

Issues Paper

**The State of Play on Extended Producer Responsibility (EPR):
Opportunities and Challenges**

***Global Forum on Environment: Promoting Sustainable Materials Management
through Extended Producer Responsibility (EPR)***

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1. Introduction

Extended Producer Responsibility (EPR) is increasingly recognised worldwide as an efficient waste management policy to help improve recycling and reduce landfilling of products and materials. The basic feature of EPR is that producers assume responsibility for managing the waste generated by their products put on the market. Since its first developments in the early 1990s, such schemes have contributed to significant increases in recycling rates and reductions of public spending on waste management in many countries. In addition, producers under an EPR scheme are incentivised to maximise the material benefits from their products throughout the value chain.

OECD's work on EPR began in 1994. At that time, the objective was to identify the legal and administrative issues which OECD Member countries would be confronted with when developing and implementing such approaches, based on the experience of a few European countries. In 2001, the OECD published a Guidance Manual for Governments on Extended Producer Responsibility, in which EPR is defined as "*an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle*". The 2001 Guidance provided governments with a broad overview of the key issues, general considerations, and the potential benefits and costs associated with EPR.

Almost fifteen years later, the OECD is now engaging in a review and update of its guidelines on EPR. Since 2001, considerable experience has been built up as the use of EPR policies has developed both in terms of geographic expansion and product coverage. Most OECD countries have now implemented EPR policies in key sectors such as packaging, electronics, batteries and vehicles. Certain emerging economies in Asia, Africa and South America have also started to develop EPR programmes in recent years. The spread of such schemes beyond OECD countries makes it relevant for the guidance to address the differing policy context for EPR in developing countries. The review of the guidelines will also allow the OECD to take into account recent efforts undertaken by governments to better assess the cost and environmental effectiveness of EPR and its overall impact on the market. In addition, the broader global context has also evolved and presents new challenges and opportunities for policy makers designing of EPR policies. These developments include the increasing connectivity and interdependence of the world's markets, the emergence of new economic powers, and the rise of technological innovations and internet sales.

This review of the EPR guidance forms part of the OECD's broader work on Sustainable Materials Management (SMM). The aim of SMM approaches is to support sustainable decision-making by addressing the social, environmental and economic impacts of products and materials throughout their life-cycle. These efforts are essential in the global context of increasing resource scarcity. The total volume of material resources exploited worldwide reached nearly 60 billion metric tonnes (Gt) in 2007, a 65% increase since 1980 and an estimated 8 fold increase over the last century. As the world population continues to grow, the pressure on resources is expected to increase further. These developments contribute to the over-exploitation of land and water, the exhaustion of natural resources stocks, damages to biodiversity, and significant increases in the amount of waste. Going for green growth and a resource efficient economy is therefore a major environmental, development and macroeconomic challenge today. In that context, EPR is identified as an effective policy instrument to engage producers in the broader efforts on SMM, by encouraging them to improve the life-cycle efficiency of their products and materials. In addition, the increasing scarcity of resources and rising commodity prices encourages producers to find new ways to recover used products and to turn waste into a resource.

This paper provides an overview of the key issues that will be discussed at the Global Forum on EPR taking place in Tokyo on 17-19 June 2014. The first section evaluates the state of play and implementation of EPR around the world including the different policy instruments and characteristics of EPR schemes. Section 2 highlights what has already been achieved with EPR and identifies potential further opportunities for EPR programmes. Section 3 outlines some of the challenges that policy makers in OECD and non-OECD countries would likely face when developing and implementing EPR. These include economic, governance and administrative issues, issues specific to the start-up phases of EPR programmes, as well as new and emerging challenges arising in a global environment in rapid evolution. The challenges identified in the paper provide possible explanations as to why the opportunities embodied in EPR may not be fully realized in every EPR scheme. The diversity of experiences documented among different countries highlights the value of exchanging on lessons learned and identifying best practices.

Key terminology

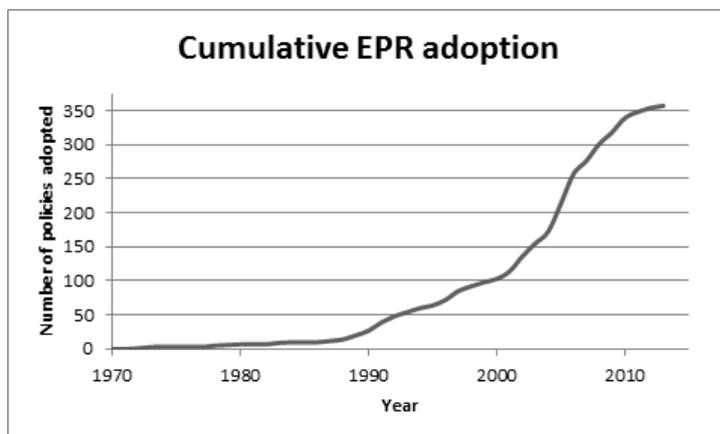
- ❖ *Extended Producer Responsibility (EPR)* is defined in the 2001 OECD Guidance as “an environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle”.
- ❖ *Sustainable Materials Management (SMM)* is a policy approach that aims to address the social, environmental and economic considerations throughout the life-cycle of a product or material, thereby improving resource security and competitiveness through better resource productivity. This is sometimes referred to as *Sound Material-Cycle Society*.
- ❖ *The 3Rs (Reduce, Re-use, Recycle)* form part of the waste hierarchy and encourages the prioritisation of waste reduction ahead of the re-use and recycling of materials, to the extent that this is economically feasible.
- ❖ *Circular Economy* is a concept that aims at closing materials loops and extending the lifespan of materials through longer use and the increased use of secondary raw materials.
- ❖ *The Polluter Pays Principle (PPP)* is an environmental policy principle which requires that the costs of pollution be borne by those who cause it.

2. State of play

2.1 EPR landscape around the world

EPR requirements first appeared in policy and law in the early 1990s in several European countries, including Germany, Sweden, and France. However, it is during the last decade that EPR programmes have spread and developed rapidly around the world. Policy makers in OECD and emerging economies are now implementing EPR policies as an efficient target-oriented environmental tool along with traditional instruments and regulations such as landfill taxes or emission standards for waste treatment facilities. According to Figure 1¹, more than 70% of the 384 EPR policies sampled in the graph were implemented since the publication of the OECD Guidance in 2001², of which 11% were implemented in the last four years.

Figure 1. Cumulative EPR policy adoption over time.



¹ Based on a sample of 384 EPR policies across industries and regions. Daniel Kaffine and Patrick O’Reilly, What Have We Learned About Extended Producer Responsibility in the Past Decade? A Survey of the recent EPR Economic Literature, May 2013.

² OECD (2001), *Extended Producer Responsibility: A Guidance Manual for Governments*, OECD Publishing. doi: 10.1787/9789264189867-en <http://www.oecd.org/env/waste/extendedproducerresponsibility.htm>

Today, most OECD countries and many emerging economies have EPR programmes and policies in place. Such programmes are also in the scoping stage in some developing countries in Asia, Africa and South America. Nonetheless, the specific features and outcomes of these measures vary significantly across regions, countries and industries.

At the *European Union (EU)* level, all Member States have implemented EPR schemes on the four waste streams for which EU Directives recommend the use of EPR policies (packaging, batteries, End-of-Life Vehicles (ELVs) and Electrical and Electronic Equipment (WEEE)). In addition, a number of Member States have put in place additional schemes for products that are not directly addressed in EU-wide legislation e.g. for tyres, graphic paper, oil and medical waste.

EU EPR policy framework

Several EU directives refer to EPR as a recommended policy instrument. The EU Waste Framework Directive provides the overall framework for waste management in the EU and four other Directives set out collection and recycling targets in specific industries i.e. Packaging, Batteries, ELVs and WEEE. This legislation encourages or requires the implementation of EPR measures for the prevention, recycling and recovery of waste. Other European instruments have an indirect effect on EPR policies across the EU, such as the EU Ecodesign Directive (2009), which provides EU-wide rules for improving the environmental performance of energy-related products. In the course of 2014, the EU is undertaking a broad review of its waste policy, including on the key targets outlined in the Directives.

In *North America*, the United States and Canada EPR programmes cover a wide array of products and are primarily designed and implemented at sub-national level (i.e. by states and provinces)³. The Canadian provincial approach, as harmonized in the 2009 Canada-wide action plan for EPR, emphasizes an outcome-driven model that has mostly resulted in collective responsibility schemes, governed and implemented by provincial governments. In the US, there is no federal law governing EPR so that individual states have developed and implemented their own policies, reflecting local conditions and each state's specific political dynamics. Between 1991 and 2011, US states have enacted more than 70 EPR laws, which generally require manufacturers to implement EPR programmes, though without specifying recycling targets. In parallel, producers have themselves implemented voluntary programmes and stewardships in order to organise the collection and recycling of their products.

In *Latin America and the Caribbean (LAC)*, several countries including OECD members Chile and Mexico, as well as Brazil, Argentina and Colombia have implemented their first EPR schemes in recent years, in particular covering the large markets for potentially hazardous electronic waste (e-waste) market. Chile in particular was requested to improve its environmental framework and solid waste management as a prerequisite to OECD accession in 2010; last year, the Chilean government submitted a specific EPR principle bill for consideration by Congress. Most EPR policies in the LAC region are however only partially implemented to date, and are complemented by voluntary initiatives of the private sector.

The current landscape of EPR in *Asia* varies significantly across countries and between OECD and non-OECD members. Industrialized OECD economies like Japan and the Republic of Korea have already well-established EPR schemes and regulations in place on the key waste streams, supported by a solid monitoring and enforcement framework. Some rapidly emerging economies, such as the People's Republic of China (PRC), India and Indonesia have started to develop EPR programmes even though these are generally not yet fully implemented and functioning. Malaysia and Thailand are also embarking the path towards EPR for e-waste, although these initiatives generally rely on voluntary participation of producers.

In *Africa*, EPR, and waste management policies in general, remain at a less advanced stage, with the exception of South Africa. E-waste is however a growing concern on the whole continent, and is generally

³ There are no reported EPRs in Mexico

handled by rudimentary and unofficial recyclers who tend to focus exclusively on extracting the valuable fractions of waste, often without concern for environmental safety. In South Africa, a broad waste management act was introduced in 2009, which empowers the environment minister to require EPR measures on a product-by-product-basis. Although EPR initiatives in South Africa have been mostly initiated by industry, the government has sometimes intervened by enacting regulations to ensure enforcement of these initiatives; this was for example the case of the industry-led tyres recycling initiative⁴.

In general, improving waste management policies is becoming increasingly important in non-OECD countries around the world in view of the rapidly growing municipal solid waste and particularly e-waste on their territory in recent years. This trend is in part due to the increasing spending power of the population in emerging countries and the rising demand for electronic goods. In the PRC for example, e-waste mainly generated by television sets is expected to grow from 50 million units in 2010 to 137 million units by 2020. In addition to household waste, emerging economies also often have to handle large amounts of e-waste exported sometimes illegally by industrialized countries.

2.2 Design of EPR schemes

EPR generally has two key objectives: the first being to increase collection and recycling rates of the products and materials targeted; the second one being to shift financial responsibility from municipalities to producers and thereby incentivise Design-for-Environment (DfE) activities and innovation. In order to realize these objectives, policy makers have a range of policy instruments at hand that could encourage or require manufacturers to bear the financial or organisational responsibility for their products throughout their life-cycle. In that sense, EPR can be described as a framework or a mix of instruments rather than as a single policy.

There are four broad categories of EPR instruments at the disposal of policy makers. These typically address specific aspects of waste management, and can be implemented concurrently:

- **Product take-back requirements.** Take-back policies require the producer or retailer to collect the product at the post-consumer stage. This objective can be achieved through recycling and collection targets of the product or materials and through incentives for consumers to bring the used product back to the selling point.
- **Economic and market-based instruments.** These include measures such as deposit-refund schemes, Advanced Disposal Fees (ADF), material taxes, and upstream combination tax/subsidy (UCTS) that incentivize the producer to comply with EPR. In South Korea for example, ADFs are imposed on importers and producers of products that are hazardous and more difficult to recycle.
- **Regulations and performance standards** such as minimum recycled content. Standards can be mandatory or applied by industries themselves through voluntary programmes.
- **Accompanying information-based instruments.** These policies aim to indirectly support EPR programmes by raising public awareness. Measures can include imposing information requirements on producers such as reporting requirements, labelling of products and components, communicating to consumers about producer responsibility and waste separation, and informing recyclers about the materials used in products.

Instruments across these four categories can be implemented by governments as mandatory policies or alternatively be applied on a voluntary basis by producers themselves. The chosen mix of instruments will be different from one country, region and industry to the other, based upon political priorities, as well as on the social, economic, legal and cultural context. For example, if a government's priority is to improve waste collection, the objective could be reached through the introduction of an ADF or mandatory collection targets. By contrast, if the priority is to stimulate eco-design activities, this could more appropriately be stimulated

⁴ In 2002, the tyre industry in South Africa formed the South African Tyre Recycling Process Company (SATRPCo), which aims to manage the collection and distribution of waste tyres to recycling and reprocessors on behalf of the tyre industry.

through policies that target products' characteristics such as minimum recycled content requirements. The scope and target of a policy should also be carefully assessed. Indeed, imposing industry-wide recycled-content standards uniformly across firms may not be efficient when it is considerably cheaper for some firms to use recycled content than for others. Policy makers could then impose company-specific requirements, or allow for individual firms to trade recycling credits subject to industry-wide targets.

The chosen mix of instruments provides the overall policy framework under which EPR schemes will be developed and organized by producers in order to comply with their legal obligations. The design of an EPR scheme varies according to a number of factors, in particular:

- **Product or range of products targeted.** EPR obligations may cover either specific products or a broader category of products or industries. Small consumer electronics appear to be the most prevalent product covered under EPR across the world.⁵ These are followed by packaging (including beverage containers), tires, vehicles and lead-acid batteries. Less common products targeted by EPR include used oil, paint, chemicals, large appliances and fluorescent light bulbs.
- **Voluntary or mandatory nature of the scheme.** Governments may establish an EPR programme through a voluntary agreement with the industry instead of imposing legislation and mandatory requirements. Programmes under which producers operate voluntarily are often referred to as "Stewardship programmes". These can be initiated by manufacturers and encourage all stakeholders (manufacturers, retailers, consumers, recyclers) to share responsibility for a product's overall environmental and social impact.
- **Individual or collective scheme (PRO).** Individual collection and treatment schemes are mostly applied in business-to-business contexts characterized by a limited number of actors. Usually, though, producers organize and finance collective Producer Responsibility Organizations (PROs) that will carry out the collection and/or recycling of end-of-life products on behalf of their members. Between 1998 and 2007, it is estimated that more than 260 PROs were established in Europe⁶. The number of PROs per sector varies a lot across countries: in France for example, 1 PRO is in charge of household packaging waste, compared to 29 PROs in the UK for the same sector.
- **Organisational versus financial responsibility.** The responsibility for waste management imposed on producers may either be financial or organizational, or both. In the first case, individual producers or PROs pay fees to municipalities, which remain in charge of waste management operations (usually the collection), while recycling is outsourced to specialist contractors. In the case of organisational responsibility, producers and PROs will finance and organise waste management operations and contract directly with recyclers.
- **Allocation of responsibility among stakeholders.** The main objective of EPR is to shift responsibility for managing a product's end-of-life from municipalities to producers. In most schemes, however, municipalities remain in charge for some aspects of the organisation of waste management. Other actors, such as consumers and waste management operators, are usually also involved. In Japan, the Packaging Recycling Act clearly defines the roles and responsibilities of every stakeholder: consumers have responsibility for sorting their waste, municipalities take charge of sorted collection, and producers handle recycling. In Germany, the role of municipalities differs for EPR schemes on WEEE (shared responsibility as producers handle the WEEE collected by municipalities) and on packaging, batteries and ELVs (full producer responsibility).
- **Cost coverage.** The cost coverage of waste management operations refers to two issues: first, how to define and calculate the full costs of managing a product's end of life under EPR; and second, whether producers bear the full costs, and if not what should be the allocation of costs assumed by different

⁵ OECD, Daniel Kaffine and Patrick O'Reilly, What Have We Learned About Extended Producer Responsibility in the Past Decade? A Survey of the recent EPR Economic Literature, May 2013

⁶ Kieren Mayers, Strategic, Financial, and Design implications of Extended Producer Responsibility in Europe: a Producer Case Study. Journal of Industrial ecology, July 2007

stakeholders. Typically, the concept of full costs includes the costs of waste management (collection, treatment, recycling) as well as a range of other costs depending on the scheme, such as the costs for public information and awareness campaigns, waste prevention actions, and the monitoring and surveillance of schemes. In line with the polluter pays principle (PPP), it is generally agreed that producers should at least bear the net costs of waste management for their products, i.e. costs for collection and recycling minus revenues from recovered materials. In certain schemes, producers do also bear other aspects of the full costs. In South Korea for example, the collection, treatment and administrative costs are fully covered by PROs, of which 70-90% of the fees paid by producers are used to remunerate recyclers, and 1-5% allocated to information campaigns. In other schemes however, producers bear only a share of the full costs, the remainder being covered by municipalities. In France for example, the aim is for producers to bear 80 % of the costs of household packaging waste, with 20% falling to municipalities. Accordingly, the allocation of full costs within a scheme will depend upon the allocation of financial and organizational responsibility among stakeholders, and on where the tasks can be most efficiently handled.

Questions for discussion:

- ✓ **What are the key characteristics of EPR schemes across regions and production groups?**
- ✓ **What are the most important criteria on which EPR programmes differ and how might it affect their impact and efficiency?**

3. Key EPR achievements and opportunities

The key objective of EPR is to support improvements in the environmental efficiency of products throughout their life-cycle. The shift of responsibility encompassed in EPR encourages producers to improve the overall cost efficiency of collection and recycling processes, to increase the recyclability of their products, to diminish the amount of material used in production and to find ways to reduce waste and recover used products. These objectives contribute to a move towards sustainable consumption and production practices.

This section outlines the main policy goals that could be achieved with EPR, as well as highlighting where well-designed EPR schemes have already realized these opportunities to various degrees. The achievements and best practices observed in OECD countries can be instructive to policy makers in emerging and developing economies for the design and running of EPR programmes. However, the methods required to achieve the opportunities of EPR are likely to differ across countries, regions and sectors.

- ***Increased collection and recycling rates (environmental effectiveness).*** Countries and regions that have implemented EPR policies have generally achieved higher collection and recycling rates. In Japan for example the recycling of containers and packaging waste increased by 27% between 1997 and 2000 (1.25 to 1.59 million tonnes). EPR encourages producers to improve the recyclability of products and materials, and to convert collected used products into a resource, thereby generating higher quality waste streams. In order to minimize costs, producers are incentivized to diminish the amount of virgin resources used in production. Certain EPR schemes are complemented with specific tools to further increase recycling rates. For example, the Minnesota Electronics Recycling Act includes a system of recycling credits earned by producers when they collect more than their annual obligations. The environmental benefits of increasing recycling rates have encouraged OECD governments to keep expanding the scope of products covered by EPR programmes. In France for example, 14 EPR schemes are currently implemented covering both household and professional waste. The extension of EPR is particularly valuable for improving the treatment of hazardous and special wastes, which are inappropriate for landfill disposal or incineration. Yet, the precise environmental impacts of EPR policies are usually difficult to determine since they involve a mix of different instruments.

- **Reduction of public spending on waste management.** The rationale behind EPR is to shift responsibility from local public authorities onto producers (and ultimately to consumers), thereby reducing public spending, i.e. taxpayers' money, on waste management operations. France for example has managed to reduce its public spending spent on waste management by almost 15% (by 2015, EPR schemes are expected to collect EUR 1.4 billion out of total waste management costs of EUR 9.4 billion).
- **Reduction in overall waste management costs.** Beyond a reduction in public spending, EPR is expected to lead to reductions in the overall costs spent on waste management. Producers are indeed incentivized to optimize the cost efficiency of collection and recycling operations. Japanese producers of PET bottles for example have reduced the amount of materials used in production and the use of material that is difficult to recycle in order to reduce costs (see box). EPR programmes can also lead to a reduction in non-monetary and indirect costs of waste management such as polluting emissions, inconvenience to local residents, and health effects caused by landfills and incinerators. The overall costs and benefits of EPR programmes vary from one scheme to the other and could be highlighted through a specific cost effectiveness analysis.

Cost Reductions and DfE Achievements: Japan's Packaging Recycling Scheme.

The implementation of the 2006 Act in Japan has reportedly fostered the reduction of weight for containers and packaging through the introduction of thin and lightweight products, reduction in less recyclable material and in the use of aluminium lining. These achievements were noteworthy in the case of PET bottles. Green-coloured PET bottles for green tea used to be common in Japan. It was however burdensome for producers and municipalities under the newly established EPR scheme to separate those bottles from transparent PET bottles. Eventually, the scheme led tea companies to stop producing coloured bottles but using green-coloured labels instead, which reduced the costs of waste collection. Similarly, manufacturers of PET bottles have started producing thinner bottles, reducing the amount of resin used in production and consequently minimizing the weight of PET bottles' waste⁷.

- **Design for environment (DfE) innovations.** Under EPR, producers are financially responsible for the treatment of their products' end-of-life and are thereby incentivized to minimize waste disposal costs. These costs can be reduced through investments in DfE innovations and by increasing the durability and reusability of products. EPR instruments can further support DfE for example through policies that impose requirements per weight unit of waste as opposed to per unit consumed, which encourages manufacturers to make their products lighter. In addition, DfE incentives allow policy makers to address environmental damages that may occur several years after the point of production or consumption. This differs from traditional policies such as taxes and tradable permits that only address immediate damages (i.e. damages measured at the point of production).

In addition to the benefits identified above, EPR programmes are also believed to generate a range of broader benefits, including increased technological and organisational innovation, a diversification of sources of material supply and therefore a contribution to resource security, and a better organisation of supply chains through the emergence of more international operators in the recycling sector. In Japan for example, automobile manufactures have reportedly developed their own "3R evaluation" technological systems as an answer to the End-of-Life Vehicles (ELV) Recycling Law, which enable them to simulate recycling rates and costs, and to assess design improvements that can facilitate recovery. These systems are based on life-cycle-assessments (LCA) that help vehicle designers to improve the recyclability and environmental performance of their products. The contribution of EPR to sustainable supply chains can be illustrated through a recent

⁷ Hosoda (2004), Evaluation of EPR programmes in Japan: A survey. Paris, OECD

initiative by the Nordic Waste Group⁸ to develop new business models for plastic and textiles waste collection and waste treatment in the Nordic region. The initiative, the Resource Efficient Recycling of Plastic and Textile Waste, encompasses six projects including one aimed at developing a region-wide EPR model. The project will suggest innovative business models for the Nordic textile industry that enable more sustainable life-cycles of textiles. The projects were open for procurement last year, and will contribute to further efforts in the Nordic region to develop the recycling of plastic waste as a profitable Nordic industry along the entire value chain.

Questions for discussion:

- ✓ **What are the key achievements of EPR schemes across the globe and what are the benefits that have not been fully realized yet?**
- ✓ **How and according to what criteria do the benefits and opportunities of EPR vary across regions, product groups and levels of economic development?**

4. Challenges and constraints of EPR implementation

This section lists the key challenges policy makers would likely be confronted with when initiating EPR programmes. Most of the issues identified are expected to be similar across OECD and non-OECD countries, implying an important role for learning from each other's experience. In particular, the long experience of OECD governments in addressing these challenges could provide useful examples for policy makers in emerging and developing economies. The appropriate answer to any challenge arising in the development and running of an EPR scheme should however be adapted to the specific economic, social and cultural context.

Given that OECD and non-OECD countries are expected to face comparable challenges at some point during the development of EPR, the list provided below does not distinguish between countries but reviews key challenges according to four categories: governance and administrative challenges, economic challenges, challenges specific to the start-up phases of EPR programmes, and the new and emerging challenges.

4.1 Governance and administrative challenges

Governance of an EPR scheme refers to the overall set-up of the system and the allocation of responsibilities among stakeholders. Policy makers have a key role to play in clearly defining the respective roles and responsibilities of municipalities, PROs, producers, and consumers, and to ensure that these are enforced. Below is an overview of the main governance and administrative challenges that have been encountered in EPR schemes.

- ***Unclear and overlapping roles and responsibilities of different actors, including the relationship between public bodies and PROs.*** As highlighted above (2.2), the allocation of responsibilities among stakeholders (PROs, producers, importers, collectors and recyclers, municipalities, consumers) varies significantly among schemes. The role assigned to every actor depends on diverse factors such as the overall objectives of an EPR scheme, the pre-existing infrastructure and waste management practices, the mix of policy instruments implemented and the products targeted. The challenge for policy makers will be to assign specific functions to each stakeholder while avoiding as much as possible any overlap and loophole. Indeed, the frontiers can sometimes be unclear between the responsibilities to collect and recycle, to finance the scheme, to set and enforce the targets, to ensure surveillance and compliance, and to produce awareness campaigns. Overlaps may for example arise in the case of partial organizational responsibility as producers, municipalities and waste management operators are all in charge of some aspect of the collection and treatment activities. On the contrary, certain schemes may contain loopholes if roles are not clearly and adequately defined, which can lead to free-riding. In certain cases, it might also be difficult for policy makers to identify which actor in a value

⁸ The Nordic Waste Group works under the Nordic Council of Ministers (includes Prime Ministers from Norway, Sweden, Denmark, Finland and Iceland) to support sustainable processing of waste products in the Nordic countries and Europe.

chain should be considered as the “producer”. In the context of the 2001 OECD Guidance, the producer was considered to be the brand owner or the importer, except for certain cases such as packaging where the filler of the packaging rather than the firm that produces the container would be considered the producer.

- ***A lack of transparency and difficulties in the comparability of data.*** PROs have often been criticised for providing limited public information on their economic data and on the costs faced by producers, recyclers and municipalities. This lack of transparency is not necessarily intentional and can result from unclear and diverse reporting modalities and calculation methods. A key challenge for policy makers is to determine the appropriate level of public information to be required from PROs and producers since full transparency can be difficult to implement in some sectors and may hinder competition on the market. A certain level of information is however necessary in order to assess the effectiveness of EPR schemes in place and possibly review the targets. Transparency on costs is also critical for producers and municipalities in order to make informed decisions on which PRO to choose when several options exist. Finally, transparency and the harmonization of definitions and reporting modalities are essential to allow international comparison of data and peer-reviews. In order to ensure surveillance on all actors, a two-tiered audit system was for example introduced in Austria for packaging waste. Under that system, an Austrian governmental agency is designated to act as a clearing house, assuming data collection and monitoring on producers and PROs, who are themselves in charge of auditing the collection and recycling operators with whom they contract.
- ***Concerns with free-riding.*** Free-riding refers to situations where some producers do not adequately comply with their obligations under EPR. This happens for example when some producers do not finance the collection and recycling of their products up to the level required. Free-riding could also refer to non-compliance, for example if producers do not provide accurate data about the quantities of products put on the market. These situations arise more frequently in collective schemes, because responsibility is shared and it is easier for producers to circumvent their respective obligations. In Germany for example, the PRO for packaging waste (Duales System Deutschland (DSD)) nearly collapsed in 1993 as a licence fee had been paid by only 55-60% of all packaging bearing the Green Dot symbol. The system was reinforced to strengthened detection and the right to levy fines when the symbol was used without payment of the licence fee. Similarly, free-riding issues are expected to happen more often in markets with many competitors that are more difficult for policy makers and PROs to monitor. For example, according to the European Commission, little free-riding is observed in the concentrated ELV market across the EU, compared to up to 25% on the competitive market for packaging waste. Other issues that are likely to exacerbate the issue of free-riding are the increases in international trade of waste and in online trading of products.
- ***A lack of enforcement mechanisms.*** A number of issues that threaten the good functioning of EPR require permanent monitoring and control by public authorities. These issues include free-riding, competition concerns, illegal landfilling, exports of waste and used products, lack of transparency on costs and of traceability for certain products. However, policy makers may sometimes lack the adequate enforcement means and sanctioning options that are necessary to guarantee compliance. For example, licence revocation as a tool to sanction non-compliant PROs can be ineffective when there is only one PRO operating on the market. In Austria, when a PRO does not comply with the obligation of free take-back, the Ministry of Environment has the ability to organise the collection and treatment of ELVs and charge the costs to the PRO.
- ***Concerns with collective schemes (PROs).*** Producers generally favour collective schemes with PROs over individual schemes, because of the business advantages that they present. Collective schemes are indeed considered to be cost efficient for producers by building on economies of scale, and to facilitate the centralization and exchange of data. However, PROs also pose a number of challenges that make compliance and enforcement of EPR more difficult. Shared responsibility under collective schemes may lead more frequently to free-riding issues and decrease incentives for eco-design investments by individual companies. Besides, a PRO that gains important market power is also more prone to generating competition issues (see 4.1.1).

4.2 Economic challenges

Given that EPR policies go beyond end-of-life and address different aspects along the value chain of a product, they may also have broader and unintended impacts on the market. The challenges outlined below highlight some of the main adverse effects that EPR schemes could have on local, national and international markets. These effects are generally difficult to quantify precisely and so it can be difficult to measure them against the expected economic and environmental benefits of EPR.

- **Trade and competition concerns.** The multi-stakeholder nature of EPR and its ownership by private entities make the system potentially prone to trade and competition concerns. These issues can arise at different levels:
 - a) *Product market competition:* When producers choose to meet their obligations collectively through a PRO, their decisions may have impacts on the corresponding product markets. In particular, if they agree collectively on the fee passed on to consumers for handling waste, this would reduce price competition for the original products. EPR may also differently affect producers themselves and their respective competitive position. It can for example be more onerous for small and medium sized producers to contribute to a scheme. Certain products may also be favoured over others through differing EPR rules and tariffs, which could disproportionately affect costs of production and put certain producers at a disadvantage. This can typically be the case for foreign firms, which have to understand and comply with various regional and national schemes that put them at a competitive disadvantage. In Germany for example, the requirement imposed by the *Duales System Deutschland (DSD)* (see box below) to bear the Green Dot symbol made it costly for packaging firms with a single production line to supply small quantities bearing the symbol to German consumers. Similarly, in Denmark, the requirement imposed on foreign producers to use containers pre-approved by the Danish government was ruled as being in violation of EU law by the European Court of Justice.

Stimulating competition amongst PROs: the example of Duales System Deutschland (DSD)

In 2003, DSD operated as a monopoly on the German market for packaging PROs. Following recommendations by the German Federal Cartel Office to open the market to new entrants, the market share of DSD had fallen to 44% by 2011. As a result, costs of packaging PROs had fallen from about EUR 2 billion in 2003 to less than EUR 1 billion in 2001. In parallel, the competitive market encouraged the development of new technologies, for example on the sorting of lightweight packaging. On the other hand, the increase of competition on the PRO market has increased administrative burden and has reportedly sometimes negatively affected environmental quality of waste management⁹.

- b) *Competition among PROs:* A competitive PRO market can generate cost efficiency and stimulate technological developments. On the other hand, single PROs operating in a market may be efficient by benefitting from economies of scale and facilitating administrative oversight, including tackling free-riders. Monopolistic PROs could however lead to abuses of dominant positions when producers are subject to high fees and conditions unilaterally imposed by the PRO, with no other options available. This can also happen when several PROs engage in illegal collusion among themselves to fix higher prices together. In addition, when a single PRO operates in a market and has already developed capacity for a range of waste management services, the barriers to entry into the market are high for new entrants as it requires high investments in collection and recycling infrastructure from the start.

⁹ VKU (Association for local public utilities), Municipalities and Producer Responsibility in Germany – The do's and the don't's, October 2013

- c) *Competition among PROs and the waste collection markets:* The market for collection services is generally a natural monopoly. Indeed, the existence of large economies of density makes it more efficient to have one single waste collector per area¹⁰. Lengthy exclusive agreements between a PRO and collection providers is however likely to disrupt competition on the waste management market and make the entry of competing PROs and collectors difficult. The introduction of competitive tendering to choose the providers of collection services has been seen to lead to significant cost reduction for PROs. In Germany, the European Commission decided that the duration of DSD's exclusive agreements with local collection companies of up to 15 years was excessive. Eventually, the introduction of competition for collection and sorting services for DSD resulted in reductions of more than 20% in the costs of these activities. Under certain schemes, the entire provision of waste management services is vertically integrated through exclusive agreements and monopolies, which is likely to decrease efficiency and hamper waste collectors and sorters to compare and switch schemes. This was for example the case under the Spanish glass packaging scheme, which in 2010 the Spanish competition authority ruled to be anti-competitive and discriminatory against non-members.
- d) *Competition between PROs and recycling/recovery providers:* Contrary to waste collection markets, recovery markets enjoy large economies of scale and are usually more competitive. Exclusive arrangements between PROs and recyclers for example through the establishment of vertically integrated schemes may however hinder competition on the market. This may hamper the survival of recyclers that are not part of the agreement, and impede the entry of new competitors on the market. In Italy, the competition authority considered that an industry-wide consortium for the recovery and recycling of lead batteries would maintain market shares among smelters thereby reducing incentives to improve efficiency in recycling and raise barriers to entry by competitors. Similarly, in the Netherlands, it was observed in 2006 that PROs for WEEE that were using multiple recyclers and transport firms chosen through competitive tenders had lower costs than the PROs that had chosen a single supplier. In addition, competitive tendering has also reportedly contributed to the development of new recycling technologies, suggesting that the guarantee of large scale demand helped to overcome entry barriers.
- ***Difficulty to implement differentiated fees and lack of incentives for DfE.*** The rationale behind EPR is that producers pay for the post-consumer costs of their products and hence have an incentive to minimise those costs through better product design. In the case of individual schemes, single producers directly pay the full costs for waste management for their products. It is however more difficult in the case of PROs to charge a specific fee per producer that corresponds precisely to the quantity of material put on the market, and therefore to their actual recycling costs. If PROs apply identical fees on all producers, this would amount to averaging waste management costs among producers and thus reduce incentives for DfE investments. In practice, however, it can be very difficult to implement differentiated fees proportional to the actual waste management costs, because of the difficulty to disaggregate treatment costs to the level of products. In addition, price fluctuations of secondary raw materials make it difficult to correctly assess revenues from recovered products on a long-term basis. Another limitation lies in the increasing role that multinationals play in certain product markets. Corporations that design and market essentially identical products at a global level will be less inclined to modify product designs for a specific market and the impact of relative changes in the fees applied by one EPR scheme may therefore be limited. Yet, some initiatives and pilot projects are under way; in France for example, PROs from different industries have recently initiated fee modulation practices based on recyclability criteria and a producer's prevention efforts.

¹⁰ Economies of density in waste collection imply that the average costs of waste collection decrease as the volume of waste collected from a fixed network increases. In that situation, competition is not efficient and sustainable on the waste collection market.

***Bonus/Malus system as incentive for DfE investments:
the example of Eco-Emballages***

Next to differentiated fees, other economic and financial incentives exist that can encourage DfE investments. Eco-Emballages, a French packaging PRO, has modified its contribution calculation by introducing a new “Bonus/Malus” system in 2012. Under this eco-modulation model, producers can be penalized by up to 100% of the fee for non-recyclable packaging put on the market. On the contrary, they could get a reduction of up to 8% when they diminish the weight or volume of their packaging, or when they invest in broad communication campaigns.

- ***Different understandings of full cost recovery.*** The financial responsibility of producers under EPR often implies that they bear the real full costs of managing the end-of-life of their products in order to optimize costs and environmental performance. As highlighted in section 1.2, however, there is no consensus on what these costs shall cover and on what an efficient allocation of costs between producers and municipalities would be. Under most EPR schemes PROs cover the general net costs of waste management i.e. costs for collection, transport and treatment of waste minus revenues from recovered materials. These net costs are not always easy to evaluate as they depend on a range of factors including the infrastructure and technology level, the quality of public services, and price fluctuations of secondary materials. In addition, the concept of “full-cost” could also refer to a range of additional expenses, such as the costs for public communication and awareness campaigns, the costs for waste prevention measures, and the costs for enforcement and monitoring of the scheme. Certain expenditures might be more important in specific phases of the development of the scheme. For example, communication campaigns would likely require higher investments during initial stages.
- ***Difficulty to assess the cost effectiveness of EPR policies.*** The wide disparities in fees and cost coverage across EPR schemes have raised concerns among governments and policy makers to the issue of cost effectiveness. Indeed, the variations as to what is included in full costs and what share of the costs will be assumed by producers make it challenging to assess the cost effectiveness of a specific scheme. In addition, all EPR programmes have specific scopes, objectives, and accounting and reporting modalities, which hinder their comparability. In that context, it can be challenging for policy makers to determine an adequate cost-effectiveness assessment of a new or existing EPR programme, especially as the expected benefits of EPR (e.g. DfE, increase in recyclability, correction of market failure such as ineffective recycling markets) are also hard to quantify.

***Optimizing cost effectiveness:
The example of the Japanese Packaging Recycling Act***

This Act foresees the payment of a contributing commission by PROs to municipalities, the amount of which is relative to actual recycling costs. If the municipality provides high-quality well-sorted waste to recyclers, the costs become lower and the producers would then reimburse 50% of the difference compared to the initially estimated costs. These fluctuating contributions incentivize municipalities to provide high-quality and properly sorted packaging waste to recyclers, thereby reducing overall recycling costs.

4.3 Issues specific to EPR start-up phases

A number of specific issues may arise when developing a new EPR programme. In OECD countries, policy makers would have to address those challenges when designing EPR policies for new products or extending the coverage of EPR. In non-OECD countries, the initial development and start-up of EPR programmes is a more comprehensive issue that often requires a transition from informal to formal waste management. This shift requires important investments in human, physical and financial capital in developing countries with rudimentary and unsafe waste management systems, and sub-standard technology levels. In addition, the necessary administrative and institutional capacity required to adequately deal with waste and to ensure enforcement of EPR policies needs to be established.

The lessons learned in OECD countries in the early stages of EPR implementation can therefore be relevant to developing countries. However, the adequate responses to issues arising during the initial developments of EPR need to be tailored to the specific social and economic context of a country, which imply that the models developed in OECD countries may not be perfectly suitable to other regions.

Some key challenges policy makers are likely to encounter when developing new EPR programmes are:

- **Informal waste management sector and social challenges.** Unauthorized facilities and illegal recyclers are present in most markets both in OECD and non-OECD countries. Given that informal actors do not have to comply with safety and environmental standards, they can operate at relatively cheaper costs and be more profitable than official recyclers. The use of inappropriate techniques by informal actors leads however to high environmental risks and loss of valuable material in the process. In addition, the presence of unofficial actors raises challenges for the good functioning of EPR schemes given that waste covered by the scheme is sometimes diverted into informal facilities. It is usually producers whose products are most easy and profitable to recycle who will be less likely to recover their materials; thereby de-incentivizing DfE innovations. These losses are expected to proliferate as more and more waste is considered to contain net positive value. This challenge is particularly large in developing and emerging economies where informal recycling has developed as a large and sometimes lucrative activity. In India for example, it is estimated that more than 95% of e-waste is managed by informal recycling businesses. These usually provide a livelihood to the poorest sections of the population who are often unaware of the harmful and irreversible impacts of e-waste for their health and the environment. The challenge for policy makers in those countries and regions is to organize a transition towards EPR and formal recycling while taking into account the social issues involved and ensuring that alternative employment opportunities and social protection frameworks would be available for people who have their livelihood in that sector.
- **Waste leakage.** Leakage of waste products occurs when they are not being captured by the EPR scheme, but instead collected and treated through other legal, or illegal, channels. Illegal leakage can be due to the activities of informal recyclers or to the illegal exports of waste, usually for waste that has positive value. Leakage also occurs when used products are exported, which is not illegal but still results in a reduction of material that can be recovered through the EPR scheme. In addition, leakage may cause severe environmental and health damages, when leaked products are disposed of in an un-environmentally sound manner.
- **Orphan products and free riders.** A new EPR scheme may be confronted with products whose producers did not contribute to the scheme or cannot be identified, leading to inadequate levels of finance to handle end-of-life costs. One such category is orphan products, which were put on the market before the introduction of EPR systems by producers who are no longer in business, thereby leaving the responsibility to finance their treatment to current producers. A similar problem arises when there is a large share of free riders, i.e. producers who do not pay their fees at an adequate level. The issue is exacerbated in markets where it is difficult to identify manufacturers, especially in emerging economies characterized by large counterfeiting and second-hand sectors and illegal importers. These challenges are often especially present during the first years of establishment of an EPR scheme given that past producers would not be covered.

**Managing the transition from informal to centrally-run waste management
The example of the Chinese e-waste disposal fund**

The Chinese government-run e-waste disposal fund scheme was established in 2012 and collects charges from producers and importers of electronic and electrical products via the tax and customs authority. The funds collected are provided to certified recyclers in the form of subsidies in order to support the development of the legal e-waste recycling industry. In over a year, 64 e-waste recycling companies have been certified by the Ministry of Environmental Protection (MEP). The potential for development is still high however as 9 less developed provinces do not have any certified recycling company yet. Besides, formal recyclers currently struggle to collect most e-waste except for that with negative value, notably cathode-ray tube (CRT) television sets. The key challenge for the government is to modify the incentive structure in a way that increases legal collection, while taking into account the impact that this would have on people active in the informal sector. In order to facilitate administration, more responsibility might also be transferred to producers through the development of PROs.

- ***Absence of a business framework that is conducive to investment.*** A stable and effective EPR system requires the presence and development of efficient and competitive waste management operators and of markets for recovered material. However, during the first years of development of a scheme, uncertainty about the volume of waste that will be collected by producers and PROs hampers future investment planning by recyclers. As waste leaks out of the official scheme and is processed by informal actors instead, it becomes more difficult for waste operators to recover their infrastructure investments and to operate legally at a profit.

4.4 New and emerging issues

The global context has significantly evolved since the development of the first EPR policies over two decades ago. New economic powers have emerged on the global scene, companies are increasingly active at multinational level, technological changes are altering patterns of communication and consumption (e.g. online sales), and some key resources are becoming scarcer. In such a context, EPR models could require some review and adaptation.

In this section, a number of key emerging issues are considered as to their potential implications for EPR. Most of those are especially relevant for OECD governments that have already well-established EPR schemes in place and that are looking into future improvements of their overall policy framework. Policy makers from emerging and developing economies could also benefit from assessing and integrating these concerns at the initial steps of EPR design and development.

- ***Internet sales by-passing EPRs.*** The rise in internet sales is a clear challenge for EPR in all countries, and particularly in OECD countries where online markets are beginning to achieve significant market share. Products sold online frequently free ride on EPR systems. This phenomenon is especially noticeable among small-scale internet sales companies that are difficult to identify and can more easily act as free riders. This puts national producers who are contributing to EPR schemes at a competitive disadvantage.
- ***Increasing export of waste and used products.*** The export of waste and used products that are financially covered by national schemes is a challenge for PROs especially in OECD countries. The trend is increasing as transport becomes cheaper and environmental and legal requirements become more burdensome in certain regions than in others. These exports create loopholes in the market and damage the efficiency of EPR schemes. In addition, the illegal export of waste and hazardous materials to developing countries that do not have the capacity to enforce safe processing can generate negative impacts for the environment and the health of the local population. Some benefits could however ensue from the exports of used products to developing countries with a deep culture of reuse

as these can lead to an extension of the products' useful life, which is a priority in the waste hierarchy. In order to limit the export of waste covered by EPR, some OECD governments have reinforced the control and monitoring of waste streams onto their territory, sometimes through the establishment of national clearing houses that collect data on material exports. A clearinghouse collecting data and monitoring product flows exists for WEEE in all EU member states for example. In a context of increasing globalization, further measures might become necessary such as reinforced collaboration with customs authorities as already implemented under the Chinese e-Waste Disposal Fund Scheme.

- ***Whether and how to extend EPR schemes to cover new products as well as strategic materials, and components.*** The potential extension of EPR schemes opens up two questions. First, how shall PROs and policy makers encourage and increase the recovery of more materials covered by existing schemes? Second, according to what criteria shall governments make the decision to establish new EPR schemes for additional products and categories of products? Certain products and materials that had up to now not been considered for EPR could present new opportunities for addressing resource security concerns. This could for example be the case of strategic metals and rare earth elements that are becoming concentrated in high-tech products in big cities. France is currently considering including those into new EPR schemes. Certain products may however not be suited for EPR systems, for example because of a very long life-span.
- ***Whether and how to address waste prevention in EPR policies.*** EPR is designed to organize the end-of-life of products. It creates incentives to recover material from waste products, but usually does little in the way of encouraging the re-use and reduction of waste (the two other “R” in the “3Rs” principle), which are given higher priority in the waste hierarchy. Some OECD countries are trying to reconcile EPR and waste prevention through recent initiatives. In Japan for example, a system aimed at reducing packaging waste was introduced in 2006, under which industries and companies that use large volumes of packaging are required to report their activities to the government. When activities are deemed insufficient, the Japanese government can issue recommendations such as a requiring a reduction in the quantity of packaging used. Policies that charge fees on waste per unit of weight instead of units consumed also encourage reductions in the amount of material used. In parallel, charities and voluntary initiatives are flourishing that engage communities in the reduction, re-use, recycling and redistribution of resources (e.g. the London Community Resource Network (LCRN) in the United Kingdom and the *Emmaüs* programmes in France). These community-based programmes can be complementary to EPR by stimulating behaviour change within the population.
- ***Waste as a valuable resource: changes the rationale for EPR.*** The context of growing resource scarcity and increasing commodity prices gradually increases the intrinsic value of waste streams. This will eventually put into question the basic assumption that regulation is needed in order to divert waste from landfills. In addition, it will likely become increasingly difficult for producers to collect end-of-life products, especially those that contain larger quantities of valuable materials and are easily recyclable, such as certain electronics products. New business models are being developed that shift product ownership from consumers to producers and to improve opportunities for collection, re-use and recovery. The American company Xerox for example operates a leasing system for its copying machines, which gives the company control over the entire life-cycle of the machines and enables it to repair and reuse components. Eventually, the growing resource scarcity and increasing value of waste could require a general review of the basic features and objectives of EPR.

Questions for discussion:

- ✓ **Which challenges from the ones highlighted in this section are most relevant from your point of view? Are there other challenges that policy makers face and that are not in the list?**
- ✓ **What key challenges do emerging economies encounter and how do they differ from those encountered in OECD economies?**
- ✓ **What are some specific responses to these challenges?**