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Market incentives for eco-design: the case of eco-modulation

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Abstract

Governance instruments to accelerate sustainability transitions are needed. Eco-modulation has been proposed as a means to incentivize green product design. Developing the instrument will be challenging, but well worth analysing in detail.

Eco-modulation is a market-based governance mechanism that seeks to incentivize more eco-friendly product design by improving the functioning of extended producer responsibility (EPR) schemes. What exactly does that mean?

The evolution of EPR

"The design incentive of EPR is lost."

Extended producer responsibility (EPR) is an environmental policy strategy that makes producers responsible for the waste management of products and packages they put on the market. Having been introduced in the early 1990s and gradually implemented for selected product groups such as electronics, packaging, and motor vehicles, EPR keeps spreading – in part because it is seen as an important lever to advance the circular economy. The popularity of EPR means that the burdens of pub-

lic waste management services are increasingly shifting to the private sector. The spread of EPR has, however, potential for a more fundamental effect: the objective of EPR is to incentivize the producer companies to (re) design their products and packages to be more recyclable and reusable. More sustainable product design is urgently called for, as our societies keep transgressing the planetary boundaries of Earth.

However, the way in which the financial and operational structures of EPR have evolved has ended up dampening, if not altogether muting its eco-design incentive function. In implementing EPR, producers have in most cases joined together as collectives called producer responsibility organizations (PRO). A PRO assumes the EPR responsibilities of all participating producers, organizing the collection and treatment of wastes on their behalf. The producers, in return,

pay fees to the PRO to cover the costs of EPR. Centralization of EPR in PROs creates economies of scale in waste collection and processing that individual producers could not attain on their own – but it also creates a fundamental problem. The design incentive of EPR is lost.

Why is the design incentive lost?

Typically, producers pay for PRO services according to their share (by weight) of products put on the market each year, rather than according to the actual recyclability or other environmental characteristics of their products. The fees the producers pay in current PRO schemes vary by product category, reflecting the cost that the PRO incurs in meeting the EPR obligations for each category of products. However, allocating costs by market share in each product category, and not by the qualities of the products, severs the pivotal link upon which the eco-design incentive relies; the connection between the characteristics of a product and the cost the producer bears for treating it. Hence, a producer that invests in making its products more recyclable will not, *ceteris paribus*, see the fees it pays to a PRO decline. In other words, the price a producer pays the PRO for treating a kilogram of laptops is fixed, regardless of how recyclable the laptops are – so why would the producer change its product designs?

“Eco-modulation” has recently emerged as an additional component in EPR to restore this eco-design incentive function. It changes – modulates – the fees that producers pay to PROs to meet their EPR obligations: environmentally problematic product and packaging design is financially penalized, while improved design is rewarded.

The modification of fees under the guise of eco-modulation can take one or both of two approaches. First, the differentiation of product categories can be made more granular and precise. Rather than simply distinguishing, for example, between plastic and glass packaging, the product categories can be narrowed to differentiate between different types of plastics used in packaging. This results in more product categories; a higher resolution. Second, bonuses and penalties based on product

attributes, such as durability or incorporation of recycled materials, can be imposed on the fees paid by producers.

Both approaches are intended to restore the lost eco-design incentive by reviving the link between the products put on the market, and the fees their producer must pay for their waste management. With eco-modulation, the design incentives faced by producers change.

The European approach

A significant impetus to the adoption of eco-modulation was the 2018 revision to the Waste Framework Directive; Article 8a(4)(b) of the Directive requires Member States to take the necessary measures to ensure that the fees paid by producers to comply with their EPR obligations...

...are modulated, where possible, for individual products, or groups of similar products, notably by taking into account their durability, reparability, reusability and recyclability and the presence of hazardous substances, thereby taking a life-cycle approach and aligned with the requirements set by relevant Union law, and where available, based on harmonized criteria in order to ensure a smooth functioning of the internal market.

As such, eco-modulation has four key components:

- The choice of products (through product categories) subject to eco-modulation. Where can environmental gains be made?
- The choice of objectives pursued with eco-modulation – such as the above-mentioned durability and recyclability. How should the different objectives be prioritized?
- The choice of technical criteria against which products can be assessed. For example, how does a producer prove the recyclability of their product to the PRO?
- The structure and magnitude of fees to be charged. How to ensure that eco-modulation is properly operationalized?

Environmental benefits instead of product attributes

“Due to the widely documented opaqueness of EPR schemes, very little data exists.”

Until now, EPR schemes have mainly sought increases in recycling rates. However, the ultimate outcomes to be sought with EPR – whether with or without eco-modulation – are not increased recycling rates or other forms of improved waste management. Rather, they are the reductions in greenhouse gas emissions, impacts on air and water quality, threats to biodiversity, and other environmental impacts that can be engendered by improvements in product design and waste management; thus, recycling rate is only a proxy measurement.

far been too small to influence product design or material choice decisions of producers. However, due to the widely documented opaqueness of EPR schemes, very little data exists. Without data, it is challenging to understand and verify the impacts of eco-modulation on producers, consumers, and the environment.

Furthermore, the implementation of eco-modulation across jurisdictions both within and outside the European Union is not coordinated, resulting in fragmented, even conflicting systems. If producers do not face the same configuration of eco-modulation schemes across markets, they are unlikely to find the benefits or costs of eco-modulation sufficiently large to warrant changes in the product design or materials.

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Eco-modulation is an important experiment to better understand how market instruments can work as a product policy.

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The key components of eco-modulation outlined above should aim at reducing environmental impacts, but the effects of EPR and eco-modulation are difficult to anticipate and measure. Incorrectly set objectives can lead to unintended consequences, even perverse environmental outcomes. For example, extending the lifespan of electronic products that consume significant amounts of energy during their use may be counterproductive, if the longer lifespan forestalls their replacement by more energy efficient products. Moreover, the desired attributes can obstruct each other, or even worse, not correlate with actual reductions in the biophysical environmental impacts of the products.

Practical difficulties in implementation

Besides the above, there are also practical challenges to improving EPR through eco-modulation. The fees paid by producers under EPR have thus

As the lack of harmonization contributes to the complexity and compliance costs of EPR schemes, it also encourages freeriding. Freeriding producers evade their EPR obligations altogether, which means that they do not face the environmental design incentives of eco-modulation either. Freeriding is exacerbated by difficulties in monitoring the rapidly growing online sales over platforms such as Amazon and AliExpress, where enforcement of EPR obligations is underdeveloped.

Eco-modulation bull by the horns

The challenges of eco-modulation are not insurmountable. If eco-modulation is to reduce adverse environmental impacts, then more attention needs to be paid to the actual environmental outcomes it generates. To fully assess and appropriately monitor the environmental outcomes, life cycle assessment (LCA) or similar techniques offer the best

available option. LCAs can capture burden shifting across the product life cycle and quantify impacts across a variety of environmental categories. Using LCA studies to inform eco-modulation focuses the programs towards reducing the environmental impacts of products and packages. Beyond life cycle assessments, data are also required for policy evaluation and development. As EPR schemes are not transparent, the provision of data must be mandated by law.

To conclude, if eco-modulation is to work as an environmental policy, three key points need to be addressed:

(1) **More and better data collection.** This applies both to environmental impacts of products and the design of eco-modulation policies.

(2) **Harmonization** of the key components of eco-modulation. Prioritize the harmonization of technical criteria; product qualifying as (for example) “recyclable” in one jurisdiction must qualify as such elsewhere.

(3) **Eco-modulation policy experiment.** Eco-modulation offers important opportunities for policy learning; not only for improving EPR schemes, but more broadly for understanding how market instruments work as a product policy. We encourage proceeding with the experiment.

Hungry for more? We invite you to read our research article “Restoring the incentives for eco-design in extended producer responsibility: The challenges for eco-modulation” [here](#).

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Antti Jukka, presenting eco-modulation at the 11th International Conference on Industrial Ecology held in Leiden. Elated audience not pictured. Photo by Stijn van Ewijk.

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