

## 4.4. Instruments and measures

### Key takeaways

01

The EPR policy framework should be viewed in terms of both product and waste management policy. The policy option selected would depend on where in the product chain decision-makers wish to influence materials extraction, design or disposal.

02

Several EPR policy instruments and measures are available to governments to help them meet their stated goals and objectives. They are product take-back, deposit/refund, advance disposal fees, product/material taxes, combined upstream tax and subsidy and minimum recycled content requirements. Policymakers should review these different instruments to identify which might best meet their particular needs. The point of intervention for the instrument selected depends on the point where the market fails to internalize the impacts from the disposal of products at their post-consumer stage. The instrument or mix of instruments that would best meet policy goals should be selected.

03

An instrument's applicability depends on policy goals, or the influence or pressure necessary to reduce environmental impacts of concern.

04

Several types of supportive measures can be used to enhance the effectiveness of an EPR policy. Such measures should be selected in light of the policy goals.

05

Environmental effectiveness and economic efficiency of EPR should be examined. If a less onerous alternative or measure could produce the same effects as the EPR policy instrument, there would be no point to introduce EPR-based policy.

06

Selection criteria can help policymakers select an EPR policy instrument that best suits their needs. These criteria are environmental effectiveness; economic efficiency; political acceptability; administrability (ease of administration); and innovative advancement.

### 4.4.1 Introduction

This chapter describes a range of policy instruments for implementing EPR policy. Three basic categories of instruments exist: take-back requirements, economic instruments, and performance standards.

Take-back requirements can meet policy objectives by assigning responsibility for the end-of-life management of products e.g. product take-back.

Economic instruments can be used to meet the same objectives. These instruments are incentive-based and provide flexibility to the private sector to establish the means to accomplish the program requirement e.g. deposit/refund, advance disposal fees, material taxes and the upstream combined tax/subsidy.

In addition, performance standards like minimum recycled content can be set to specify a particular percentage of recycled materials to be used in the product.

Section 2.9 discusses the environmental effectiveness and economic efficiency of EPR and describes conditions under which EPR would be most efficient and effective. Criteria for selecting a policy instrument or measure are included in section 2.10. These criteria should help guide policymakers to select the most appropriate instrument in view of their particular environmental priorities, goals and objectives.

### 4.4.2 Policy drivers

National environmental priorities and other drivers need to be taken into account when considering EPR. To date, countries have used EPR to stimulate change in three key priority areas: resource efficiency, cleaner products and waste management. EPR can help realize objectives of sustainable development by helping to reduce wastes, reduce the release of potentially toxic chemicals in the environment, reduce use of virgin material inputs and lower energy consumption.

When resource efficiency is the primary concern, the policy emphasis would be on resources consumed in the production phase. Supporting instruments might include material taxes, take-back, combined upstream tax/subsidy and recycled content requirements. A specific focus would be on a life cycle approach. Measures should be designed to maximize overall environmental gains without limiting action to a particular phase of the life cycle.

In contrast, if improving the design of more environmentally compatible (or cleaner) products drives decision-making, the emphasis of EPR will centre on specific products or product categories that pose problems at the post-consumption phase of their life cycle. Increased attention to product design for better durability and recycling, as well as transparency of environmental impacts to the consumer, may also be expected. Supporting actions could include advance disposal fees, take-back and recycled content standards. Other supportive programmes would include those such as eco-labelling to identify preferable products for the consumer and for green government purchasing.

Waste management driven decisions are more likely to focus on the specific percentages of post-consumer materials to be diverted from final disposal. These activities would further support related research and development or commercialization activities for materials recovery technologies and capacities. Concerns about the internalization of costs may be more narrowly focused on internalizing costs for waste management. Instruments would include deposit/refund, take-back combined upstream tax/subsidy, and advance disposal fees.

### 4.4.3 EPR policy instruments and measures

While other environmental policy instruments tend to target a single point in the product chain, EPR seeks to vertically integrate signals related to the environmental characteristics of products and production processes throughout the chain. Several kinds of instruments and measures exist for implementing EPR. The following paragraphs outline some of the options available. The instruments discussed in this section are those that act to implement the basic principles of EPR. Therefore, programmes established using any of the instruments listed below would need to include the distribution of physical and economic responsibility (see Section 3) under the EPR policy.

It is relevant to note that the decision about which of these options are the most suitable for PV waste management has to be taken by the PV industry itself, as the principle guiding EPR is self-organisation by the producers in order to achieve the goals set in the regulation. Therefore, this section won't provide recommendations on the most appropriate options, but will rather illustrate the full spectrum of the available instruments.

#### 4.4.3.1 Take-back requirements

Policies that require the producer and/or retailer to take back the product or its packaging after use are the clearest example of extending the producer's responsibility into the post-consumer phase of a product's life cycle.

#### **Product take-back**

The most active use of EPR, under both voluntary and mandatory schemes, is in product take-back. EPR is applied to specific products (e.g. automobiles), product categories (e.g. electric and electronic products) or waste streams (e.g. packaging) that are to be taken back or returned. This type of programme is often associated with targets for collection and recycling and/or reuse.

In most cases, the producer is given the responsibility (or as under voluntary systems, takes on the responsibility) of meeting the targets for reuse, recycling and collection through a law, ordinance or agreement unless other conditions such as participation in a Producer Responsibility Organisation (PRO) or in the initiation of an individual take-back scheme, have been met (PROs are industry-wide schemes that are set up to implement voluntary and regulatory EPR approaches, such as for example PV CYCLE).

Policy approaches range from legal requirements, to negotiated industry/government agreements, to completely voluntary industry-based programmes. Often take-back is regarded as the purest form of EPR.

While voluntary agreements fall under administrative approaches to EPR, it is important to note that there are certain industry-based initiatives that could serve as an option. Firms have taken action to redesign products for easier recycling and/or recovery of particular components deemed to have a positive value at their end-of-life stage. Some firms have redesigned products to reduce the amount of toxic materials or chemicals used - based on voluntary challenge initiatives such as the US EPA's 33/50 programme and the Canadian ARET programme. In other instances, a sector as a whole creates a programme - as was done in Australia through their packaging stewardship programme.

#### 4.4.3.2 Economic instruments

Whereas take-back requirements use the assignment of responsibility to the producer for the end-of-life management of their products to meet the policy objectives, economic instruments can also be used toward the same objectives. Listed below are economic instruments that can be used to effectuate EPR policy. These instruments provide a direct financial incentive for actors to implement EPR. Examples of economic instruments that can be targeted to meet EPR objectives include deposit- refund schemes, advance disposal fees, and taxes and/or subsidies. Under an economic-based scheme, producers make sure that the products return to them through a variety of measures – by having targets in place, by the obligation that the scheme must sensitize the market, by the condition that take-back collection network must be established.

When using economic instruments for EPR policy implementation, certain conditions should be established to ensure that a significant degree of the physical and/or financial responsibility of the producer is allocated. For instance, if the consumer is required to pay an advance disposal fee to cover the additional costs for treating their product at its post-consumer phase, then the physical responsibility should be extended to the producer. Another example would be the earmarking of a materials tax. Earmarking the tax would ensure that money paid by producers are used for the treatment of the products subject to the EPR programme. Moreover, this tax could be set so that it differentiates between those materials that are difficult to recycle or reuse (e.g. containing toxic chemicals or numerous types of materials) from those that are not.

##### **Deposit/refund schemes**

In a deposit/return system, a payment (the deposit) is made when the product is purchased and is fully or partially refunded when the product is returned to a dealer or specialized treatment facility. Traditionally, deposit/refund schemes have focused mainly on beverage containers. Despite the success rate of these schemes, little activity outside of beverage containers has evolved. Although they have been used in some countries to a limited degree for other product categories such as consumer batteries, fluorescent light bulbs, tyres, and shopping bags.

To encourage more environmentally sound choices of materials, charges are applied to specific products and are refunded when the product is returned.

Arrangements are usually made with retailers to accept same brand and type of product, which they sell. Distributors are often responsible for the pick-up of containers (or products) and delivery to a recycling or treatment centre. Deposit/refund schemes can also be organized through a recycling centre or through kerbside collection. However, studies indicate the return ratio is lower under these two methods. The physical responsibility for operating this scheme would be delegated to the producer (and perhaps the distributor).

Principally, the deposit should include the commercial costs of the container (or specific product), plus the environmental costs associated with the disposal or with littering. Refunds should equal the avoided environmental costs plus the scrap value of the container. Higher return rates can be achieved when the fee is set at a higher percentage of the price.

Administrative arrangements between the producers, retailers (and distributors) need to be made at the onset of the programme. To avoid dislocations, some programmes have set maximum numbers of returnables permitted per customer per retail establishment. Under a deposit/refund system, full or partial responsibility should be allocated to the producer.

Deposit/refund schemes are often introduced as a means to encourage reuse and the reduction of material inputs (e.g. beverage containers), and/or to ascertain a reliable flow of materials for recycling and recovery operations.

### **Advance disposal fees**

An advance disposal fee (ADF), in the context of EPR, would be a fee levied on certain products or product groups based on estimated costs of collection and treatment methods. Fees are paid at the point of sale. Fees could be levied through the government or by an industry-based private sector organisation. Who collects the advance disposal fee (government or a private sector body) is an aspect that needs to be sorted out in the design of the system. The role of the retailer and distributor in this scheme needs to be arranged at the programme design stage.

Some countries with advance disposal fee programmes have set up a system to return a portion of the fee (paid by consumers) that was not used if recycling costs for the product have decreased. Similarly, lower fees or higher refunds could be paid for those products by which the waste management costs are reduced through actions such as redesigning the product for easier disassembly or with more homogeneous material composition. This scheme is similar in some respects to the deposit/refund scheme and is often used for longer-life products such as tyres, refrigerators or photovoltaic modules.

An ADF by itself would not constitute an EPR programme per se. The customer pays a fee for the recycling or treatment costs for the product, therefore, some portion of the physical organisation and treatment of the product at its post-consumer phase would need to be placed on the producers for the ADF scheme to be considered EPR. For example, producers (and importers) can organise an individual structure with retailers for product returns, or set up their own return depots. Another option is for producers and importers to form a private sector body (a PRO) to organise the collection and treatment of the products.



In efforts to enhance the communication about their EPR programme, one country requires that the advance disposal fee is placed on the customers sales receipt (and it is noted as a visible fee for the waste treatment of the product they are purchasing).

### **Material taxes**

The aim of material taxes is to reduce the use of virgin materials (or materials that are difficult to recycle, contain toxic properties, etc.) in favour of secondary (recycled) or less toxic materials. Special taxes may be levied on particular materials used or on materials (or chemicals) deemed to cause pollution or create a particular hazard. This instrument can be used when source reduction is the principal goal.

Ideally, the tax should be set at a level where the marginal costs of the tax equal the marginal treatment costs. Taxes set at the optimal level can contribute to material reductions i.e. to a level that would address the externality. Establishing the appropriate tax level, and the administrative costs associated with collection and re-distribution of the revenues, would need to be factored into decision-making. The tax could be set in relation to the damage from production and/or costs of waste management and as a scarcity premium. The tax level also should take into account costs for recycling, reuse and/or recovery of the product to ensure that the appropriate signals are transmitted across the product chain.

The tax should be earmarked and used for the collection, sorting, and treatment of post-consumer products. Under a tax programme, the physical responsibility (full or partial) for post-consumer products should be allocated. A structure closer to the core of EPR would be to delegate physical responsibility to the producer or to establish a shared system of responsibility in which the producer responsible for the extra costs for the treatment of the post-consumer products, and as exemplified under the Japanese and French packaging laws, the municipality could retain responsibility (funded by the materials tax) to collect and sort the wastes.

### **Upstream combination tax/subsidy**

An upstream combination tax/subsidy (UCTS) model is an alternative economic instrument to EPR, and not successful. However, the UCTS is consistent with EPR and it could be used as an instrument for EPR since it is a tax paid by producers, which is then used to subsidize waste treatment. An upstream combination tax/subsidy instrument signals the producer to alter their material inputs and product design and provides a financing mechanism to support recycling and treatment.

The upstream combination tax/subsidy combines a tax on produced intermediate goods, such as aluminium ingot or rolls of specific grade paper, with a subsidy to collectors of recyclables like used beverage cans and old newspapers sold for reprocessing. The upstream tax is levied by weight rather than per unit of a good because it is focused on materials and seeks to reduce the physical amount of material that ends up going to waste disposal. A subsidy is then provided to waste management firms or local governments to finance waste management.

The allocation of producer responsibility would be financial (through the tax). Producers can also be given physical responsibility (full or partial) for treatment of the post-consumer products. For instance, the producer might recycle their products while the local government

collects and sorts the waste through the subsidy. Tax schedules could be designed to deter the use of materials that might be difficult to recycle or have an impact on the environment (e.g. high toxicity). Establishing the correct tax and subsidy, as well as identifying who should be taxed and who should manage the system (level of government), are choices decision-makers will need to make.

#### 4.4.3.3 Standards (Minimum recycled content requirements)

A target of a minimum amount of recycled content (or secondary materials) per product can be set (like a performance standard). While minimum recycled content requirements are a performance standard per se, they will also encourage taking back of materials for recycling or re-use of the product. The producers and intermediaries generally take on the physical responsibility (or an agreed combination thereof).

Progressive standards can induce the potential for innovation. As stated by Kemp et al, 1991<sup>21</sup>, the policy mix of a standard (minimum recycled content) and a levy, or tax, can enhance the potential for innovation. Minimum recycled content requirements are often used with paper products, glass containers and plastic beverage containers. Some industry sectors have strong voluntary programmes for paper products, aluminium and plastics. Partnerships with government have also been formed.

#### 4.4.3.4 Other industry-based measures

There are initiatives that firms may take that would meet similar objectives to EPR. Public policymakers would not be responsible for such policies per se, but could help create conditions to stimulate these activities. One measure is leasing where ownership of a product never terminates. Another measure is a concept based on the new economy in which there is a transition from selling a product to offering a service.

##### **Leasing**

With leasing, the producer would not terminate ownership. Many companies advocate leasing of their products because this gives producers control over their products' entire life cycle and allows them to repair and reuse components. This option can be impractical, or impossible, however, in the case of products with a very short life.

##### **Servicizing**

Servicizing is the notion that firms firmly rooted in product manufacturing evolve into being service providers (White and Feng, 1998)<sup>22</sup>. A serviced firm still makes a physical product, but subordinates such products within a new business strategy that sells their customers function

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<sup>21</sup>Kemp, R. P. M., A. A. Olsthoorn, F. H. Oosterhuis, and H. Verbruggen (1991), *Policy Instruments of Stimulate Cleaner Technology*, paper for the EAERE conference, Stockholm, June 11–14th, 1991.

<sup>22</sup>White, Allen and Linda Feng (1998). "Servicizing: The Quiet Transition to EPR," paper presented at the OECD Workshop on Extended and Shared Responsibility for Products: Economic Efficiency/Environmental Effectiveness. Washington, DC, 1–3 December.

rather than physical input. The firm actually moves beyond extended warranties for longer-life products and leasing to redefine itself as a service provider, relegating its products to “service delivery agents” while rebuilding its cost and profit structure on the basis of function. Examples of this evolution from a product to a service company include firms such as Castrol, Henkel and Dow, who have established chemical management programmes. A package of services is provided with unit-based pricing structures, e.g. per door module coated or per wafer cleaned. Xerox has moved from a copy machine maker to being a “documents management” company where they now sell a service. Xerox finds this product stewardship programme provides them with better control over the product. The concept of servicizing clearly indicates an important trend for the future.

#### 4.4.4 What is the primary response to an instrument?

The policy goals and specific programme objectives will influence decisions on which instrument(s) is selected and the point of intervention along the product chain. The following Table 1 depicts the EPR policy instrument and its primary response. While all instruments have secondary and indirect effects that could influence behaviour and changes across the product chain, Table 1 highlights the primary responses under EPR to the specific intervention.

**Table 18 – Primary response under EPR to specific intervention. Source: own elaboration.**

	Source reduction	Environmentally Compatible Products	Waste Management
Deposit/refund		•	•
Take-back	•	•	•
Materials tax	•	•	
Combined Tax/subsidy	•		•
Advance disposal fee			•
Recycled content requirements	•	•	

#### 4.4.5 Applicability

The goals of the EPR policy will guide policymakers to select the most appropriate instrument. The application of an instrument to a particular product, product group or waste stream should take into account the feasibility of steering producer and consumer behaviour in a particular direction. Some of the policy instruments are more suitable or directly applicable to certain product groups, waste streams and sectors than others: that is, they can be directly aimed at product design and/or material choice stage in the product chain. Other EPR policy instruments target the waste management phase, but will create an indirect effect on the production and design phase of the product.

The allocation of physical and financial responsibility will affect the applicability of the instrument or mix of instruments.



#### 4.4.6 Implementation components

The following table was developed to illustrate some of the implementation components for the EPR policy instruments listed in this section. While all of the instruments can have ancillary effects, the table below attempts to illustrate the direct effect or influence that could occur, the scope of the instrument (waste stream or product), and the body that could implement it.

**Table 19 - Implementation components of EPR policy instruments. Source: own elaboration.**

	Product or waste stream	Stage in product chain	Direct response to intervention	Implementing body
Deposit/ refund	Specific products (e.g. beverage containers)	Disposal, with signals to design stage	Re-use and design	All levels of governments, industry based-firm level or private sector organisation
Take-back	Product and waste streams (and sectors)	Disposal with strong signals to resource extraction and design stages	Re-use, recycling some source reduction and design	All levels of governments, industry based-firm level or private sector organisation
Materials tax	Product (specific inputs)	Resource extraction and design stages	Reduced inputs of targeted materials and design	National and sub-national government
Advance disposal fee	Product	Disposal stage1	Recycling and some reuse and recovery	All levels of governments, private sector organisation
Combined upstream tax/ subsidy	Product	Design and disposal stages	Reduced material input and recycling	National and sub-national government, private sector organisation (waste management)
Recycled content	Product (e.g. paper and plastics, etc.)	Design, signals to disposal stage	Design, reduced raw material input	All levels of governments, industry based-firm level or private sector organisation

#### 4.4.7 Other government measures

In addition to producer responsibility under EPR, other measures can be implemented, which complement and support the goals and objectives of EPR policy and programmes. These may be economic instruments that could help fund or reduce the cost of EPR, or they may be non-economic (often performance based) in nature. The latter include measures such as landfill bans, environmental labelling, and environmental or green procurement.

The following list of mechanisms have been explored or documented internationally.

Therefore, they are simply referenced here. It should be emphasized that the best mix of instruments would help bring about stated goals and objectives. Policy instruments and measures should be coordinated and not in conflict with other national or sub-national laws.



unit based pricing (pay as you throw, waste volume charges);



green government purchasing (especially of products with high recycled content where recycling quotas have been set);



eco-labelling (energy consumption, environmental characteristics, etc.)



landfill bans and taxes;



removal of subsidies on virgin materials;



disposal (landfill) bans and restrictions;







materials bans and restrictions; and



product bans and restrictions.

#### 4.4.8 Other instruments

Additional economic instruments that are being, or have been, examined in many countries and could supplement or provide support to an EPR policy include:

-  virgin material taxes;
-  waste charges (levied on either collection or disposal of the waste after the point of sale);
-  marketable permits (there is a potential application to products with respect to a legislation-driven level of recycling);
-  recycling credits (payments made to those reusing containers or recycling materials, so that they do not go to final disposal).

#### 4.4.9 Environmental effectiveness and economic efficiency of EPR

When is EPR likely to be more environmentally effective and economically efficient than alternative environmental policy instruments? This question can only be answered by distinguishing between the role of EPR-based instruments and other policy instruments in terms of the product [product-waste] chain. While other policy instruments tend to target a single point in the chain, EPR seeks to integrate vertically signals related to the environmental characteristics of products and production processes throughout the chain.

This is best understood if we compare the usual EPR-based instruments which tend to “bracket” the chain (e.g. deposit-refund, product take-back, materials taxes, advance disposal fees, recycled content standards) with a policy instrument that targets either the beginning (e.g. a virgin materials tax), the middle (e.g. a product tax) or the end (e.g. a unit-based waste fee) of the chain.

For the latter type of instrument (those applied to a particular point in the product chain) to be environmentally effective and economically efficient, information related to the environmental characteristics of products must be transmitted up and down the product-waste chain through the market.

Taking a unit-based waste fee as an example, such an instrument will be environmentally effective and economically efficient if it is able to transmit signals all the way back through consumption patterns, to manufacturing, and ultimately to product design.

For instance, a unit-based waste fee should encourage consumers to purchase products that generate less waste and to recycle as much waste as possible. However, it should also encourage producers to manufacture and market products that have these attributes, since

the market opportunities for such products will have improved relative to those products which do not. And finally, further upstream, there should be greater incentives to design products with such attributes relative to products that do not.

In some sense the broad acceptance for EPR is based upon a belief that such signals are not transmitted effectively through arms' length market transactions. Thus, there is a belief that a unit-based waste fee will not result in sufficient incentives for design for environment. Analogously, it is felt that a virgin materials tax will not sufficiently affect household decisions about the packaging content of the consumers goods they purchase. Thus, information about the environmental characteristics of products is not being transmitted effectively through the market. Even, if such signals are transmitted, it may be felt that the time-lags from one end of the chain to the other are excessive, slowing down the realization of the environmental objective. Thus, through EPR, governments have sought to integrate these incentives vertically throughout the chain by means of the policy instrument itself.

When would this government intervention be necessary? It would most often arise in cases where consumers had imperfect information about the environmental characteristics of products and thus did not base their consumption decisions on such information, even if they had clear preferences for less damaging goods. For instance, this would be the case if consumers did not recognize the relative waste burden of different products. It would also arise if product markets were imperfect at certain stages in the product chain. Illegal disposal is an obvious example of an important market imperfection, but even factors such as market power at particular stages of production can affect the transmission of signals. In such cases, signals concerning the environmental characteristics of products will not be effectively transmitted forward and backward.

It might also arise if there are technical constraints that prevent direct targeting of a given externality at individual points in the product chain. For instance, virgin materials taxes (or even product taxes) are often inefficient and ineffective means of targeting waste-related externalities in cases where there is considerable variation in environmental impacts depending upon the precise nature of downstream use and disposal. However, substituting them for waste fees may also be environmentally ineffective since such fees are usually calculated on the basis of characteristics (e.g. weight, volume, size of bags) which treat environmentally important attributes of waste (e.g. toxicity, leachability, biodegradability) in an undifferentiated manner due to the high costs of doing otherwise at the point of household generation when wastes are mixed.

However, there is often a trade-off since instruments based upon EPR can incur considerable administration costs (for consumers, firms and governments) due to the complexity of "bracketing" the product chain effectively. This is particularly true for long-lived and widely-dispersed goods produced in sectors which are not vertically-integrated and which are highly tradable. In such cases, there would not be reason to introduce EPR when less administratively costly instruments can achieve the same environmental goals and objectives more efficiently.

Thus, EPR is likely to be most effective and efficient in cases where other instruments are unable to provide the appropriate signals up and down the chain (due to imperfect information or other market imperfections), where it is difficult to target externalities precisely at individual points in the production chain (due to technical constraints), and where the administration