



Economic Measures for Packaging Waste Prevention

Published by:

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Global Project

"Support of the Export Initiative for Green Technologies" (BMU)
Köthener Str. 2
10963 Berlin / Germany
T +49 30 338 424 646
E markus.luecke@giz.de

Collaborative Action for Single-Use Plastic Prevention
in Southeast Asia (CAP-SEA)
193/63 Lake Rajada Office Complex, 16th Fl.
New Ratchadapisek Road, Klongtoey
Bangkok 10110 / Thailand
T +66 65 2400266
E christoffer.brick@giz.de

More information:

<https://greentechknowledgehub.de/>
<https://www.giz.de/en/worldwide/78869.html>
www.exportinitiative-umweltschutz.de

Authors:

Prakash, S.
Michalscheck, M.

Layout:

Crolla Lowis GmbH, Aachen, Germany

Photo credit:

Title: Catherine Sheila/Unsplash

URL links:

Responsibility for the content of external websites linked
in this publication always lies with their respective publishers.
GIZ expressly dissociates itself from such content.

GIZ is responsible for the content of this publication.

Freiburg, May 2022

On behalf of:



**Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection**

of the Federal Republic of Germany



In cooperation with Öko-Institut e.V.

Contact

info@oeko.de
www.oeko.de

Head Office Freiburg

P. O. Box 17 71
79017 Freiburg / Germany

Street address

Merzhauser Straße 173
79100 Freiburg / Germany
Phone +49 761 45295-0

Office Berlin

Borkumstraße 2
13189 Berlin / Germany
Phone +49 30 405085-0

Office Darmstadt

Rheinstraße 95
64295 Darmstadt / Germany
Phone +49 6151 8191-0

Table of contents

4	List of Abbreviations
5	Key recommendations
6	Introduction
9	Measure 1 – Tax on virgin materials
14	Measure 2 – Tax or fee on SUP packaging items
18	Measure 3 – Tax/levy on non-recycled packaging
21	Measure 4 – Incineration and Landfill taxes
24	Measure 5 – Extended Producer Responsibility (EPR)
29	Measure 6 – Deposit-Return-Systems (DRS)
32	Measure 7 – Pay-as-you-throw (PAYT)
35	Measure 8 – Green Public Procurement (GPP)
39	Measure 9 – Plastic Credits
43	Conclusions
47	References

List of Abbreviations

BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety & Consumer Protection
CAP SEA	Collaborative Action for Single-Use Plastic Prevention in Southeast Asia
CCM	Circular Credit Mechanism
DRS	Deposit-Return System
EEB	European Environment Bureau
EFSA	European Food Safety Authority
EPR	Extended Producer Responsibility
GBP	British Pound Sterling
GPP	Green Public Procurement
FSC	Forest Stewardship Council
KAYT	Know-as-you-throw
LCA	Life Cycle Assessment
NPC	National Plastic Contribution
OECD	Organisation for Economic Co-operation and Development
PAYT	Pay-as-you-throw
PEFC	Programme for the Endorsement of Forest Certification Schemes
PET	Polyethylene terephthalate
PIK	Potsdam Institute for Climate Impact Research
PRO	Producer Responsibility Organisation
R&D	Research & Development
RFID	Radio Frequency Identification
SUP	Single-Use Plastic
TOC	Total Organic Content
UNEP	United Nations Environment Programme
VAT	Value Added Tax
WEEE	Waste Electrical and Electronic Equipment
WTO	World Trade Organization

About the Export Initiative for Green Technologies

The GIZ global project “[Support of the Export Initiative for Green Technologies](#)” contributes to solving key environmental problems on behalf of the German Federal Ministry for the Environment and Consumer Protection (BMUV). The [BMUV Export Initiative](#) aims to export know-how available in Germany and support sustainable development worldwide. It includes topics such as poor waste management, air and water pollution or supporting infrastructures for sustainable urban development. Partner countries are Egypt, Jordan, India, Thailand, Malaysia, Indonesia and Ukraine. Project measures

focus on building up technical and institutional know-how as well as laying the groundwork for the introduction and use of environmental and climate protection technologies “Made in Germany”.

The project component CAP SEA, which stands for Collaborative Action for Single-Use Plastic Prevention in Southeast Asia, focusses on the prevention of single-use plastic (SUP) and reusable packaging systems in Thailand, Malaysia, and Indonesia. For more information on CAP SEA project activities, please download the factsheet [here](#).”

Key recommendations

- Economic measures must be well designed to primarily encourage reduction, followed by reuse and recycling (preferably mechanical material recovery for same or similar functionality or field of application). The overarching goal should be to achieve an absolute reduction in packaging (by weight and amount) and phasing-out single-use-packaging as much as possible.
- Effective economic measures should be implemented as parts of a bundle of measures, e.g., bans, reduction and reuse targets, transparent consumer communication etc.
- The “polluter pays” principle should be the basis of any economic instrument, fostering competition and investments towards an improved environmental performance of packaging. Most commonly, the polluters are defined as those economic operators that bring products or packaging onto a national market.
- Economic measures should guarantee a continuous price advantage for options with lower environmental impact (e.g. lower prices for reusables than for single-use products, or lower prices for recyclates than for virgin materials).
- The effects of every economic measure should be closely monitored. In case of severe unintended sideeffects and/or evolving technical framework conditions, reviews and adjustments should be made.
- Tax rates and charges must be high enough to influence the market and low enough to limit circumvention. Demographic groups with low incomes may require special consideration. For instance, this may be achieved by exempting packaging charge for vital product groups for daily consumption (e.g. packaging of staples), but not for luxury goods. Exemptions should also be defined for smaller businesses, albeit with a clear timeline for a complete transition.
- Economic measures should always evaluate the risks of regrettable substitutions. E.g. taxing only single-use plastic packaging may lead to a shift towards other materials for single-use applications with probably even higher environmental impacts.
- Economic measures seeking to drive a phase-out of environmentally harmful products should consider that affordable alternatives (e.g. more durable shopping bags) will be available for large parts of the population.
- Economic measures, such as taxes and levies, should be supported by additional financing support mechanisms in order to mobilize private sector investments, e.g. in sorting and recycling infrastructure or in establishing reverse logistics for reusables.
- Economic measures should not lead to long-term investment lock-in effects in the downstream segment. Such lock-in effects are likely to occur when large parts of available funds are invested in setting-up very few processing solutions, e.g. for pyrolysis, gasification, incineration or landfilling. This carries the danger that – once established – waste management systems are bound to use such solutions, even if they prove to be suboptimal from a long-term environmental and economic perspective. Such investments should be planned and monitored closely.
- It is important to engage producers, consumers, service providers for reusables and recyclers to avoid blind spots in defining economic measures.
- The revenues of an economic measure should be earmarked for specific environmental purposes such as upgrading the infrastructure for reuse logistics, waste segregation, collection, and high-quality recycling¹.

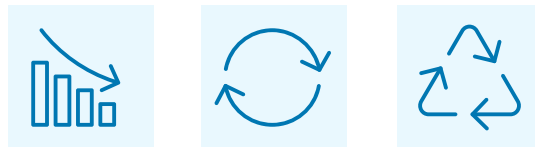
¹ Zero Waste Europe (2018).

Introduction

Currently, the global packaging economy is characterized by

- Low prices for virgin material (plastics), fostering the take-make-dispose mentality with single-use packaging items dominating the market(s)²
- Little transparency concerning material compositions and (often) unclear responsibilities for packaging waste management²
- Insufficient availability of high-quality recyclates, hampering a broader application of recyclates in the packaging-intensive, quality-sensitive food and cosmetic sector²
- High volumes of relatively low-quality, downcycled recyclates²
- A high percentage of leakage as litter into the environment²

A more sustainable packaging economy is implemented through a more sustainable consumption and production (SCP) that prevents packaging waste. Waste prevention is achieved through the three main waste reduction targets in the waste management hierarchy:



- 1. reduce it:** not generating packaging waste, by eliminating or reducing the use of material volumes in packaging or by shifting from one packaging type to another, more sustainable one³
- 2. reuse it:** ensure that packaging can be and is used multiple times
- 3. recycle it:** ensure ideally closed-loop recycling, to delay downcycling, avoiding losses through litter or through incineration. Recycled material (recyclates) shall substitute virgin material.

The main aim in packaging waste prevention must be the reduction of primary re-source use and of waste generated. To exemplify the urgency: if our plastic packaging use would continue to grow like it currently does, even with increased use of recycled material the requirement of virgin feedstock would still double by 2050⁴. The over-all use must decrease. Only if packaging cannot be avoided, it should at least be reusable. If a packaging cannot be reused anymore, it should be recycled, preferably with mechanical material recovery for same or similar functionality or field of application as the first priority. It is important that a packaging is not only theoretically recyclable but has a high likelihood of actually being recycled in practice, so that the recovered materials can go into the production of new products. Therefore, measures and investments in collection, source segregation and sorting are equally important. The entire waste management system should be designed and committed to preventing littering, incineration, landfilling untreated waste or disposal in non-sanitary landfills to keep materials in the loop, keeping them useful for as long as possible.

Economic measures provide basic economic and regulatory guidance to influence the demand and supply for particular packaging materials and/or product groups. They include governmental spending, taxes and transfer payments that influence the aggregate demand. They can be powerful tools to foster the emergence of a more sustainable packaging economy. To do so, the **measures must be well designed to primarily encourage reduction, followed by reuse and recycling.**

Concerning the design, economic measures may be set up as a penalty (e.g. taxes, levies) or a reward (e.g. credits or subsidies) system. Furthermore, the penalty or reward may be applied to producers (upstream, including monomer, resin, plastic packaging producers⁵ or retail) or to consumers (downstream). The chosen entry point (upstream or downstream) is a design-choice that affects the practical implementation of the measure.

For example, upstream taxation will affect a limited number of economic actors per category⁶ involved and may achieve early efficiency gains in material use along the plastic value chain⁷. At the same time,

² Wider Sense (2020).

³ OECD (1993)

⁴ World Economic Forum & Ellen MacArthur Foundation (2016).

⁵ Zero Waste Europe (2018)

⁶ With category, we refer to monomer, resin (polymer) or plastic packaging producers, representing the different stages of the plastic value chain.

⁷ Zero Waste Europe (2018)

upstream taxation does require complementary trade arrangements so that both, national and foreign producers or importers comply⁸. Regulating imports and exports, in turn, requires a precise and coherent labelling system to identify mono- and polymers as well as plastic contents⁹. Distortions to competition shall be minimized and carefully considered in the design of the economic measure⁸. If taxes were levied downstream to consumers, many more economic actors would need to comply, increasing the complexity of tax administration⁸. Furthermore, no additional trade agreement would need to be made, since all products sold on the regulated market would be affected. Downstream taxes allow targeting specific packaging types, not just specific mono- or polymers. It is important to consider that in practice, additional costs of an upstream taxation are typically passed on to the consumers downstream⁹.

Examples for common economic measures for packaging prevention are

- **Taxes**, such as
 - taxes on virgin materials¹⁰ by weight, with higher charges for materials for which an environmental-friendlier alternative is readily available
 - taxes on single-use packaging (SUP) items¹¹
 - taxes on packaging items that are not (or not sufficiently) made up of recyclates
 - taxes on packaging items that are not recyclable
 - an incineration tax¹²
 - a disposal tax
 - a carbon dioxide (CO₂) tax
- **Charges**, such as
 - a charge on SUP items (e.g. plastic bags)
 - incineration and waste disposal charges to encourage the reuse of packaging items, increasing high-quality recycling (preferably mechanical material recovery for same or similar functionality or field of application)
- **Penalties**, such as
 - for littering to avoid leakage into the environment, keeping materials in the loop for recycling

- **Investments** (rewards), such as
 - Investments into awareness campaigns on the benefit and urgency of packaging waste reduction¹³
 - investments into higher production standards to optimize / reduce the material use in production, improving the quality of products, making them more durable and reusable, improve the recyclability of materials
 - investments into support infrastructure for mainstreaming reusable systems, such as digital tracking of reusable containers, reverse logistics and dishwashing facilities.
- **Rebates** (rewards),
 - for unpackaged items or for the most sustainable packaging options per product category
- **Subsidies** (rewards), such as
 - on products fulfilling recyclability and recycled content targets to stimulate the demand for and supply of recyclates

The effectiveness of the abovementioned individual measures depends on their design, on how their theory is put into practice and on accompanying measures. Effective economic measures are often implemented as parts of a bundle of measures and/or as a system-change¹⁴.

Few examples for intended system-changes include:

- an **Extended Producer Responsibility** (EPR)¹⁵
- standards for **Green (Public) Procurement** (GPP), i.e. creating a demand for products with minimal packaging waste, fostering innovations
- **Pay-As-You-Throw** (PAYT) systems¹⁶, where smaller and cleaner waste streams are rewarded
- **Deposit-Refund Schemes** (DRS)¹⁷, where consumers pay a refundable deposit, so packaging is returned to be reused or recycled
- A credit or trade system such as one for **plastic credits**¹⁸

⁸ Zero Waste Europe (2018)

⁹ Zero Waste Europe- ÖI Interview 30 Jul 2021.

¹⁰ Wider Sense (2020), PIK (2021), World Economic Forum & Ellen Macarthur Foundation (2016), European Commission (2021), UNEP (2020), The Government of the UK (2021), Recycling Network Benelux (2021), Recycling magazine 8 Aug 2020, Werner & Mertz - ÖI interview 7 Sep 2021

¹¹ Werner & Mertz - ÖI interview 7 Sep 2021

¹² WWF (2021)

¹³ Wuppertal Institut - ÖI Interview 22 Jul 2021

¹⁴ Zero Waste Europe- ÖI Interview 30 Jul 2021, OECD (2007), Roehling Stiftung - ÖI interview 22 Jul 2021

¹⁵ Werner & Mertz - ÖI interview 7 Sep 2021, Be Waste Wise (2016), WWF-Malaysia (2020), OECD (2019), Yamakawa (2013), NATUR-PACK (2021), Öko Institut internal - ÖI Interview 13 Apr 2021, PREVENT (2020), Zero Waste Europe (2017), Green Dot - ÖI Interview 29 Jul 2021, European Environmental Bureau - ÖI Interview 22 Jul 2021

¹⁶ EPA USA (2016)

¹⁷ Knecht und Catterfeld (2015), UBA (2016)

¹⁸ Wuppertal Institut - ÖI Interview 22 Jul 2021, PREVENT (2021b), CCM (2021), CAH (2021), CAH (2015), Roehling Stiftung - ÖI interview 22 Jul 2021, ValuCred (2021), PREVENT (2021a)

In this report, we provide a structured overview of nine important economic measures and systems changes for packaging waste prevention. Each measure or system is presented in a factsheet, including the description of the measure, its advantages, limitations, and the main enabling factors for making it effective. To increase the perspectives on the presented economic measures, we interviewed the following experts from industry, civil society, research institutes and a foundation:

- [Ursula Denison](#), Managing Director at PRO EUROPE s.p.r.l. (the Green Dot), Germany. **Expert on Extended Producer Responsibility (EPR) for packaging (Green Dot Germany, PRO Europe), European Packaging compliance regulations and packaging sustainability. 30 years active experience in implementation of Producer responsibility, fee setting and modulation, ecodesign for packaging, and use of recycled plastics in packaging. Active engagement with over 30 packaging recovery organizations worldwide, as well as government institutions and associations in Europe and North America.**
- [Dr. Henning Wilts](#), Director of Division Circular Economy, Wuppertal Institute. **Research Focus on the Economics of Waste Prevention, Environmental assessments of waste prevention measures; listed expert of the European Topic Center Waste and Materials in a Green Economy; Listed Academic Expert of the Science and Technology Options Assessment (STOA) Committee of the European Parliament; Member of the Editorial Advisory Board 'Waste and Resource Management'**
- [Piotr Barczak](#), Senior Policy Officer for Waste, European Environmental Bureau (EEB), **Representing the voice of around 150 green NGOs. Before joining the EEB, he worked with the Polish Ministry of the Environment and its International Cooperation Unit. In 2011, he was sent to Brussels to reinforce the Environmental Policy Unit at the Permanent Representation of Poland to the EU.**
- [Ume Amrhein](#), Foundation Manager at the Röchling Foundation. **The Röchling Foundation, together with Wider Sense, annually publishes the Polyproblem report, which reports on challenges and possible solutions regarding plastic packaging waste.**
- [Delphine Levi Alvares](#), Products Policy Officer for Zero Waste Europe. **European Coordinator of the Break Free from Plastic Movement and, since 2017, Coordinator of the Rethink Plastic Alliance with the latter being a Brussels based, policy coalition working on plastic pollution issues across the European Union. The Rethink-Plastic Alliance played a crucial role securing ambitious legislation on single-use plastics at the European level.**
- [Timothy Glaz](#), Head of Corporate Affairs of the Werner & Mertz GmbH, **a German company of the chemical industry, producing ecologic cleaning products since 1986. The company received several awards such as the German Environmental Award (2019) and the German Award for Ecodesign for recycled-use (2014).**
- [Günter Dehoust](#), Senior Expert, Resources & Transport, Öko-Institut e.V. **Focus on sustainable material flows, closed-loop materials and waste management. Expert in Extended Producer Responsibility, LCA, assessment of waste treatment technologies and waste management strategies.**

This report has been prepared by the Öko-Institut, Germany. The target audience of this report are the political decision-makers and companies in Thailand, Malaysia, and Indonesia. Currently, the target audience in the abovementioned countries are supported by the GIZ project module CAP-SEA (Collaborative Action for Single-Use Plastic Prevention in Southeast Asia). The aim of the CAP-SEA project is to support in reducing plastic waste and promoting reusable packaging systems in Thailand, Malaysia, and Indonesia by focusing on upstream approaches and embedding those in broader circular economy strategy advice to the government. CAP-SEA is funded by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and is part of the global project to support the “Export Initiative for Green Technologies”. GIZ is the main implementer while the implementation period runs from August 2019 to March 2023.

MEASURE 1

TAX ON VIRGIN MATERIALS

Definition

Packaging material made of primary resources is charged with a tax.

Pathway for reduction

The tax on virgin materials is typically applied upstream, i.e. to producers or vendors of monomers, polymers or packaging items. In practice, additional costs of an upstream taxation are typically passed on to the consumers downstream. Provided that the tax is high enough and that alternatives are available (e.g. lighter or recycled packaging), producers and consumers will shift away from packaging material made of primary resources¹⁹. The more elastic (responsive) the demand, the more effective the price increase implemented through the tax¹⁹. The common tax base is the weight or the value (same base as VAT) of a packaging item¹⁹. Globally, 90% of plastic produced is derived from virgin fossil feedstock²⁰, thus this tax targets a large pool of problematic packaging material.

Examples

- **UK:** A plastic packaging tax of 200 GBP per tonne will apply to products that are predominantly made of plastic (by weight) with less than 30% recycled content, for production and imports of over 10 tons/year. The tax will be operational from April 2022 onwards²¹.
- **Italy:** is envisioning a tax of 0.45€ per kg for SUP items from 2023 onwards. Shares made from recycled plastic are exempted from tax. Exception for compostable products (according to EN 13432: 2002), medical products, and packaging of pharmaceuticals.
- **Spain:** is also envisioning a tax of 0.45€ per kg for SUP items from 2023 onwards. Shares made from recycled plastic are exempted from tax. Exemptions for pharmaceuticals, health care products, food for special medical purposes, infant formula for hospital use, and silage film for agriculture and livestock.

Considerations for Good Design

- The tax legislation must define (1) the point of charge (where and for whom), (2) covered products and exemptions, (3) the tax base¹⁹ e.g. based on weight or value (4) the tax rate i.e. the tax amount and the (5) responsibilities for documentation and collection of packaging made from primary plastics²².
- When thinking about the **point of charge**, please consider¹⁹:
 - **Charging producers requires complimentary tariffs on imports and exemptions on exports**¹⁹. The aim is to avoid a tax-circumventing shift in production location and to guarantee a level playing field in and outside of the regulated market¹⁹. To include imports and exempt exports based on their material types, mono- and polymers as well as packaging products must be precisely and coherently labelled. A nomenclature and labelling system must thus be defined.

¹⁹ Zero Waste Europe (2018)

²⁰ World Economic Forum & Ellen MacArthur Foundation (2016)

²¹ The Government of the UK (2021), Recycling Network Benelux (2021)

²² UNEP (2020)

TAX ON VIRGIN MATERIALS

- **Charging plastic manufacturers** (resin or polymer producer) for **purchasing virgin monomers** does not allow a differentiation between specific resins between particular products or uses (e.g. no differentiation between single-use versus reusable plastic packaging items)²³, since these are determined in later processing or production steps. When regulating fossil-fuel based monomers, bio-based monomers may need an additional arrangement²³. An advantage is that monomers are easily identifiable in foreign trade operations²³.
 - Charging plastic manufacturers (resin or polymer producer) for selling or plastic converters for **purchasing virgin resins/ polymers** allows a tax differentiation according to polymer type²³. Tax administration would be more complex than for taxes on monomers, but much less complex than downstream taxes. Taxing resins would not allow a differentiation of plastic packaging uses²³ since these are determined in later processing or production steps.
 - **Charging consumers** of packaging would not require tariffs but would involve a much higher number of economic agents²³. Fraud could be significant²³. An advantage is that taxes could be levied on specific packaging types made from virgin materials²³. To enable consumers to differentiate between and chose preferable packaging types, a labelling system²³ would have to indicate e.g. the share of recyclates and the price difference.
- Recycled packaging items or secondary mono- and polymers designated for packaging production must be treated differently (e.g. exempted) by the tax²³. Consider that chemical recovery processes (e.g. pyrolysis and gasification) are very energy intensive with a high environmental footprint²³ and bear risk that they lead to a lock-in effect in the future and hinder efforts for prevention, reuse and recycling (preferably mechanical material recovery for same or similar functionality or field of application) Life-Cycle Assessments (LCAs) may provide guidance for appropriate differentiation of financial (dis)incentives²³.
 - It is important to avoid conflicts or overlaps with existing economic measures, e.g. in the EU, a plastic tax on raw materials (crude oil) and intermediate products (naphtha) cannot be levied since it would conflict with harmonized fuel taxes³²³.
 - The tax should not contradict more strict measures such as bans, typically applied to address high priority pollution problems²³.
 - The compatibility of a suggested tax affecting imports and exports shall be checked against existing WTO arrangements²³.
 - Engage stakeholders (consumers, producers, recyclers etc.) to eliminate blind spots and increase the efficiency of the design. Ensure transparency and inclusion to foster mutual understanding, greater compliance with the tax and continued support in updating the tax²⁴.
 - The revenues from the tax could be purposefully used for investments into R&D to foster reduction, reuse, and better recycling²⁵
 - The tax must be high enough to influence the market²³ and low enough to limit circumvention.

²³ Zero Waste Europe (2018)

²⁴ Zero Waste Europe (2018), European Environmental Bureau - ÖI Interview 22 Jul 2021.

²⁵ Wider Sense (2020)

TAX ON VIRGIN MATERIALS

- An important aspect to consider in determining the right tax rate is the elasticity of demand²⁶ i.e. what changes in demand can be expected relative to the suggested price changes²⁷. The more elastic the demand, the more effective even a relatively low tax will be²⁶. Note: elasticity is non-linear (i.e. changes at different price levels) and may change over time. Furthermore, the respective elasticity of monomer-, polymer- and plastic packaging types differs according to their uses and available substitutes, implying different tax rates²⁶. E.g. the demand for plastic water bottles has been described as inelastic²⁸ in the USA since PET bottles are not considered to have sufficiently suitable substitutes. An example for changing elasticity over time is the plastic bag levy in South Africa²⁹ where demand was highly elastic right after introducing the levy, as a reaction to having to pay for something that previously was for free. However, elasticity decreased over time since tax rates were not high enough²⁹.
- The tax must be adjusted to the social and economic context²⁶. E.g. the amount of fees and taxes may differ considerably between and within countries.
- Analyze possible social effects of the tax in order to avoid regressive effects²⁶ (i.e. placing a higher burden on low-income earners).
- Define predictable rate increases²⁶ (progressive introduction) for market players to gradually transition into a packaging reduction or towards preferable packaging options.
- Collect data on the current use, production, import and export of virgin and recycled materials³⁰.
- Implement transparency and accountability mechanisms³¹.

Effective implementation

- The tax on virgin materials should be implemented together with other instruments e.g.
 - with reduction and reuse targets and
 - with a tax on single-use packaging items, to avoid a regrettable substitution e.g. replacing single-use plastics with single use aluminum, glass²⁶, paper or wood³².
- Ideally, the chemical industry³³ (producing plastic pallets) should be included, compelling them to guarantee:
 - a minimum recyclability without quality loss (polymers designed for durability)
 - ease of recyclability (e.g. no stench during recycling)
 - toxicological harmlessness in order to facilitate a shift towards reuse and recycling for producers who would like to avoid the use of virgin material.
- Ensure the availability of supporting infrastructure e.g. for sorting and recycling²⁶.

²⁶ Zero Waste Europe (2018)

²⁷ Inelastic: demand changes (%) less than price changes (%); Unit elasticity: same; Elastic: demand changes (%) are greater than price changes (%)

²⁸ Berck et al. (2016)

²⁹ Dikgang et al. (2012)

³⁰ Zero Waste Europe (2018), Green Dot - ÖI Interview 29 Jul 2021

³¹ UNEP (2020)

³² Zero Waste Europe- ÖI Interview 30 Jul 2021.

³³ Werner & Mertz - ÖI interview 7 Sep 2021.

TAX ON VIRGIN MATERIALS

- Clearly define quality standards for both, virgin materials and recyclates³⁴. Transparency in quality will further encourage the use of recyclates and decrease the use of virgin material³⁴.
- Define gradual phase-outs for tax exemptions wherever possible.
- Schedule regular reviews of the tax instrument to allow for adjustments³⁵.

Hindering factors / Drawbacks

- The efficacy of the tax on virgin plastics depends on the availability (quantity and quality) of recyclates³⁶. Recyclates, however, are often perceived as of less quality than virgin plastics³⁷. Experience (quality checks) of producers in Europe³⁴ however show, that virgin materials may contain similar or greater amounts of problematic substances as compared to recyclates. In-house testing is essential to control the quality of both, virgin and recycled plastics.
- Use of recyclates in food packaging requires stringent food safety, hygiene and waste management standards. This may constitute a challenge especially in the absence of a sufficiently differentiated waste segregation. For instance, in Europe, the use of recyclates for food packaging needs the approval of EFSA (European Food Safety Authority), requiring 95% of the reprocessed materials being provenly sourced exclusively from food-contact applications (full traceability through the supply chain)³⁸.
- Price competitiveness and demand of recyclates is highly dependent upon the price fluctuations experienced by virgin materials³⁹.
- The tax will not be effective in changing the demand if virgin plastics are cheaper than recyclates³⁶. The tax on virgin plastics must ensure a continuous price disadvantage for the virgin material as compared to recyclates.
- Non-transparency for consumers distorts demand: what does recyclable and high-quality recycling mean? What part of a package is made of recyclates? What about the quality (hygiene, durability) of recycled packaging? These questions shall be addressed to engage consumers and producers in shifting away from packaging made of virgin plastics.
- Instead of turning to recyclates, it might be cheaper for the packaging sector to shift to aluminum or glass (e.g. for beverages), resulting into new environmental challenges³⁵. A tax on single-use and non-recyclable packaging could close this loophole, reflecting the importance of reusability and recyclability across material compositions, avoiding undesirable substitutions.
- There is a risk of undesirable side effects (i.e. large scale, unregulated imports or exports) in open markets, thus a check must be done what these could be and how to avoid them by careful wording or flanking regulations⁴⁰.

³⁴ Werner & Mertz - ÖI interview 7 Sep 2021

³⁵ Zero Waste Europe (2018)

³⁶ Roehling Stiftung - ÖI interview 22 Jul 2021

³⁷ Wider Sense (2020), World Economic Forum & Ellen MacArthur Foundation (2016)

³⁸ Recycling magazine 8 Aug 2020.

³⁹ World Economic Forum & Ellen MacArthur Foundation (2016)

⁴⁰ Wuppertal Institut - ÖI Interview 22 Jul 2021

TAX ON VIRGIN MATERIALS

- Although the tax on virgin material sets valuable incentives towards the use of environmentally preferable alternatives, they usually do not reflect the full negative externalities and societal costs currently caused by plastic packaging waste⁴¹. The tax on virgin materials thus does not solve the problem as a stand-alone solution but may serve to implement a significant improvement.

Further information

To better understand the environmental relevance of substituting virgin plastics with recyclates: Recycling a ton of plastic rather than using virgin feedstock reduces emissions by 1.1.-3.0 tons of CO₂e⁴². Furthermore, the incineration of one ton of plastic emits 2.5 tons of CO₂e⁴³. Fostering the recycled materials market will foster job creation and enhance the supply security of recyclates.

⁴¹ PIK (2021)

⁴² World Economic Forum & Ellen Macarthur Foundation (2016)

⁴³ Öko Institut internal - ÖI Interview 13 Apr 2021

MEASURE 2

TAX OR FEE ON SUP PACKAGING ITEMS

Definition

Single Use Plastic (SUP) packaging items are charged with a tax or fee. While the tax revenues go to the local or national government, the fee remains with the seller. A ban would not generate revenues but would imply costs for implementation⁴⁴.

Pathway for reduction

The tax or fee on SUP-packaging items may be charged upstream i.e. to manufacturers or distributors of packaging items (designing for reuse and/or recycling) or it may be charged downstream i.e. to consumers. Provided that the tax or fee is high enough and that more durable and reusable alternatives are available, producers and consumers will shift away from single-use packaging items, towards unpackaged or reusable options⁴⁵. Retail (i.e. downstream) taxes typically are set as an absolute amount per plastic item⁴⁶.

Examples

- **UK:** Charge on Single Use Carrier Bags (Order 2015) shopping bags (5 Pence per bag instead of free bags) leading to 80% of reduction in their use⁴⁴. Applied to retailers with 250 or more full-time employees⁴⁶.
- **Ireland:** Charge on single-use plastic bags of 0.22€/bag (2018), which led to a reduction of 90% in the use of SUP plastic bags⁴⁷.
- **Spain:** Royal Decree 293/2018 – charges of €0.05, €0.10 or €0.15/bag are applied depending on the thickness of the SUP bag and whether it contains recycled material⁸. Furthermore, the Spanish government approved a draft law including a levy on manufacturers, importers or intra-community acquisitions of non-reusable plastic packaging, foreseeing charges on 0.45€/kg of packaging, expected to result into a revenue of 724 million €⁴⁸.
- **Fiji:** Environment and Climate Adaptation Levy (Plastic Bags) Regulations 2017 – the ‘Levy charged on plastic bags must be collected by a cashier at the point at which a plastic bag is provided by the business to a consumer.’⁴⁶
- **Lesotho:** Environmental tax on plastic bags, caps, lids and other closures⁴⁶,
- **Belgium:** Tax on single-use plastic bags and disposable cutlery⁴⁶ and a charge of 9.86€/hectolitre of product (2004) on non-reusable beverage packaging ..
- **Italy:** Tax of 0.45€ per kg for SUP items from 2023 onwards. Shares made from recycled plastic are exempted from tax⁴⁸.
- **Croatia:** Charge of 0.0138€/unit on all beverage packaging. Revenues earmarked to finance the separate collection and sorting of packaging waste⁴⁹.
- **Norway:** Tax of 0.1308€/unit on disposable packaging i.e. non-refillable beverage containers⁵⁰

⁴⁴ Be Waste Wise (2016)

⁴⁵ Zero Waste Europe- ÖI Interview 30 Jul 2021

⁴⁶ UNEP (2020)

⁴⁷ Irish environment (2015)

⁴⁸ Recycling Network Benelux (2021)

⁴⁹ OECD (2020)

⁵⁰ UNEP (2020), Recycling Network Benelux (2021)

TAX OR FEE ON SUP PACKAGING ITEMS

- **Scotland:** An Expert Panel of Environmental Charging and other Measures (EPECOM) determined that a charge on SUP cups is more effective at reducing consumption and increasing reusable cup use than a reusable cup discount. The panel determined that a minimum charge of 0.20 Pounds was needed to change the behaviour of 49% of the population⁵¹. In 2020, Scotland thus proposed a charge on SUP disposable beverage cups⁵².

Considerations for Good Design:

- The legislation of the tax or fee must define (1) the point of charge, (2) covered products and exemptions, (3) the tax base⁵³ e.g. based on weight, volume or number, (4) the tax rate i.e. the tax amount and the (5) responsibilities for documentation and collection of SUP-packaging items.
- When thinking about the **point of charge**, please consider⁵³:
 - **Charging producers requires complimentary tariffs on imports and exemptions on exports**⁵³. The aim is to avoid a tax-circumventing shift in production location and to guarantee a level playing field in and outside of the regulated market⁵³. A labelling system must be defined and implemented. The compatibility of a suggested tax affecting imports and exports shall be checked against existing WTO arrangements⁵³.
 - **Charging consumers** –of SUP-packaging items at point-of sales would not require tariffs but would involve a much higher number of economic agents⁵³, implying larger risks of fraud⁵³. An advantage is that the tax or fee can be product type specific⁵³. Packaging items shall be labelled to clearly indicate their reusability.
- A tax or fee can most easily be implemented when low-cost reusable alternatives (e.g. more durable shopping bags) are available and affordable for large parts of the population⁵⁴
- Rather than an average fee for all similar products (e.g. plastic bags) the fee should differentiate e.g. according to weight, material type, recyclability⁵⁴ and, if possible, recycled content⁵³.
- Engage stakeholders (producers, consumers, reuse organizations and recyclers etc.) to eliminate blind spots and increase the efficiency of the design of the tax or fee. Ensure transparency and inclusion to foster mutual understanding, greater compliance with the tax or fee and continued support in updating the economic measure.
- Charges have to be nuanced: taking the example of the 5-Pence-charge on shopping bags in the UK: to achieve a similar reduction in SUP coffee cups would require a higher charge, since 5 Pence would not make much of a price difference to the coffee. 25 Pence would probably be more appropriate⁵⁴. Charges may be per item or purchase, based on weight, volume or price of the product⁵⁵.
- The tax must be just high enough to influence the market⁵³, circumvention and littering must be avoided or prosecuted. Define predictable rate increases⁵³ (progressive introduction) for market players to gradually transition into a packaging reduction or towards preferable packaging options.

⁵¹ Recycling Network Benelux (2021)

⁵² Government of Scotland. (2020)

⁵³ Zero Waste Europe (2018)

⁵⁴ Be Waste Wise (2016)

⁵⁵ UNEP (2020)

TAX OR FEE ON SUP PACKAGING ITEMS

- The tax must be adjusted to the social and economic context⁵⁶. E.g. the amount of fees and taxes may differ considerably between and within countries.
- Analyse possible social effects of the tax or fee in order to avoid regressive effects⁵⁶ (i.e. placing a higher burden on low-income earners, who may feel dependent on single use alternatives that are perceived as cheaper).
- It is important to clearly define the objective of the tax/levy. Taxes should always be enforceable and hence, not too complicated. If the main objective is to promote recyclability, a tax on non-recyclable packaging should be set. This would require clear rules on what constitutes recyclable packaging and, even better, a positive catalog listing all recyclable packaging. If the main objective is to tax resource consumption, recyclability does not necessarily have to be considered in order to reduce complexity.
- It is important to avoid overlaps with existing economic measures such as a Deposit-Return Scheme that e.g. covers single-use beverage containers.
- Implement transparency and accountability mechanisms⁵⁷.

Effective implementation:

- Ensure that there is an alternative (e.g. reusable plastic bags) that people can use instead of the SUP packaging items. The available alternative must constitute a real environmental improvement to the single use packaging items.⁵⁸ For example: Just because a tax successfully avoids single use plastic bags, it does not mean that the chosen alternatives reduce waste or bring a real environmental benefit.⁵⁹
- A large-scale shift from SUP packaging items to reusable packaging requires A) and B):
 - A) The sales of more durable and stable packaging items (e.g. boxes, bottles) for multi-purpose, flexible and safe re-use by the consumer before disposal, and the option of re-filling the above mentioned more durable packaging item with the original product, provided that the refill is hygienic and real environmental gains are to be expected.
 - B) participation in pooling systems, where producers agree on similar packaging options, set up and incentivize (e.g. with a deposit, see Factsheet 6) a joint re-collection for professional cleaning and reuse.
- The SUP-tax shall be flanked with measures to foster recyclability, the use of recycles in packaging and to avoid landfilling (e.g. by landfill taxes), incineration (e.g. by incineration tax) or disposal (e.g. by disposal taxes).
- Define gradual fade-outs for tax exemptions wherever possible.
- Schedule regular reviews of the tax instrument to allow for adjustments⁵⁶.

⁵⁶ Zero Waste Europe (2018)

⁵⁷ UNEP (2020)

⁵⁸ Wuppertal Institut - ÖI Interview 22 Jul 2021.

⁵⁹ Wuppertal Institut - ÖI Interview 22 Jul 2021, Roehling Stiftung - ÖI interview 22 Jul 2021

TAX OR FEE ON SUP PACKAGING ITEMS

Hindering factors / Drawbacks:

- Avoid loopholes and minimize the risk of burden-shifting⁶⁰. Regulating the demand for specific SUP packaging items may lead to the use of other single use materials, at no environmental gain⁶⁰.
- For some consumers, paying the fee will still be more convenient than changing their behaviour e.g. carrying a reusable shopping bag or a reusable coffee cup etc.⁶¹
- A fee or tax is not suitable, if the use of a certain packaging type is meant to be fully and immediately stopped, e.g. in case of a particularly large environmental impact, difficult or excessively expensive recycling like for styrofoam food trays or cups⁶¹, where weight- or CO₂-based charges do not do justice to the environmental issue. A ban is often more appropriate here.
- The tax or fee will not be effective in changing the demand if SUP packaging items remain cheap and readily available. The convenience and higher environmental cost of SUP packaging must come at a higher market price.
- Non-transparency for consumers distorts demand: is it clean/hygienic to reuse e.g. a beverage bottle or food container? How many times can a packaging item safely be reused? Such questions shall be addressed in order to engage consumers and producers in shifting away from SUP packaging options.

Further information:

There is a growing agreement on negative consequences of increasing single-use plastic and packaging waste to human health, marine and terrestrial ecosystems, climate change and biodiversity. However, implementation of measures to tackle the problem vary considerably. The prevalent inconsistency in the measures to address the problem of single-use plastics and packaging waste is partly due to a lack of knowledge on environmental impacts and potentials of material choices for sustainable packaging designs and single-use plastic alternatives. Taking science-based material choice decisions are key in reducing the environmental impact of single-use packaging. The study "Material choices for environment-friendly packaging design - Analysis of existing Life Cycle Assessment (LCA) studies" shows potential conflict of interest between different environmental goals as a result of material choices. This report is based on a literature review of several LCA studies conducted to analyze the environmental impact of different packaging materials and alternatives. The report focusses on five packaging applications: shopping bags, beverage containers, beverage cups, take-away food packaging and meat packaging. Available at: https://greentech-knowledgehub.de/sites/default/files/2021-10/Material_choices_211020.pdf

MEASURE 3

TAX/LEVY ON NON-RECYCLED PACKAGING

Definition

Packaging material that will not be recycled is charged with a tax or a levy.

Pathway for reduction

A disincentive (charge) is set for the use of packaging materials that are not recycled after their use. The tax/levy may be charged to distributors or at national level (see example: EU levy on non-recycled plastic packaging). Packaging materials that are being recycled after use thus become more attractive for producers and consumers. The rate/amount may be determined by their environmental footprint (type of material), the weight, volume, or value.

Examples:

- **EU:** Since 1st January 2021, the EU member states have to pay a so-called National Plastic Contribution (NPC) based on the amount of non-recycled plastic packaging waste. This measure, which is often wrongly labelled as a tax, was introduced as a new revenue source for the EU budget. The member states are charged with 800€ per ton non-recycled plastic packaging waste. The NPC is calculated based on existing reporting obligations under the Packaging Waste Directive (94/62/EEC) and [Eurostat data](#). Member states pay on a monthly basis, first based on forecasts of non-recycled plastic amounts, later based on actual amounts. Less wealthy member states are protected from excessive contributions. While NPC is expected to encourage Member States to reduce packaging waste, it leaves national governments the freedom to define the most suitable policies to reduce plastic packaging waste pollution in line with the principle of subsidiarity. **Member States can choose how to fund this levy: pay the contribution directly from their national budget or design their own tax legislation to collect the revenues by taxing the plastic/packaging sector.**
- **Austria:** In line with the „polluter pays“ principle, producers and importers will in future be charged an average levy of 80 cents per kilogram of plastic packaging placed on the market. The levy is reduced if the packaging verifiably contains recyclates or is designed for recycling⁶². The levy is linked to the EU ‘charge on non-recycled plastic packaging’ and will decrease if Austria’s recycling rate increases⁶².

Considerations for Good Design:

- The legislation must define (1) the point of charge (where and for whom), (2) covered products and exemptions, (3) the tax/levy base e.g. weight, volume or number, (4) the tax/levy rate i.e. the amount and (5) responsibilities for documentation and collection⁶³
- The tax/levy must be high enough to increase efforts to achieve greater recycling shares, circumvention and littering must be avoided or prosecuted.
- Engage stakeholders (producers, consumers and recyclers etc.) to eliminate blind spots and increase the efficiency of the design of the tax/levy. Ensure transparency and inclusion to foster mutual understanding, greater compliance with the tax/levy and continued support in updating the economic measure.

⁶² Recycling Netwerk Benelux (2021)

⁶³ UNEP (2020)

TAX/ LEVY ON NON-RECYCLED PACKAGING

- The revenues from the levy could be purposefully used for investments into a better recycling infrastructure or R&D for better recycling⁶⁴.
- Ideally, the tax would not only consider whether a packaging item is recycled, but it would consider the number of recycling loops: the more the better.
- It is important to avoid conflicts with existing economic measures such as an Extended Producer Responsibility (EPR) system, see also Factsheet 5.
- While the tax on non-recycled plastics should ideally encourage recycling, it should be complemented by measures that foster re-use, such a tax/levy on SUP packaging items, see also Factsheet 2.
- Implement transparency and accountability mechanisms⁶⁵.

Effective implementation:

- Foster investments into waste segregation and recycling infrastructure, so that efforts towards greater recycling rates are not hampered by technical limits and the economic incentive can unfold its effect.
- Reliable data on waste streams and waste management (% recycled, % not recycled, differentiating packaging from other types of plastics, clearly defining the type of recycling etc.) is the basis for applying this measure. Introduce simple and legally binding accounting systems to capture the status quo as well as developments in respect to recycled plastics.
- The tax/ levy on non-recycled plastics may be flanked with other economic measures for plastic packaging waste prevention, especially recycling quota and a SUP tax/levy or fee on single-use plastic packaging items.
- Define gradual fade-outs for tax/levy exemptions wherever possible.
- Schedule regular reviews of the tax/levy instrument to allow for adjustments⁶⁶.

Hindering factors / Drawbacks:

- Cheap virgin materials decrease the demand for recyclates and lower the effectiveness of the tax/levy on non-recycled plastics⁶⁷.
- The efficacy of the tax/levy on non-recyclable plastics does not only depend on the will of individual producers but also on the available collection and recycling infrastructure. Recycling rates can only be high when waste fractions are segregated and when clean waste streams are achieved. Thus, mobilizing investments into waste segregation, collection and recycling infrastructure are important accompanying measures in order for the tax/levy on non-recycled plastics to be effective.

⁶⁴ Wider Sense (2020), Öko Institut internal - ÖI Interview 13 Apr 2021

⁶⁵ UNEP (2020)

⁶⁶ Zero Waste Europe (2018)

⁶⁷ World Economic Forum & Ellen Macarthur Foundation (2016)

TAX/ LEVY ON NON-RECYCLED PACKAGING

- It is not just the quantity but also the quality that matters when judging the performance of a recycling system: the aim would be to keep as many materials as possible in the loop without them losing functionality and quality i.e. avoiding downcycling to inferior polymers and products. The EU NPC on non-recycled plastics currently does not account for that.
- Most EU countries probably pay the contribution from the general budget rather than linking it to the actual polluters. This implies that the NPC will not unfold its effect and not directly influence the efforts towards increased recycling rates.
- The generated revenues from the EU NPC are currently not used for R&D for better recycling¹ but for funding the coronavirus recovery package⁶⁸. The charge could cause a shift from plastics to glass, paper and cardboard, which is not necessarily desirable.

Further information:

To better understand the environmental relevance of encouraging high shares of recycling: Recycling a ton of plastic rather than using virgin feedstock reduces emissions by 1.1.–3.0 tonnes of CO₂e⁶⁹.

⁶⁸ Recycling magazine 8 Aug 2020

⁶⁹ World Economic Forum & Ellen Macarthur Foundation (2016)

MEASURE 4

INCINERATION AND LANDFILL TAXES

Definition

An incineration tax is an environmental tax that is charged to anyone (e.g. companies, municipalities) who wishes to dispose waste at an incineration facility⁷⁰ for the controlled burning of waste. The burning of waste is often accompanied by energy recovery for production of heat and electricity. Similarly, the landfill tax charges those who dispose waste at a landfill.

Pathway for reduction

Both, the incineration and landfill tax shall establish waste incineration and land-filling as expensive last options for waste management respectively⁷⁰. Additional charges shall encourage the removal and utilization of reusable, recyclable or compostable (bio) waste fractions. Both taxes are charged to the incineration or landfill operator respectively, but costs are passed on to consumers, those who deliver waste for incineration or landfilling⁷⁰. In the absence of flanking prohibitions (e.g. prohibiting the disposal of untreated waste) the incineration and landfill tax complement each other: if only the incineration tax was introduced, more waste would be landfilled and vice versa.

Examples:

- **Austria**⁷¹: introduced a landfill tax, a landfill ban and, in 2016, an incineration tax. The revenue from the landfill tax (1.2 billion Euros until 2014) are exclusively used for the clean-up of contaminated sites pre-dating the tax. Landfill operators pay the tax based on the disposed tonnage and type of landfill (e.g. mass/hazardous waste: 29.80€ per tonne). Waste with a total organic carbon (TOC) content of above 5% is banned from landfills since 2004, effectively forcing municipal solid waste to be pre-treated mechanically-biologically or incinerated. Incineration is taxed at 8€ per tonne. The main effect of the landfill ban seems to have led to an increase in incineration (see Figure 4.1).

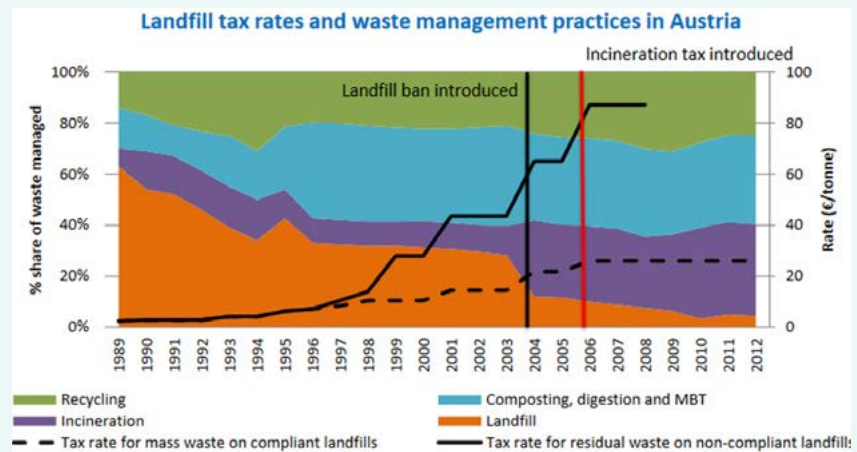


Figure 4.1: Landfill tax rates and waste management practices in Austria (1989-2012), Source: (IEEP 2016)

- **United Kingdom**: The landfill tax⁷² (1996) was UK's first environmental tax. The tax amount depends on the waste weight and type (active or inactive). Active waste is currently charged at 94 GBP and inactive waste 3 GBP per tonne. The landfill tax rates in the UK increase constantly over the years (8 GBP/ton/year), giving companies time to prepare, shift and reduce their overall packaging waste⁷³. The increasing costs for landfilling have made investments into advanced waste management technologies more attractive. Operators may reduce their tax liability by contributing

⁷⁰ WWF (2021)

⁷¹ IEEP (2016)

⁷² UK Government (1996)

⁷³ Be Waste Wise (2016)

INCINERATION AND LANDFILL TAXES

to local Community Funds, which invests into community and environmental projects. In the UK, landfill taxes can be based on weight, calorific value or biodegradability⁷⁴.

- **Catalonia, Spain:** The Catalan landfill (waste disposal) tax includes municipal solid waste, rewarding communities for good performance in separately collecting organic waste. The tax led to greater efforts by the municipalities to separate biowaste (766 out of 947 communities started a separate collection, status: 2016).

Considerations for Good Design:

- Attune the incineration and landfill tax, so they jointly encourage waste prevention, material reuse and recycling (preferably mechanical material recovery for same or similar functionality or field of application)⁷⁵.
- Decide whether to charge the taxes by weight or by CO₂ emissions, which may be compensated.
- Set a gradual increase for the taxes over time, providing clear incentives and a trajectory for minimizing incineration and landfilling⁷⁵. A reliable statement on increasing charges fosters well-calculated investments into waste reduction measures⁷⁴.
- Modern landfills or incineration facilities may be equipped with improved technologies. Differentiated landfill or incineration taxes set different tax rates based on their environment and performance standards⁷⁵.
- What types of waste should be banned from landfills (e.g. thresholds for total organic carbon i.e. biowaste; plastics⁷⁶)? Alternatively, one could introduce a reward mechanism for reduced biowaste content.
- Ask (incineration and landfill) operators to submit annual statements on the amounts (and qualities) of waste processed and the resulting taxes⁷⁵.
- What should the revenues of these taxes best be used for⁷⁵? E.g. for introducing or improving waste segregation, for remediation (see Austrian example), for inspection or awareness programs.
- Implement transparency and accountability mechanisms⁷⁷. Circumvention and littering must be avoided or prosecuted.
- The incineration and landfill tax also importantly complement the economic measure of GPP, since higher disposal costs increase the life cycle costs of less sustainable, material-intensive packaging options as compared to reduced, reusable and/or recyclable packaging alternatives.

⁷⁴ Be Waste Wise (2016)

⁷⁵ WWF (2021)

⁷⁶ WWF (2021), Tomas Ekvall et al. (2014)

⁷⁷ UNEP (2020)

INCINERATION AND LANDFILL TAXES

Effective implementation:

- Both taxes work best if (bio)waste is segregated at household level, facilitating the subsequent collection, sorting and removal of reusable, recyclable and compostable fractions. The introduction of one or both of these taxes shall be accompanied by (1) information campaigns⁷⁸, (2) enabling measures for waste segregation and (3) sorting and recycling capacities.
- Support a system change, away from incineration or landfilling. Large investments into new incineration facilities and efficient landfills will take time to be paid-off⁷⁹. Such investments should thus be monitored closely in order to avoid a lock-in into unsustainable waste management practices.
- The incineration and landfill tax discourage the disposal of packaging, but the taxes may be complemented by economic measures that encourage reuse and recycling, such as the SUP packaging tax or fee, the tax/ levy on non-recycled plastics, a Deposit-Return Scheme (DRS) etc.

Hindering factors /Drawbacks:

- The introduction of e.g. a landfill tax needs to be accompanied by a ban or at least a strong limitation of exports. Norway and Sweden had introduced a landfill tax and residual waste was shipped to Denmark and England because shipping it was cheaper than paying the landfill taxes⁷⁹. Even if every country would introduce a landfill tax, prices will differ considerably, leading to a global shipment of waste if not regulated. There would have to be a minimum cost per incinerated/ landfilled tonne⁷⁹, rendering global shipments unprofitable.
- Since operators of incineration facilities often do not have direct control over waste segregation and recycling, they may invest into a co-production of heat and electricity to reduce emissions and costs. If fees are too low, there might not be an incentive for an overall reduction of incinerated waste.
- In Germany ⁸⁰, large investments were made into incineration facilities, resulting into low prices for incineration, making it an attractive end-of-life option for packaging and other waste. An incineration tax would counteract the low prices. Ideally earlier measures, keeping material in the loop by reuse and recycling, would constitute further incentives for preventing waste incineration.

Further information:

Download a full overview of EU landfill taxes and bans [here](#), shaping the [municipal waste treatment](#) of the EU member states + Switzerland, Norway and the UK.

⁷⁸ Sahlin et al. (2007)

⁷⁹ Wuppertal Institut - ÖI Interview 22 Jul 2021

⁸⁰ UBA (2014)

MEASURE 5

EXTENDED PRODUCER RESPONSIBILITY (EPR)

Definition

Extended Producer Responsibility (EPR) for packaging is a policy approach that makes producers & distributors responsible for the collection, treatment, recycling and disposal of packaging at the post-consumer stage⁸¹.

Pathway for reduction:

Charging producers and distributors for the management of their packaging (or equivalent amounts) shall set incentives for reducing their packaging material volumes⁸¹ as well as reducing non-reusable or non-recyclable packaging types. An EPR creates an economic advantage for less polluting producers and distributors and may help in funding the implementation of waste segregation⁸² to increase recycling rates. Ideally, an EPR scheme can also be used for promoting reusables.

Examples:

- **Germany**: the German Packaging Ordinance (1991) was the first legislation worldwide to incorporate the concept of EPR for packaging waste⁸³. It included targets for collection, sorting, recycling (and later recovery) rates; EPR fees were first paid by item, later (since 1993) also by material and weight. The Packaging Act of 2019 increased the recycling rate targets and gave more power to municipalities. It introduced a central packaging register as well as incentives for better recyclability. The amendment of the German Packaging Act in 2021 introduced further measures, e.g. new producer's obligations for packaging not subject to system participation (e.g., transport or reusable packaging), extension of DRS obligations to one-way beverage bottles and drink cans (with few exceptions), mandatory offer by final distributors of reusable alternatives and minimum recycled content for beverage containers.
- **Japan**⁸⁴: EPR was introduced through the Packaging Recycling Act (1995, last revised: 2006) and includes plastic packaging, paper packaging incl. corrugated cardboard, cans, glass and PET-bottles. The main aim was to reduce the quantity of waste dumped into landfills. The weight of packaging (e.g. drinking bottles) decreased and the quantity of packaging waste recycled increased annually, reducing packaging waste and mitigating the shortage of landfills in Japan.

Considerations for Good Design:

- The following key questions may be asked in designing an EPR:
- Define the scope of your system: what material should be covered and where?⁸⁵
- How to first incentivize packaging reduction, then reuse and then recycling (favouring recycling (preferably mechanical material recovery for same or similar functionality or field of application)?⁸⁶ EPR license fees could be charged based on the reusability and recyclability of packaging as well as the use of recyclates⁸⁷.

⁸¹ Be Waste Wise (2016), WWF-Malaysia (2020), OECD (2019).

⁸² Zero Waste Europe (2017)

⁸³ PREVENT (2020)

⁸⁴ Yamakawa (2013)

⁸⁵ Green Dot - ÖI Interview 29 Jul 2021.

⁸⁶ Werner & Mertz - ÖI interview 7 Sep 2021, Green Dot - ÖI Interview 29 Jul 2021

⁸⁷ Werner & Mertz - ÖI interview 7 Sep 2021.

EXTENDED PRODUCER RESPONSIBILITY (EPR)

- Think about waste segregation: how to optimize the waste streams to facilitate sorting and achieve clean inputs for recycling⁸⁸? Basic condition: separating organic waste from (plastic) packaging waste⁸⁹. This will improve the quality, availability and price of recyclates.
- Define the current material streams and technical recycling options⁹⁰: how much packaging waste will be collected? Who would be responsible for it? Shall there be a public procurement of waste management services or do municipalities take care of it?⁹¹
- In planning: involve practitioners, not just legal experts, politicians, and academics⁹¹.
- What will be the costs for recycling and disposal, i.e. for collection, transport, setting up, running and maintaining facilities, labor costs etc.⁹². These costs need to be covered by the EPR fees⁹¹. The costs of implementation and operation also depend on how the waste is currently collected and treated⁹¹. To obtain an idea on the amount of fees, you may have a look at [prices and calculations of the Green Dot Europe](#)⁹¹. Fees may differ by region, depending on waste streams, ease of collection, recycling and disposal options. Fees for waste disposal must be higher than recycling/recovery fees⁹³, but not as high as to encourage environmental littering.
- Take into considerations [options for the eco-modulation of EPR fees](#) for waste prevention⁹⁴ i.e. introducing a bonus-malus system for particularly good or bad practices, factor-in costs for waste prevention (include targets for waste prevention) and earmark revenues for social economy actors to encourage innovations on circular economy. E.g. in France, a 'Solidarity Re-Use Fund' was established, which receives 5% of the national EPR fees collected for textiles and WEEE⁹⁵.
- To meet their extended responsibility, producers typically pay a fee to a Producer Responsibility Organization (PRO) that collectively organizes and finances all take-back and treatment of waste on their behalf⁹⁶. A PRO that is directly responsible for purchase, collection, sorting and recovery is called 'operational PRO'⁹⁷. A competition between multiple operational PROs can increase efficiency and leverage innovation. Competition, however, also typically reduces incentives towards a better environmental performance. A financial EPR implies that the operational responsibility is left e.g. to local authorities, who receive financial support from a single non-profit PRO. A single scheme requires regulation (supervision and coordination) of the financial support for adequate cost coverage⁹⁶.
- Experience from Europe and North America⁹⁸ has shown that limiting the market to a monopoly non-profit PRO for the first 5-10 years facilitates the introduction of an EPR system, generating stable markets, standards and procedures. A transition to an open market with private, for-profit companies (like in Germany) can then build on the existing structures, increase competition, leading to significant price reductions and improvement in services⁹⁷. However, the competition in Germany favored cheaper instead of environmentally better waste management, slowing down larger infra-structural improvements in the recycling sector⁹⁸.

⁸⁸ Öko Institut internal - ÖI Interview 13 Apr 2021.

⁸⁹ European Environmental Bureau - ÖI Interview 22 Jul 2021

⁹⁰ Yamakawa (2013)

⁹¹ Green Dot - ÖI Interview 29 Jul 2021.

⁹² Green Dot - ÖI Interview 29 Jul 2021, Zero Waste Europe- ÖI Interview 30 Jul 2021

⁹³ NATUR-PACK (2021)

⁹⁴ UNEP (2020), Ecologic (2021)

⁹⁵ Ecologic (2021)

⁹⁶ WWF-Malaysia (2020)

⁹⁷ Deloitte (2017)

⁹⁸ Öko Institut internal - ÖI Interview 13 Apr 2021, Green Dot - ÖI Interview 29 Jul 2021

EXTENDED PRODUCER RESPONSIBILITY (EPR)

- If possible, incentivize competition among PROs for ecological performance, not (only) for the least price, since the latter alone undermines the performance e.g. of the recyclers⁹⁹.
- Ideally across an economic region, there should be a harmonized system for the registration of producers/importers, so that they follow the same procedure independently of the jurisdiction that they are in¹⁰⁰. Larger markets with similar requirements facilitate compliance for producers¹⁰¹. Last but not least, the careful design of the accompanying legal basis is fundamental: it needs to include clear definitions, guidelines, timelines, sanctions and control mechanisms to ensure effective implementation¹⁰². The legal framework should be regularly updated to match evolving technical possibilities. Clear guidelines must be set for recycling facilities and recycling processes as well as for calculating and verifying recycling quota and recycled content in products.

Effective implementation:

- Besides the required technical changes think about the social transition¹⁰³: what information do producers and consumers need? What waste segregation habits would need to change? How to involve informal waste pickers? What does it mean for urban planning?
- There needs to be a legal basis requesting the extended producer responsibility, clearly describing for what and for whom, including documentation needs and penalties for non-compliance.
- Related minimum quota for recycling (and recycled content) must regularly be revised to match latest technological standards.
- Collecting standardized data on waste streams as a prerequisite to ensure adherence to quotas¹⁰⁴. There needs to be an independent, central register to collect data and ensure compliance¹⁰⁵.
- Most companies are willing to participate in an EPR if they clearly know what is expected from them and what costs they will face. Their most important concern is: planning security¹⁰⁶
- Having a few big market players join the EPR system early onwards helps create momentum and compliance among whole sectors¹⁰⁷.
- Awareness raising measures, market conversation particularly with multi-seller platforms¹⁰⁸ and market control, to ensure compliance¹⁰⁹. Coordinated efforts between enforcing agencies¹⁰⁷. One idea is to make fees visible e.g. on receipts and invoices,

⁹⁹ Werner & Mertz - ÖI interview 7 Sep 2021.

¹⁰⁰ OECD (2019), Green Dot - ÖI Interview 29 Jul 2021

¹⁰¹ Be Waste Wise (2016).

¹⁰² Green Dot - ÖI Interview 29 Jul 2021.

¹⁰³ Zero Waste Europe- ÖI Interview 30 Jul 2021

¹⁰⁴ Wuppertal Institut - ÖI Interview 22 Jul 2021, Öko Institut internal - ÖI Interview 13 Apr 2021, Green Dot - ÖI Interview 29 Jul 2021

¹⁰⁵ Wuppertal Institut - ÖI Interview 22 Jul 2021

¹⁰⁶ Wuppertal Institut - ÖI Interview 22 Jul 2021, Green Dot - ÖI Interview 29 Jul 2021

¹⁰⁷ Green Dot - ÖI Interview 29 Jul 2021

¹⁰⁸ OECD (2019)

¹⁰⁹ Öko Institut internal - ÖI Interview 13 Apr 2021

EXTENDED PRODUCER RESPONSIBILITY (EPR)

so the consumers are informed about a bonus or malus¹¹⁰. Another idea would be to introduce labels with recyclability information¹⁰⁹.

- Pricing and EPR system design shall be regularly adjusted in order to cover costs and to match the reality of waste streams¹¹¹.
- For an EPR system to effectively foster a packaging waste reduction through greater recycling rates, the latter must be traceable and verifiable. It thus must first be precisely defined what is accepted as recycling (e.g. high-quality mechanical recycling i.e. plastic to plastic of similar quality). Suitable recycling plants must be certified and approved. The material flows from collection to sorting to recycling must be precisely recorded and controlled in a volume flow certificate. In Germany, there is a high precision in tracing these resource flows, but this requires experts, who must be well trained and certified.

Hindering factors & How to overcome them

- Weight-based EPR fees in Germany have sometimes led to the undesirable side-effect that very thin plastic packaging was difficult to recycle and incinerated for thermal recovery¹¹². If not carefully designed, an EPR thus may create a lock-in, leading to thermal recovery rather than a meaningful reduction, reusability, and recyclability of packaging. To avoid this lock-in, the EPR should be complemented by recycling quota and effective sanctions for non-compliance-. Additional policies may be introduced that prevent incineration, foster reuse, reward, and postulate recyclability.
- In the Europe Union, members states had different trajectories for introducing EPRs, with different standards in waste prevention and recycling. There are currently (2021) 21 EPR systems in the EU. Diverging fees are difficult to explain to international producers. Homogenous systems and standards help acceptance.
- EPR costs need to be regularly revised in order not to run a deficit.
- Separate EPR systems may cause inefficiencies if different packaging waste types are separately (by different institutions) collected and recycled¹¹³
- If various PROs offer their service, competition for lowest prices may result in lower quality recycling¹¹⁴
- The EPR system should not adversely impact the established municipal waste management services¹¹⁵ but rather team up with these to jointly sensitize the population for best practices in packaging waste management.
- Free riders, i.e. producers not assuming their responsibility, may jeopardize the success of the EPR system¹¹⁶. Pro-active compliance controls are needed.

¹¹⁰ Deloitte (2017)

¹¹¹ Green Dot - ÖI Interview 29 Jul 2021

¹¹² Wuppertal Institut - ÖI Interview 22 Jul 2021, Zero Waste Europe- ÖI Interview 30 Jul 2021, Zero Waste Europe (2017), Roehling Stiftung - ÖI interview 22 Jul 2021

¹¹³ Yamakawa (2013)

¹¹⁴ Öko Institut internal - ÖI Interview 13 Apr 2021

¹¹⁵ Be Waste Wise (2016)

¹¹⁶ OECD (2019)

EXTENDED PRODUCER RESPONSIBILITY (EPR)

- The import and/or export of valuable recycling materials (e.g. PET bottles from Japan) may threaten the financial sustainability of the domestic recycling system¹¹⁷. Items that were sold before the enforcement of the EPR system are often out of scope of the producer's responsibility¹¹⁸.

Further information:

To explore lessons learnt on EPR in Slovakia, you may be interested in reading their report on [Packaging and Packaging Waste](#)¹¹⁹.

¹¹⁷ Yamakawa (2013)

¹¹⁸ OECD (2019)

¹¹⁹ European Commission (2021)

MEASURE 6

DEPOSIT-RETURN-SYSTEMS (DRS)

Definition:

A deposit is charged when a product with a certain packaging is purchased. The deposit is repaid when the empty packaging is returned, whether to the point-of-sale¹¹⁹ or to a collection point. DRS may cover both: reusable/refillable and single-use containers¹²⁰.

Pathway for reduction:

Consumers return their packaging waste, avoiding litter and generating relatively clean (single or few polymers) streams of reusable/refillable or recyclable materials, reducing the amount of packaging material from virgin materials (if recycled) or reducing the overall material and energy use for packaging (if reused often enough)^{120,121}.

Examples:

- **Germany:** Germany has deposit systems for both reusable/refillable and single-use containers (added recently in the amendment of the packaging act in 2021). As the target of share of beverages filled in reusable beverage containers of at least 70 percent was missed, it was decided to include single-use containers in the DRS. It is applied to beverage cans and disposable glass and plastic beverage bottles, if they have a capacity between 0.1 liters and 3 liters. To ensure single-use containers do not overtake reusables/ refillables, a higher deposit value is set for single-use containers (25 cents). The returnable deposit is only 8 cents (beer bottles) or 15 cents (other reusable bottles).

Single-use packaging subject to a deposit can be returned at any point of sale that sells single-use containers made of the same material. The decisive factor is the material alone and not the shape, brand or content of the packaging. Examples: Anyone who offers cola in plastic bottles and cans must also take back plastic mineral water bottles or beer cans. Anyone who only sells beverages in disposable plastic bottles must only take back disposable plastic bottles. Those who sell only cans must take back only cans.

Retailers must take back empty packaging and pay the deposit of 25 cents, even if the beverages were purchased at another store. The refund of the deposit is not tied to a new purchase.

For stores with a sales area of less than 200 square meters (for example, kiosks or smaller petrol stations), a special rule applies: they only have to take back empties of those brands and materials that they themselves carry in their assortment. Example: Only XY brand cola cans are sold, then only XY brand cola cans must be taken back (it does not matter where the XY cans were purchased)

- In the **US state of Maine** there is a deposit of 5-10 USD on pesticide containers, which previously were often disposed illegally, causing environmental harm¹¹⁹.

Considerations for Good Design:

- DRS are most effective when they target products that evince a, thus far, low return rate, that constitute a particular littering problem or that are particularly well reusable and recyclable when separately collected¹¹⁹.

¹²⁰ UBA (2016)

¹²¹ Be Waste Wise (2016)

DEPOSIT-RETURN-SYSTEMS (DRS)

- Examples of deposits worldwide include deposits on beverage and food containers, some packaging of cosmetics and of cleaning products in terms of primary packaging. Tertiary and secondary packaging (larger crates and containers for transport) may be relatively easy to collect and reuse and are thus often charged with a deposit, too.
- The deposit amount needs to optimize the rate of return by consumers. It needs to be large enough for consumer to care about the deposit. The greater the amount of time that the consumer needs to invest to return packaging items with a deposit, the greater the deposit amount has to be in order to constitute an effective incentive for return¹²²
- Deposits may be nuanced, so that packaging with an environmentally better performance has a lower deposit, setting incentives for producers to shift to better packaging.
- Packaging items for which a deposit has been paid must be forgery-proof and clearly differentiable from items on which the deposit has not been paid e.g. as for imported items. In Germany, a code and a symbol are printed on included beverage containers, while foreign beverage containers lack this code. The distinct labels allow automated DRS-machines in Germany to scan and differentiate own and foreign containers. Non-coded containers are rejected. Non-coded containers are still collected as part of the German EPR system, ideally ending up at household-level in the so-called yellow-bag (Gelber Sack) for packaging materials.
- Socio-economic side effect: while wealthier citizens may donate their packaging items with a deposit (e.g. beverage cans or bottles), societal groups with a low income (elderly, homeless) may collect and return these items to enhance their income¹²³. This effect has been observed in Germany and in Denmark¹²¹.
- For recycling of single-use containers, a high-quality recycling (e.g. closed loop i.e. PET bottle recycled into a PET bottle) with effective controls and proofs should be compulsory¹²¹.

Effective implementation:

- The incentive of returning the reusable beverage packaging item decreases if there is no urgency and the charge is very low. A time limit, tracked via an app, has proven to be helpful¹²⁴.
- Pooling systems for items with a deposit work well if a minimum mass and tight enough network in collection points can be established, so it is easy for consumers to visit return-points¹²³.
- Implementing DRS not only for reusable beverage containers but also for single-use applications. Deposit for single-use beverage containers should be substantially higher than for reusable containers.
- Implementing DRS that covers all materials.

¹²² Be Waste Wise (2016)

¹²³ Be Waste Wise (2016), Knecht und Catterfeld (2015)

¹²⁴ Wuppertal Institut - ÖI Interview 22 Jul 2021

DEPOSIT-RETURN-SYSTEMS (DRS)

- Packaging material that is not covered by a DRS should be covered by the more general EPR scheme¹²⁵.
- Consider expanding the use of DRS beyond beverage containers, such as food containers.
- Setting mandatory national targets for the refillable quota for beverage packaging and continuous monitoring will support the wide-scale implementation.
- There needs to be a legal basis for the DRS system, with clear rules for those who (need to) commit to the DRS. The legal basis must clearly describe to what and to whom the DRS applies, including documentation needs and penalties for non-compliance.
- Besides the required technical changes think about the social transition¹²⁶: what information do producers and consumers need? What habits would need to change? What effect would a DRS have on informal waste pickers? What loopholes would need to be closed to prevent fraud? Answering these questions and engaging into an early communication with involved stakeholders will facilitate the introduction of a DRS.

Hindering factors/ Drawbacks:

- DRS have a time and logistics-cost for consumers. If the deposit amount is too low, if time for the consumer is too valuable and the logistics are too much of an effort for the consumer, the items might not be returned¹²⁷
- A national DRS system must be protected from fraud, clearly allowing a differentiation between containers for which a deposit has been paid and those for which the deposit was not applied e.g. like for imported materials or containers.

Further information:

Deloitte (2019): Deposit-Refund Systems (DRS) - Facts & Myths; https://www2.deloitte.com/content/dam/Deloitte/pl/Documents/Brochures/pl_DRS_Brochure_Deloitte.pdf

TOMRA (n.y.): Rewarding Recycling - Learnings from the World's Highest Performing Deposit Return Systems, White Paper, <https://www.tomra.com/en/collection/reverse-vending/deposit-return-schemes/white-paper>;

Zero Waste Europe (2021): It's time to acknowledge the role of Deposit Refund Systems (DRS) in achieving a Circular Economy for beverage packaging in the EU; <https://zerowasteurope.eu/press-release/its-time-to-acknowledge-the-role-of-deposit-refund-systems-drs-in-achieving-a-circular-economy-for-beverage-packaging-in-the-eu/>;

¹²⁵ European Environmental Bureau - ÖI Interview 22 Jul 2021

¹²⁶ Zero Waste Europe- ÖI Interview 30 Jul 2021

¹²⁷ Be Waste Wise (2016)

MEASURE 7

PAY-AS-YOU-THROW (PAYT)

Definition:

Individuals, households or communities are charged for the collection of waste based on the amount of waste they throw. PAYT treats waste management services like other utilities (e.g. electricity or gas). PAYT systems are also called unit-pricing or variable-rate pricing systems¹²⁷.

Pathway for reduction:

PAYT creates a direct economic incentive to generate less waste¹²⁸. PAYT is an opportunity to introduce a fair cost-sharing for a functioning municipal solid waste management system¹²⁷.

Examples:

- **USA**¹²⁷ and **Germany**: most communities with a PAYT system, charge residents a certain fee per bag or container of generated waste. Some communities bill by weight. The less individuals throw away, the less they pay.
- **Italy**¹²⁹: several municipalities have introduced a PAYT system. An example is the municipality of Seveso, who introduced transparent bags for residual waste equipped with RFID tags, which are spotted by the antennae of collection vehicles that may optimize their collection route. The PAYT system was introduced together with a KAYT (Know-as-you-throw) system raising awareness on waste generation, saving potentials and the individual performance as compared to the average. Implementing the RFID automated bag delivery, measuring and invoicing cost around 5€/capita/year. Seveso reached 85% separate collection rate¹²⁸.

Considerations for Good Design:

- Successful implementation requires early planning and communication between actors (collectors, recyclers, local authorities, civic groups, container retailers and consumers etc.)¹³⁰
- A basic element of a good design is the clear definition of who has what duties?¹²⁷
- The fee structure shall be chosen in consultation with waste managers and municipal accounting/finance staff¹²⁷. It typically works well if there is flat rate low minimum fee combined with a variable amount depending on the actual waste amount and possibly on the waste fractions/quality. The fixed fee shall ideally finance the expected amounts of residual waste.
- Special rates may be considered for particularly poor parts of the population¹²⁷.
- Think about different PAYT systems for urban versus rural areas¹³¹: these likely have different design criteria e.g. in terms of their collection and population density, types and total amounts of waste generated, housing arrangements (individual houses versus multi-story and multi-family housing). Opt for simple systems, best suitable collection containers (bin, bag, basket), best ways of storage (lifted off the ground to keep animals away?) and means of transport for waste collectors (bike, truck?)¹³⁰

¹²⁸ EPA USA (2016)

¹²⁹ Interreg Europe (2021)

¹³⁰ Zero Waste Europe- ÖI Interview 30 Jul 2021, EPA USA (2016)

¹³¹ Zero Waste Europe- ÖI Interview 30 Jul 2021.

PAY-AS-YOU-THROW (PAYT)

- It helps to implement pilot programmes to calibrate a system before scaling¹³². At the same time, trialing a new PAYT system in one community only runs the risk of causing so called 'waste tourism' where regulated communities or housing units dump their waste in non-regulated ones. A nationwide introduction of a PAYT system is best, unless communities are shielded off e.g. on an island or in a mountain range¹³³.
- For larger housing units, payments for waste amounts and types should be differentiated per housing unit to reward the individual commitment to reducing the waste amounts¹³⁴. Collect Data to allow monitoring of collection rates¹³¹
- Implement transparency and accountability mechanisms¹³⁵.

Effective implementation:

- Besides the required technical changes think about the social transition¹³²: what information do consumers (households and businesses) need? What waste segregation habits would need to change? What happens to informal waste pickers? How to involve them? What does it mean for urban planning? How to integrate existing holders of knowledge e.g. local waste collectors?
- The introduction of a PAYT system should be accompanied by intensive sensitization of the population to raise awareness and avoid littering or taking waste to other places (neighboring housing units or communities, public waste bins or to work). Information may i.a. be provided at the waste bins, at community meeting points or in schools.
- Train enforcement personnel and avoid that people resort to littering in order to avoid the PAYT fees¹³¹. Idea: create 'error tags' that collection crews can attach to inappropriately delivered waste e.g. not packed in the right bags or bags being too heavy¹³¹.
- Possibly provide a customer service for questions on the new PAYT system¹³¹. Ideally conduct annual customer service evaluate to ensure a high quality of service to citizens¹³¹.
- Think about a KAYT (Know-as-you-throw) system: use simple and clear communication tools¹³⁶.
- Collecting standardized data on waste streams as a prerequisite for judging waste quantities and qualities.
- Set-up regular feedback loops in order to learn and improve the PAYT-system design¹³¹. Regular revisions of fees and logistics will be needed to keep the PAYT system effective and to further improve its performance.

¹³² EPA USA (2016)

¹³³ Zero Waste Europe- ÖI Interview 30 Jul 2021.

¹³⁴ Innotec (2021)

¹³⁵ UNEP (2020)

¹³⁶ Interreg Europe (2021).

PAY-AS-YOU-THROW (PAYT)

Hindering factors /Drawbacks:

- If fees are perceived as too high, individuals may shift to an illegal disposal (littering, burning)
- Any system change needs an upfront investment i.e. for stakeholder dialogues, implementing the logistics and complementing the existing infrastructure.
- Free riders, i.e. producers not assuming their responsibility, may jeopardize the success of the PAYT-system. Pro-active compliance controls are needed.
- Introducing a PAYT system when separate collection and recycling rates are already high is challenging¹³⁷, requiring complementary incentives such as individual feedback, community activities, awareness raising and transparency on residual (undesirable) waste streams.
- Without intensive and holistic counseling and sensitization, littering, distributing trash to public garbage bins or at workplace, etc. can occur.

Further information:

[EPA USA](#) published case studies, videos and advice i.a. on billing, container options, illegal diversion, complementary programme¹³⁸.

¹³⁷ Interreg Europe (2021)

¹³⁸ EPA USA (2016)

MEASURE 8

GREEN PUBLIC PROCUREMENT (GPP)

Definition:

GPP sets sustainability standards for governmental purchases of goods and services.

Pathway for reduction:

Governmental spending constitutes a large purchase power. In Germany, for instance, the central government expenditure (i.e. payments for operating activities of the government in providing goods and services) as share of GDP was about 28.5% in 2019. The central government expenditure as a share of GDP was about 18% in Thailand and Malaysia and about 15% in Indonesia and India¹³⁹. Governmental agencies could apply sustainability standards to packaging and packaging of procured goods and services. The new procurement criteria (demand) would imply a shift towards a more sustainable production (an upstream benefit preceding the acquisition) as well as a greater focus on reduction, reuse, and recycling of packaging materials (put into practice downstream by consumers or users after the acquisition). The aspects of 'minimizing packaging', 'minimizing waste' and 'recycling' could also be factored in under an award criterion.

Examples:

- **Basque country, Spain**¹⁴⁰: GPP by Mutualia, which operates 17 social and medical service centres in the Basque country, was applied to address issues of plastic waste and reduce spending on bottled water. Mutualia decided to install water fountains connected to the public water network and offering tap water instead of buying bottled water. It published the GPP tender in two Lots: Tender Lot 1: Installation and commissioning of the water fountains (connected to the public water network), incl. maintenance, repair, or replacement in case of breakdown, supply of spare parts etc.; and Tender Lot 2: Delivery of refillable glass jars and bottles. Estimated savings were about €17,000/ a on water for patients, employees, and visitors. In total, savings accounted for 147,000 plastic cups, 4,000 big plastic water cooler bottles, and 7,000 small plastic bottles.
- **France**¹⁴¹: Ville de Venelles, where cleaning products for schools were purchased requesting details on packaging and waste reduction measures in the technical specifications. The Award criteria included the price (45%), technical merit (30%) and the environmental performance (20%, incl. environmental friendly packaging: refillable containers, paper packaging meeting eco-label criteria such as FSC, PEFC or equivalent), delivery time (5%).

Enabling factors / Important Insights:

- The basis for introducing measures in the relatively new topic of consumption reduction and reuse should be an announcement at the national level indicating the high priority of the government for promoting reusables within the framework of the Green Public Procurement. It will help in creating acceptance for reusable systems in the mass market.

¹³⁹ OWID (2021)

¹⁴⁰ EC (2019): GPP in Practice, From the tap: replacing single-use water containers with glass in the Basque Country, Spain, Issue no. 91, Available at: https://ec.europa.eu/environment/gpp/pdf/news_alert/Issue_91_Case_Study_173_Mutualia.pdf, Accessed: 31.03.2022

¹⁴¹ EC (2012).

GREEN PUBLIC PROCUREMENT (GPP)

- Implementing GPP requires a clear legal framework, to make sustainability considerations a mandatory part of public procurement.
- A national GPP policies should ideally be accompanied by or embedded in other national and international commitments such the Sustainable Development Goals (SDGs), a national Green Growth Trajectory or a GPP Roadmap and Strategy.
- At national and municipal level, a GPP legislation must be well integrated in or clearly replace the existing procurement policy, complement existing environmental laws such as a climate change mitigation policy and it must become an integral part of national development plans. At national levels, GPP should be linked to Key Performance Indicators (KPIs), targets and standards.
- At municipal level, GPP must be taken up into action plans or administrative laws e.g. procurement guidance documents.
- The legal basis of GPP must be regularly reviewed in order to remain valid and up to date.
- The roles and responsibilities of agencies involved in procurement must be clearly assigned and functional.
- Capacities need to be built in order to put the GPP theory (a legal requirement) into practice (improve the sustainability of procured goods and services).
- Life cycle thinking (life cycle assessments and life cycle costing) should be applied to different packaging options to set the right procurement criteria, possibly excluding materials or packaging types that are hard to reuse or to recycle and that are known to cause littering problems (e.g. Styrofoam food trays and boxes; single use coffee cups)
- Sustainability criteria for packaging must be specific, avoiding loopholes. For instance, design for recycling criteria should consider the local recycling capacities. A complementary criterion could be to avoid composite packaging materials, which are hard to recycle.
- An early market dialogue with potential producers is key to ensure sufficient responses to tenders including the new (more sustainable and stricter) procurement criteria.

Effective implementation:

Important overarching points to consider would be:

- Intensive market consultation is required to check the availability of market players to fulfill the potential tendering requirements
- Market consultation & communication also helps in raising the awareness of suppliers
- Flexibility is needed if not one service provider is able to fulfil all the requirements (e.g. publishing different lots for different requirements)
- Detail design requirements and environmental management measures should be described in the technical specifications
- Give higher priority to quality & environmental characteristics (award criteria)

GREEN PUBLIC PROCUREMENT (GPP)

During the procurement process, there are many entry points where GPP may be implemented:

- During the initial needs-assessment, it shall be established whether packaging is needed. If it is needed, the request for the most sustainable (reusable, recyclable) packaging option must be established. This is the stage, at which the specific market dialogue should latest be initiated in order to allow producers to prepare and adapt to the new minimum requirements and award criteria.
- When setting the procurement method and strategy, it will be decided whether packaging will be purchased or possibly rented and whether local businesses should be given a competitive advantage.
- When defining the procurement criteria, sustainability aspects shall be defined. In practice, environmental and financial are defined and weighted (e.g. price: 60%, environmental sustainability (reusability, recyclability): 40%). Certain packaging or material types may be excluded due to their negative environmental footprint and end-of-life challenges. Type I ecolabels may be taken as a reference for packaging options fulfilling basic environmental standards. In Germany, the ecolabel Blue Angel (Blauer Engel) is issued to well-performing returnable transportation packaging (DE-UZ 27)¹⁴², for returnable bottles and glasses¹⁴³ (DE-UZ 2) and for recycled packaging paper (DE-UZ 217a)¹⁴¹.
- During the solicitation of procurement documents, another round of market consultation is desirable.
- During the bid or proposal evaluation, sustainability criteria are considered and weighted against other important aspects. Whole life-cycle costs should be considered.
- During the contract period, compliance with the environmental standards should be verified.

Hindering factors /Drawbacks:

- Lack of local suppliers for reusable and recyclable packaging items. The entry point would be to select the best performing provider, setting ambitious yet realistic targets so that the local market has time to adjust. For businesses, an important incentive for investment is planning security. Market communication is key to enable business to respond to the government's demand for more sustainable products and services.
- The higher investment costs for more sustainable packaging might constitute a disincentive or even a conflict with the available procurement budget.
- Lack of knowledge by procurement staff, to be addressed with capacity building measures.
- Lack of understanding towards the urgency and potency of GPP as an economic measure to foster sustainable production and consumption, not only but also for packaging items.

¹⁴² Blauer Engel (2019)

¹⁴³ Blauer Engel (2021)

GREEN PUBLIC PROCUREMENT (GPP)

Further information:

- European Commission has published [good practice examples](#) for GPP since 2010
- GPP 2020 project published over [100 case studies](#)
- SPP Regions project published [40 tender models](#) of GPP
- Procura+ Network has [activity profiles](#) on each participant
- Sustainable Procurement Platform has a [database of case studies](#)
- Example for an e-catalogue in Thailand: <http://gp.pcd.go.th/cat-1-ssl>
- A tool for assessing both LCC and CO2 emissions in procurement, developed within the SMART-SPP project: <http://www.smart-spp.eu>;
- An LCC tool produced by the Swedish National Agency for Public Procurement: <https://www.upphandlingsmyndigheten.se/en/subject-areas/lcc-tools/>;
- LCC tool by the OnePlanet-Network: <https://www.oneplanetnetwork.org/initiative/life-cycle-cost-tool-lcc-tool>;
- Overview on LCC tools in the European Union: https://ec.europa.eu/regional_policy/sources/good_practices/GP_fiche_28.pdf

MEASURE 9

PLASTIC CREDITS

Definition:

Credits (reward system, compensation payments¹⁴³) for additional plastic waste collection, recovery and recycling efforts that may be sold e.g. to countries or companies, who would like to improve their recycling performance. The idea is similar to the market instrument of carbon credits. Carbon credits may be 'proprietary' or 'third-party' and are typically generated through micro, small or medium scale project operations¹⁴⁴. Other terminology used for plastic credits are Circular Credits, Social Plastic Collection Credits, Waste Collection Credits, Waste recycling Credits, Ocean Bound Plastic Credits (OBP Credits) or Neutralization Certificates¹⁴⁴. Note: Plastic Credits are a novel instrument. A first review¹⁴⁴ of 38 crediting schemes (status 2021) hold that plastic credits are seen as a measure to manage littered plastic waste but the plastic credit market is currently unregulated and thus unsuitable to reduce the overall packaging material in use if not aligned with EPR principles¹⁴⁵, see also drawbacks and hindering factors¹⁴⁴.

Pathway for reduction:

Plastic credits aim to reward improved waste collection, sorting and recycling¹⁴⁷ by linking formal and informal waste recovery and recycling projects (possibly world-wide) with performance-based investments¹⁴³. By improving collection and recycling, plastic credits reduce littering and ideally increase the quantity and quality of recyclates available¹⁴⁶, leading to a reduction in littered packaging waste.

Examples:

- **India and Vietnam**¹⁴³: A standard (ValuCred) is currently developed for the calculation, certification and validation of plastic credits. In Vietnam the TonToTon programm for 'orphan plastics' has kicked-off early 2021 on two island communities (Phu Quoc and Hon Son)¹⁴⁸: orphan plastic is collected, processed and used in the manufacturing of cement (i.e. downcycled). Companies may purchase plastic credits, so that the equivalent tonnage will be collected and recycled by TonToTon. Participating companies may label their products as 'Plastic Neutralized' in return.
- **Brazil and Mexico**: Performance-based payments for environmental services through a circular credit mechanism (CCM)¹⁴⁶ as part of the Circular Action Hub¹⁴⁹. The CCM is based on the Reverse Logistics Credits-scheme by BVRio which includes tradable credits for plastics, metal, glass and paper. In 2012, Brazil produced about 67 million tons of waste per year and only 1 % was recycled, while the value of annually wasted recyclable materials was estimated as more than USD 3 billion¹⁵⁰. Brazil also had more than 800,000 informal waste pickers¹⁴⁹. The Brazilian government introduced a new Solid Waste Legislation, making producers, importers, retailers and distributors responsible for the collection and disposal of the solid waste generated through their business activity. The obligation applies to packaging in general as well as to tyres, lubricating oils, batteries, pesticides, fluorescent lamps, electric and electronic products. Credits are now generated and sold by cooperatives of waste pickers and purchased by importers or producers who need to comply with the solid waste legislation of Brazil¹⁴⁹.

Considerations for Good Design:

- What quality standards shall be set for a plastic credit¹⁴³? The exact added-value and end-of-life measures (recycling? Incineration?) must be indicated to potential purchasers. Minimum social standards (safety, salary, age) for waste workers must be set for participation in the scheme.
- The mechanisms for implementing plastic credits must be transparent and inclusive (=including all or most actors in the local waste value chain)¹⁴³

¹⁴⁴ Wuppertal Institut - ÖI Interview 22 Jul 2021

¹⁴⁵ ValuCred (2021)

¹⁴⁶ PREVENT (2021a)

¹⁴⁷ CCM (2021)

¹⁴⁸ Forbes (2021)

¹⁴⁹ CAH (2021)

¹⁵⁰ CAH (2015)

PLASTIC CREDITS

- Plastic credit registries and trading platforms must be established¹⁵¹ There must be a real-time trading system¹⁵⁰ in place for carbon credits, indicating prices and qualities.
- Local recycling facilities may be boosted through the generated additional income¹⁵⁰. early communication with different stakeholder groups is key for a good design i.e. a design adapted to local circumstances and culture.
- Integrating informal waste pickers into the credit scheme is easier if they are organized in groups e.g. as associations or cooperatives like in Brazil¹⁵².
- Check the compatibility of plastic credits with the local EPR: do the overlap, conflict or compliment each other?¹⁵⁰
- Currently, global standards are being developed that assure and describe the quality of different plastic credits¹⁵³.
- Implement transparency and accountability mechanisms¹⁵⁴.
- Concerning the compatibility of plastic credits with other measures, representatives from organizations such as Rethinking Plastics¹⁵⁵, with extensive experience with EPR and plastic credits i.a. in Vietnam, hold that plastic credits must be designed to complement and must not compete with e.g. EPR systems – since plastic credits currently do not lead to a reduction of plastic packaging material in use. Plastic credits may serve as a complementary trading system where minimum quota (e.g. for recycle use) are established, so that better performing (environmental friendlier) companies may sell a part of their additional efforts to worse performing companies. In a system without a quota, where best performance is rewarded (e.g. with rebates) and least performance is taxed or charged, allowing trades will likely lead to a below-potential implementation of measures for waste prevention.

Effective implementation:

- Introducing plastic credits shall be accompanied by minimum standards for
 - The quality of recycling
 - The social conditions of workers involved in waste collection, sorting and processing
 - Community engagement in the design and implementation of waste management as well as transparency in revenues and participation in the scheme.
- Ideally, a third-party certification that clearly labels specific standards is introduced. For as long as no worldwide standard has emerged, it is the responsibility of every individual country or community to set and communicate these standards so that customers can chose well-performing, well-designed and beneficial projects rather than just comparing the price.

¹⁵¹ Wuppertal Institut - ÖI Interview 22 Jul 2021

¹⁵² CAH (2015)

¹⁵³ Roehling Stiftung - ÖI interview 22 Jul 2021

¹⁵⁴ UNEP (2020)

¹⁵⁵ Zero Waste Europe- ÖI Interview 30 Jul 2021

PLASTIC CREDITS

- Besides the new business model and the logistics, think about the social transition¹⁵⁶: what information or training does the implementing community need? What happens to existing community initiatives and maybe business models around waste? What if all local waste is collected? Could the revenues flow into a community fund that finances new and alternative businesses to employ community members?
- Collecting and communicating standardized data on plastic (packaging) litter is a prerequisite to claim additional efforts and cash these in through plastic credits. Ideally, the amounts should be verified by an independent authority.

Hindering factors/ Drawbacks:

- The price per tonne (to acquire a plastic credit) varies between locations and suppliers, which is likely associated to the quality and type of and difficulty in collection, recycling or disposal. However, these details are often not visible to the buyer¹⁵⁷. It also raises the question: how close by should a credit be acquirable for a company that needs to compensate its business-activities? If cheaper credits can be bought elsewhere, the own local recyclers may be short of funding for their activities.
- In open global markets there is a risk that waste is shipped to locations where recycling is cheapest, so that plastic credits may be generated in one part of the world and 'spent' in another part of the world (like carbon credits).
- Just like for carbon credits, loopholes like double accounting must be avoided.
- While CO₂ equivalents are a distinct 'currency', there is no equivalent unit for polymers, which makes it more complex to implement¹⁵⁶.
- The term "plastic neutrality" is misleading, since it suggests that rather than a waste reduction, we need an increase of collection. As a matter of fact, we need to reduce the total amounts of packaging waste produced, optimize packaging materials to have the lowest possible environmental footprint and optimize recycling processes to keep material in the loop.
- As of June 2021, accredited certification services were not yet available for Plastic Credit Programs¹⁵⁸. However, Verra is developing a standard to plastic waste collection and recycling activities under ISO 17029 and ISO 14065:2020¹⁵⁷.
- Plastic credit programs may be compliant (self-proclaimed title) or certified (independent third-party assures compliance)¹⁵⁷. Terminology currently not correctly applies in the Plastic Credit market, thus leading to confusion.
- Credit schemes are currently typically set up and owned by foreigners rather than local communities. Fair working conditions including a fair remuneration, the provision of personal protective equipment, the prohibition of child labour should be a minimum standard for participation in a credit scheme.

¹⁵⁶ Zero Waste Europe- ÖI Interview 30 Jul 2021.

¹⁵⁷ Roehling Stiftung - ÖI interview 22 Jul 2021

¹⁵⁸ ValuCred (2021)

PLASTIC CREDITS

Further information:

Consider: Just as Carbon Markets gave rise to the climate justice movement, plastic credits are likely to raise questions on equality and fairness concerning plastic pollution since good recycling is labour intensive and actors along the value chain need to be adequately compensated¹⁵⁹.

Trade system for recyclates-shares under a minimum quota for recyclates can be referred to for lessons learnt¹⁶⁰

¹⁵⁹ ValuCred (2021)

¹⁶⁰ Wuppertal Institut - ÖI Interview 22 Jul 202

Conclusions

Economic measures for packaging waste reduction build an important pillar for triggering a transformation towards a sustainable packaging economy. However, they need to be embedded within a bundle of policy instruments in order to be effective. Several complementary mechanisms must be in place to increase the impact of economic measures. Few examples include:

- bans for worst environmental performers (e.g. certain single-use packaging types)
- mandatory national level targets (e.g. minimum share of reusables in retail)
- mandatory product-specific requirements (e.g. minimum share of recycled content in certain packaging types)
- mandatory sectoral requirements (e.g. take back obligations for retail)
- mandatory product-specific standards and guidelines (e.g. for eliminating hazardous substances and recycling incompatibilities from packaging)
- financial support programs (e.g. for reverse logistics for reusables and collection, sorting & recycling infrastructure)

Thus, as a matter of fact, economic measures can be perceived as facilitators for innovations in the packaging sector. They set incentives for companies to go beyond minimum mandatory requirements, gain competitive advantages and save costs, for instance, by paying less levies & taxes.

The effect of economic measures can be limited if they are applied as individual, stand-alone measures or in absence of minimum requirements and necessary supporting infrastructure, for instance, for waste collection, segregation, sorting, and recycling. The limited effect of the economic measures in reducing the overall packaging waste, may have several reasons, for instance:

- Lack of experience in designing the instrument (e.g. a packaging levy with a low steering effect),
- Lack of a harmonized policy approach (e.g. focusing only on downstream waste management),

- Lack of societal support for the measure (e.g. introduction of a tax or levy without proper public consultation and awareness raising),
- High complexity of the measure (e.g. unclarity over whom to tax, amount of tax, high administrative burden),
- Lack of holistic knowledge on the interrelation of several economic measures (e.g. availability of recyclates in sufficient quantity and quality depend upon clean domestic waste streams through segregation, sorting and recycling facilities).

It is noteworthy mentioning that economic measures, such as taxes, levies, fees etc. are sensitive and contentious subjects and require acceptance and a common understanding in the society. Economic measures targeting packaging waste reduction are bound to create winners (e.g. reuse businesses, manufacturers of recyclates) & losers (e.g. manufacturers of virgin resin, operators of solid waste incinerators and landfills). Thus, an open and transparent debate on the potential impact of waste reduction policies is required as well as a long-term planning for the transformation. Effective economic instruments are tailored to their social and economic context¹⁶¹ and socio-economic effects need to be analyzed before introduction of a measure.¹⁶⁰

Overall, economic measures must set financial (dis)incentives that are high enough to influence producers and consumers to:

- reduce and minimize packaging waste,
- to encourage and practice reuse,
- to use or buy end products with a high share of recycled content, and
- actively contribute to high recycling rates, e.g. by waste segregation and participating in EPR schemes.

Thus, the “polluter pays” principle should be at the basis of any economic instrument¹⁶². Most commonly, the polluters are defined as those economic operators that bring products or packaging onto a national market. Letting producers (and thereby also the consumers) pay a differentiated price based on the actual environmental impact of their packaging waste creates a good feedback mechanism,

¹⁶¹ Zero Waste Europe (2018)

¹⁶² Recycling Netwerk Benelux (2021)

encouraging a reduction in packaging waste. This could happen through different tools such as a tax or a fee for single use packaging items, Pay-As-You-Throw or through Extended Producer Responsibility schemes.

On the other hand, taxes or fees that are too high may lead to circumvention and in worst cases to unintended side-effects, such as environmental littering in order to avoid costs¹⁶³. A good design and accompanying awareness raising measures determine the success of a measure. A good design would also involve defining predictable rate increases¹⁶⁴ (progressive introduction) for market players to gradually transition into a packaging reduction and towards preferable packaging options that may be reused and/or recycled as many times as possible. The revenues of an economic measure should be earmarked for specific environmental purposes such as upgrading the infrastructure for reuse logistics, waste segregation, collection, and high-quality re-cycling¹⁶⁴.

¹⁶³ For instance, in cases of weak enforcement, underdeveloped institutional arrangements for implementing penalties and sanctions and unregulated shipment or exports, companies and municipalities may tend to reduce the total weight of the waste generated by either diverting it (illegally) to open environment or transporting it to other destinations. This may happen to avoid paying high costs incurred through incineration and landfill taxes, or within the Pay-As-You-Throw schemes.

¹⁶⁴ Zero Waste Europe (2018)

Öko-Institut e.V

Freiburg | Darmstadt | Berlin

The Oeko-Institut is one of Europe's leading independent research and consultancy organisations working for a sustainable future. Since its establishment in 1977, it has been laying the ground-work and devising strategies to realise the vision of sustainable development at global, national and local level. The Oeko-Institut has offices in Freiburg, Darmstadt and Berlin.

www.oeko.de | info@oeko.de

Contact

Siddharth Prakash
+49 761-45295-244
s.prakash@oeko.de

References

- Be Waste Wise (2016):** Economic Instruments and Packaging Consumption, Global Dialogue on Waste. Global Dialogue on Waste. Be Waste Wise. Wales, England, 2016. Online available at <https://www.youtube.com/watch?v=yzPclv11gNk>, last accessed on 14.15.2021.
- Berck, P.; Moe-Lange, J.; Berti Villas-Boas, S.; Stevens, A. (2016):** Measuring Consumer Responses to a Bottled Water Tax Policy. In: American Journal of Agricultural Economics (98), pp. 981–996. Online available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3575997, last accessed on 27 Sep 2021.
- Blauer Engel (2019):** Transportation Packagings. Online available at <https://www.blauer-engel.de/en/products/business-municipality/returnable-transportation-packagings/transportation-packagings>, last accessed on 28 Sep 2021.
- Blauer Engel (2021):** Blauer Engel für Verpackungen. Blauer Engel (ed.). Online available at <https://www.blauer-engel.de/en/s/packaging>, last accessed on 28 Sep 2021.
- CAH (2015):** BVRio Reserve Logistics Credit System in Brazil. CAH (ed.). Online available at <https://www.circularactionhub.org/reverse-logistics-waste-brazil>, last accessed on 27 Jul 2021.
- CAH (2021):** Circular Action Hub Website. CAH (ed.). Online available at <https://www.circularactionhub.org/>, last accessed on 27 Jul 2021.
- CCM (2021):** Performance-based payments for circular services. CCM (ed.). Online available at <https://www.circularcredits.org/>, last accessed on 27 Jul 2021.
- Deloitte (2017):** Extended Producer Responsibility and competition, An analysis of the consistency of organisational frameworks for collective schemes for packaging recovery, 2017.
- Dikgang, J.; Leiman, A.; Visser, M. (2012):** Elasticity of demand, price and time: lessons from South Africa's plastic-bag levy. In: Applied Economics 44 (26), pp. 3339–3342. DOI: 10.1080/00036846.2011.572859.
- EC (2012):** Green Public Procurement, A collection of good practices. European Commission (ed.), 2012. Online available at https://ec.europa.eu/environment/gpp/pdf/GPP_Good_Practices_Brochure.pdf, last accessed on 28 Sep 2021.
- EC (2019):** GPP Training Toolkit (2019), European Commission. Online available at https://ec.europa.eu/environment/gpp/toolkit_en.htm, last accessed on 28 Sep 2021.
- Ecologic (2021):** Extended Producer Responsibility and Ecomodulation of Fees. Ecologic (ed.), 2021. Online available at <https://rethinkplasticalliance.eu/wp-content/uploads/2021/08/Ecologic-report-EPR-and-ecomodulation-August2021-1.pdf>, last accessed on 2 Sep 2021.
- EPA USA (2016):** Pay-As-You-Throw, EPA USA. Online available at <https://archive.epa.gov/wastes/conserve/tools/payt/web/html/index.html>, last accessed on 27 Jul 2021.
- European Commission (2021):** Plastic own resource. EC (ed.). Online available at https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/revenue/own-resources/plastic-own-resource_en, last updated on 2021, last accessed on 7 Jun 2021.
- European Environmental Bureau - Öl Interview (22 Jul 2021):** Economic instruments for packaging waste reduction. Interview with Piotr Barczak. Freiburg. MS Teams.
- Forbes (2021):** Innovative Program To Rescue Tons Of 'Orphan Plastics' Along Vietnam's Coastline. In collaboration with Brett Davis, Forbes. Online available at <https://www.forbes.com/sites/davisbrett/2021/06/10/innovative-program-to-rescue-tons-of-orphan-plastics-along-vietnams-coastline/?sh=71ea44ed472e>, last accessed on 21 Sep 2021.
- Government of Scotland. (2020):** Securing a green recovery on a path to net zero: climate change plan 2018–2032 - update, Energy and Climate Change Directorate. Online available at <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/>, last updated on 27 Sep 2021, last accessed on 27 Sep 2021.
- Green Dot - Öl Interview (29 Jul 2021):** Ökonomische Instrumente zur Plastikabfallreduzierung. Interview with Ursula Denison. Freiburg. MS Teams.
- IEEP (2016):** Landfill Tax, Incineration Tax and Landfill Ban in Austria. Institute for European Environmental Policy (ed.), 2016. Online available at <https://ieep.eu/uploads/articles/attachments/5b-cba177-793e-4ed5-acbb-ffe8e0dc238f/AT%20Landfill%20Tax%20final.pdf?v=63680923242>, last accessed on 4 Sep 2021.

Innotec (2021): Website Innotec. Online available at <https://www.innotec-abfallmanagement.de/>, last updated on 19 Nov 2021.

interreg Europe (2021): PAYT (Pay As You Throw) to reach 80% recycling. interreg Europe (ed.). Online available at <https://www.interregeurope.eu/policylearning/good-practices/item/4331/payt-pay-as-you-throw-to-reach-80-recycling/>, last accessed on 28 Sep 2021.

irish environment (2015): Plastic Bag Levy. Online available at <http://www.irishenvironment.com/iepedia/plastic-bag-levy/>, last accessed on 27 Sep 2021.

Knecht, A.; Catterfeld, P. (2015): Flaschensammeln, Überleben in der Stadt, Alpen-Adria-Universität Klagenfurt. Online available at https://www.researchgate.net/publication/323540127_Flaschensammeln_-_Eine_Einfuehrung, last accessed on 2 Jun 2021.

NATUR-PACK (2021): Extended Producer Responsibility – Packaging and Packaging Waste in Slovakia. Bratislava, Slovakia, 2021. Online available at <https://www.oecd.org/environment/waste/Slovakia%20final.pdf>, last accessed on 14 May 2021.

OECD (1993): Applying Economic Instruments to Packaging Waste: Practical Issues for product charges and deposit-refund systems. OECD. Paris, 1993. Online available at [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=OCDE/GD\(93\)194&docLanguage=En](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=OCDE/GD(93)194&docLanguage=En), last accessed on 11 May 2021.

OECD (2007): Instrument mixes for environmental policy. OECD. Paris: OECD. Online available at <http://site.ebrary.com/lib/alltitles/docDetail.action?docID=10245385>.

OECD (2019): Extended Producer Responsibility. Online available at <https://www.oecd.org/environment/extended-producer-responsibility.htm>, last updated on 14 May 2021.

OECD (2020): Policy Instruments for the Environment (PINE) Database. OECD (ed.). Online available at <https://pinedatabase.oecd.org/>, last accessed on 27 Sep 2021.

Öko Institut internal - ÖI Interview (13 Apr 2021): EPR. Interview with Günter Dehoust. Freiburg.

OWID (2021): Government Spending. Our World In Data (ed.). Online available at <https://ourworldindata.org/government-spending>, last accessed on 28 Sep 2021.

PIK (2021): Umweltsteuern könnten hunderte Milliarden Euro mobilisieren - und damit Haushalte an anderer Stelle entlasten. In collaboration with PresseBox. Online available at <https://www.pressebox.de/inaktiv/potsdam-institut-fuer-klimafolgenforschung-ev/Umweltsteuern-koennten-hunderte-Milliarden-Euro-mobilisieren-und-damit-Haushalte-an-anderer-Stelle-entlasten/boxid/1061545>, last accessed on 1 Jun 2021.

PREVENT (2020): EPR Toolbox: The origin of Germany's EPR system for packaging. Bonn, Germany, 2020. Online available at <https://prevent-waste.net/wp-content/uploads/2020/09/Germany.pdf>, last accessed on 25 May 2021.

PREVENT (2021a): EPR+: Mandatory and voluntary mechanisms for financing the circular economy for plastics and packaging. Hosted by: PREVENT, 21 Sep 2021. Online available at <https://prevent-waste.net/en/event-epr-plus-financing-the-circular-economy-20210921/>, last accessed on 21 Sep 2021.

PREVENT (2021b): Plastic Credits, For inclusive and transparent circularity. Online available at <https://prevent-waste.net/en/pilotprojects/plastic-credits/>, last accessed on 27 Jul 2021.

Recycling magazine (8 Aug 2020): Press release: Mixed market reaction to EU €800/tonne plastics charge, Trends, Analyses, Opinions and Facts for the Recycling Industry: Recycling magazine. Contact: Mark Victory. Online available at <https://www.recycling-magazine.com/2020/08/08/mixed-market-reaction-to-eu-e800-tonne-plastics-charge/>, last accessed on 27 Jul 2021.

Recycling Network Benelux (2021): The Polluter Pays: How to implement the EU contribution to create incentives for the plastic transition. Recycling Network Benelux, 2021.

Roechling Stiftung - ÖI interview (22 Jul 2021): Ökonomische Instrumente zur Plastikabfallreduzierung. Interview with Uwe Amrhein. Freiburg. MS Teams.

Sahlin, J.; Ekvall, T.; Bisaillon, M.; Sundberg, J. (2007): Introduction of a waste incineration tax: Effects on the Swedish waste flows. In: Resources, Conservation and Recycling 51 (4), pp. 827–846. DOI: 10.1016/j.resconrec.2007.01.002.

Stiftung Zentrale Stelle Verpackungsregister (2021): Webseite der Zentralen Stelle Verpackungsregister. Online available at <https://www.verpackungsregister.org/>, last accessed on 28 Sep 2021.

The Government of the UK (2021): Introduction of Plastic Packaging Tax from April 2022, Updated 20 July 2021. The Government of the UK. London, 2021. Online available at <https://www.gov.uk/government/publications/introduction-of-plastic-packaging-tax-from-april-2022/introduction-of-plastic-packaging-tax-2021>, last accessed on 27 Jul 2021.

Tomas Ekvall; Jan-Olov Sundqvist; Kristian Hemström & Carl Jensen (2014): Stakeholder analysis of incineration tax, raw material tax, and weight-based waste fee. SERI, 2014. Online available at <https://www.ivl.se/download/18.343dc-99d14e8bb0f58b7721/1445517852690/C74.pdf>, last accessed on 6 Sep 2021.

UBA (2014): Entwicklung von Instrumenten und Maßnahmen zur Steigerung des Einsatzes von Sekundärrohstoffen – mit Schwerpunkt Sekundärkunststoffe. Online available at https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/texte_65_2016_steigerung_einsatz_sekundaerrohstoffe.pdf, last accessed on 28 Sep 2021.

UBA (2016): Entwicklung von Instrumenten und Maßnahmen zur Steigerung des Einsatzes von Sekundärrohstoffen – mit Schwerpunkt Sekundärkunststoffe. UBA. UBA (ed.). Dessau-Roßlau, 2016. Online available at https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/texte_65_2016_steigerung_einsatz_sekundaerrohstoffe.pdf, last accessed on 7 Jun 2021.

UK Government (1996): The Landfill Tax Regulations 1996. Online available at <https://www.legislation.gov.uk/ukxi/1996/1527/contents/made>, last accessed on 6 Sep 2021.

UNEP (2020): Tackling plastic pollution: legislative guide for the regulation of single-use plastic products. UNEP (ed.). Nairobi, Kenya, 2020. Online available at <https://www.unep.org/resources/toolkits-manuals-and-guides/tackling-plastic-pollution-legislative-guide-regulation>, last accessed on 27 Jul 2021.

ValuCred (2021): Plastic Credits – Friend or Foe?, Retrospective of recent market dynamics 2021. Online available at <https://yunusenvironmenthub.com/wp-content/uploads/2021/09/Plastic-Credits-%E2%80%93-Friend-or-Foe.pdf>, last accessed on 21 Sep 2021.

Werner & Mertz – Öl interview (7 Sep 2021): Ökonomische Instrumente zur Plastikabfallreduzierung. Interview with Timothy Glaz. Freiburg. MS Teams.

Wider Sense (2020): Polyproblem report, Warum der Markt für recycelten Kunststoff nicht rund läuft... und wie sich das ändern könnte. Wider Sense (ed.), 2020. Online available at <https://widersense.org/content/uploads/2020/12/polyproblem-report-2-wertsachen.pdf?x74604>, last accessed on 12 Apr 2021.

World Economic Forum & Ellen Macarthur Foundation (2016): The New Plastics Economy, Rethinking the future of plastics. World Economic Forum & Ellen Macarthur Foundation, 2016.

Wuppertal Institut – Öl Interview (22 Jul 2021): Ökonomische Instrumente zur Plastikabfallreduzierung. Interview with Henning Wilts. Freiburg. MS Teams.

WWF (2021): Incineration Tax., Plastic Smart Cities. WWF (ed.). Online available at <https://plastic-smartcities.org/products/incineration-tax>, last accessed on 4 Sep 2021.

WWF-Malaysia (2020): Study on EPR Scheme Assessment for Packaging Waste in Malaysia (1. edition). WWF. WWF (ed.). Selangor, Malaysia, 2020. Online available at https://www.wwf.org.my/media_and_information/media_centre/?28105/WWF-Releases-Report-Proposing-Effective-Solution-to-Mitigate-Plastic-Pollution-in-Malaysia.

Yamakawa, H. (2013): The Packaging Recycling Act: The Application of EPR to Packaging Policies in Japan. Kyoto Prefectural University. Kyoto, Japan, 2013. Online available at https://www.oecd.org/environment/waste/EPR_Japan_packagingFinal%20corrected0502.pdf, last accessed on 14 May 2021.

Zero Waste Europe (2017): Extended Producer Responsibility - Creating the Frame for Circular Products. In collaboration with Levi Alvares, D. and Ferran, R., 2017. Online available at <https://zerowasteurope.eu/wp-content/uploads/edd/2017/12/ZWE-EPR-policypaper.pdf>, last accessed on 30 Jul 2021.

Zero Waste Europe (2018): Research Paper on a European tax on plastics, 2018. Online available at <https://zerowasteurope.eu/wp-content/uploads/2018/11/ZWE-Position-paper-Plastic-tax-in-Europe.pdf>, last accessed on 23 Jul 2021.

Zero Waste Europe – Öl Interview (30 Jul 2021): Economic instruments for packaging waste reduction. Interview with Delphine Levi Alvares. Freiburg. MS Teams.



Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn

Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de