life-Cycle Management and Trade*.

[4.]   OECD (1999), *Conclusions and Papers Presented at the International Conference: Green Goods V - Eco-labelling for a Sustainable Future*.

[5.]   OECD (1997), *Eco-labelling: Actual Effects of Selected Programmes*.

- The impact of eco-labelled products on the market is directly linked to the general level of environmental awareness and, consequently, the consumer demand for green products.

- Eco-labelling schemes have greater impact when they become a requirement imposed by retailers or when they are used as instruments for "green" public procurement and institutional purchasing.

- No hard evidence could be found of changes in trade flows arising from the selected eco-labelling programmes.

- The impact of an eco-label on the market for a specific product is difficult to evaluate. Eco-labels are one of many factors that can influence the market penetration of products.

- The environmental effectiveness of eco-labelling in terms of measuring improvements to the environment is also very difficult to evaluate — owing mainly to difficulties in isolating environmental benefits achieved through eco-labelling from environmental benefits attained by other environmental measures.

- The market presence and visibility of eco-labelled products have contributed to the awareness of consumers. Eco-labels have also had an impact on the behaviour of manufacturers of certain categories of products.

Recent studies on the effects of eco-labels: overview

There are hundreds of eco-labelling schemes in place, and numerous studies have been done on the various aspects of eco-labels. However, only very few of these studies have analysed the environmental or economic impacts of labelling schemes on the basis of empirical evidence.

Building from the 1997 report, this paper includes studies that analyse the effects of voluntary government-sponsored schemes. Most of these studies have been produced or mandated by the labelling schemes themselves, and a few have been done by governments.

For the purposes of this report, the following recent studies have been examined:

- *Public Good and Environmental Labelling,* by the Ministry for Environment of New Zealand (2001). This study reviews environmental labelling schemes, and especially New Zealand's Environmental Choice label, in regard to their ability to deliver public benefits.

- *Investigation of the Market Impacts and Penetration of the European Eco-label over the Years 1992-2000 and 2001-2004* (European Commission, 2001). This report assesses the past (1992-2000) efficiency of the EU Flower scheme in terms of resources devoted and market penetration of labelled products, and explores the different possibilities for the development of the eco-label for the years 2001-2004.

- *Market Survey 2002 – Survey of Market Share of Eco Mark Certified Stationary Products* (Eco Mark Office/Japan Environment Association, 2002). This study presents the results of a survey conducted among certified Japanese corporations or distributors of selected certified products. The analysis aimed at verifying whether an increased demand for environmentally preferable products was reflected in an increase in the sales of Eco Mark-certified products and measuring their market position.

- *The Effect of the Nordic Swan Label on Consumers' Choice* (Bjørner *et al.*, 2002). This empirical analysis of the environmental effects of the Nordic Swan Label is based on purchase decisions of Danish consumers. It employs a large Danish consumer panel with detailed information (weekly observations) on actual purchases from the beginning of 1997 to the end of January 2001.

- *Environmental Labelling, Innovation and the Toolbox of Environmental Policy – Lessons Learned from the German Blue Angel Program* (Müller, 2002), and *Evaluation 25 Jahre Blauer Engel* (Eberle and Reuter, 2003). These studies provide an analysis of the economic and, primarily, the environmental achievements of the scheme, carried out on the occasion of its 25th anniversary.

- *Social Costs and Benefits of Ecolabelling*, by the Korean Environmental Labelling Association (KELA, 2004). This report summarises the main findings of previous studies and statistics about the Korean eco-label.

- *Are Eco-Labels Valuable? Evidence from the Apparel Industry* (Nimon and Beghin, 1998). The goal of this study was to identify how the market values the environmental attributes of apparel goods in the United States. Price premiums or discounts associated with the environmental characteristics advertised by the eco-label were identified as indicators.

- *Ecocertification: Why it may not be a "Field of Dreams"* (Teisl, Roe and Levy, 1999). This study analyses the market effects of eco-labels in the US electricity supply market in order to provide electric utilities and environmental regulators with information on consumers' reactions to the "eco-marketing" of electricity.

- *Energy Star – The Power to Protect the Environment through Energy Efficiency* (USEPA, 2003). This USEPA report reveals environmental and economic benefits of the eco-label Energy Star and its contribution to a more efficient energy use.

- *Can Eco-Labels Tune a Market? Evidence from Dolphin-Safe Labeling* (Teisl, Roe and Hicks, 2001). This empirical study tests whether or not dolphin-safe labels altered consumer purchases and the market share of canned tuna in the United States. A welfare analysis shows society's willingness to pay for dolphin-safe labelled tuna in order to contribute to dolphin protection.

Measuring the effects of eco-labels

Assessing and measuring the effects of eco-labels is difficult. It is even more difficult to compare the effects of different schemes, for several reasons. First, the focus of the different studies varies. Most research seems to focus on market effects, and in particular, on consumers and their willingness to pay for labelled products and actual purchases – e.g., the studies on the Nordic Swan label (Bjørner *et al.*, 2002), the Japanese Eco Mark (Eco Mark Office, 2002) or the Energy Star label (USEPA, 2003). Secondly, some studies focus on a single product – e.g., household detergents (SNF, 1998) or tuna (Teisl, Roe and Hicks, 2001) – while others (Eberle and Reuter, 2003; KELA, 2004; Nimon and Beghin, 1998) consider a limited range of products, and attempt to assess their impact on the environment. Finally, as described below, these studies apply different methodologies to assess the impacts of the respective schemes.

One recurrent finding in the studies is the difficulty to obtain data, especially for assessing environmental effects. None of the studies in the overview analysed actual trade impacts.

The difficulty of assessing the effects of eco-labelling schemes was confirmed by various experts, including representatives of several schemes, who were contacted by the Secretariat. One expert, the representative of an eco-labelling scheme, indicated that "there is mostly anecdotal information or testimonials from companies about the label's effect". Another expert considered the question on economic and environmental effects of eco-labels to be "the essential question about eco-labelling programmes". He confirmed that there "still remains a paucity of hard data", and while "there are specific instances – companies or product categories – where eco-labelling is having a significant impact, at the more macro level, it is hard to make such generalisations. This applies as much to potential environmental benefits as to economic ones."

A third expert considered that, "eco-labelling has come to mean so many different things, that it is almost impossible to differentiate such [environmental and economic] effects unless one first separates the different types of ecolabels. This does not mean using the ISO codification of Types I, II and III". In his view, the best way to move this ongoing debate forward is to "examine characteristics of ecolabels as opposed to simply relying on the ISO codification or on some homogeneous 'ecolabelling'. The characteristics could include the following: single or multiple issue labels; single or multiple sector labels; self declared or third party verified labels; leadership, information or rating labels; voluntary or mandatory labels". Another expert referred to the need to develop a simple methodology that could be used to measure and monitor benefits of "soft steering mechanisms", which could include eco-labelling and "green" public procurement.

Overview of methodologies to assess the effects of eco-labels

The study by Bjørner *et al.*, 2002, analysing the effects of the Nordic Swan Label on consumers, confirmed the findings of the 1997 OECD study that most evidence on actual effects of eco-labels was anecdotal, and that only a handful of empirical studies have been undertaken on the effects of environmental labelling on the actual purchase decisions of consumers. Table 1 below summarises the methodologies used by some recent studies and indicates whether the labels in questions had an effect.

Table 1.   **Empirical studies on the effect of environment labels and product characteristics**

Reference	Method/data	Market	Type of label of environmental characteristic	Did label have an effect?
Henion (1972)	Real market experiment in 4 stores	Detergents	Content of phosphate	Yes
Teisl et al. (2002)	Real market behaviour using aggregate monthly time series data (using an "almost ideal demand system" specification)	Canned sea-food and substitute meat products	Dolphin-safe label	Yes
Blamey and Bennett (2001) Bennett et al. (2001)	Real market behaviour in discrete choice models (also combined with stated preference data)	Toilet paper	Unbleached Recycled	No Yes
Nimon and Beghin (1999)	Hedonic regression using catalog prices	Apparels	Environmentally friendly dyes Organic cotton	No Yes
Roe et al (2002) Teisl et al. (1999)	Hypothetical market (validated with hedonic regression based on electricity prices)	Electricity	Certified green electricity	Yes

Source: Bjørner, T. B. *et al.* (2002).

Not only has there been very little empirical research on the effects of eco-labels but there is also a strong need for refined methodologies to adequately measure their environmental and economic impacts. The studies analysed here applied different methods to examine the impacts of eco-labels, including consumer and producer surveys or the use of retail level data, combined with the use of selected indicators or regressions, or both; and replacement-cost methods.

Some of the studies, including those on the German Blue Angel, New Zealand's Environmental Choice, the EU Flower and the Japanese Eco Mark labels, undertook consumer and producer surveys and used selected indicators to identify the effects of these eco-labels on producers, consumers, markets and the environment.

- The analysis of the Blue Angel's environmental effects (Eberle and Reuter, 2003) included interviews with experts and representatives of three different product groups (heating systems, copying machines and paper products). The objective was to assess the development of markets for environmentally preferable products, the environmental factors that are taken into account during the technological phase of product development, and the impact of the Blue Angel label on these two issues. The three product groups were identified as suitable if they met three eligibility criteria: *(i)* it was possible to document the achievements of the Blue Angel label (e.g., through the degree of utilisation of the label by product manufacturers, or the importance of the label in consumers' decision making); *(ii)* the product groups were representative for the whole spectrum of awarded products; and *(iii)* the eco-label in these product groups had been in place long enough to measure effects. A set of appropriate indicators, described in detail in the report,

facilitates an assessment of environmental improvements achieved under the influence of the Blue Angel label. In general, these indicators allow *(i)* identifying the product's or product group's specific potential for environmental improvements, consistent with the environmental objectives of the German Environmental Ministry and *(ii)* quantifying the environmental contributions of Blue Angel.

- Current licence holders of the New Zealand Environmental Choice label responded to a questionnaire (Box 1) on various aspects of the scheme. The study by the New Zealand Ministry for Environment (2004) summarises the results of the survey.

Box 1. Questionnaire for New Zealand's Environmental Choice licence holders

- Why did you get involved with Environmental Choice?

- What changes to your processes did you make? What are some of the ways that you think that these have benefited the environment?

- How strong do you think [is] green consumerism in New Zealand? Do you think that the green consumerism trend is increasing or decreasing? Do you have any evidence of this?

- Is participating in Environmental Choice having a positive effect on your market share? Do you have any ways to assess this? If so, how?

- Do you think that having the 'green tick' is going to be increasingly or less important in the future?

- Do you think that complying with the Environmental Choice standards might help you avoid […] regulation costs in the future?

- Do you see any trade benefits from having the 'green tick'?

- Do you see a role for government in such schemes? If so, what sort of role? Promotion? Development of green markets?

Source : New Zealand Ministry for Environment (2004).

- The Japanese Eco Mark Office (2002) used a similar method to identify the effects of the label in the market for stationary products. From May through July 2002, Eco Mark conducted a survey among certified corporations or distributors of the five target products (ballpoint and marker pens, mechanical pencils, correction products and notebooks). A specialist survey company analysed the data received and estimated the effects of the label.

- Assessment of the past efficiency of the EU Flower (phase I, 1992-2000) was mainly based on interviews with competent bodies of the labelling schemes and other stakeholders. Apart from responses to the questionnaire, the European Commission provided an extensive and homogeneous set of data on the number of labelled products and awarded companies. Among the indicators that were chosen to measure the efficiency of the EU eco-label are the number of product groups for which labelling criteria exist, the number of labelled products and awarded companies, and, in some cases, the market share of the labelled products. In order to explore the

possibilities for development of the EU Flower in 2000-2004 (phase II), several scheme development scenarios were elaborated and evaluated.

- Teisl, Roe and Levy (1999) examined the effects of eco-labels in the electricity supply market by using a mall-intercept sample consisting of a consumer survey in eight different shopping malls in the United States. The survey design of this statistically not representative study consists of several experimental approaches, including the choice of the products that respondents were most and least likely to buy on the basis of an (experimentally manipulated) product information brochure. Responses were converted into individual product rankings or choice. Both were a function of the marketing information as well as the presence of an eco-label.

The effects of eco-labels have also been examined through econometric studies based on retail level data.

- The study by Nimon and Beghin (1998) aimed at identifying price premiums or discounts on organic apparel goods to derive the market valuation of environmental characteristics of textiles. To this end, the authors applied hedonic regression methods and estimated price functions using apparel data across a large section of items from retail order catalogues and textile companies, both for conventional and organic cotton apparel.

- Teisl, Roe and Hicks (2001) used aggregate monthly time-series data on the expenditures for canned tuna and its substitutes and estimated a set of conditional demand functions for these goods. In a regression analysis they analysed whether dolphin-safe labels affect consumer behaviour.

- Bjørner *et al.* (2002) examined the effect of the Nordic Swan label using shopping diary data for a large Danish consumer panel with detailed information on purchases of toilet paper, paper towels, and detergents between 1 January 1997 and 31 January 2001.[6] They estimated a multinomial conditional choice model to measure households' willingness to pay for the product attribute "Nordic Swan label".

Yet other methods to identify the effects of environmental labelling schemes were applied in the cases of the Korean eco-label and the US Energy Star label.

- One study on the Korean eco-label programme used a cost-benefit analysis to compare the environmental performance of labelled and conventional products and identify cost savings related to the use of certified products. KELA (2004) used a replacement-cost method, a methodology to calculate the benefits of non-market properties by identifying the cost savings from substituting marketable goods and activities.

- The 2003 USEPA report on the Energy Star built its conclusions on the effects of the label on peer-reviewed methods which took into account the "business-as-usual improvements" (improvements that would have occurred without the eco-label).

Main effects of eco-labelling schemes

This section provides an overview of the main findings on effects of the eco-labelling schemes described in the different studies. It is broken down into effects on producers, on consumer behaviour, on

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6.   Data obtained from GfK Denmark, a market research institute.

markets, and on the environment. Of course, these different effects are closely linked: producer and consumer behaviour will, to a certain extent, affect markets, and may in turn lead to effects on the environment. However, few studies examine these various linkages in depth. Some authors point out the difficulties of isolating the effects of a label from effects caused by other factors, such as general technological improvements in a sector, or policy measures adopted in parallel with an eco-label. The study by Teisl, Roe and Hicks (2001), for example, pointed out that labelling of "dolphin-safe" tuna was accompanied by other measures aimed at limiting the killing of dolphins.

Effects on producers

The 2003 study on the Blue Angel (Eberle and Reuter) identified this label as a communication tool, allowing for environmental benchmarking. The Blue Angel label encourages producers to assess the environmental impacts of products over the whole life cycle. However, even for companies that do not apply for it, the label seemed to play an important role in their production processes, and the selection criteria helped orient many companies' R&D activities and internal requirements for construction departments.

The study also looked at the effects of the label on innovation, which it defined, as "all changes of the life-cycle of a product — major or small — resulting in a reduction of pollution". On the basis of a few examples that show a mixed picture as regards the contribution of the Blue Angel to solving product-related environmental problems, the study concluded that the environmental effectiveness of voluntary environmental labelling and its usefulness for overall environmental policy depends very much on the nature of a product category.

One fact that slowed down the diffusion of eco-labelled products was that the environmental performance in some (non-labelled) product categories (e.g., detergents and household appliances such as washing machines, dish washers, refrigerators) has improved dramatically over the past decades, while environmental claims have become common vehicles for advertising. This has led to a decreasing interest of producers in applying for the Blue Angel label. Another factor is that, often, producers offer a variety of models, and may therefore hesitate to label some models for fear that this could adversely affect sales of the rest of their product line.

The study on the Japanese Eco Mark found that 62% of companies experienced increased sales of their Eco Mark-certified products, while only 10.3% stated the opposite.[7] Furthermore, the study revealed that corporations are the main clientele for Eco Mark-certified products. This fact is reflected in the answers of manufacturers when asked about corporations' and consumers' interest in Eco Mark-certified products: while 96.7% of the companies replied that corporations (businesses) had shown interest, only 31% confirmed interest by consumers.

The study on New Zealand's Environmental Choice label came to similar conclusions. It stated that "[t]here is a trend towards businesses seeking environmental labels for products sold to other businesses, rather than to the household consumer. As more businesses adopt green procurement policies they look to suppliers to deliver more environmentally friendly products." According to the study, industries' behaviour worldwide has changed making improvements to their environmental performance as they strive to meet consumers' increased demand for environmentally preferable products. This also has an influence on suppliers since manufacturers are increasingly demanding proof of their products' environmental soundness in order to prevent future liability or negative publicity.

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[7] Questionnaires were sent to 40 Eco Mark-certified companies of which 31 responded.

Eco-labelling programmes provide an incentive to produce environmentally-friendly products The presence of an environmental label may have an impact on producer behaviour, as shown in the case of the dolphin-safe label. An increased range of products with environmental characteristics would lead to an increased demand by consumers. The inauguration of the dolphin-safe label was among the reasons why fishermen have changed their harvesting techniques. Instead of landing yellowfin tuna that are known to be associated with dolphins (which were often killed during the harvest), fishermen shifted to catch other kinds of tuna (Teisl, Roe and Hicks, 2001).

In the apparel industry, the situation is comparable, in that consumers have revealed their preferences for products deemed to be beneficial for the environment. Eco-labels have helped producers of clothes made from organic cotton to differentiate their products from conventional apparel. The result is a significant growth in production of organic cotton (Nimon and Beghin, 1998)

In the case of the Energy Star, several manufacturers of electronic devices have adjusted their products to the requirements of the label and also support the USEPA in determining the energy performance levels for products to be awarded the Energy Star (USEPA, 2003).

Effects on consumer behaviour

The study on the Nordic Swan label (Bjørner *et al.*, 2002) analysed the impact on purchases of various brands of toilet tissue, kitchen paper towels and compact laundry detergents in Denmark between 1997 and 2000. Based on detailed shopping diaries from a wide sample of Danish households, the data cover about 90 000 individual purchases. Over the period, 13 of 32 different brands of toilet paper on the market carried the Swan label, as did 9 out of 26 brands of paper towels and 3 brands of detergents. Consumers showed a "willingness to pay" 10% to 17% more for eco-labelled toilet paper and a similar extra premium for labelled detergents. Little or no effect was detected for kitchen towels. The study concluded that (Danish) consumers were willing to act on an environmental label even though the products did not provide any direct additional benefits to the users; this they took to be an indication of altruistic motives. Among the reasons cited were the following: consumers seemed to have great confidence in the Danish Government (which certifies the label); environmental issues received substantial attention in the media; and there appeared to be wide acceptance of policies pursuing relatively ambitious environmental goals.

The study on New Zealand's Environmental Choice label discussed not only positive but also potential negative impacts of environmental labelling on consumer behaviour, such as increased consumption. It argued that "consumers that change their purchasing behaviour to purchase 'green products' can be led to believe that they have 'done their bit' for the environment […] which could result in consumption levels continuing to increase rapidly over time". The scheme therefore considered developing specifications for products which consumers purchase frequently and for products with large adverse impacts on the environment.

The study on the Japanese Eco Mark analysed corporate and consumer purchases of five Eco Mark-certified products (ballpoint pens, mechanical pencils, marker pens, correction products and notebooks). It concluded that the proportion of corporate purchases of these labelled products was significantly larger than that of consumer purchases.

The Korean study (KELA, 2004) reported two surveys on consumer awareness of the label, carried out in 1999 and 2001. According to these surveys, it would seem that more than half of the Korean population recognised the logo of the Korean Eco-label, and more than 70% had heard of it. While 72.5% of the surveyed people had experience in purchasing environmentally preferable products, most of them

said that "they did not see the label on the product" and only 16.8% had actually purchased a product with the Korean eco-label.

The study on the effects of the dolphin-safe label (Teisl, Roe and Hicks, 2001) describes a deferred consumer reaction to the introduction of the dolphin-safe label. The reasons for this temporal effect are twofold: (i) "the presence of a pure information diffusion process"; and (ii) a "verification effect". The first means that most consumers notice a label and react to it only after it has been around for a while. The second refers to an increased level of believability provoked by label-verifying information by media and lawmakers, which leads to an increase in consumption of the labelled product. The results presented in the study show that the introduction of the label has indeed had an effect on consumer behaviour: consumers started to move back to purchasing tuna while the market shares of substitution products declined. The observed effects may lead to the conclusion that consumers' decisions were influenced by moral and ideological reasons and that people were willing to pay "to avoid personally contributing to dolphin mortality as a result of tuna fishing".

The study on eco-labels in the apparel industry (Nimon and Beghin, 1998) found that consumers of apparel made from organic cotton are generally concerned about the environment. The price premium of about 33.8% of the apparel price, which was identified in the study is an indicator for the market valuation that consumers ascribe to and are willing to pay for the apparel's environmental characteristics.

According to the study on eco-labels in the US electricity supply market (Teisl, Roe and Levy, 1999), potential environmental effects mainly depend on consumers' levels of education and environmental involvement, but also on the type of additional information available. For example, products described in the consumer survey as using renewable resources, provoked in consumers' minds an association with environmental friendliness, and, in such cases, an additional eco-label did not have a significant effect on consumer decisions. In other cases – e.g., when a labelled product was marketed as being inexpensive – the eco-label may have even caused a negative reaction, especially if it was interpreted by the consumer as an attempt to manipulate his or her behaviour.

Currently, about 40% of the US public recognises the Energy Star label and, according to household surveys, about 50% of the purchasers of Energy Star products were influenced by the label. The Energy Star programme aims to raise awareness among consumers of environmental characteristics of labelled products and of the correlation between energy use and air emissions. The label is also considered to increase information on how to save money and, at the same time, protect the environment by improving the energy efficiency of houses, buildings and industries. According to the study, "[a] home fully equipped with Energy Star qualifying products will operate on about 30% less energy than a house equipped with standard products, saving the typical homeowner about $400 each year."

Market effects

The 2002 study on the Blue Angel label summarised the findings of a range of studies which have attempted to evaluate the impact of the programme on the market and on companies' marketing strategies. The main findings were that:

- A major impact could mainly be observed in those product categories that are interesting for professional purchasers and public procurement. For example, the market share of Blue Angel-labelled paints was above 60% in the do-it-yourself sector, but only 20% in the handicraft sector (OECD, 1997; figures for 1995).

- Label-using companies are more-or-less equally represented among small, medium and large companies.

- Micro-economic benefits of individual forerunner companies disappear over time as other companies enter the market with environmentally improved products. Smaller companies reported the greatest impact on their market position, whereas medium-sized companies were among those that often observed little or no effect on their market share.

- Price management is an important factor for the marketing strategies of companies. However, price elasticity had declined over the period in which the Blue Angel has been operating.

The study concluded that a global approach that attempts to assesses the performance and effectiveness of the Blue Angel by measuring its recognition by manufacturers and consumers does not actually say much about its effectiveness. Some product categories chosen for labelling may have failed to meet their objectives, while others may have been useful for fostering other measures to reduce product-related pollution.

The study on the Nordic Swan label estimated the proportion of market share attributable to that label, and found it to be 6 to 7% for toilet paper, 4% for labelled detergents and 0.5 to 1.5% for kitchen towels.

The report on New Zealand's Environmental Choice sees an important contribution of the label in promoting economic efficiency, but recognises that, due to a lack of formal studies, the actual market impact of the label could not be assessed.

According to the survey on the Japanese Eco Mark, eco-labelling has had a significant market impact in Japan. It estimated that the market size of four out of five examined product categories exceeded 10 billion yen in 2001. The estimated market share of Eco Mark-certified products ranged between 8.7% for ballpoint pens to 24.2% for correction products. However, while the overall growth in most product categories was stagnant in 2001, producers of Eco Mark-certified products realised a rapid growth in sales.

The study on the Korean eco-label (KELA, 2004) also provides some figures on the market share of certified products. The ratio of certified products to the corresponding product category was on average 3.4%, with peaks of 45.8% for fluorescent lamps and 28.4% for paints and gasoline engine oil. According to the study, the market share of certified products is expected to grow continuously owing to the increasing participation of industries in the programme.

Other than studies that used data with relatively short time series (up to 30 months), Teisl, Roe and Hicks (2001) found that the introduction of the dolphin-safe label has had a significant impact on the market share of canned tuna — unlabelled as well as labelled. A longer observation period (66 months) allowed integrating time dependent label effects (e.g., the increase in consumer's recognition of the label, or the increase in trust in the labelling programme and the information provided). While the market share of canned tuna increased over time due to the introduction of the label, the markets of its substitutes (other seafood, luncheon meat, red meat) declined. In addition, the presence of the dolphin-safe label leaves the estimated market share of canned tuna roughly 1% higher than it would have been without the label.

The market effects of environmental labels have also been examined in the textile industry. Eco-labelling schemes in the apparel industry, such as the US organic certification programme CCOF (California Certified Organic Farmers), certify organic cotton farmers as well as companies selling apparel made from certified cotton. The analysis by Nimon and Beghin (1998) aimed at identifying the market valuation of environmental characteristics claimed by the label. To that effect, the authors estimated the price premiums or discounts for organic-cotton apparel, environmentally benign dyes, and no-dye

appellations. For organic-cotton textiles, an average price premium of 33.8% of the apparel price (expressed in dollars per unit of fiber content) was identified. While there was no evidence of a premium on apparel with environmentally preferable (or "low impact") dyes, a discount of approximately 15% was identified for textiles that were not dyed at all. As regards the no-dye discount, it was found consistent with the cost savings resulting from the absence of the dying process. Provided there are no barriers to entry, the organic premium is also assumed to reflect the cost differences related to different production methods for organic and conventional apparel. On the other hand, it indicates consumers' willingness to pay higher prices for environmentally preferable products.[8]

The study on the electricity-supply market examined whether and how environmental labels affect consumers' product choices and the ranking of suppliers. While the results show that eco-labels have a stronger effect on the rankings than on the choice of products, they indicate that any potential effect varies significantly across individuals. The study further revealed that market effects of eco-labels seem to depend on the type of additional information that is available to the consumer. Some product claims, additional to those made by the eco-label, have had little impact on product rankings while others had the potential to affect consumers' reactions much more strongly (see "Effects on consumers" section).

According to the USEPA report, one of the most important market effects of the Energy Star label is "an enhanced market for energy efficiency". By providing more information to businesses and homeowners, the eco-label contributed to reduced transaction costs and investment risks and was therefore considered to lead to a higher number of attractive projects, e.g., energy efficiency projects in the building sector or purchases of energy-efficient equipment In several regional new housing markets in the United States, the market penetration of Energy Star products exceeded 20%. About one third of the top 100 building companies in the new home construction business co-operated with the Energy Star programme.

Environmental effects

One of the studies on the Blue Angel label (Müller, 2002) considered environmental labelling schemes to be an integral part of a "well assorted environmental toolbox". The study described the label's twofold role as an environmental policy tool. On the one hand, when supported by and complemented with additional measures and tools, e.g., "green" public procurement, the effects of the label improved significantly. In addition, the label has often proved to be a facilitator and "door-opener" for new, binding regulations.

The primary objective of the 2003 study on the Blue Angel (Eberle and Reuter) was to analyse the environmental achievements of the label since its creation in 1977, and to describe them in both qualitative and quantitative terms. It focused on three product groups, namely heating systems, copying machines and paper products. In order to measure environmental improvements, a set of indicators was chosen, which should allow *(i)* identification of the product's specific potential for environmental improvements, consistent with the environmental objectives of the German Environmental Ministry and *(ii)* quantification of the environmental contributions of the Blue Angel label. For each of the three product groups analysed, the report indicated a continuous reduction of negative environmental impacts (e.g., reduced CO_2 or nitrogen-oxide emissions) that went along with the tightening of the Blue Angel criteria. However, in all cases, technological developments had taken place in parallel that made it difficult to quantify the ratio of improvement actually attributable to the label.

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[8]   Supported by eco-labels, the cultivation of organic cotton – a relatively new market segment – has featured strong growth rates in the US in the first half of the 1990s when it developed from 900 acres in 1990 to 24,625 acres in 1995. After this peak, acreage planted with organic cotton in the US has dropped and was estimated 11,459 in 2001 (Nimon and Beghin, 1998 and information obtained from IFOAM Secretariat.)

In general, the study concluded that several environmental improvements could be attributed to the existence of the label. For example, the Blue Angel label:

- initiated the breakthrough for eco-labels (being the first national eco-label, it triggered the development of many other eco-labels, often serving as a model);

- contributed to the development of a more environmentally conscious market (and market behaviour);

- helped set standards for product development and manufacturing, directives and support programmes;

- contributed to a systematic approach in decision-making (life cycle assessment);

- provoked a "Europeanisation" of environmentally preferable products (helping some product groups to prevail on the European market, thus strengthening the market position of manufacturers of such products);

- had a multiplier effect (raising public awareness for environmentally preferable products beyond the labelled product group).

In 2001, the LG Environment Institute estimated the environmental benefits of Korea Eco-Label certified products using the replacement-cost method, and in 2003, KELA recalculated the environmental benefits using updated data based on the same model suggested by the Institute. The purposes of the study was to identify the difference in environmental performance between the certified products and conventional products and to calculate the cost saving effects (e.g., saving in energy costs, material costs, and remediation costs for pollution and health risks) of the certified products. The average estimated environmental benefit of the certified products covered by the study amounted to 130% of their retail price (Table 3).

Table 2.   Korea Eco-label: Environmental benefits of certified products

Product Category	Environmental Advantages	Estimated Benefits	
		Korean Won/unit	% of Price
Printing Paper	Recycling of waste paper and reduction of material use	3,490 (Box)	69.8%
Copiers	Energy saving and reuse of waste consumables	1,278,050 (Unit)	128.1%
Printers	Energy saving and reuse of waste consumables	824,550 (Unit)	235.5%
Fluorescent Lamp	Energy saving and the Reduction of mercury use	3,140 (Unit)	104.7%
Tap Water Faucet	Water saving and expansion of Lifespan	225,200 (Unit)	252.2%
Paints	Reduction of air pollutant and hazardous substance	1,589 (L)	79.5%
Gas Boilers	Energy saving and the Reduction of air pollutant	392,350 (Unit)	78.5%
Detergents	Reduction of water pollutant and toxic chemicals	4,580 (kg)	286.2%
Toilet Paper	Recycling of waste paper and reduction of material use	113 (Roll)	37.7%
Solar Street Light	Energy saving and reduced use of fossil fuel	522,620 (Unit)	104.5%
Bricks and Paving	Recycling and reuse of waste Materials	30,570 (ton)	65.6%

Source: LG Environment Institute (2001), "The Way to Promote Sustainable Consumption and Production in Korea" and KELA (2003), "The Analysis of the Environmental Benefits of Ecolabelled Products".

The 2001 study of New Zealand's Environmental Choice label discussed the role of eco-labelling as part of environmental policy-making. It considered that eco-labels can help making the public aware of the environmental impacts of consumption and can therefore be employed to influence national policies. For instance, the label emphasised the amount of recyclable material in products, and thus created a market for such material. The study also found that, by promoting the label, the government was likely to adjust its environmental policy on minimising waste.

The study by Teisl, Roe and Hicks (2001) demonstrates environmental effects that have been achieved in the United States due to the dolphin-safe label and other measures to protect dolphins. The inauguration of the dolphin-safe label followed a series of acts aiming at reducing dolphin mortality. Several US government initiatives, such as the US Marine Mammal Protection Act of 1972, the Dolphin Protection Consumer Information Act of 1990 and the International Dolphin Conservation Program Act of 1997, have had an impact on the US tuna fleet, increasing their protection measures for dolphins. In addition, high media attention to the issue in the late 1980s raised US consumer awareness and led to the establishment of different labelling programmes. Environmental effects were significant, as all measures together have lowered the number of dolphins killed during tuna harvest from more than 100 000 per year in the 1960s to less than 5 000 per year in 2000. However, the environmental effects that were purely set off by the dolphin-safe label cannot be clearly identified and distinguished from the effects of other measures.

According to the 1998 study by Nimon and Beghin, eco-labels in the US apparel market have contributed to an increase in the market potential of organic cotton textiles. Organic cotton is cultivated

without the utilisation of synthetic pesticides (insecticides, fungicides, herbicides) or fertilizers. Positive environmental effects are mostly achieved by this independency of synthetic chemicals compared with conventional cotton, which is even more dependent on chemicals than most other crops. Synthetic chemicals used in farming are often the source of groundwater contamination and other environmental damages.

According to the USEPA report, significant environmental improvements can be achieved through the Energy Star programme. [9] For example, it estimated that in 2002, the Energy Star avoided greenhouse gas emissions equivalent to those from 7 million vehicles and saved more than 50 billion kWh of electricity, corresponding to the power produced by 25 300-megawatt power plants. While households accounted for about 17% of US greenhouse gas emissions, the commercial and industrial sectors contributed about 37%. The study found that US households alone may account for potential environmental effects in terms of energy savings between 25 and 30% when using household items awarded with the Energy Star.

When is an eco-labelling scheme successful?

Some eco-labelling schemes regard a high number of certified products to be a sign of success. However, this view is not generally shared. According to the 1997 OECD study, "the environmental benefits of eco-labelling will be achieved when a balance is reached between the number of eco-labelled products and the stringency of the criteria." In general, eco-label criteria are set so that only a small percentage of products in a product category (typically, 5 to 30% can meet these criteria). With a share higher than 30%, eco-labels no longer selectively identify a sub-set of products that are environmentally preferable to other products in the same category.

Quoting the OECD study, the 2002 study on the Blue Angel considered that a "large number of certified products is no indicator of success. Continuously improved criteria may be a precondition for eco-labelling to achieve positive environmental effects." It considered also that an indicator of its own success was the "stagnation of the number of products labelled with the Blue Angel", which has remained stable at about 4 000 a year. In addition, the study revealed further preconditions for a successful functioning of the labelling programme, such as *(i)* being informative and easily understood by consumers; *(ii)* reducing product-related environmental pollution through innovation and diffusion of environmentally improved products; and *(iii)* providing sufficient economic incentive to manufacturers to respond to the programme. Furthermore, according to the study, it is not sufficient for consumers to be "environmentally conscious": they also have to be able to act on this ambition within their purchasing decisions. This gives retailers an important role since they have to be willing to include labelled products in their range of products.

The study on the past efficiency of the EU Flower label presents six criteria and indicators to measure the success of the Flower against the expected results (Table 4).

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[9]. The Energy Star programme consists of two main parts: Product Labelling and Superior Energy Management. Figures indicate the benefits that have been achieved as a result of consumers using Energy Star labelled products. Additional benefits of approximately the same size are achieved through the Superior Energy Management program, a partnership program with organisations in the pursuit of superior energy management practices (USEPA, 2003).

Table 3.   **Success criteria and assessment indicators of the EU eco-label**

Success Criteria			Assessment Indicators
Finality	Environmental Improvement		Suitability of the product groups Relevance (nature and magnitude of the associated environmental impacts) Potential (potential environmental benefits) Steeribility (extent to which the product groups can be influenced by eco-labelling) Use of the label in public and private procurement (use of the eco-label as a standard)
Get Momentum	Adequacy with the demand of the market = Being a marketing tool for manufacturers and retailers (in order to increase the supply of labelled products by manufacturers and retailers)		Number of companies awarded (manufacturers, retailers) Impact on the image of the companies awarded Number of shelves in stores with eco-labelled products Range effect (assortment of labelled products, product families) Level of environmental concern of the purchasers
	Level of development		Number of products labelled Number of articles labelled Market shares of labelled products
	Visibility (to increase the demand by consumers)	Spontaneous notoriety	% of European consumers which recognised the EU eco-label logo as a label of environmental excellence as the EU eco-label
		On the shelves	Leaflets Merchandising Number of stores where eco-labelled products are sold Number of promotional actions per year in the stores
Results	Growing path		Annual growth rate of the number of awarded companies Ex-factory sales value of the labelled articles Number of new product groups per year and related growth Budget and staff

Source: EC (European Commission), DG Environment (2001).

Concluding remarks

This overview does not attempt to define what constitutes the actual effects of an eco- label, nor which factors contribute either to its environmental effectiveness or economic efficiency. It simply summarises those effects that the authors of the different studies have highlighted.

Most studies covered by this report have registered some impact of eco-labels on the behaviour of consumers and producers. In general, eco-labels seem to raise consumers' awareness of environmental issues and change their purchasing behaviour while leading manufacturers to increasingly produce environmentally preferable goods. Environmental attributes are then often emphasised in marketing practices. While some of the studies provide data on the effects of the schemes on their respective markets (e.g., the German Blue Angel, the Japanese Eco Mark and the Korean label), or on consumers (e.g., the Nordic Swan), and while it is found that most eco-labels have a positive effect on the environment, they also note the difficulties associated with measuring this effect precisely, or dissociating it from the effects of other measures.

The number of studies that look at the environmental and economic effects of eco-labels is increasing. Their findings may help policy-makers to develop a clearer picture of the necessary requirements to make eco-labelling programmes more effective. However, further empirical research on eco-labelling schemes is still needed. So far, no empirical research has been conducted on performance characteristics of different labelling schemes, or on the optimal labelling form for different products. Further research into methodologies to assess the impacts of eco-labelling schemes might also be useful.

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