# TAKE IT BACK: EXTENDED PRODUCER RESPONSIBILITY AS A FORM OF INCENTIVE-BASED ENVIRONMENTAL POLICY[1]

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**ABSTRACT**

This paper describes extended producer responsibility (EPR), an emerging approach to incentive-based environmental policy. Sometimes known as manufacturer take back or product stewardship, EPR imposes responsibility on producers for the environmental impact of products and materials throughout the product life cycle. Typically, EPR policies are enacted in order to facilitate high levels of recycling by tapping the expertise or financial resources of producer groups. More fundamentally, EPR attempts to internalize externalities by changing the behavior of producers by tightening the link between product design and marketing decisions and waste management-related concerns.

Extending responsibility of producers through take back requirements, financing obligations and related instruments relies on a product life cycle perspective on environmental management and represents a substantial change in environmental policy. This paper sketches some reasons why EPR may be preferable to a more economically orthodox, product life cycle stage-by-stage approach. Those reasons include a heightened concern about resource scarcity and pollutant loadings as seen from a sustainability perspective, skepticism about consumer sovereignty and the ability of the market to respond to demand for greener products, a belief that EPR will promote environmentally-oriented technological change and the political impact of a dramatic assignment of environmental responsibilities.

**KEYWORDS:** Extended Producer Responsibility; Manufacturer Take Back; Product Stewardship; Economic Incentives; German Packaging Ordinance; Product Life Cycle

## INTRODUCTION

Incentive-based approaches to environmental policy are increasingly attracting attention and even cachet in policy circles. Seen as a way of correcting market failure in a cost-effective manner, incentive-based approaches such as pollution (Pigovian) taxes, tradeable credits, deposit-refund systems or liability requirements are lauded both because they force the incorporation of environmental damages into market prices—and therefore correct skewed incentives—and because they do so in a manner that provides flexibility and, hopefully, the potential for least cost approaches to environmental improvement.

To this list of familiar policy instruments, however, must be added a new approach: extended producer responsibility (EPR).[2] The German Minister of the Environment, Hans Töpfer, created this approach nearly from scratch when he proposed the Ordinance on the Avoidance of Packaging Waste in 1990.[3] Under the provisions of the Ordinance, producers are required to "take back" discarded packaging for recycling from waste generators, thereby deliberately shifting the responsibility for waste management from final consumers to materials producers, product manufacturers and retailers. In so doing, the Ordinance seeks to force producers to incorporate waste management-related concerns into product design and marketing decision making. Recyclability now competes with all of the other conventional concerns in product design such as cost of inputs, manufacturability, compatibility with the distribution chain, functionality, safety, and so on.

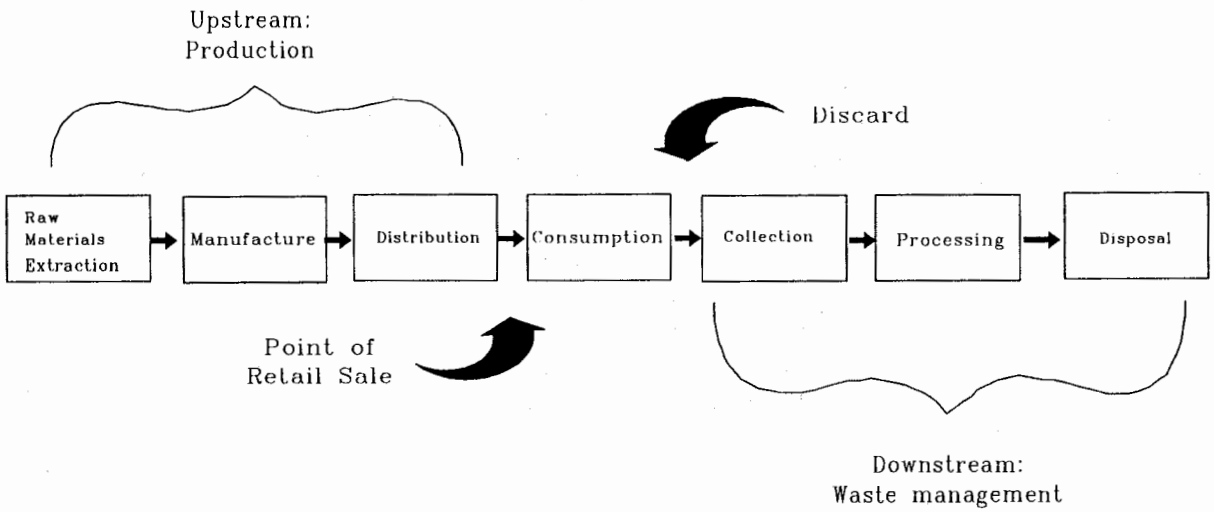


**FIGURE 1**
**Extended Producer Responsibility and the Product Life Cycle**

The Packaging Ordinance establishes a series of deadlines that industry must meet for take back, re-use and recycling of various types of packaging. Manufacturers and distributors must take back transport packaging, such as pallets and corrugated boxes used for shipping, and retailers must provide bins in which consumers can leave secondary packaging (e.g., the paper carton around a tube of toothpaste) in the store. The Ordinance imposes large deposits on many types of primary packaging (defined as the basic package that surrounds the good) unless industry establishes a privately-financed system for collecting and sorting discarded packaging. The result has been the formation of the Duales System Deutschland (DSD). This private consortium operates a private collection and sorting infrastructure for packaging wastes in Germany. Packaging producers wishing to participate in the DSD pay a license fee which entitles them to place a "green dot" symbol on their package, indicating to consumers that the package can be recycled through the DSD.

The Packaging Ordinance has spawned offspring, imitators and detractors. Germany is developing similar take-back policies for consumer electronics, automobiles and paper goods. Sweden recently enacted the Eco-Cycle law imposing producer responsibility, the French are debating an "Eco-emballages" system modeled on the German DSD, and the Canadians are working out the details of "packaging stewardship" and "shared responsibility" for the financing of recycling. The Belgians and Dutch have related policies in development, the European Community (EC) has been struggling since 1990 with a continent-wide version of the German initiative, the Taiwanese attempted producer responsibility for recycling of PET packaging and the US is flirting with a variant known as utilization standards.[4]

EPR generates powerful incentives for changing the environmental attributes of products, internalizing externalities by maintaining implicit property rights in goods and materials by producers throughout their life cycle. The intuitive appeal of EPR is clear: one need not worry about the ability of the market to transmit the desire of households for increased recyclability of, say, packaging, up the distribution chain from retailers to goods manufacturers to packaging producers. This policy tool immediately and directly increases the incentives for product or package redesign to meet waste management objectives.

Nonetheless, EPR raises important questions: what particular aspects of market failure does it remedy and how does it compare to more conventional approaches? Few EPR policies are fully in place. Even the German Packaging Ordinance has been fully in operation for less than a year. So, while the Ordinance has engendered both praise for its preliminary accomplishments and criticism for its disruption and high costs, it is premature to hazard even a mid-course evaluation of this or other EPR schemes. The goal of this paper is, instead, to explore the conceptual foundations of this policy approach.

## WHAT IS EXTENDED PRODUCER RESPONSIBILITY?

Producers bear some responsibility for the environmental impacts of their activities in most industrialized countries.[5] Traditionally, those responsibilities focus on the emissions and effluents from manufacturing and related industrial facilities and activities. Government regulations typically mandate air and water pollution controls on factories, utilities and other installations. The notion of *extended* producer responsibility implies that these conven-

tional responsibilities are to be broadened. The product life cycle as shown in Figure 1, makes this extension clearer. To a limited extent, producers' responsibility for environmental impacts already extends beyond the factory. For example, automobile manufacturers are responsible for meeting emissions and fuel economy standards for the vehicles that they sell in the U.S. More broadly, product liability has broadened manufacturer responsibility to post-production stages of the product life cycle in the U.S. without the explicit legislative development of an EPR policy.

It is only within the product life cycle framework, however, that extended producer responsibility is a coherent concept. A life cycle-based perspective allows environmental threats and remedies to be identified according to the "stage" (as in raw materials extraction, manufacture or disposal) in which they occur. Most environmental regulation requires the entities operating in a given stage of the product life cycle to be responsible for impacts occurring at that stage. In contrast, at issue in most discussions of EPR is the addition of some form of responsibility for waste management impacts to those conventionally associated with production. In the language of Figure 1 above, "upstream" entities take on responsibility for "downstream" impacts under EPR. However, EPR has begun to broaden in conception to include responsibility of manufacturers for the inputs to their products and the environmental behavior of the associated suppliers.[6]

The variants on EPR are multiple and instructive. Canadian policies under development propose to leave collection and sorting of municipal wastes in the hands of local communities, but to require industry to make up any deficit resulting from the failure of revenues from sales of recovered materials to cover collection and sorting expenses. Here the rubric is "shared responsibility" rather than "take back."[7] The proposals being debated in France and in the European Community are notable in that they allow a portion of collected packaging to be incinerated if the relevant facilities recovery energy.[8]

"Take back" takes on a more literal meaning in the case of EPR for consumer durables. In the case of automobiles, consumer appliances, consumer electronics and batteries, manufacturers may, in fact, actually take back the products that they manufactured. Managing discarded durables in this manner increases the possibility of re-use of components. It also may be a less formidable challenge economically and logistically than the take back of packaging because of the higher economic value per recovered item and the smaller number of units in the waste stream. German initiatives in this area have prompted auto makers to establish pilot dismantling plants to experiment with techniques for improving the re-use and recycling of discarded automobiles.[9,10]

EPR can thus be realized through a variety of approaches. According to Lindhqvist, at least five broad types of producer responsibility are possible:[11]

- ownership - where the producer literally retains ownership of and thus responsibility for a product through leasing or other arrangements;
- physical responsibility - where the producer is involved in the physical management of the products or the effects 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 the wastes at the end of the product's life (e.g., collection, processing and disposal);
- liability - where responsibility for environmental damages caused by a product is borne by a producer and may encompass damages occurring in various stages of the life cycle including use and final disposal; and
- informative responsibility - where the producer is required to provide information on the product or its effects in various life cycle stages.

These types of EPR are not mutually exclusive. Physical responsibility often devolves through contracting relationships into economic responsibility and/or liability. EPR policies can also be designed so that some producers choose one type responsibility, as in a physical take back system while others maintain only economic responsibility by paying a third party to perform the relevant tasks.

## MARKET FAILURE AND THE EXTENSION OF PRODUCER RESPONSIBILITY

In a market economy and especially in American political discourse, the rationale for government invention in the economy rests on a diagnosis of market failure. Economic theory argues the principle market failure in environmental policy is the failure to "get the prices right," that is, to ensure that prices reflect the environmental benefits and burdens posed by the production, consumption and disposal of goods and materials. Economists have long argued that by incorporating the impact of pollution and other environmental insults into prices—internalizing externalities—we can resolve our environmental difficulties. A negative externality arises when an economic activity imposes costs on a third party and that cost is not reflected in the price paid in the relevant commercial transaction. A text book example is contamination of ground water from pesticides used in growing cotton. Uncontrolled, the pollution imposes costs on the communities reliant on that groundwater for their drinking water—health risks, increased costs if alternative water supplies are needed, even devaluation of local property values. Because the farmer does not bear these costs, she can grow her products more cheaply than if she were responsible for the control of runoff. When the textile manufacturer—and eventually the consumer—buys the product, the cost of pollution control is not part of the price—it is an "external" cost of the transaction. Consequently, the consumer obtains a less expensive product and the producer sells more. One result of the externality is that consumers buy, and producers make, too many goods relative to the environmental

resources consumed and relative to goods that incorporate the full costs of their environmental impacts.

The imposition of extended producer responsibility (EPR) represents perhaps the most literal version of internalization: producers retain legal or even physical responsibility for their products from cradle to grave under the broadest form of EPR. When a producer retains responsibility for a product or material throughout the life cycle *and* if the appropriate regulations are in place at each stage of the life cycle, then internalization occurs nearly automatically. The cost of complying with those regulations is borne by one entity who cannot shift the costs to an external party—because of the legal or regulatory assignment of responsibility—and must therefore incorporate the costs into product pricing. This extended responsibility forces producers to consider the environmental implications of their products in their design, production and marketing decisions.

Extended producer responsibility is thus a type of *performance* standard. Producers must meet the requirements of environmental regulation at each stage of the product life cycle but are free to choose the particular means of doing so. The use of performance standard contrasts with technology- or design-based standards and similar command and control style regulations that mandate in detail the technology which must be used to accomplish environmental goals. Presumably, this implicit performance standard allows producers freedom to innovate and to choose the most inexpensive approach to regulatory compliance. It is here that EPR can be most clearly seen as a form of incentive-based regulation.

Nonetheless, EPR differs from a more orthodox approach to remedying market failure. In the latter view, externalities would be corrected at the point in the product life cycle where they occurred. The corrections would change prices of the particular activity or good in question: stiffer regulation of mining would raise mineral and metals costs and more stringent standards for control of leachates from landfills would similarly raise disposal costs. The impacts of these life cycle stage-specific changes would then cascade throughout the economy, causing producers to use different raw materials or produce different products and causing consumers to demand and purchase and dispose of an altered mix of goods. The stage-specific approach is thought to be more efficient because the remedy is more closely tied to the identified environmental problems.[12] Ultimately, however, the economic criterion for choice of policy would be that the approach addressed the environmental concerns at the lowest net cost to society. Thus, implicit in EPR are a set of arguments that this "stage-specific" approach is not the most cost-effective.

## WHY EXTEND PRODUCER RESPONSIBILITY?

Underlying EPR are four motivations: (1) to bring about specific results, especially *to achieve high levels of re-use, recycling and related forms of recovery* (labeled as "recovery" hereafter to reflect the diversity of activities); (2) *to alter behavior*, particularly to influence materials use and product design decisions by producers; (3) *to tap expertise* of producers for activities that relate to their capabilities as designers, manufacturers, marketers and distributors; and (4) *to obtain financial resources* to allow more ambitious environmental and especially, waste management, goals to be achieved than could be accomplished through public, taxed-based sources.

While it is clear that EPR is a very flexible form of performance standard, it is not clear what type of standards are to be achieved. EPR could be structured so that a producer must take responsibility for its products when they become wastes, without additional requirements. That is, the producer would have to collect the wastes, but would be permitted to recycle, incinerate or landfill them as it saw fit. The relevant government agency would set risk, emissions or related standards, for example, for incinerator operators and the operators would analyze whether or not the combustion of various types of wastes would cause the facility to exceed regulatory standards. The facility operator could then, in turn, refuse to accept wastes that they deemed problematical or could charge producers higher fees for those wastes that required more elaborate pollution controls.

EPR as it is proposed or implemented around the world does not work this way. The responsibility that is extended to producers is responsibility for achieving numerical targets for re-use, material and or energy recovery of products at the end of their life cycle. The German Packaging Ordinance sets explicit collection and sorting goals by material by year that must be met if punitive take back and deposit regulations are to be avoided. This suggests that the evaluation of EPR must be two-tiered: first as policy that combines producer responsibility with recovery targets and second, as a generic approach to environmental management.

## Making Recovery Happen

In many cases, then, EPR represents a groping towards a new policy approach to accomplish long held goals, rather than a deliberate, theoretically-grounded choice of instruments. Whether the benefits of producer responsibility coupled with recovery obligations exceed the costs depends on the criteria used to define risk and benefits. In a strict market efficiency view, the recovery targets make economic sense if the specified level of recovery would occur if all market failures and distortions were remedied. These market failures include:

- resource depletion arising from the too rapid use of renewable and nonrenewable energy and materials;
- government subsidies favoring primary resource extraction and use (i.e., "virgin materials subsidies")
- environmental externalities that occur during re-

source extraction (e.g., ecosystem damage due to mining, logging, etc.);
- environmental externalities that could be avoided through the substitution of recovered materials for virgin materials (e.g., externalities that could be reduced through the decreased energy consumption commonly arising from recovered materials utilization in manufacturing);
- environmental externalities arising from disposal; and
- conventional financial costs of waste management that are not passed on to waste generators because of the absence of quantity-based user fees.[13]

The magnitude of these market failures is highly disputed. To summarize rather crudely, many members of the risk assessment profession, conservative and some mainstream environmental economists and many industry representatives question the severity of these problems. They doubt that the high recycling levels specified in various national and state/provincial policies would be realized if all these market failures were corrected. In particular, they are skeptical about the inability of the market to deal with resource scarcity, they argue that virgin materials subsidies have only a small impact on recycling rates and they emphasize that the externalities associated with disposal are insignificant. Other academics, government officials and environmental advocates disagree, relying on more pessimistic evaluations of the environmental threats listed above. Whether or not high levels of recycling are justified within the framework of conventional economic analysis is well beyond the scope of this paper. What is relevant here is that, to one side in the debate over recycling, extended producer responsibility is inappropriate if its rationale is simply the achievement of high rates of recycling where undistorted markets would not otherwise bring about such a result.[14]

However, there is powerful evidence that a life cycle-based view and the focus on producer-related activities are warranted. A life cycle assessment of packaging prepared by the Tellus Institute, a nonprofit research and consulting firm in Boston, for the U.S. Council of State Governments, the U.S. EPA and the State of New Jersey suggests that production-related impacts of materials use are the most important. The lifecycle assessment quantifies the emissions and effluents arising at the various stages of production and waste management due to packaging, and it takes a further step and estimates the monetary value of impacts of the releases of the various pollutants. Imputing a monetary value to environmental impacts is a controversial and speculative endeavor, but it provides a common metric for the various impacts, allowing the comparison of what are otherwise disparate impacts. It avoids an implicit judgment that "a pound is equal to a pound," that is, that equal quantities of different pollutants have the same impact on the environment. It also permits the comparison of environmental impacts to conventional costs and prices.

Table 1 presents the results of the Tellus Institute Packaging Study.[15] Three sets of costs are presented: the monetized value of the environmental impacts that occur in the production of packaging materials, the monetized value of the environmental impacts that occur in the waste management of packaging and the conventional costs of waste management. Conventional costs refer to the dollar expenditures on collection, processing and disposal, that is, the cost of wages for collection labor, capital for trucks and incinerators, etc. The environmental costs refer to impacts occurring *after* compliance with existing environmental laws—emissions and effluents remaining after use of pollution control devices. The conventional cost of producing packaging materials is excluded from this table because it is already captured in the market price of packaging materials. In other words, the costs presented in this table are externalities—impacts not incorporated in market prices.[16]

Several inferences can be drawn from these figures. First, the impacts from production shown in column three are uniformly much greater than those in column two and, in almost cases, larger than those in column one. As measured in dollars, production-related environmental impacts (e.g., increased cancer arising from air pollution) are more significant than either waste management-related environmental impacts (e.g., health impacts from exposure to toxics leached into groundwater from landfills) or the conventional costs of collecting and disposing of trash. Second, production of goods from recovered materials in the case of every material studied,[17] has significantly less environmental impact than production from virgin materials, indicating that recycling can produce important environmental benefits. Taken together, these results can be read as implying that the rationale for recycling is *not* the avoidance of incineration and landfilling: the monetized values in Table 1 are the lowest for environmental impacts of waste management. Instead, recycling should be pursued to minimize the pollution arising from raw materials processing and manufacturing. Thus, the extension of producer responsibility to include waste management impacts corresponds with the locus of threats in the product life cycle and with the benefits that arise from increased recycling.

There are additional grounds to avoid relying solely on a conventional market efficiency test of the pursuit of high recycling rates through EPR. In particular, a sustainability focus evinces greater caution about resource scarcity and about the impact of pollution on human health and ecosystems. Broadly speaking, sustainability or sustainable development refers to actions or policies which, in the words of the now famous Brundtland Commission, "meet the needs of the present without compromising the ability of future generations to meet their own needs."[18] Concerns about resource scarcity, and therefore the value of recycling as a means of conserving material resources are judged differently when viewed from the perspective of mainstream economics and from sustainable development. Proponents of a "strong" sustainability position argue that our obligation to future generations entails minimization of

**TABLE 1**
**Full Cost of Packaging Material Production and Disposal Externalities from the Tellus Institute Packaging Study[11]**

| *Materials* | *Coventional Disposal ($/ton)* | *Disposal Externalities ($/ton)* | *Production Externalities ($/ton)* | *Full Cost ($/ton)* |
|---|---|---|---|---|
| PLASTIC | | | | |
| HDPE | $242 | $4 | $292 | $537 |
| LDPE | $232 | $4 | $344 | $580 |
| PET | $250 | $5 | $854 | $1,108 |
| PP | $232 | $4 | $367 | $602 |
| PS | $232 | $4 | $385 | $620 |
| PVC | $232 | $4 | $5,053 | $5,288 |
| PAPER | | | | |
| Bleached Kraft Paperboard | $110 | $2 | $330 | $443 |
| Unbleached Coated Folding Boxboard | $110 | $2 | $269 | $382 |
| Corrugated Cardboard | $118 | $2 | $214 | $334 |
| Unbleached Kraft Paper | $110 | $2 | $277 | $390 |
| Recycled (100%) Folding Boxboard | $110 | $2 | $135 | $247 |
| Recycled (100%) Corrugated Cardboard | $118 | $2 | $150 | $270 |
| GLASS | | | | |
| Virgin Glass | $71 | $1 | $85 | $157 |
| Recycled (100%) Glass | $71 | $1 | $55 | $127 |
| ALUMINUM | | | | |
| Virgin Aluminum | $24 | $5 | $1,933 | $1,963 |
| Recycled (92%) Aluminum | $24 | $5 | $313 | $342 |
| STEEL | | | | |
| Virgin Steel Containers | $134 | $2 | $230 | $366 |
| Recycled (12%) Steel Containers | $134 | $2 | $222 | $358 |

the depletion of nonrenewable resources and maintenance of a replenishable stock of renewable resources—implying a stronger commitment to recycling than that of orthodox economics.

Analogously, an emphasis on sustainability would challenge the acceptability of use of the environment as a sink (i.e., repository) for wastes. Where conventional economic analysis would look at current flows of wastes into the environment and the resulting damages, an analysis oriented toward sustainability would be especially attentive to the accumulation of pollutants over time and the resulting cumulative threats to carrying capacity. Irreversible changes to the environment are an especial concern here because they deny future generations the option to make judgements about the value of the damaged, destroyed or depleted resources. Thus, a sustainability focus might lower the acceptable levels of pollutants coming from landfills and incinerators and would value more the avoidance of upstream environmental impacts achieved through source reduction or use of recovered materials in manufacturing.

Thus, one view of EPR and recycling targets simply

posits higher levels of uncertainty around environmental threats and therefore more aggressive policy goals. A concern about sustainability would also translate into a desire for policies that emphasized establishment of ongoing incentives for the consideration of environmental impacts of products by producers. This interpretation focuses on the tighter links that EPR forges between product design and waste management. Here the argument is not one of the severity of the environmental threats and the associated need for radical intervention, but instead of the efficacy of this policy approach.

## Altering Behavior

Behavioral change is a key rationale for broadening the scope of producer responsibility. By making producers responsible for the waste management impacts of their products, it is hoped that they will have an ongoing, institutionalized incentive to design products that facilitate source reduction, re-use, recycling and/or composting or safer disposal. Other policy approaches can promote the same behavioral changes. Obligations can be imposed on downstream entities with the expectation that effects will filter back "up" the distribution chain to producers. For example, quantity-based user fees imposed on waste generators (i.e., households, institutions and businesses) can provide a financial stimulus to change purchasing decisions by consumers, because more of their trash can be recycled, leaving a smaller residual quantity of trash for which they will be charged. By buying recyclable products, consumers can reduce the fees that they ultimately pay for waste services. Those purchasing decisions translate in turn to altered demand for consumer products which influence producer behavior. However, fees on waste generators are an indirect means of influencing producers and rely on fully competitive producer markets to ensure that product designs change in response to demand for less waste-intensive products.

*Consumer Sovereignty and Market Responses to Environmental Preferences.* This highlights a key premise of EPR: that incentives for recyclable or otherwise environmentally preferable products are not adequately transmitted through conventional market channels, that is, up and down the production/distribution chain. Consumer sovereignty, the notion that consumer is "king," in that the expenditure of personal income on various consumer goods indirectly determines the allocation of society's resources, in this view, does not hold. In more concrete terms, if a community adopts quantity-based user fees so that households and businesses have financial incentives to engage in source reduction and recycling, the use of EPR implies skepticism that either consumers will change purchasing behavior to maximize their savings "at the curb" or that consumers' attempts to purchase more recyclable, re-usable or source-reduced products and packages will lead to sufficient change in the type of goods produced and offer for sale.

The grounds for this skepticism at the consumer level include claims that waste services fees are too small a portion of household or business budgets to compel changed behavior on financial grounds or that consumers are simply unwilling to change their purchasing behavior. It should be noted that, to a *laissez faire* economist, either of these reasons for unchanged behavior suggest that there is no problem to be resolved—the waste generator has made a judgement, albeit implicitly, that the costs of changed behavior outweigh the benefits.

Three other concrete claims can be imputed to the skepticism about consumer sovereignty. First, markets can be incompletely competitive in such a way that consumer desires are not met because, for example, producers with market power own specific assets tied to waste-intensive goods. Specific assets are those which cannot be used for an alternative purpose.[19] For example, some types of capital equipment used for papermaking may only be appropriate for use with virgin pulp; other equipment maybe flexible in allowing either pulp or waste paper as a feedstock. The significance of the specificity of the former asset is that, if the paper market shifted to an emphasis on use of recycled materials, the owner of the specific asset would not only be ill-equipped to take advantage of market changes, but would also be unable to sell the asset to another user, potentially being forced to take an economic loss. In the terminology of competitive strategy, the exit costs, defined as the cost of leaving a market, are often high when assets are specific. The combination of market power with asset specificity would provide strong incentives for such a producer to be unresponsive to consumer demand.[20]

Alternatively, if the equipment needed to make use of recycled feedstocks is characterized by asset specificity, then potential entrants to the market may be dissuaded from investing, because of fears that, if the business failed, little of their investment could be recouped through sale of assets. According to contemporary economic theory, exit costs are one of the most important determinants of the likelihood of market entry by new competitors. Asset specificity may be a particular concern where recycling markets are characterized by the "chicken-and-egg" problem. Producers do not want to invest in use of recycled materials for fear that supplies are ephemeral, that is, that public passion for recycling will wane and supplies will dry up. At the same time, municipalities are reticent to gear up collection programs for certain materials in the absence of a stable and secure end market.[21] When dynamic problems of this occur within the private sector, the relevant firms often solve the problem by vertically integrating.[22] Because the chicken-and-egg problem crosses the public-private boundary, such a conventional solution is less tenable. Here EPR may be seen as an alternative to vertical integration.

Second, producers threatened by purchasing based on waste-related criteria can "muddy the waters" with false,

misleading or ambiguous claims about the recyclability or other attributes of their products, making it difficult for consumers to know how to exercise their "dollar vote."[23] The provision of information by competing producers seems to follow a kind of Gresham's law of propaganda: bad information drives out good.[24] As has been thoroughly discussed in the debates over environmental labeling and green marketing, the potential for confusing and alienating green consumers is high. Life cycle assessments, for example, have often been used, both legitimately and illegitimately, to dissuade consumers from making decisions on environmental grounds by emphasizing the ambiguity or complexity involved in choosing environmentally preferable products and materials.

Third, consumer sovereignty may ultimately triumph, but at a rate and pace incommensurate with needed environmental changes. Such a time lag in transmission of consumer desires may be a problem because of the severity of environmental threats, but more plausibly the problem is that the pace of change in materials technology and new product introductions may overwhelm consumer ability to recognize, evaluate and respond to the products and packages available for sale and their impact on waste-related concerns.[25] Use of complex materials for capital goods and consumer durables such as ceramics, engineered polymers, and advanced metals is growing rapidly.[26] So, too are familiar versions of advanced materials in the packaging waste stream such as composites and laminates (e.g., juice boxes, multi-material foils) for which there is not readily available recycling technology.

*Technological Change*. While a *laissez faire* view would suggest that incorporation of environmental considerations into the design process would occur through conventional market processes—a producer anticipates that a "green" product will gain market share or increase profitability and thus invests in R&D to develop and introduce the new product—the EPR approach implicitly assumes that this will not readily occur. The combination of the certainty of the obligation engendered by EPR and the proprietary information or expertise possessed by a producer suggests that EPR increases the incentives for green design. Green design, according to the Office of Technology Assessment (OTA), is "a design process in which environmental attributes are treated as design objectives, rather than constraints."[27] Green design in turn potentially increases the prospects of significant improvements in the environmental character of products because the product design phase of a product's life cycle is the one in which opportunities for discontinuous change are most likely. After the design phase, investments in production, distribution and marketing will have been made. In the words of Office of Technology Assessment: "70 percent or more of the costs of product development, manufacture and use are determined in the initial design stages...once a product moves from the drawing board into production, its environmental attributes are largely fixed."[28] Technological innovation holds out the potential for reducing environmental risks at lowered costs, by leapfrogging existing technologies and practices.[29]

## Expertise

Producers have expertise in some aspects of environmental management that governments lack. For example, the processing and especially the marketing of materials recovered from municipal solid waste are often activities at which the private sector is more adept. Similarly, product design incorporating environmental concerns relies extensively on producer expertise. Further, some aspects of materials marketing, product design or other upstream decisions involve proprietary information that producers may choose to act on if they bear responsibility for their products from cradle to grave, but which they may be unwilling to share with government authorities or competitors in a more public process. A producer may not be willing to share the detailed type of design information needed to facilitate post-consumer recycling of complex or rapidly changing products with other market participants. In such a situation, an EPR strategy that relied on ownership, physical responsibility or only very direct economic responsibility would be more effective than third party recovery through conventional, arms-length market mechanisms.

In the management of municipal solid wastes, production decisions have historically been divorced from waste management concerns; waste managers have typically lacked influence over materials use and product design choices. As a result, they face entreaties and often obligations to reduce, re-use and recycle wastes but lack the appropriate authority and expertise to do so.[30] EPR is, in this case, an attempt to resolve this gap between production and waste management by shifting a portion of the waste management responsibility to producers. Alternatively, the gap can be bridged by giving government authority over production decisions insofar as they affect waste management.

## Generating Funds

Extension of producer responsibility is also a means of generating funds for environmental protection activities. This can be literal and direct as when a tax or fee is imposed on producers of a set of products or materials and the resulting revenues are used to ameliorate the "downstream" impacts of those products and materials. In other cases, EPR brings new financial resources in a more indirect fashion. By shifting responsibility for an environmental problem to producers, governments also shift the cost of dealing with that problem.

EPR can be thought of as a variant of privatization. Privatization usually involves the shifting of ownership or responsibility for productive enterprises and government service delivery from the public to the private sector.[31]

Under EPR, responsibility for public "bads" rather than for public or private "goods" is transferred. EPR, unlike privatization, increases the social obligations of private firms, but like privatization, it relies on the resources and expertise of nongovernmental entities to achieve public goals. As with privatization, EPR can be a means of reducing the cost of accomplishing public goals if private firms are more efficient than public entities in performing the relevant tasks. In some instances, EPR, like privatization, is motivated by a desire of the public sector to engage "load shedding," that is, to transfer obligations for societal tasks to the private sector as a means of relieving pressure on government budgets.

## THE POLITICS OF EXTENDING PRODUCER RESPONSIBILITY

To discuss EPR solely in economic terms is to miss its more important incentive effects. Shifting the cost of making products greener has mixed political implications. Some critics of EPR suggest that it is way of hiding the cost of responding to public passion for recycling and other environmental goals.[32] Others see it simply as a producer rather than consumer-oriented strategy and as the essence of incentive-based policy: materials or product producers who can meet the relevant environmental standards more cheaply will be able to undersell their competitors.

EPR sends a strong signal to potentially regulated entities about the commitment of society to the accomplishment of the relevant environmental goals. While EPR is not the only way in which commitment to environmental goals can be so signaled by policymakers, an informal survey of solid waste policy in the western industrialized countries suggests that EPR is especially effective in communicating to industry the resoluteness of policymakers to achieve particular goals.[33] More broadly, an analysis of public policy that relies exclusively on issues of market failure ignores important features of EPR. Where economic analysis concludes by advocating the internalization of external costs, a political analysis *starts* with the insight that no group in society wants to bear costs—externalities exist in part because they shift responsibilities from one group or entity to a less powerful one. Notably, both the German Packaging Ordinance and the Ontario, Canada "shared responsibility" proposal were formulated after the failure of voluntary agreements between industry and government to increase waste reduction and recycling.[34]

The certainty of the mandate and perhaps the shock of the change in responsibilities may provide the strongest incentive effect of EPR insofar as its prompts changes in business as usual.[35] After the take back requirements for secondary packaging in the German Packaging Ordinance went into effect (requiring retailers to remove such packaging or provide bins in which customers can deposit it for re-use or recycling), according to the DSD, this form of packaging declined in the waste stream by 80%. A leading retail chain claimed that it had been attempting to push manufacturers to reduce packaging for years to no avail until the imposition of the Packaging Ordinance.[36,37]

## CONCLUSION

There is little doubt that extended producer responsibility generates both economic and political incentives for waste recovery and, more broadly, for green design. The question is then one of how EPR compares to alternative policy approaches and especially how it fares relative to more conventional approaches. Before EPR is accepted or decried, the fundamental motives for its use need to articulated. Some lessons can be learned by following the progress of the German Packaging Ordinance and similar EPR initiatives underway. An evaluation must, however, disentangle short term impacts from long run structural questions. Among the latter are a clear definition of goals and rationales.

Thus, we need to answer questions such as: Are aggressive levels of recycling simply the goal? Or are we particularly worried about incompletely competitive markets and the failure of consumer sovereignty? Or is our concern about broadening the design process to incorporate environmental performance in a way that will keep pace with or stimulate technological change? Is EPR actually a response to the failure of previous political initiatives and to the difficulty of internalizing externalities?

This paper attempts to sketch grounds for use of EPR as an alternative to conventional life cycle stage-specific interventions to remedy market failure. These arguments are not definitive—no systematic empirical evidence has been produced. Nor have arguments been advanced that extension of producer responsibility is the only way to remedy the problems described. Nonetheless, this discussion suggests that *prima facie* assumption of the superiority of more orthodox policy tools is not warranted. We might just want to take it back.

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Schall, John, "Does the Solid Waste Management Hierarchy Make Sense? A Technical, Environmental and Economic Justification for the Priority of Source Reduction and Recycling." Working Paper #1, Program on Solid Waste Policy, Yale University School of Forestry and Environmental Studies (1992).

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## REFERENCE NOTES

1. An earlier version of this paper was presented at the Conference on Economic Incentives for Environmental Management, Air & Waste Management Association and U.S. Environmental Protection Agency, held in Rochester, New York, November 3-4, 1993.

2. EPR has multiple names: product stewardship, manufacturer responsibility, and manufacturer take-back. A related but not identical policy approach is product-oriented environmental policy which focuses regulatory analysis and intervention on products, rather than facilities. See Center for Energy Conservation and Environmental Technology (1993) for more on product policy.

3. Fishbein, B.K., *Germany's Packaging Law: A Nation Confronts Its Solid Waste Crisis*, Draft, INFORM: New York: 1993, forthcoming, ch. 3, p. 3.

4. For a description of the EC, Dutch, French and Belgian packaging initiatives, see Dallemagne, D., Devlin, A. and Shopley, A., "The Changing Packaging Landscape" *Spectrum*, 4 January 1993.; for brief descriptions of the Swedish and other German proposals, see Hayes, D., "Beyond Cradle-to-Grave," *Environmental Forum*, September/October 1993, 14-17 and "Status of Proposed Product Takeback Regulations in Sweden, Germany" *Business and the Environment,* 1993 4:15; for the various Canadian proposals, see, Canadian Council of Ministers of the Environment, *Canadian Code of Preferred Packaging Practices,* Office of Waste Management, Conservation and Protection, Environment Canada, Ottawa, Canada, n.d., the Ontario Waste Reduction Advisory Committee, "Resource Stewardship in Ontario: A Shared Responsibility" November 1992, and the "Canadian Grocery Manufacturers Design Product Stewardship Program for Packaging" *Business and the Environment,* December 1992 3:6; 1992; for the Taiwanese endeavor, see Yeh, J. "Searching for a Better Combination of Command-and-Control and Economic Incentive: Resources Recycling Policy in Taiwan" in Proceedings of the Invitational Expert Seminar on Extended Producer Responsibility Arranged by The Department of Industrial Environmental Economics, Lund University, Trolleholm Castle, Sweden, 4-5 May 1992. Utilization standards were proposed in Senate Bill 976, the bill to reauthorize the Resource Conservation and Recovery Act introduced by Senator Baucus in the 102nd session of the US Congress.

5. Portions of this paper are based on an earlier discussion of extended producer responsibility in Lifset, R. "Extended Producer Responsibility in North America: Rationales and Practices," in Proceedings of the Lund University Invitational Expert Seminar on Extended Producer Responsibility, *op. cit.* and in "Packaging and Product-Oriented Environmental Policy" in the Proceedings of the International Workshop on Product-Oriented Environmental Policy, Dutch Ministry of Housing, Physical Planning and the Environment, The Hague, Netherlands, 1 October 1993.

6. "Greening the Supply Chain," *Business and the Environment*, February 1993 IV: 2-4.

7. Ontario Waste Reduction Advisory Committee, "Resource Stewardship in Ontario: A Shared Responsibility" *op. cit.*

8. Dallemagne, et. al., "The Changing Packaging Landscape," *op. cit.*

9. Maxwell, et. al. "German Policy for Automobile Recycling and the Industry Response," in Proceedings of the Conference on Design and Disposal of Durable Products, Massachusetts Institute of Technology, Cambridge, MA, 24-25 March 1993.

10. If EPR is defined simply as extending producer responsibility to a stage of the life cycle outside of those in which the producer imposes direct impacts, then well known policies could be considered as EPR. For example, recycled content requirements, mandatory deposit redemption systems, advance disposal fees, and liabilities for hazardous waste collection, disposal and remediation are all policies that entail extending producer responsibility beyond emissions and effluents generated at a production facility.

11. Lindhqvist, T. "Extended Producer Responsibility" in Proceedings of the Lund University Invitational Expert Seminar on Extended Producer Responsibility, *op. cit.*

12. Goddard, Haynes, "The Benefits and Costs of Alternative Solid Waste Management Policies," Paper prepared for Symposium on Balancing Economic Growth and Environmental Goals, American Council for Capital Formation: Washington, D.C., 29 September 1993.

13. Quantity-based user fees (QBUFs) are also known as unit pricing, variable rates, bag/tag or pay-as-you-throw systems. They involve charging waste generators according to the volume or weight of solid waste discarded.

14. Brisson, I., "Packaging Waste and the Environment: Economics and Policy" *Resources, Conservation and Recycling*, 1993 8, 183-192.

15. A description of the methodology used, and a more detailed description of the findings are beyond the scope of this brief paper. Such information can be found in Tellus (1992). Shorter descriptions can be found in Schall (1992) and Ackerman (1993).

16. The conventional costs of waste management are treated as an externality because of the lack of quantity-based user fee systems in most communities in the US. Material prices do not, therefore, incorporate solid waste management costs. Strictly speaking, this a failure to employ marginal cost pricing, rather than a complete absence of prices.

17. Because of the absence of data on the environmental impacts arising from the recycling of plastics, no comparison can be made of plastics production using virgin and recovered materials.

18. The World Commission on Economic Development, *Our Common Future*, Oxford University Press, New York, 1987.

19. Williamson, O., *Economic Institutions of Capitalism*, The Free Press, New York, 1985.

20. For a discussion of the relationship of asset specificity to exit costs, see Oster, S., *Modern Competitive Theory*, Oxford University Press, New York, 1992, ch. 3.

21. Some limited evidence for the specificity of capital used in papermaking can be found in the low elasticities of substitution of waste paper for virgin pulp. See, Nestor, D, "Partial Static Equilibrium Model of Newsprint Recycling" *Applied Economics*, 1992 24:411-417 or Edgren, J. and Moreland, K, "An Econometric Analysis of Paper and Wastepaper Markets," *Resources and Energy*, 1990, 11:299-319.

22. That is, the firms will purchase their suppliers (backward integration) or their customers (forward integration) or they will employ the myriad of related techniques such as long term contracting that accomplish the needed results.

23. Holmes, H., "The Green Police" *Garbage Magazine*, September/October 1991, p. 42-51.

24. Gresham's Law refers to problems in currency debasement or depreciation. It usually is summarized as "bad money drives out good."

25. Generators of commercial waste outside of vertical marketing channels may lack the market power to push the pace of reduction of logistical and distribution wastes (i.e., pallets, corrugated containers and other shipping wastes). For a discussion of this, see, Twede, Diana, "Less Waste on the Loading Dock," Yale Program on Solid Waste Policy, Working Paper #2, 1993, forthcoming.

26. U.S. Department of the Interior, Bureau of Mines, *The New Materials Society*, Government Printing Office, Washington, D.C., 1990.

27. U.S. Congress, Office of Technology Assessment, *Green Products By Design*, Government Printing Office, Washington, D.C. 1992, p. 37.

28. U.S. Congress, Office of Technology Assessment, *Green Products By Design*, *op. cit.*, p. 35-37.

29. Ashford, N. "A Unified Technology-Based Strategy for Incorporating Concerns about Risk, Costs and Equity in Setting National Environmental Priorities" in Proceedings of the Conference on Setting National Environmental Priorities, Resources for the Future, Annapolis, Maryland, 1992.

30. Schall, John and Wirka, Jeanne, "The Demise of Integrated Solid Waste Management: Why We Need a National Materials Policy," *Livable City*, 1990 14:8-9.

31. Privatization has different meanings in across nations and policy arenas. It refers variously to denationalization of state-owned industries, deregulation of industry, defunding of organizations and activities previously supported with tax-based monies or contracting by governments for private delivery of public services.

32. "Waste and the Environment," *The Economist*, 29 May 1993, 3-18.

33. Dallemagne, D., et. al., "The Changing Packaging Landscape," *op. cit.*

34. Fishbein, Germany's Packaging Law, op. cit. ch. 3, p. 3 and Recycling Coalition of Ontario, "A History of the Battle Leading Up to New Soft Drink Container Regulations" Toronto, Canada, December 1985.

35. Ehrenfeld, John, Director, MIT Program in Hazardous Substances Management, personal communication, October 1, 1993.

36. It is also interesting to note that this occurred despite the fact that Germany has had a rudimentary version of quantity-based user fees for years. In many communities, households pay for waste services according to the number of trash cans that they use. The resulting incentives for waste generators apparently did not translate into upstream changes in packaging practices.

37. Fishbein, *Germany's Packaging Law*, *op. cit.*, ch. 5, p. 2.