EPR for Plastic Packaging: What the Evidence Shows

An independent analytical assessment by THRESHOLD, drawing on the GRID-Arendal / Basel Convention Plastic Waste Partnership working group brief on EPR good practices (November 2025)

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This paper was prompted by questions raised by a delegate at the United Nations Development Programme working on plastic pollution policy. The questions were about who structurally benefits from EPR schemes, and whether the instrument's scale matches the scale of the problem. Those are exactly the right questions. Asking them, inside an institution, takes a certain kind of care about getting this right. That care is what the field needs, and this paper is an attempt to answer those questions honestly.

The honest answer is: nobody knows whether EPR works, because nobody has measured it.

The Basel Convention's Plastic Waste Partnership working group has published what is now the institutional consensus document on Extended Producer Responsibility for plastic packaging. It is thorough. It catalogues EPR implementation across five continents. It maps governance structures, design features, compliance mechanisms. It recommends verification systems, stakeholder engagement frameworks, targets and timelines. It is produced by people who understand the plastic waste problem as well as anyone working in the field.

What it does not attempt (and the brief is not designed to do this) is measure

whether EPR has changed the primary metric.

The GRID-Arendal brief opens by stating that since 1950, less than 10% of plastic waste has been recycled globally. That figure appeared in the first academic literature on plastic pollution thirty years ago. It appears unchanged in the document that is currently shaping global EPR policy. Three decades of what the brief calls the primary policy instrument for plastic packaging waste, and the primary measure of its effect has not moved.

The GRID-Arendal brief is not responsible for that gap. EPR as a policy instrument is. The distinction matters, and it is the subject of this paper.

A word about GRID-Arendal before proceeding. They are one of a very small number of organisations working in this field that consistently combines scientific rigour with genuine political neutrality and clear, accessible communication. That combination is rarer than it should be. This paper uses their brief as its primary source precisely because their work can be trusted. The questions raised here are questions about

the policy instrument, not about the quality or integrity of GRID-Arendal's analysis. Their brief is the best current institutional account of what EPR is and how to make it function well. This paper is asking what comes alongside it.

Section 1

Who benefits from EPR: the structural answer

The structural beneficiaries of EPR schemes are not the environment. They are not the public. Three actors benefit in documented, systematic ways.

Producer Responsibility Organisations. PROs sit between producers and the scheme. Producers pay fees into PROs, which then contract collection and sorting. The PRO model creates a buffer that insulates major producers from direct accountability: fees are calculated on volumes placed on the market, but verification of those volumes is largely self-reported.

UK parliamentary evidence (House of Commons Environment Committee) found approximately 10% of UK PRO fees may be fraudulent: labels placed on non-qualifying materials, or volumes inflated to claim rebates.

UK EPR schemes paid out approximately £306 million in 2021.

The fraudulent share: estimated at £30–50 million of that figure.

The GRID-Arendal brief's own recommendation, published November 2025, states that fulfilment of EPR targets requires implementing 'credible verification mechanisms, including proof such as invoices, declarations, and other documentation, which should be checked and confirmed by a registered independent expert and/or by an accredited public authority.'

That GRID-Arendal is calling for this openly is significant: it is honest institutional acknowledgement that the verification architecture needs to improve, and that current self-reporting is not sufficient.

The UK evidence is not a UK problem. It is a structural feature of how EPR systems are designed, and credible parties in the field are now openly naming it.

Virgin plastic producers. EPR fees apply to plastic placed on the market, but recycled content is typically exempt or discounted. This creates an incentive to purchase small volumes of recycled material to qualify for exemption on large volumes of virgin production: the recycled content offset mechanism reduces fee liability without reducing overall plastic production. The incentive structure of EPR does not discourage production. It creates a mechanism to manage its cost.

Municipal waste authorities frequently end up subsidising the gap. EPR was designed to shift end-of-life costs from taxpayers to producers. In practice, EPR revenues rarely cover actual collection and processing costs, and municipalities fund the difference from general taxation. The German DSD (Gruener Punkt) system was subject to repeated investigations for exactly this subsidy capture.

One further group that EPR consistently fails is the informal waste sector. In large parts of the Global South, informal waste pickers do a significant share of actual collection and recovery. EPR systems routinely fail to credit or compensate them, often displacing their established capacity while claiming their contribution toward EPR targets. The communities most exposed to plastic harm are the least protected by the instrument designed to address it.

Section 2

The scale problem: billions against trillions

EPR operates in billions. The problem operates in trillions.

The social cost of leaked plastic runs at approximately EUR 1,380 to EUR 3,400 per tonne in remediation and health impact costs (OECD; WWF/Dalberg; Ellen MacArthur Foundation; Bain). Against approximately 30 million tonnes leaking annually, that is EUR 41 billion to EUR 102 billion per year in social cost generated. EPR schemes globally collect a few billion euros annually.

EUR 41–102 billion per year: social cost of leaked plastic.

EUR 1–2 trillion: 10-year accumulated remediation liability at current trajectory.

EPR global collections: low single-digit billions per year.

The European Union's Regulation (EU) 2025/40 now mandates EPR obligations in all EU member states. This is the current regulatory high watermark: the most ambitious EPR policy landscape on earth, the culmination of three decades of progressive implementation in the countries the GRID-Arendal brief identifies as leading the field. It does not change the arithmetic. The most comprehensive EPR regime ever implemented covers a small fraction of the social cost it is designed to address.

Section 3

EPR addresses the wrong fraction

This is the dimension most EPR commentary omits, and it is the most important.

EPR is structurally limited to addressing externalities from the fraction of plastic that escapes into the environment. It does not touch the full social cost of plastic production.

Approximately 460 million tonnes of plastic are placed on the market annually. The 22 million tonnes that leak is roughly 6.5% of that total. EPR is designed to address the externalities of a fraction of the externalities of a fraction of production.

460 million tonnes produced annually.

22 million tonnes leaked: approximately 4.8% **of production.**

EPR addresses the externalities of the leaked fraction only.

The social cost of The remaining 438 million tonnes **is outside EPR's scope entirely.**

The remaining 438 million tonnes the plastic that enters the 'legitimate' waste stream, carries its own social costs: microplastic accumulation already measurable in human blood and foetal tissue, embedded health impacts across the food chain, the long-term remediation liability of all plastic ever manufactured since the 1950s. These costs are outside EPR's scope. They are not in any cost calculation EPR schemes are designed to address.

The full intergenerational liability of 70 years of plastic production, covering all health impacts, all long-term remediation, all microplastic human health costs, has never been formally calculated. The industry has invested significantly in ensuring it is not.

None of this is a reflection on the people who built these systems. EPR was designed in a different era, against a problem that was less fully understood, with tools that did not yet exist in their current form. The people who have spent careers developing EPR frameworks, building compliance infrastructure, designing collection systems, and arguing for producer accountability inside institutions that often resisted it have done work that matters. The Threshold does not propose to replace that work. It proposes to add what has been missing underneath it: the social cost record that makes enforcement meaningful and the full liability visible.

Section 4

Thirty years of EPR, the same 10%

The GRID-Arendal brief identifies Germany, Norway, France, Belgium, and Sweden as the leading EPR jurisdictions: the countries with the most comprehensive, longest-running, best-designed schemes. Some have had EPR for plastic packaging for over thirty years.

The global plastic recycling rate is still below 10%.

The GRID-Arendal brief is a guide to implementation, not an outcomes study. It does not set out to provide before/after analysis of recycling rates in EPR versus non-EPR jurisdictions, or longitudinal data on leakage reduction in countries with mature systems, or evidence on whether producer behaviour on production volumes has changed. That is not what it was commissioned to do.

The point is not a criticism of the brief. It is a description of the gap that still exists: a guide to making EPR work better is not the same as a demonstration that EPR has worked. Both are needed. Only one currently exists.

> *"Nobody has demonstrated it. The tool has been operating for thirty years. The primary metric has not moved. At what point does the absence of outcome evidence become the evidence?"*

Section 5

The structural parallel

The comparison with tobacco is not rhetorical. It is structural.

For four decades, the tobacco industry maintained that its product was not proven to cause cancer. The argument held not because the evidence was weak (it was not) but because the evidence was expensive to establish, disaggregated across individual cases, and contested at every point by an industry with the resources to contest it. The industry's primary strategy was not to dispute individual health claims but to prevent the construction of a systematic social cost ledger: to keep the harm disaggregated, individual, and unprovable in aggregate.

EPR, in this context, is not a solution to the plastic problem. It is a political instrument that provides the appearance of producer accountability while ensuring that the full social cost ledger is never opened. It does this structurally: by defining the scope of producer responsibility as end-of-life management of the leaked fraction, EPR places the full intergenerational liability outside the policy frame. The question then becomes not 'what does plastic cost society' but 'how should producers contribute to managing its waste.' The larger question is not asked. The frame prevents it.

The GRID-Arendal brief is thorough, sincere, and produced by people with genuine expertise and concern for plastic pollution. It operates, as it must, within the EPR policy frame. That frame asks: how do we manage

plastic waste at end of life? It is a legitimate and important question, and the GRID-Arendal brief advances it well. The Threshold asks a different one: what is the full social cost of plastic production, and who carries it? That is not a criticism of the brief or of the people who produced it. It is a description of where the policy frontier currently sits, and where it needs to go. Both questions need to be live at the same time.

> The final US tobacco settlement recovered $206 billion. It took decades of litigation to force the systematic social cost ledger into existence.
>
> The plastic industry is approximately ten years behind tobacco on this trajectory.
>
> *The missing element is not evidence of harm. That evidence is already in our blood. The missing element is a systematic social cost ledger that forces the full liability into the light. That is what the Threshold is built to produce.*

That ledger is not a research project. The research exists. It is a design and architecture problem: how do you build a system that aggregates citizen testimony, scientific evidence, and institutional data into a convergent record that cannot be contested piece by piece? How do you make it credible to courts, to policymakers, and to the public simultaneously? How do you make it replicable across jurisdictions and languages? How do you build it so that it works before litigation begins, not after?

The Threshold Programme has answered those questions. The architecture is designed: the Spotter intake system, the Althing Simulation, the convergent analysis methodology, the Knowledge Base specification, the forward security and jurisdictional framework. It has been tested against the tobacco trajectory, the asbestos litigation record, and the PFAS remediation litigation now moving through US and European courts.

The question for institutions working in this space is not whether to act. The GRID-Arendal brief confirms that the evidence gap exists and that verification needs to improve. The question is whether to keep improving an instrument that has not moved the primary metric in thirty years, or to build the ledger that forces the full liability into the policy frame. One of those is the job the Threshold was designed to do.

A final word for everyone working in this space. If you have spent years trying to make EPR work and wondered why the primary metric has not moved despite genuine effort, that frustration is the right response. It is not a sign that the work was wrong. It is a sign that the frame was always incomplete, and that the instrument needed was not yet available. The evidence gap this paper describes is not a failure of will or intelligence. It is a missing piece of infrastructure: the social cost record that was never built because nobody had designed a way to build it yet.

That infrastructure now exists as a design. The Threshold was built specifically to produce it, in partnership with the institutions, the policymakers, and the citizen communities that have been doing this work. The conversation it is inviting is not about who was right. It is about what comes next, and who wants to be part of it.

This is an independent paper produced by Andrew Henderson and THRESHOLD *. It is not produced by, on behalf of, or with the involvement of GRID-Arendal, the Basel Convention Secretariat, or the Plastic Waste Partnership working group. The GRID-Arendal brief cited throughout ('Good practices for establishing and improving the functioning of EPR systems for plastic packaging', draft 24.11.2025) is an important piece of institutional work. The analysis in this paper is the author's own and does not represent the views or positions of any of the organisations whose work is cited. This paper supersedes and incorporates CTT-UNDP-Delegate-EPR-Response-EN-v1.*

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