



## Project Summary

# Background Document on Clean Products Research and Implementation

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**The concept that products can be made "environmentally friendly" or "clean" has been attracting much attention. As yet, however, there is no accepted definition of what is meant by "environmentally friendly," nor any agreement on how to achieve clean products. The full report summarized here provides information on current activities in the U.S. and around the world concerning clean products and identifies issues to be resolved. Although focus is on consumer products, the same criteria and methodologies can be used for any product or process.**

***This Project Summary was developed by EPA's Risk Reduction Engineering Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).***

### The Life Cycle of Products

The manufacture, use, and disposal of products can affect resources and the environment at every stage in the product's life cycle. The life cycle of a product moves from extraction of raw materials to processing stages and on through manufacture. The product then goes through the distribution channels to the consumer. Finally the product is consumed, disposed of, or perhaps recycled.

There is general agreement that minimizing a product's overall effect on resources and the environment, is desirable; however, determining what the effects really are and how one product compares with another is not easy. Many claims that a given product

is "environmentally friendly" are based on only one of the many possible points or types of its effect on the environment.

### Existing and Proposed Clean Products Programs

Existing labeling programs range from well-controlled national programs and simple shopping guidelines recommended by various consumer/environmental groups to labeling claims with undefined technical basis made by manufacturers and retailers trying to cash in on consumers' rising environmental concerns.

### Germany: Blue Angel

The Federal Republic of Germany is clearly the pioneer in the field of national environmental labeling. Its "Blue Angel" program, in existence since 1978, is used by other countries as a model. Over 3000 products in 57 product categories now carry the Blue Angel label. The program defines clean products as those that

"... when compared with other products fulfilling the same function and when considered in their entirety, taking into account all aspects of environmental protection (including the economical use of raw materials), are, as a whole, characterized by a particularly high degree of environmental soundness without thereby significantly reducing their practical value and impairing their safety."

It is claimed that a cradle-to-grave approach is used in evaluating products for the label; however, it appears that, lacking any outstanding environmental effects in other areas, products in a given category are usually differentiated on the basis of a single



criterion. This criterion may be recycled content, reusability, or some other environmental concern.

Criticisms of the program include

- failure to update (tighten) criteria;
- not enough emphasis on quality and usability of labeled products;
- use of a single environmental criterion;
- failure to provide broader labeling opportunities;
- no guarantee that an unlabeled product may not be as environmentally sound as, or even superior to, a labeled one; and
- because some product categories are excluded, some use of manufacturers' own labels results in consumer confusion.

### **Canada: Environmental Choice**

Canada's Environmental Choice program produced its first three guidelines in the summer of 1989. As of May 15, 1990, 11 approved product category guidelines were in use and 6 draft issues were out for public review.

The program literature discourages use of the term "environmentally friendly" in favor of referring to products that "reduce the burden on the environment." A good environmental product is "any product which is made, used or disposed of in a way that causes significantly less harm to the environment than other similar products."

### **Japan: EcoMark**

Japan's environmental labeling program was launched in February 1989. The program aims to promote "clean" innovation by industry, heighten consumers' environmental awareness, recommend products that contribute to environmental protection and conservation, and symbolize an ecological lifestyle.

"Clean" products considered for labeling are those that cause little or no pollution when used or discarded, improve the environment while being used, or otherwise contribute to conservation of the environment. The logo will also be used for environmentally favorable activities such as recycling programs.

To qualify for the EcoMark, preventive measures against environmental pollution must have been taken during manufacturing, product disposal must not involve difficult processing, opportunity must be available for conserving energy or resources through use of the product, compliance with quality and safety laws, standards, and regulations must be demonstrated, and price must not be excessively higher than that of comparable products.

### **Nordic Countries**

In November 1989, the Nordic Council of Ministers agreed to implement a voluntary environmental labeling program. Common criteria developed with the cooperation of all participating Nordic countries and a common label will be used. The environmental performance of selected product groups will be assessed in terms of such factors as what was involved in extracting the raw materials, what production processes were used, and what disposal methods are available; a set of minimum requirements will be established. In some cases, the label will be granted to the least harmful product in a group; in other cases, the label will be granted to products that represent an alternative, more environmentally sound means of satisfying consumer needs.

Participation of individual Nordic countries will be voluntary. Norway, Sweden, Iceland, and Finland have all indicated that they will participate; Denmark is waiting to see whether the European Economic Community will adopt a labeling program before it decides whether to participate.

### **Australia: Green Spot**

Australia is preparing to launch a labeling program late in 1990. The Green Spot program proposes to identify and label consumer products that are environmentally sound in terms of four broad impacts:

- \* they cause substantially less pollution than other comparable products,
- \* they are recycled and/or recyclable,
- \* they significantly contribute to saving nonrenewable resources or minimize use of renewable resources, and
- \* they contribute to a reduction of adverse environmental health consequences.

Types of products universally considered environmentally benign are not to be included in the labeling program.

### **U.S. States and Regional Organizations**

In the absence of a nationally authorized environmental labeling program in the United States, individual states and regional organizations have begun to attack the issue of "environmental friendliness." Legislative efforts have primarily been directed at defining and banning environmentally unacceptable goods, rather than promoting "clean" products. Judgments of whether or not goods are environmentally friendly are usually based on recyclability, degradability, and reusability.

Perhaps more than any other, the issue of degradability illustrates the differences in perceptions of what is better for the environ-

ment. Although many states have bills pending that seek to ban nondegradable plastics, many other bills have also been introduced to ban degradable plastics because of the lack of information on the identity and effect of degradation products that may be mobilized by the breakdown of the material and the possibility of adversely affecting plastics recycling operations. Proposed legislation often does not specify a preferred or optimum substitute material for banned materials nor indicate that the environmental effects of substitute products have been thoroughly considered.

CONEG (Coalition of Northeastern Governors) has focused its attention on the issue of environmental responsibility in packaging. Its preferred packaging guidelines, in order of preference, are: no packaging, minimal packaging, consumable, returnable, refillable/reusable packaging, and recyclable packaging or recycled material in packaging. CONEG is also supporting requirements for removal of toxic agents such as lead, cadmium, and mercury from packaging.

The Pennsylvania Resources Council (PRC) sponsored an environmental shopping seminar in March of 1990. They also publish an environmental shopping guide that recommends buying items packaged in recycled or recyclable materials or reusable containers and avoiding mixed material packaging and excessive packaging.

The New York Public Interest Research Group has put out a pamphlet similar to PRC's guide in its recommendations on packaging. Consumers are urged to avoid single-use, disposable items, difficult-to-recycle or nonrecyclable packaging, and toxic packaging and to look for reduced, reused, and recycled products.

The most recent entrant into the field of product certification and labeling is Scientific Certification Systems of Sacramento, California, with its "Green Cross" labeling program. The program is being supported by the National Toxics Campaign and four West Coast supermarket chains. Two seals of approval will be awarded, one for recycling and one for overall environmental acceptability.

### **Environmental Groups**

Among environmentalists, enthusiasm for green marketing is high. In an informal telephone survey, many environmental organizations were eager to hear of any developments in this area, particularly regarding the possibility of the beginning of a standardized approach to environmental labeling claims.

Many environmental shopping guides are now widely available as well as "save the world" books that contain product/pack-

aging recommendations. Shopping and environmental action guides are books and pamphlets, published by various individuals and environmental groups, intended to provide the reader with information to use in making purchasing decisions, investments, lifestyles adjustments, etc., that will have the least adverse effect on the environment. Most of these publications do not claim to provide the answer of what is environmentally best; rather they aim to help readers make informed choices or modify their habits in order to minimize waste and pollution and conserve resources. These guides include: *Shopping for a Better World*, *The Green Consumer*, *The Green Consumer's Supermarket Shopping Guide*, *50 Simple Things You Can Do To Save The Earth*, *How to Make the World a Better Place*, and *Save Our Planet - 750 Everyday Ways You Can Help Clean Up The Earth*.

These guides generally appear to use a single-criterion approach to evaluating products. None of these guides attempted even a simplified life cycle analysis. When more than a single criterion is used, the presentation of data is often one-sided. Data on a single topic may vary considerably from book to book depending on its source.

### **Private Organizations (Companies, Supermarkets, etc.)**

Many manufacturers, eager to respond to environmental concerns by labeling their products "environmentally friendly," are sponsoring evaluations of the environmental implications of their products. The results of these evaluations may be published in private reports, in informational pamphlets, or as advertisements.

Typically, manufacturers' environmental labels are based on a single environmental criterion; no clue is given as to whether any other environmental effects were considered. Common criteria for labeling claims are those with high public interest or visibility, such as recycled content, degradability, or lack of chlorofluorocarbons (CFCs) in content or manufacture.

In the above programs, criteria have been developed for various product groups--groups selected for one or more of the following reasons:

- \* the product is a major constituent of the waste stream,
- \* the product has a significant impact on the waste stream because of its toxicity, etc.
- \* product use provides a substantial environmental benefit,

- \* the product meets safety and quality requirements for normal use,
- \* product requirement levels for the label are high to challenge industry to meet or exceed current levels of clean technology,
- \* the product is easy to evaluate,
- \* the product is commonly used, and
- \* the product does not shift environmental impacts from one area only to create problems in another.

### **Criteria Used to Evaluate Products**

Most "clean product" recommendations are based on one or a few of the criteria discussed below rather than on a total environmental impact evaluation.

#### **Recycled Content**

Recycled content is the most popular and widespread criterion used. It is a popular criterion because of wide recognition and support by consumers; however, different groups may use different definitions or requirements for recycled content.

#### **Recyclability/Reusability**

In the United States, recyclability and reusability are widely used as criteria in legislation although definitions may vary. For example, recent proposals in Massachusetts and Oregon to ban environmentally unacceptable packaging differed in their definitions of "recyclable." Obviously, standard definitions of terms would be a step in the right direction. In addition, proposed legislation is not specific on the materials or containers that are to replace those deemed unacceptable.

#### **Degradability**

Degradability is a popular and widely disputed criterion. It has been heavily used as an advertising point but is currently being questioned or even denounced by many environmentalists. Many manufacturers and retailers focus on degradability as a positive characteristic, however, at least one "environmentally conscious" mail order company has temporarily withdrawn its biodegradable plastic bags for reevaluation of their environmental effects. Some legislative proposals have called for bans on nondegradable plastics, whereas others have attempted to eliminate degradables.

#### **Hazardous/Toxic Material Content**

This criterion can be used to justify the need for environmental labeling, or it can be

used to disqualify products from eligibility for labeling.

#### **Water Pollution Impacts**

Water pollution has not been frequently used as a criterion although it is given specific attention in several environmental guides, particularly those having to do with phosphates and bleaches in detergents and biodegradability of various household products.

#### **Soil Pollution Impacts**

This is another criterion that is an integral part of a cradle-to-grave analysis, but it is not a popular single criterion for labeling, except perhaps in the case of organically grown foods. Soil pollution is given some attention as an issue associated with the disposal of batteries and concern about the fecal wastes in disposable diapers. It is also being mentioned as a concern regarding degradable plastics because little is known about the identity and effect of degradation products.

#### **Air Pollution Impacts**

The most popular air pollution issue in the past few years has been the chlorofluorocarbon (CFC) content of certain products or a product's "ozone friendliness." Ozone friendliness has been covered by labeling programs, environmental shopping guidelines, and proposed legislation, particularly with regard to foam plastics production and content. Air pollution effects are also used as a criterion when discussing disposal of products by incineration.

#### **Noise Pollution Impacts**

Noise pollution is little used as a criterion in the United States; however, it has been used as the primary criterion in labeling certain West German products, e.g., lawn mowers, car mufflers.

#### **Production Processes Used**

This criterion has not been directly used but draft Canadian guidelines for re-refined oil and recycled cellulose construction materials specified "acceptable processes" for oil demetallization and hydrotreating and use of a "dry process" to produce recycled paper products, however, these specifications were removed from the final guidelines.

#### **Use of Resources (Including Energy)**

This criterion can be subdivided into use of energy and use of resources. Unless energy usage is the primary evaluation criterion, it is difficult to tell whether it has been

addressed in assessing environmental impact of a product. For example, cradle-to-grave energy consumption is rarely mentioned when comparing plastic bags with paper bags. In addition, it is difficult to determine whether legislative bodies seeking to ban certain materials have considered the increased energy use for collecting, transporting, cleaning, and distributing reusable products such as refillable glass bottles.

Product recommendations on the basis of resource conservation are most often related to plastics as a user of petroleum (considered a nonrenewable resource) and paper as a user of wood (considered a renewable resource).

### **Other Criteria**

Other criteria that have been used are more benign products/processes, general requirement of safety/usability, amount or type of packaging, provision of information for the consumer, overall corporate reputation, effect on rain forest, longer lasting or repairable products, weight or volume contribution to landfills or waste streams or troublesome disposal problems.

### **Methods Used to Evaluate Products**

#### **Product Life Cycle Analysis**

Environmental problems can be potentially alleviated by either direct or indirect means. A direct means would include bans or economic incentives or disincentives (such as taxes or grants) that have an immediate effect on an environmental problem caused directly by the product. Indirect means include the banning of a product or the substitution of one product for another where the environmental problem alleviated is not as clearly linked to the product.

The worth of either a direct or an indirect approach can only be assessed by a life cycle analysis that examines the entire complex of operations associated with a product. The theory behind the use of product substitution or banning as a way to benefit the environment is that if the product is not purchased, then the manufacturing and processing will cease and, along with it, the environmental consequences will cease. The substitute product also produces environmental consequences that need to be evaluated. A narrow focus analysis can greatly err in assessing the actual results of any action that affects purchasing habits.

In comparing a given product or a set of products on two or more environmental issues, even life cycle analysis may not be

enough to give adequate guidance. The reason is that there are no weighting factors that tell how to compare environmental impacts, for example, of one pound of toxic heavy metal sludge to one gallon of water usage or consumption of one Btu of energy.

#### **Matrix Approach (Pass/Fail)**

Although the life cycle analysis approach is the most comprehensive method, a more common approach is using a matrix with "pass/fail" ratings. For example, a widely used book in England lists a variety of packaging materials with a series of environmental criteria (recyclable? degradable? etc.) with yes/no answers and some comments.

#### **Weighting Systems**

A problem with either the life cycle analysis approach or the matrix approach is that decisions as to which criteria are most important are left to the reader or consumer of the product. For example, two products (say aluminum cans and glass bottles) can be compared using a life cycle analysis. One product may "win" based on air pollution impacts and the other may "win" based on the amount of solid waste to be disposed. Which is more important?

#### **Issues/Technical Problems to be Resolved**

#### **Selection of Products to be Evaluated**

Several of the criteria used in product selection are somewhat vague or controversial such as selecting products that are a significant factor in the waste stream (the issue here is definition of the term, "significant"), selecting products that are simplest to evaluate, or selecting products that do not contain hazardous components.

#### **Complete Life Cycle Analysis Versus Easier, Quicker Methodologies**

Decisions must also be made as to whether a complete life cycle analysis should be made or whether easier, quicker methodologies should be used. The main concerns here are time and expense involved in analysis versus environmental benefit, and consumer loyalty and possible disillusionment or confusion. A true cradle-to-grave life cycle analysis is time-consuming, expensive, and raises difficult questions about weighting the relative importance of various environmental concerns. Also, once environmentally committed consumers have embraced an idea, it may be difficult to change their minds with the facts.

### **Handling Trade-Offs**

In complete life cycle analyses, summaries of environmental effects such as the total energy usage or water usage associated with one product can be directly compared with the same effects associated with another. Problems arise over comparing different impacts with respect to each other. There are no established scientific methodologies for deciding which is more important. Some ways to handle these trade-offs are: weighting systems (this involves subjective judgment as to which components are least desirable or most harmful); pass/fail systems (using quantitative comparisons with minimum or maximum allowable levels); letting the consumer decide (abandon a simple logo and present environmental impact information, letting the consumer decide what is environmentally preferable); or using only one easy consumer-determined criterion (the advantage is easy evaluation by consumers but the disadvantage is oversimplified and erroneous conclusions on environmental impact).

#### **Implementation Issues**

Who should implement labeling programs? Some governmental clean product programs are being done at the national level but not in the United States. A number of states are, however, moving in the direction of some kind of "environmentally friendly" product regulations. The states that are in CONEG have been particularly active in this regard. Environmentalist or other nonprofit groups also are involved in studying clean product/source reduction issues. Finally, many private companies have been carrying out their own initiatives, sometimes in connection with groups like CONEG.

#### **Policy Implications**

There would be some advantages to implementing a clean product program nationwide. However, having a federal program would not necessarily preclude states or other organizations having their own programs as well. There would be the need to determine which agency(ies) would implement the program, research would be required, and an implementation mechanism would have to be developed and administered.

Another issue is the necessity to update the criteria used to measure products. These criteria can change with time as research provides new information on environmental phenomena. Also, new products are continually being developed, and processes used to manufacture products also evolve over time.

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## Recommendations

Both manufacturers and consumers generally appear to recognize the potential benefits of labeling products as being environmentally safe. As yet, however, no universally accepted and supported course of action has been identified. Although current efforts by various individual groups may be well-intentioned, they do not adequately address the comprehensive environmental impacts associated with a product's entire life cycle, and therefore, may offer consumers misguided direction.

Additional effort in several areas could aid in the development and support of clean products programs, e.g., standardized defi-

nitions and use of environmental impact terminology, survey of consumers to find out what types of information/education would be most useful, further development of methods to thoroughly and effectively evaluate products on a life cycle basis, development of a standardized environmental labeling program, reward incentives for manufacturers who provide cleaner products.

Additional measures that could minimize environmental effects of consumer products might include: education on proper use and disposal of products; elimination of high environmental impact products for which acceptable, less damaging alternatives ex-

ist; elimination of excess packaging; and efforts to reshape today's convenience-oriented consumer perspective to a more environmentally responsible attitude.

The benefits to the environment, and consequently to mankind, that may be gained by support of clean products are considerable. The information provided and issues raised in this report can serve as a starting point.

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The complete report, entitled "Background Document on Clean Products Research and Implementation," (Order No. PB91-108 977/AS; Cost: \$17.00, subject to change) will be available only from:

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