

## **STRATEGIES TO PROMOTE CLEAN PRODUCTION**

### **EXTENDED PRODUCER RESPONSIBILITY**

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*Current industrial production systems are not compatible with the earth's ecosystem. Resources are consumed unsustainably, processed inefficiently into often superfluous, disposable products and then dumped as waste. The use of toxic and hazardous materials in production processes results in dangerous emissions, by-products and ingredients in final products. Hazardous waste treatment technologies, such as incineration, cause air pollution as well as soil and groundwater pollution when incinerator ash is dumped.*

*The transition to Clean Production will rely increasingly on smaller and cleaner material, water and energy flows. The speed and volume of resources flowing through production-consumption cycles can be reduced by improved product design that allows for reuse of components and materials recycling. A better choice of materials that favours the use of non-hazardous substances in production processes will result in cleaner and safer products.*

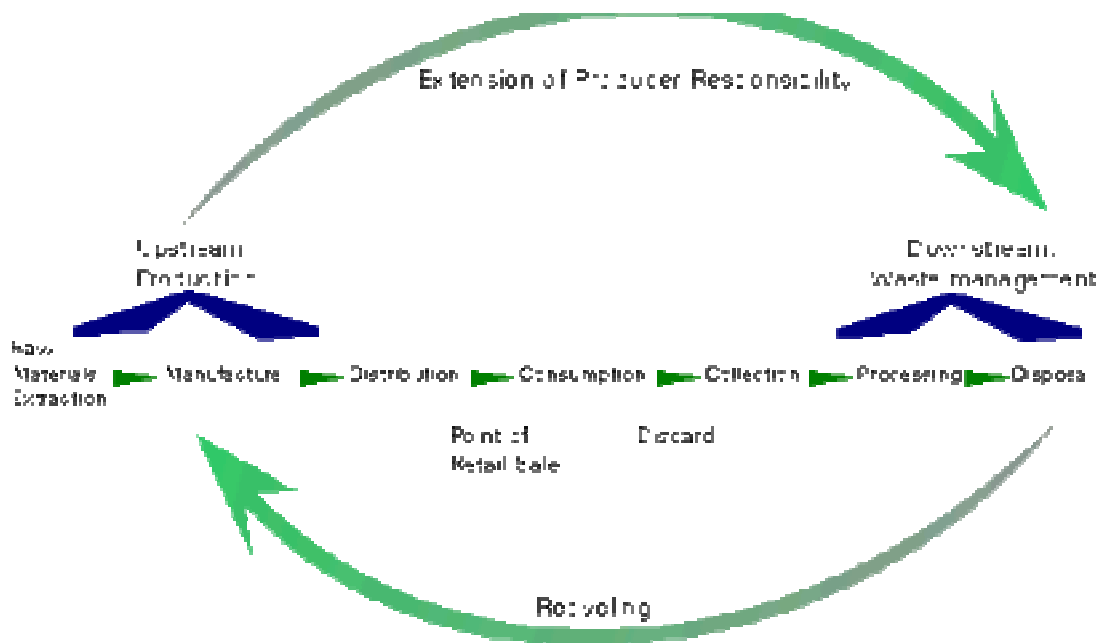
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#### *1. What is Extended Producer Responsibility?*

*Extended Producer Responsibility (EPR) is an emerging principle for a new generation of pollution prevention policies that focus on product systems instead of production facilities.*

*The aim of EPR is to encourage producers to prevent pollution and reduce resource and energy use in each stage of the product life-cycle through changes in product design and process technology. In its widest sense, Producer Responsibility is the principle that producers bear a degree of responsibility for all the environmental impacts of their products. This includes upstream impacts arising from the choice of materials and from the manufacturing process and downstream impacts, from the use and disposal of products. Producers accept their responsibility when they accept legal, physical, or economic responsibility for the environmental impacts that cannot be eliminated by design.*

*Extended Producer Responsibility (EPR) focuses on the responsibility that producers assume for their products at the end of their useful life, or post-consumer stage. The model example of EPR is product take-back where a producer takes back a product at the end of its useful life (i.e., when discarded) either directly or through a third party. Other terms used are 'take-back', 'product liability' or 'product responsibility.'*



**Fig 1: Extended producer responsibility and product life cycle**

## 2. The range of responsibilities

Conceptually, the ultimate form of EPR is leasing - where the producer never terminates ownership. Many companies such as Xerox advocate leasing of their products because it gives the producer control over the entire life cycle of the product and allows them to repair and re-use components. However, this is impractical or impossible for many product categories and so other policy tools are used such as:

### *physical responsibility*

where the producer is involved in the physical management of the products, used products, or the impacts of the products through development of technology or provision of services;

### *economic responsibility*

where a producer covers all or part of the costs for managing wastes at the end of a product's life (eg. collection, processing, treatment or disposal);

### *liability*

where responsibility for environmental damages caused by a product – in production, use or disposal - is borne by a producer; and

### *informative liability*

where the producer is required to provide information on the product and its effects during various stages of its life cycle.

## 3. The need for Extended Producer Responsibility

In the longer term, the goals of EPR are to promote the development of sustainable production-consumption systems through more efficient resource use and a drop in the consumption of resources. This can be achieved through:

- overall waste prevention;
- the use of non toxic materials and processes
- the development of closed materials cycles;

- *the development of more durable products;*
- *the development of more reusable and recyclable products;*
- *increased reuse, recycling and recovery;*
- *the transfer of waste management costs for used products onto producers consistent with the Polluters Pay Principle.*

*Most of the above objectives can be factored into product design which is the most crucial step in determining the nature and quantity of resource use and pollution emissions throughout the products' life cycles. The goal of EPR is to bring about better and cleaner product design – not to simply set up a recycling system.*

*On a more immediate level, however, EPR has been seen as a way of shifting waste management costs from the public sector back to the private sector. Today, responsibility for the disposal of used products rests ultimately on local government and the general taxpayer - and not on the producer.*

*Over twenty years of environmental regulations have focused on controlling pollution from each individual facility with no regard to pollution arising at other stages of product life cycle. Under this limited view of environmental responsibility, solid waste management has been the responsibility of the individual householder or the local government. As solid waste burdens have increased and more stringent disposal regulations have made solid waste management more expensive, the budgets of local governments have been stretched thin, and local taxes have been increased. At the same time, the siting of solid waste facilities has become a major political battleground. Local governments have been saddled with the responsibility for a problem that is not of their own making and about which they can do little on their own to prevent.*

*Of course consumers also have responsibility but in the end only the producer has ultimate choice over materials and product design. Many consumers would in fact welcome more reusable and repairable products but such products are less and less available.*

*An economic analysis of the implications of a cradle-to-cradle product responsibility will inevitably question the feasibility of producing and selling short-life, disposable goods designed for obsolescence. It will question the economic feasibility of re-processing toxic materials contained in used products and it will question the use of multiple and composite materials as well as the design of products whose components cannot be reused or the material of which they are made cannot be recycled.*

*Increasing the life of products through better design is pollution prevention. Doubling the utilisation (or product-life) of goods cuts by half the need for raw materials and energy production, and halves the amount of post-consumer waste, without a reduction in wealth or welfare. It reduces mining waste and environmental damage in extractive industries, waste in manufacturing, distribution, recycling and waste disposal by 50%. This is achievable largely with existing technology and at the same or lower price to the consumer.*

#### *4. Extended Producer Responsibility - Progress to date*

*Ever since the Ordinance on Avoidance of Packaging Waste was enacted in Germany in 1991, product take-back and related forms of EPR have spread across industrialised countries, industry sectors, product categories, and waste streams.*

*Although some of the applications of EPR may be new, the idea is not. After all, deposit refund systems on refillable glass bottles are some of the earliest forms of EPR.*

*The extension of producer responsibility throughout the product cycle has been enacted or is under serious consideration in Austria, Germany, Belgium, France, the Netherlands, Sweden, Japan, Taiwan, Korea, UK and Canada, as well as in numerous sub-national governments. The*

range of products and waste streams targeted under these emerging EP policies include packaging, paper goods, consumer electronic, office machinery, cars, tyres, furniture, electric appliances, buildings and construction materials, batteries and household hazardous wastes. Clearly, the epicentre of the movement to increase the environmental responsibility of producers remains in northern Europe.

Many industrial sectors are particularly alarmed at the prospect of EPR and are lobbying to dilute their responsibilities for used products. Instead of EPR, they favour 'Extended Stakeholder Responsibility' that transfers much of their liability onto consumers, or the even weaker term 'Product Stewardship'. However, if the objectives are indeed to reduce the use of resources through a better choice of materials and product design, then producers should be targeted. Producers are the actors with the greatest leverage over environmental improvement.

EPR is still in its infancy and time will tell if legislation will promote no use, extended use and reuse - and thus a drop in resource consumption - versus an expanded recycling industry that simply perpetuates resource intensive and hazardous production for expanding markets.

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#### 5. Policy tools for Extended Producer Responsibility

There is a range of policy instruments that governments can use to encourage producers to accept greater responsibility, from voluntary to mandatory and from upstream to downstream.

In selecting the policy instrument for application of the EPR principle, it is important for governments to be clear about the outcome they are looking for.

- Is the goal to encourage the producer to alter the design of products?
- Is it to tap the expertise of the producer in managing the product after its useful life?
- Is it to generate funds for waste management as a means of shifting costs?

Some EPR instruments already being used:

##### Deposit Refund schemes

Deposit refund schemes encourage reuse. They were standard practice, used most extensively on refillable glass bottles, before the age of disposable packaging and global trade. Denmark has legislated against the use of non-refillable beverage containers and implemented mandatory deposit schemes on refillable ones. It is illegal to sell beer, soft drinks and other beverages in cans. A deposit of 1-3 krone (17-51 US cents) per bottle has ensured 97% of beer and soft drink packaging is reused or recycled.

##### Product charges

Product charges influence the type of material used and thus shift consumer behaviour. Belgium introduced an eco-tax to shift consumption away from PVC. PVC generates toxic by-products in its manufacture and disposal and is impossible to recycle to its original material state.

##### Advance disposal fees

These fees cover the cost of disposing of used products. These may be a fee paid by the producer into a government fund which may or may not be earmarked for environmental programmes. The consumer is rarely aware of such fees.

An alternative that engages consumer participation and raises awareness is the use of advance disposal fees. These go into a government fund and are then offered as a refund to consumers who handle the waste from the product in a specified way. These fees are used for refrigerators in Austria and cars in Sweden. The refund may be more than the original fee to act as an added incentive for the consumer to return the used product/waste to a specified location.

### *Voluntary agreements tied to mandatory regulations*

*Consumer awareness has often spurred voluntary agreements to phase out certain materials or redesign products for better recyclability. The Netherlands Packaging Covenant (Stichting Verpakking en Milieu, 1991) aims to recycle a minimum of 60% of used packaging which cannot be reused. This would include up to 75% recycling of plastics. The covenant places a priority on refillable containers. The use of asbestos and PVC in packaging is banned. Bans exist on landfill disposal, for over 30 types of waste, including household, building and demolition waste and contaminated soil.*

*However, because voluntary agreements do not ensure a level playing field, government regulations are often seen as essential. The Dutch covenants are indeed backed by the inevitable use of mandatory regulations if industry does not act voluntarily. For instance, at the request of the Dutch car industry, the government introduced a fee to finance mandatory end-of-life vehicle recycling.*

*Policies that embody the principle of EPR can be classified as below:*

*1. Regulatory instruments that embody EPR can include:*

- mandatory take-back;*
- minimum recycled content standards;*
- secondary materials utilisation rate requirements;*
- energy efficiency standards;*
- disposal bans and restrictions;*
- materials bans and restrictions; and*
- product bans and restrictions*

*Economic instruments that embody EPR include:*

- advance disposal fees;*
- virgin materials taxes;*
- removing subsidies for virgin materials;*
- deposit/refund; and*
- environmentally preferable products procurement*

*Information instruments that embody EPR include:*

- seal-of-approval types of environmentally labelling (Green Seal, Blue Angel);*
- environmental information labelling (energy efficiency labelling, CFC use);*
- product environmental profiles for the whole life cycle of materials;*
- product hazard warnings;*
- product durability labelling.*

*Most information approaches place the primary responsibility on the producer to develop and provide the information, either voluntarily for market advantage or as regulatory requirement.*

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### *6. Some Product Take-back schemes*

*Product take-back programmes have been enacted for the following product categories: packaging, batteries (particularly small consumer batteries), electric and electronic products and end-of-life vehicles. Take-back promotes the reduction of waste and use of fewer and safer materials.*

*The key questions to ask with any take-back scheme are:*

*What will be the fate of used products or waste when they are returned?*

- Will EPR result in less per capita consumption of resources?*
- Will EPR encourage use of less hazardous materials, capable of being safely recycled?*
- Will EPR result in more re-use and less use or simply more recycling?*

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## **6.1 Case Study: Germany's packaging law**

*In December 1991, the Ordinance on the Avoidance of Packaging Waste (Verpackungsverordnung) was introduced and has been adapted for use in Austria, France, Belgium, Luxembourg, Spain and Portugal. However, contrary to other countries which put the costs on local authorities and consumers as well as producers, Germany puts full financial responsibility on manufacturers and distributors to be responsible for the packaging they create. The idea behind the Ordinance is to make industry pay for managing the waste generated by its packaging, by taking back packaging materials and either reusing and/or recycling them. Its goals are to reduce packaging waste requiring disposal and to develop sound material use practices.*

*The Ordinance is implemented by setting out government-mandated recycling and refilling (for beverage containers) targets and allowing industry to impose fees on packaging materials. It imposes a minimum 72% quota for refillable bottles, and, on average, from 1 January 1999 the following quantities of materials, by weight, must be recycled: glass – 75%; tinplate – 70%; aluminium – 60%; paper, cardboard – 60%; composites – 60%. From 1 January 1999, 60% of plastic packaging must be recovered. Currently 33% of plastic waste is mechanically recycled. Most of this is polyethylene (PE) and polypropylene (PP). The rest is sent to chemical depolymerisation plants for 'feedstock' recycling – which now take the bulk of plastic waste (58%). Chemical recycling of plastics– which is itself highly energy intensive - extracts the gas and oils in the plastic for use as a substitute for heavy oil in blast furnaces to make pig iron or to liquefy the polymer for recycling into other plastics. In 1997 nine percent of plastic waste was shipped to other countries for recycling.*

*The original ordinance specifically prohibited incineration but this was changed in 1998 to allow energy recycling under strict conditions such that the waste must only be used as substitute fuel and not to simply get rid of the waste; the caloric value of the waste must be high; the incineration efficiency must be high; and any additional waste arising during recovery can be disposed of without further treatment. Of the 57 incinerators operating in Germany today, only two or three can fulfil these requirements.*

*A small amount of PVC (2.5%) is still used in packaging and this has proved a problem since it contaminates other plastics in mechanical recycling and creates additional waste disposal problems in feedstock recycling. For this reason PVC packaging waste is sent to landfill.*

*The ordinance also requires retailers to provide bins so that customers can leave outer packaging in the stores. Under pressure from retailers, the Duales System Deutschland (DSD) – a consortium of 600 companies - started operating in January 1993. Under this system, all products licensed by DSD carry a green dot and are collected by the consortium-funded private service. Over seventy-five percent of all packaging in German stores carries the green dot. Consumers pay an increased price for the packaging, based on what material it is made from, to cover the cost of recycling and because of this manufacturers have an incentive to reduce the price by using more favourable materials which have a lower disposal fee or reducing the amount of packaging.*

### *Impact of the Packaging Ordinance*

*In retrospect, the new law generated a mountain of recyclable waste, the majority of which in the early days was exported and dumped abroad. However, it has subsequently reduced per capita packaging use. According to the DSD there has been a total drop in per-capita consumption of packaging from 94.7 kg in 1992 to 82.3 kg in 1997. This 13 percent drop in consumption compares to the 15 percent increase in per capital packaging use in the USA over the same time period. The proportion of beverages sold in refillable containers has increased. The transport packaging sector, which has seen the greatest drop in packaging, has developed reusable*

shipping containers. Furthermore, the Ordinance has also raised awareness among packaging producers of the need to radically re-think material use in packaging.

*Has the take-back system resulted in real reductions in resource use?*

Critics of the system point out that material bans need to accompany take-back targets. For instance, aluminium has a large environmental 'footprint' throughout its lifecycle from mining bauxite in tropical countries to the intensive use of electricity to process the ore. The use of aluminium in one-use ('disposable') Tetra Paks or drinks cartons cannot be justified. Similarly, a ban on PVC and other halogenated materials would alleviate the problems of hazardous emissions throughout the materials manufacturing, use and disposal phase. For heavy metals, the revised ordinance stipulates a reduction of the total use of lead, mercury, cadmium and hexavalent chrome in packaging down from 600 ppm in 1998 to 100 ppm in 2001, but this could be better achieved with a total ban. A ban on all one-use beverage containers which could later be extended to all food and cleaning packaging as well as incentives for more regional recycling would further reduce the use of resources. The Oko Institut in Germany has further recommended a Red Dot labelling scheme to warn consumers of non-recyclable materials.

## **6.2 Case Study: Product take-back in the car industry**

*Proposal for an EU Directive on Waste from End-of-Life Vehicles (ELV)*

On the initiative of some European countries, in 1997 the EU published a proposal for a Directive on Waste from End of Life Vehicles. The directive, which attempts to implement the principle of Extended Producer Responsibility, is due for adoption at the end of 1999.

One of its objectives is to address the problems of abandoned car wrecks, by providing for the collection of ELVs for processing and the re-use and recovery of their useful components. According to the proposal, the final owner of a car, in order to have it removed from the national vehicle register, would have to obtain a certificate of destruction to prove that it had been delivered to an authorised facility for re-processing. Producers will also have to take responsibility, by phasing out the use of harmful substances and incorporating more recyclable materials into their vehicles.

The revised text has agreed that:

- From 2003, member states must ensure that the last owner of a vehicle can hand it over to a treatment facility free of charge. Vehicle producers must meet all or an 'adequate' part of the cost of this measure or must take back the vehicle for free themselves.
- A recovery of 85 percent by weight of all automobiles by 2002 (90 percent for new models) and 95 percent by 2015 must be achieved. Incineration is curtailed, so that by 2015, at least 90 percent of the recovery is achieved through material recycling. All vehicles put on the market from 2005 must meet these targets.
- Vehicle materials and components must not contain lead, mercury, cadmium, or hexavalent chromium, except in specific cases and under certain conditions. This general ban will apply to vehicles put on the market 18 months after the directive is published. The exemption annex will be updated regularly. Currently, it foresees four exemptions for lead as an alloying element, six for lead in components and one exemption each for mercury and hexavalent chromium.

In addition to the detailed arrangements for cost free return of vehicles, member states will be able to implement a range of the directive's secondary provisions through voluntary agreements with industry. These include provisions on reducing the use of hazardous substances in vehicles, the

creation of collection systems for scrap vehicles, encouraging reuse and recycling of components, use of component and material coding standards, provision of dismantling manuals by producers and publication by economic operators of information on vehicle design, treatment and reuse, recycling and recovery.

#### *Shortcomings of the Proposal*

*The delegation of responsibility for further prevention, as regards the phase-out of hazardous substances and eco-design criteria to Member States, weakens this proposal considerably. Since any product norms affect the internal market, such policies on the national level are either met with severe legal restrictions or have to become an EU issue. Thus, this delegation of responsibility to the national level is postponing action.*

*Another weakness of the proposal is that the phase-out of PVC plastic is postponed and referred for horizontal measures (all uses of PVC, and not just cars). Realistically, any phase-out of PVC will be sector specific, depending on the available substitutes - so this decision of the Commission is another delaying action.*

*A third loophole in the proposal is the possibility to "recover", i.e. to burn the non-metallic components. This runs counter to the prevention objectives stated in the same proposal.*

*The European Environment Bureau (EEB) is proposing the following improvements to the Proposal:*

- a clearer definition of end-of-life vehicles, to prevent exports of used cars, especially to Central and Eastern Europe;*
- stricter controls on the materials used in cars, especially heavy metals and PVC to facilitate the safe re-use of components and material recycling;*
- stronger safeguards against incineration as a form of 'recycling'; the re-use/recycling target should be set to 95% by 2010 (instead of 85% by 2015) to motivate new product design;*
- better requirements for consumer information.*

*Several car manufacturers are promoting the use of voluntary agreements as an alternative to this directive. This would be unacceptable on a European level, because enforcement is not possible and the diversity of actors involved would make implementation impractical. Both the German and Austrian voluntary agreements are considerably weaker than the proposed directive, by for example, limiting the producers' responsibility to cars that are less than 12 years old.*

#### *National Car Take-back Schemes*

*Car take-back legislation currently exists in Germany, Sweden, Netherlands, and Denmark. In Germany BMW, Ford and Mercedes intend their take-back operation to work along the lines of the Duales System Deutschland, with a separate organisation to accept and strip down cars. An interesting development of this German initiative is that car companies have begun to extend their recycling operations to countries where the pressure to recycle is not as great, such as in the UK.*

#### *Will take-back reduce resource use in cars?*

*The original aim of the European Union Priority Waste Streams Programme working group on "car scrap" was to ensure the controlled disposal of car scrap in all the member states. Currently car scrap accounts for ten percent of all hazardous waste generated in the EU every year. The final report included measures to avoid car scrap through extending vehicle lifespan, to increase use through car-sharing, strengthen local and long-distance public transport, and detoxify waste by reducing materials containing toxic substances in vehicles. However, these measures had no obligatory stipulation attached and are not mentioned in the End of Life Vehicle Directive.*

The ultimate goal of any EPR programme imposed on car manufacturers must be the reduction of resource use. While recycling is one way to achieve this goal, it is energy intensive due to both the transport of scrap and re-processing of metals. Recycling of scrap also results in additional pollution because of toxic substances in the both the metal itself and in the coatings. A more resource efficient strategy is to reuse car components through the standardisation of parts and modular design - where these strategies do not hamper environmentally progressive innovation. The most resource efficient strategy, however, is to reduce the need for mobility by more localised production and consumption and better town planning, as well as increased reliance on public transport.

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### 6.3 Case Study: Take-Back for Waste from Electrical and Electronic Equipment

Germany, the Netherlands, Sweden, Japan, Taiwan, Austria, UK, Switzerland and France are the countries most actively pursuing EPR for electronic products. The European Union is currently grappling with a draft directive on waste electric and electronic equipment, as part of its priority waste stream project, which started in 1994. This marks a new era of environmental accountability for electronics manufacturers. These countries are calling for EPR from design to disposal.

#### **Proposal for an EU Directive on Waste from Electrical and Electronic Equipment (WEEE)**

The proposal attempts to tackle the growing amount of waste electrical and electronic equipment (WEEE). In 1992, 4-6 million tons of WEEE was generated in the EU, and the estimates today are 5.4-6.7 million tons. The life cycles of some electronic goods, like computers, have become increasingly shorter due to the short innovation time. Miniaturisation of electr(on)ic equipment reduces the volume of waste, but makes collection, repair and recycling more difficult. Also, the relative costs between repair and buying new electronic equipment have changed, so that repair is only economically feasible for very expensive and large electronic goods. The problem of WEEE is not only one of quantity, but also the hazardous impacts associated with final disposal. WEEE often contains heavy metals, arsenic, halogenated organic substances, PVC etc. which create problems when landfilled and especially when incinerated.

The EU draft directive aims to promote electrical products designed for repair, upgrade, re-use, dismantling and safer recycling.

The draft directive prohibits the use of mercury, cadmium, hexavalent chromium and brominated flame retardants in all electrical goods by the year 2004. It puts full financial responsibility on producers to set up collection systems and states that distributors, when supplying a new product, offer to take back free of charge a similar end of life electrical and electronic equipment from private households. Discussions are currently being held about setting up a private fee on new products to cover the cost of free take-back by the end user.

Compulsory targets for collection will be set in 2006. Between 70% to 90% by weight of all collected equipment must be recycled or re-used. Incineration with energy recovery is allowed for the 10% to 30% of waste remaining. However, components containing the following substances must be removed from any end of life equipment which is destined for landfilling, incineration or recovery: lead, mercury, hexavalent chromium, cadmium, PCBs, halogenated flame retardants, radioactive substances, asbestos and beryllium.

Member states shall encourage producers to integrate an increasing quantity of recycled material in new products. At least five percent of total plastic content by 2004 must be recycled plastic.

Producers must design equipment with labelling for recycling to identify plastic types and location of all dangerous substances.

Member states must collect information from producers on a yearly basis about quantities of equipment put on the market, both by numbers and by weight, as well as on the market

saturation in the respective product sectors. This information will be transmitted to the EU Commission by 2004 and every three years from that date.

#### *Industry Response*

*Industry objects to the restriction on hazardous substances. The restriction on beryllium for example, will cause problems for mobile phone producers who use copper beryllium and would be forced to stop using it due to the cost of removal at end of life. Indeed many industry representatives state that the EU should not be mandating material phase outs in specific product directives. This tactic forced the removal of PVC phase-outs from the previous End of Life Vehicles directive in 1997. PVC waste is now being examined under a separate EU initiative which is being heavily lobbied by the PVC industry in Europe and the US.*

*Industry also objects to the requirement of 5% recycled plastic content stating that legislation should now force the recycled material market and the US industry lobby is citing this as a trade barrier to global trade. The US lobby is also opposing the focus on **producer** responsibility.*

#### *NGO Response*

*The latest draft of the proposed Directive from August 1998 has sharpened producer responsibility and tightened the recovery targets. Environmental groups support the following elements of the draft Directive:*

- *financial responsibility of producers for collection, treatment, recovery and disposal;*
- *the inclusion of tough re-use and recycling targets, a minimum recovery rate of 90% by weight for large household appliances, and 70% for other categories by 1 January 2004;*
- *the inclusion of targets for use of recycled materials - the share of recycled plastic in new equipment should be 5% of total plastic content by 2004;*
- *the phase-out of the use of hazardous substances - lead, mercury, cadmium, hexavalent chromium and halogenated flame retardants - by 2004;*
- *the exclusion of energy recovery as a means of meeting the recycling targets.*

*Environmental groups are calling for the directive to be based on Art.130s and not on Art.100a. This is essentially a framework directive, which leaves Member States with a considerable degree of freedom to motivate innovation. However, to ensure that prevention measures introduced by Member States do not conflict with the internal market, the Directive should clarify what type of instruments could be used nationally e.g. price and tax incentives and substitution requirements for hazardous substances.*

#### *Elements of an Effective Take-back Regime*

- *definition of WEEE - The definition refers only to EEE which has entered the waste cycle. Thus, any EEE which was, for example exported to third countries, would not be WEEE. A definition of WEEE should be found that does not create loopholes;*
- *differentiated approach - WEEE is very diverse in terms of its technical properties, material composition, potential for recycling etc., so it requires a framework-type of legislation, which defines principles and criteria, but leaves implementation to the Member States and their industries;*
- *strict final disposal standards;*
- *an ambitious collection policy, including organisational principles and incentives;*
- *a pricing mechanism allocating take-back and treatment costs to the producers;*
- *quality control of organisations which collect and recycle;*
- *a solution for historical scrap - the Directive should cover all WEEE, regardless of the date when the equipment was put on the market;*
- *safeguards against the export of WEEE and their components.*

#### *Will the directive lead to better product design?*

*Some member states, such as Sweden, are strong in their support for the directive with its focus on producer responsibility and hazardous material phase outs. A few progressive electronic*

avoid 'free-riders'. The draft directive is a good attempt at moving toward cleaner design. More emphasis on re-use and upgradability rather than recycling, is needed. The main problem is that a strong NGO and consumer lobby is needed to counter industry lobby before May 1999 to ensure the phase-outs and producer responsibility focus remains.

#### *National Efforts on Take-Back of Electronic Scrap*

##### *Netherlands*

*The Dutch proposal is the most progressive in setting out a product recovery goal of 100% by the year 2000. It provides differential recycling targets for large appliances (90%) versus consumer electronics (70%) and for metal (95%) versus plastics (30%). Since 1998 industry must achieve these goals, as well as qualitative goals, of prevention and product reuse. The new legislation allows industry to impose a surcharge on the price of new products to help fund take-back schemes. It also imposes a ban on the landfilling and incineration of collected products -- though parts left over after recovery may be burned -- and on trade in refrigerators and freezers containing ozone-depleting chlorofluorocarbons (CFCs). The Dutch legislation places almost full responsibility for electronic take back on manufacturers and importers of electronic products.*

*In late 1997, the Dutch Association for Information and Communication Technology announced the creation of its own national take-back scheme in anticipation of the government's decree. The scheme -- covering information technology, office equipment, and telecommunications equipment -- is voluntary to members and features a partnership between the trade association and two major electronics-recycling firms.*

##### *Sweden*

*More than 200,000 tonnes of electronic and electrical products are scrapped annually in Sweden - a volume that is expected to increase as a consequence of increased consumption. Most of this waste currently ends up at landfill sites and incineration plants.*

*By 2000, producers of electronics and electrical equipment would share with municipalities the responsibility for recycling end-of-life electronic equipment. All dismantlers and recyclers of such equipment would have to be certified. End users of waste electronic and electrical equipment will be able to return their old equipment free of charge to retailers and producers upon purchase of new, equivalent equipment. If there is no purchase of new equipment, the consumer will give the old equipment to a municipal collection system. The system takes advantage of the fact that most municipalities in Sweden already require separation and recovery of electronic waste from the household waste stream.*

*Producers are expected to finance their part of the take-back system through a fee on new products. The ordinance covers equipment sold before and after the take-back system takes effect. Under the ordinance, no landfilling, incineration or shredding of electronic scrap will take place without treatment by a certified operator. It is thought that the landfill ban and certification system will be sufficient to achieve high recovery and recycling rates. Under the ordinance, producers will be required to provide detailed information on product content to dismantlers, particularly on hazardous substances. Sweden has a strong programme on the phase out of hazardous chemicals, including brominated flame retardants and other heavy metals listed in the draft EU directive.*

##### *Taiwan*

*Taiwan's take-back system for computers, TVs, refrigerators, washing machines, and air conditioners has been in effect since March 1998. The system requires retailers to accept used electronics from customers, and will cover equipment regardless of when it was sold.*

##### *Switzerland*

*Since the summer of 1998, the Swiss government has approved take-back legislation for waste electrical and electronic equipment, requiring retailers, manufacturers, and importers to take back*

*the products free of charge and treat them in an "ecologically sensitive" manner. The take-back requirement will apply to all products, regardless of whether they were bought - "a day after the legislation comes into effect, a year ago, or even 15 years ago", a government official stated. Manufacturers will have to take back only their own brands, while retailers will have to accept any type of product they sell.*

*The government is not setting specific requirements for recovery or disposal or stipulating how the scheme will be financed, leaving it up to business to make arrangements. The government has decided to act because of rising volumes of waste electrical and electronic equipment. It estimates that some 110,000 tons are thrown away each year. Attempts to develop voluntary solutions for product take back and disposal have failed because of concern over free riders.*

*The new law treats all exports of used electrical and electronics goods as hazardous waste transfers according to the Basel Convention.*

#### *Long term Impact on industry*

*Electronic products entering the waste stream today were not designed with recycling in mind. A lack of information on product composition, material variety and hazardous constituents present obstacles to recycling, particularly for plastics. Cost-effective recycling in the future will require product design changes that reduce disassembly time and increase the reuse and recyclability of components, including:*

- product simplification;*
- standardisation of components, product configuration;*
- modular designs, including components for reuse;*
- standardisation of material types;*
- easily detachable parts;*
- reduction in number of pieces requiring dismantling*
- accessibility of components; and*
- reduction in material types to reduce sorting*

*Such initiatives are already underway. At Sony Europe, new television designs incorporate more snap together parts and fewer screws to facilitate product disassembly. There are also fewer material types to reduce the amount of sorting required for recycling and PVC has been phased out. Siemens in Germany has designed a new eco-PC which facilitates dismantling in response to German electronics legislation. An added benefit of the new design is lower production costs. Fewer parts means less assembly time. Xerox has had a take-back and leasing system for its photocopiers for many years.*

#### *CARE Vision 2000*

*Delft University of Technology in the Netherlands is working with manufacturers of electronic goods under a Europe-wide Eureka project called CARE (Comprehensive Approach for the Recycling of Electronics) Vision 2000. The aim of this project is to recycle electronics scrap at the highest level of utilisation. It has led to a unique co-operation between producers and recyclers. In the CARE system, every electronic product will contain an information module. This module stores all producers' information that can be useful to the recycler, such as the types of materials the product contains, the toxic substances that need to be removed etc. Another interesting possibility is to use the module to record information on the 'life history' of a product to be able to determine its remaining 'life value'. For instance, the number of hours a cathode ray tube in a television has operated determines whether or not this part can be reused in a new product or as a repair part.*

*“The global imperative to use materials more efficiently is likely to create as many new professions, companies and industries as the communications revolution did during the past century” – Worldwatch Institute, 1995.*

- Us studies show that recycling one million tons of solid waste tends to generate 1,600 jobs. Landfilling the same amount would require 600 workers and incineration only 80 workers.*
- Employment in the American car repair business increased 50% between 1980 and 1990; jobs in the manufacture of new vehicles increased only 30%.*

*No doubt there are jobs in recycling. Indeed the US government is anticipating much of the workforce for electronic recycling will come from its prison population – a movement contrary to the practice in Europe to create job opportunities via certified recyclers. The use of cheap labour may in fact act as a disincentive to design safer and more efficient products.*

## *7. Conclusion*

*The responsibility for ensuring Clean Production processes, reducing resource inputs, eliminating the use and generation of hazardous materials and products must ultimately lie with the producers. By reinforcing the Polluters Pay Principle, EPR forces producers to develop products with longer lives, reusable parts and safe materials.*

*However, EPR is only one tool to move to Clean Production systems. It must be reinforced with information and education as well as pollution prevention legislation, and Ecological Tax Reform. The existing economic model favours the use of resources and energy over people. An Ecological Tax Reform is one of the keys to the effectiveness of EPR: by making resources more expensive and labour costs cheaper.*

*If EPR is to strengthen this transition, governments will need to ensure public access to information, bans and phase-outs on the production and use of hazardous substances, as well as 'strict joint and several' liability for environmental and human health damage. It is also paramount that reuse and recycling of resources takes place as near to production as possible to reduce energy costs and promote self-sufficiency.*