



ENVIRONMENT, HEALTH AND SAFETY COMMITTEE

NOTE ON

ECO-LABELLING :

LIFE-CYCLE ASSESSMENT IN ACTION

'Eco-labelling' is an issue of considerable public interest. It also makes use of 'Life Cycle Assessment' which is potentially the most important method for assessing the overall environmental impact of products, processes or services [sometimes referred to as Life Cycle Analysis or LCA]. The principles of LCA are dealt with in another 'EHSC Note' from the RSC.

This Note is designed to outline what Eco-labelling is about and to introduce some of the questions and concerns that have been raised about it. The Note does not pretend to be a full or definitive guide and readers are urged to obtain more detailed information if this is required.

The Note was prepared by the Environment, Health and Safety Committee [EHSC] of the Royal Society of Chemistry. The Society is a registered Charity. Its Royal Charter obliges it to serve the public interest by acting in an independent advisory capacity. In order to meet this obligation the members of the EHSC are drawn from a wide range of backgrounds and serve on the committee as individual experts and not as representatives of their employer.

Introduction

An Eco-Label is an official label for approved "green" products. As well as providing authoritative guidance to consumers who wish to choose products for environmental reasons, the EU scheme for eco-labelling aims to encourage the production of products which are more environmentally benign and to facilitate trade in these products.

This note has been prepared to inform chemists and others with a technical background but little exposure to the topic. It provides a further illustration of the importance of chemistry in **Life-Cycle Assessment (LCA)**, described in RSC paper dated April 1998, upon which **Eco-Labeling** depends.

History of Eco-Labeling

Since the late 1980s a number of national labelling systems have been set up in different countries, to satisfy consumer demands to purchase greener products. The products so labelled meet the criteria established within the relevant system as having been manufactured by processes and procedures with low or minimal environmental impact. Examples of such labels include: “Blue Angel” (Germany), “Green Seal” (US), “Nordic Swan” (Sweden), “Eco-mark” (Japan).

Seeking to increase sales in some of the countries without a national labelling system, certain companies had started making spurious claims in labelling goods as “environmentally friendly”. For example some aerosol propellants were labelled ‘environmentally friendly’ because they had been changed from CFCs to propane/butane. However the latter may still affect the atmosphere by contributing to global warming or photochemical smog, *and* have the disadvantage of being highly flammable. Other examples included claiming that certain bathroom cleaners were “nitrate-free” when such products had never contained nitrates !

Given the amount of effort and preparation required it seems likely that the companies genuinely embracing eco-labelling will tend to be those with major market penetration and high brand status. Such companies may see eco-labelling as an aid to maintaining and improving their market position. It is less clear that voluntary eco-labelling will be attractive to other companies.

In 1992, an EU Regulated Eco-label was announced under Council Regulation (EEC) No. 880/2 of 23 February 1992 on a Community Award Scheme. The Regulation established a voluntary eco-label scheme intended to:

- promote the design, production, marketing and use of products which have a reduced environmental impact during their entire life cycle,
- provide consumers with better information on the environmental impact of products.

The scheme was to be self-financing. Food, drink and pharmaceuticals were excluded from the list of product categories.

Under this scheme an eco-label is only awarded if a product meets the environmental criteria, as well as meeting a defined minimum standard of fitness for its purpose. For each product category these criteria are set on the basis of an agreed Life-Cycle Assessment procedure.

Each EU Member State was directed to establish a controlling body for home product assessment. In the UK this was the UK Eco-Labeling Board.

The EU Eco-label is a stylised flower, the stalk and leaves of which are green, the head a rounded “E” in the centre of a circle of blue stars representing the Member States.



As of September 1998 :

- Criteria had been adopted by the EU for:

Tissue Paper Products
 Laundry Detergents
 T-shirts/Bed linen
 Indoor Paints & Varnishes
 Copying Paper
 Refrigerators

Light Bulbs (Single-ended)
 Light Bulbs (Double-ended)
 Washing Machines
 Dishwashers
 Soil improvers

- Criteria were still being developed for:

Shampoos
 Batteries
 Dishwasher Detergents
 Converted Paper Products
 Shoes
 Sanitary & Floor-cleaning Materials

Rubbish Bags
 Mattresses
 Furniture Care Products
 Cat Litter
 Personal Computers
 Textile Products

- Criteria had been submitted or studies were in progress for hairsprays and insulation materials.

What is the Significance of Eco-Labels to Chemists?

As stated above, all schemes whether national or international, for awarding eco-labels are based broadly upon the principle of Life Cycle Assessment (LCA). In other words they require an assessment of the overall environmental effects of the product from cradle to grave.

This ranges from the extraction of the raw materials used, through the manufacture, distribution, use and disposal of the product, and includes both the adverse and the beneficial effects on the environment at each of these stages. It should be noted that the procedure described below shows the methodology used but this is under constant review and can change to take account of improved technology and knowledge.

Under the EU Eco-label scheme the 'Product Life-Cycle' was divided into the following stages:

- Pre-production
- Production
- Packaging/Distribution
- Utilisation
- Disposal.

For each of these stages, environmental effects were considered according to the following criteria, which are referred to as '**environmental fields**':

- Waste relevance
- Noise
- Air contamination
- Water contamination
- Effects on eco-systems
- Consumption of energy
- Consumption of natural resources
- Soil pollution & degradation.

With the exception of noise, the assembly and computation of data for all these are heavily dependent on chemistry. Thus :

- ✎ the waste generated, and the energy and raw materials consumed at each stage are calculated in terms of the mass of the product or the individual materials required to produce them [in cm³/kg, MJ/kg and kg/kg, respectively].
- ✎ the volumes of air or water which would be contaminated to the environmental standard level by the total mass of each pollutant emitted to that medium are calculated. This is done using published data for the evaluation of emissions to atmosphere and discharges to water caused by manufacturing processes. The results are termed "Critical Air Volume" (CAV) and "Critical Water Volume" (CWV), respectively.

The data gathered are then assessed to gain an appreciation of the effects the product is likely to have on the environment. The final computation is essentially a complex quantitative account of the product's effects on the environment with sets of data relating to each of the five life-cycle stages. Designed-in recycling or re-use of product material can be calculated as a benefit thus proportionately reducing the adverse effects total. [The generic procedure for carrying out this computation is described in a companion EHSC Note on "Life Cycle Assessment" produced by the RSC in May 1998.]

By comparing the quantitative totals for each life-cycle stage it is possible to assess which cause the greatest environmental impacts. It is also possible to determine which 'environmental fields' are the most critical at each life-cycle stage.

The body responsible for awarding the Eco-label determines criteria for the various environmental fields and life-cycle stages based on best environmental practice for a particular product group. If the results for a particular product are shown to meet these criteria after audit by the awarding body, then the company concerned is entitled to include the Eco-label pictogram on the product label.

Will Eco-labels really help to improve the environment ?

The EU Eco-labelling scheme has experienced both technical and non-technical difficulties :

- Technical

A major criticism of the EU Eco-label scheme is the relatively small number of product types that have been covered so far. The reason given for the slow progress is the time taken to establish and agree the maximum permissible adverse impact values for each product type. At the end of 1997 only forty individual products had been awarded the label although this had grown to two hundred by September 1998.

The OECD has studied the effects of eco-labelling [a report can be found on their website www.oecd.org]. One example cited is an estimate that the Swedish Eco-label for fine paper has resulted in 11% reduction in sulfur emissions, 21% reduction in CO, and 50% reduction in emissions of chlorinated organics. However the report cautions that these figures are only indicative. It would appear that as yet it is too early to assess whether such reductions are over optimistic predictions or reliable indicators of the potential benefits which could flow from greater application of the Eco-Labelling scheme in other product areas.

- Non-technical

Overall the EU Eco-label scheme has been less successful than originally hoped. It has not had anything like the amount of publicity or the support from industry and consumers that was expected. The European Parliament is currently reviewing the Regulation in the light of experience over the last six years. The UK Government decided to disband the UK Eco-labelling Board at the end of July 1998. The competent body functions of the original Board have been taken over by the Environment, Business and Consumers Division of the Department of the Environment, Transport and the Regions. The Eco-label will still be supported in UK but alongside a new national labelling system designed to concentrate on specific aspects of environmental acceptability, such as energy efficiency and low water consumption.

A similar situation exists in some other EU Member States where the EU scheme and a national scheme run concurrently. It seems inevitable that such a situation will cause confusion for consumers and in turn this seems likely to further reduce the international acceptance of the EU Eco-label scheme.

The situation is made yet worse because some companies, principally in the North American and Brazilian paper industries, have suggested that the EU scheme seeks to protect home products by using Eco-labelling as a barrier to trade. (eg see ENDS Report 252).

More generally there are fundamental criticisms that can be made of LCAs and hence of *all* eco-label schemes [because these rely on LCAs]. These are covered in more detail in the companion EHSC Note on LCA referred to above. However such criticisms include :

- the criteria for the ‘boundary envelope’ for the LCA used to assess the product. In other words how far back should the LCA go in considering the impact of the extraction of raw materials, the production of the machines and equipment used to manufacture the product, the ultimate degradation products of disposal, etc. This is laid down by the organisation controlling the particular eco-label scheme and ultimately it is a somewhat arbitrary decision.
- the relative importance attached to demerit ratings for pollutants, energy consumption, and resource
- the difficulty of taking into account issues such as effects on biodiversity.

Proponents of eco-labelling can argue that a scheme for consumer products has to balance the costs involved in implementing it against anticipated benefits. However, it is equally true that claims about the ‘eco-friendliness’ of a particular product are unlikely to be credible unless the boundaries and other assumptions made in the relevant LCA are defensible.

The future of eco-labelling

In addition to the developments mentioned above it is significant that the International Standards Organisation [ISO] is developing new standards on:

- Environmental labels and declarations – general principles
- Environmental labels and declarations – environmental labelling Type I principle and procedures

A ‘Type I’ label refers to voluntary schemes with independent verification, covering the life-cycle of the product. [Thus for example the EU eco-label falls within this category and is considered to be fully consistent with the standard.]

Both of these standards are due to be published by early 1999. The hope is that they will provide a benchmark and so help to allay some of the reservations described above.

The role of chemists

Chemistry is vital if LCAs, and hence eco-labelling schemes, are to be soundly based.

LCAs depend on :

- understanding environmental chemistry
- obtaining and understanding reliable data [eg from monitoring studies]
- expert judgements in comparing different classes of environmental impact.

Chemists are central to all of these.

In terms of applying eco-labelling schemes the Society's view is that they would be enhanced if chemists were better represented on the committees responsible for interpreting the criteria and product data underlying the relevant LCAs.

Finally the development of chemical processes with reduced environmental impact should help to 'ratchet up' the requirements for awarding Eco-labels. It should also help to reduce some of the uncertainties in the LCAs involved. The Society has set up a 'Green Chemistry Network' to help promote the science and application of Green Chemistry.

**The Environment, Health and Safety Committee welcomes comments on this Note.
Comments should be sent to :**

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