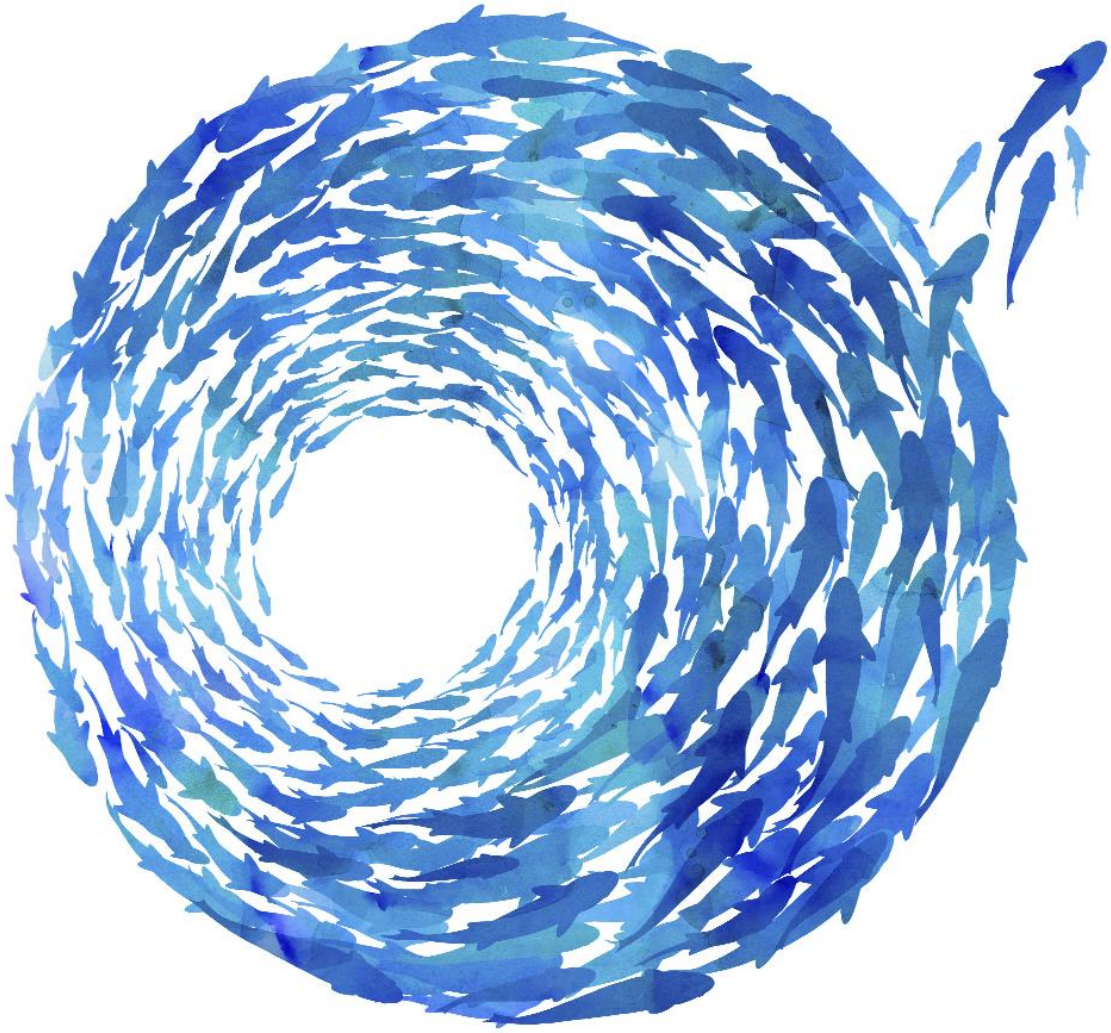
Deloitte.



Reducing Plastic Pollution and Creating a True Circular Economy for Plastics through Extended Producer Responsibility

Analysis of the status and potential of EPR for plastics in Norway for WWF

May 2020

Executive Summary

Extended Producer Responsibility (EPR) is a potentially efficient and powerful measure to achieve a circular economy for plastics. EPR builds on the principle of polluter-pays, by shifting the responsibility for the treatment of waste upstream to the producer. Well-designed EPR schemes can reduce the burden on public budgets and incentivize effective end-of-life collection and treatment. In addition, EPR may provide producers with increased incentives to design durable and recyclable products, which in turn can contribute to reducing pollution. Countries that have implemented EPR policies have generally achieved higher collection and recycling rates than other countries.

This study starts with an overview of the current organization and performance of EPR schemes for plastic packaging in Norway in Chapter 2, followed by details of the current legal framework for these EPR schemes in Chapter 3. Chapter 4 provides an overview of EPR schemes for plastic packaging in comparable countries to Norway, highlighting advantages and weaknesses of the different models.

Chapter 5 assesses the efficiency of the current legal framework for EPR for plastic packaging and identifies the barriers that hinder the transition to a true circular economy. Necessary changes to the legal framework are described in Chapter 6, while other measures that could accelerate the creation of a true circular value chain for plastics and prevent plastic pollution are presented in Chapter 7.

Key findings

This study has identified the following weaknesses with the current legal framework for EPR for plastics in Norway:

- **Limited reporting obligations and monitoring lead to incomplete data on plastic packaging waste.** There is currently no complete overview over the total amount of plastic packaging put on the market in Norway, which creates uncertainty over the actual amount that is recycled. Analyses of the content of waste generated by Norwegian households have shown that the amount of plastic packaging waste reported by the PROs was significantly lower.
- **Few incentives for recycling of plastic waste that is not covered under the EPR scheme.** Although Norway has established EPR schemes, they only cover plastic products defined as packaging. For plastic types not covered by the current EPR scheme, PROs do not receive payment for recycling and waste treatment. Therefore, they have few incentives to collect and recycle this additional plastic waste, and it will most likely be incinerated. Another consequence of the narrow scoping of the EPR scheme is the generation of a "surplus" of plastic waste compared to what the members of PROs put onto market. This means that the PROs can be more selective in the plastic waste fractions they collect, with incentives to focus on those which are most cost-efficient to process.
- **Limited incentives for creating a circular value chain for plastic packaging through the current legal framework for EPR.** The current legal framework for EPR provides the actors with few financial incentives to reduce the total amount of waste, stimulate reuse systems, reduce climate change gas emissions, and increase the value of plastic. There is no requirement in the current legislation for the PROs to modulate the fees according to eco-design. This poses the risk that the PROs "average out" the costs, which gives the individual producer few economic incentives for designing durable, reparable, re-usable and recyclable products.
- **Unclear definition of the producer that is subject to the EPR provisions.** Under current legislation, the term "producer" allows for several interpretations. Since it is the "producer" that is subject to ERP provisions, this imprecise definition may create loopholes for companies deliberately seeking to "free ride", or increase the risk that companies interpret the legislation differently.
- **Limited cost coverage and cost transparency.** In Norway, local municipalities are free to choose their own waste collection system. However, the PROs do not cover the full collection and sorting costs for those that have invested in expensive infrastructure, such as mixed waste sorting plants. There is currently low transparency regarding the cost-efficiency of the different collection systems for plastic packaging, which makes it unclear what the actual collection and sorting costs are. It also provides the municipalities with fewer incentives to increase the cost-efficiency of their waste management systems.
- **The producer does not hold responsibility for the clean-up of littering.** Under the current legal framework, there is no provision giving the producer an operational or financial responsibility for cleaning up the litter generated by their products. This provides the producers with few incentives to make efforts to prevent and reduce plastic littering.

- **The PROs have limited obligations to ensure collection of all plastic waste streams.** This creates a risk that the PROs may underbid each other to attract members, while competing on collecting and recycling the plastic waste streams with the highest market value. Such a scenario may counteract the goal of achieving a true circular economy for plastics, as certain plastic waste streams leave the value chain without any steps taken to ensure the treatment and recycling of these products.

Recommendations

Changes to legal framework

To address the challenges above and achieve a circular value chain for plastics, whilst also eliminating littering, the following changes to the Norwegian legal framework have been identified as necessary:

- Strengthening the reporting requirements for the producers and PROs to ensure control over the amount of plastic packaging put on to market and recycled
- The legal framework for EPR should be extended to include all products containing plastic put on the market
- Clear definition of the actors that are subject to the EPR regulations. The legal framework should ensure that the producers with the most influence on product design are held responsible for the products they put on the market
- Introduction of requirements for modulating fees according to the true lifecycle costs
- Ensuring that the EPR schemes cover the full costs related to collection, transport, sorting and recycling
- Ensuring that the EPR schemes cover of the costs of plastic littering
- Introduction of regulations that incentivize closed loops for different plastic waste streams.

Today, EPR for plastic packaging is regulated by the Norwegian Waste Regulations. These are currently being revised following recent amendments to the EU Waste Framework Directive, and the EU Packaging and Packaging Waste Directive. Proposed changes include adoption of new EU targets for recycling of plastic packaging waste, as well as new criteria related to the measurement of recycled packaging waste. Both changes increase producer obligations further than today. In addition, the Norwegian Environment Agency has proposed the establishment of a packaging registry. Depending on the design, the new registry may support better control and oversight over the volumes of packaging producers put on the market and increasing transparency so that producers adequately comply with their obligations under EPR. While a key step forward, these proposed changes will not address all the weaknesses in the current framework and are only considered as a prerequisite to achieving the goal of a true circular economy for plastics and stop plastic pollution.

Other measures

While changes in the legal framework for EPR are necessary to increase the circularity of plastics, other measures including taxes, fees and other financial instruments, may be necessary to accelerate the creation of a true circular value chain for plastics and end littering from plastics. However, to not undermine the efforts under the current EPR scheme and legislation, it is important that any alternative mechanisms act as complementary measures or extend EPR. Selected alternative measures are listed below:

- Fees or environmental tax on the usage of virgin plastic material
- Price subsidies to increase the usage of recycled plastic material
- Application of environmental criteria in public procurement of plastic products
- Certification schemes for plastic products
- Standardization of product design
- Innovation and optimization of product design
- Deposit return schemes on additional plastic waste streams
- Incentivize commerce and industry to reduce the amount of plastic waste and ensure reuse and proper sorting
- Incentivize investments in mixed waste sorting plants
- Develop a national plan for sorting and recycling of plastic waste in Norway
- Digital marking and tracking of plastic products

Sharing Norwegian practices globally

The study also identifies features of the current EPR scheme in Norway that are deemed efficient in creating a circular value chain for plastic. There is both a potential for extending these measures in Norway and for exporting these measures to other countries:

- Plastic beverage bottles are covered by a different set of regulations than other plastic packaging waste. While these regulations do not set specific recycling targets for plastic beverage bottles, the combination of an environmental fee and a separate deposit return system provides efficient incentives for the collection and recycling of plastic beverage bottles. The performance of the deposit return scheme outperforms the EPR schemes for other plastic packaging streams. The quality of the recycled PET from beverage bottles is also higher than for other waste streams.
- Mixed waste sorting plants have a significantly higher recycling output than collection systems that rely solely on citizens to separate and sort of plastic packaging waste. Mixed waste sorting plants receive and may sort all plastic packaging that is technically feasible, while a large share of plastic packaging that is not sorted separately in other systems is incinerated. In addition, innovation related to digital marking increases the potential of the performance of the mixed waste sorting plants. The export of best practices from Norway related to mixed waste sorting plants may contribute to the global effort of achieving a circular economy for plastics.

The establishment of a new legally binding international agreement to combat plastic pollution is currently being considered in international forums. The Norwegian Government has committed to work for the establishment of such an agreement in a Nordic Ministerial declaration from 2019, and as a voluntary commitment to the Our Ocean Conference. The revision of the current legislation provides an opportunity to design best practice national regulations. These can serve as a base model for guidelines and minimum standards on EPR that could be included in an international agreement.

Sammendrag

Produsentansvar er potensielt et svært effektivt virkemiddel for å oppnå en sirkulær verdikjede for plast. Produsentansvarsordninger bygger på prinsippet om at forurenser betaler, ved at kostnadene knyttet til håndtering av plastavfallet som genereres flyttes fra offentlig sektor til produsentene selv. I tillegg til å redusere den økonomiske byrden for norske kommuner og renovasjonsavgiften som innbyggerne betaler, kan produsentansvarsordningen bidra både til å sikre bedre avfallshåndtering og incentivere produsentene til å utforme varige og gjenvinnbare produkter som til gjengjeld er enklere og rimeligere å håndtere og gjenvinne. Land som har implementert produsentansvarsordninger oppnår generelt en høyere innsamlings- og gjenvinningsgrad enn andre land.

I Norge er det etablert en produsentansvarsordning for emballasje, som også dekker plastemballasje. Plastprodukter som ikke defineres som emballasje er ikke omfattet av produsentansvar. Denne rapporten gir først et overblikk over organiseringen av produsentansvarsordningen for plastemballasje i Norge og i hvilken grad dagens produsentansvarsordning bidrar til å øke gjenvinningen av plastemballasje (kapittel 2). Kapittel 3 gir en oversikt over det juridiske rammeverket som i dag regulerer produsentansvarsordningen for plastemballasje, samt relevant EU-lovgivning som det forventes at til dels vil måtte gjennomføres ved forskriftsendringer. Kapittel 4 gir en oversikt over produsentansvarsordningene for plastemballasje i andre land, der fordeler og ulemper ved ulike former for organisering av produsentansvar trekkes frem.

Det juridiske rammeverket for produsentansvarsordningen er vurdert i kapittel 5, med henblikk på i hvilken grad dette rammeverket legger til rette for å skape en sirkulær verdikjede for plast og forhindre plastforsøpling. I kapittel 6 er det vurdert hvilke regulatoriske endringer som er nødvendige for å skape en sirkulær verdikjede for all plast. I kapittel 7 vurderes andre virkemidler som kan være egnet for å oppnå en sirkulær verdikjede for plast og forhindre plastforsøpling.

Funn og vurderinger

Rapporten identifiserer følgende svakheter i det juridiske rammeverket som regulerer dagens produsentansvarsordning knyttet til plast i Norge:

- **Begrensede krav til rapportering og tilsyn medfører at det ikke finnes en fullstendig oversikt over plastemballasje som settes på markedet.** Det er per i dag ingen fullstendig oversikt over det totale volumet plastemballasje som settes på det norske markedet, noe som bidrar til usikkerhet rundt den faktiske andelen som materialgjenvinnes. Volumet som returselskapene rapporterer for sine medlemmer er lavere enn det totale volumet plastemballasje som blir kastet hvert år ifølge plukkanalyser.
- **Produsentene har i dag få økonomiske incentiver til å sikre at plastprodukter som ikke er omfattet av produsentansvarsordningen blir materialgjenvunnet.** Plastavfall som faller utenfor produsentansvarsordningen går som regel til forbrenning, og forlater dermed verdikjeden. En annen konsekvens av at en rekke plastprodukter ikke omfattes av produsentansvarsordningen, er at returselskapene har større frihet til å velge hvilke plaststrømmer de samler inn og sender til materialgjenvinning, ettersom det dannes et overskudd av plastavfall sammenlignet med hva returselskapene er pliktige til å samle inn.
- **Dagens regelverk gir i liten grad incentiver for å skape en sirkulær verdikjede for plast.** Produsentene som er omfattet av produsentansvarsordningen incentiveres per i dag i liten grad til å redusere bruken av plast, stimulere til ombruk, redusere klimaavtrykket for sine produkter eller til å øke verdien på plasten som gjenvinnes. I dag stilles det ikke krav til at returselskapene må differensiere vederlaget medlemmene betaler i henhold til produktenes livssykluskostnader. Dette medfører en risiko for at returselskapene fordeler kostnadene likt mellom produsentene, og fratar den individuelle produsent incentiver til å utforme produktene med tanke på varighet, mulighet for ombruk og reparasjon eller gjenvinnbarhet.
- **Uklar definisjon av hvilke aktører som regnes som produsenter.** Dagens regelverk åpner for ulike tolkninger av hvilke aktører som defineres som produsenter og som dermed er omfattet av kravet om å tilslutte seg et returselskap. Uklarhet rundt hvilke aktører som klassifiseres som en produsent gjør det enklere for produsenter å omgå kravene, enten bevisst eller utilsiktet.
- **Begrenset kostnadsdekning og innsyn i kommunenes kostnader for innsamling og håndtering av plastemballasje.** Returselskapenes godtgjørelse for innsamling av plastemballasje til kommuner dekker ikke de reelle kostnadene for kommuner som har investert i dyre innsamlingsløsninger eller sentralsorteringsanlegg.

Kommuner med sentralsorteringsanlegg kompenseres heller ikke for at de i tillegg til innsamling av plastavfall fra innbyggerne også sørger for utsortering av rene plastfraksjoner. Per i dag er det begrenset med offentlig tilgjengelig informasjon over hvilke kostnader de ulike kommunene og interkommunale avfallsselskapene har knyttet til innsamling av plastemballasje, og hvilke innsamlingsordninger som er mest kostnadseffektive. Dette gjør at det ikke er klart definert hva som er de reelle kostnadene for innsamling og sortering i Norge. Ettersom kommunene ikke måles etter innsamlingsgrad og kostnadseffektivitet, incentiveres de per i dag i liten grad til å utbedre innsamlingssystemene for å øke innsamlingsgraden.

- **Produsentene holdes ikke til ansvar for opprydning av plastavfall på avveie.** Produsentene holdes i henhold til dagens regelverk ikke ansvarlige for opprydning av produkter de setter ut på markedet som havner på avveie, og incentiveres dermed i liten grad til å jobbe for å redusere forsøpling.
- **Det stilles ikke tilstrekkelige krav til returselskapene for å sikre innsamling av de ulike plaststrømmene.** Det stilles begrensede krav til hvilke plaststrømmer returselskapene har plikt til å samle inn. En risiko ved dette er at returselskapene i en konkurransesituasjon underbyr hverandre for å tiltrekke seg medlemmer, mens de konkurrerer om å samle inn plaststrømmene som er rimeligst å materialgjenvinne. Dette medfører at produsentene ikke tar ansvar for plaststrømmer som er vanskelige å gjenvinne, og heller ikke arbeider for å øke sirkulariteten til disse strømmene.

Anbefalinger

Endringer i regelverket

For å skape en sirkulær verdikjede for plast og forhindre plastforsøpling, er følgende endringer i regelverket vurdert som nødvendige:

- Styrke rapporteringskravene overfor returselskapene og deres medlemmer for å sikre bedre kontroll over det faktiske volumet plastemballasje som settes på det norske markedet og som materialgjenvinnes.
- Produsentansvarsordningen bør utvides til å gjelde all plastemballasje, samt andre plastprodukter som ikke regnes som emballasje.
- Tydeliggjøre definisjonen av hvilke aktører som regnes som produsenter under produsentansvarsordningen. Definisjonen bør sikre at aktørene med størst påvirkning på design og utforming av produktene omfattes av produsentansvarsordningen.
- Innføre krav til at returselskapene skal differensiere vederlagssatsene som medlemmene betaler utfra de faktiske livssykluskostnadene til produktet.
- Sikre at de faktiske kostnadene kommunene dekker knyttet til innsamling, transport, sortering og materialgjenvinning av plastavfall blir dekket av produsentene.
- Sikre at produsentene dekker de faktiske kostnadene knyttet til plastforsøpling.
- Stille krav som legger til rette for at det dannes ensartede plastavfallsstrømmer.

Dagens produsentansvarsordninger for plastemballasje er regulert i avfallsforskriften kapittel 6 og 7. Disse kapitlene er nå under revidering som følge av nye EU-krav som skal innlemmes i norsk regelverk. Miljødirektoratets forslag legger i tråd med EU-kravene til rette for at produsentene skal få et større ansvar for produktene de setter ut på markedet gjennom høyere mål for materialgjenvinning av plastemballasje og innføring av et nytt målepunkt for når emballasjeavfallet regnes som materialgjenvunnet. Miljødirektoratet foreslår også at det opprettes et emballasjeregister som, avhengig av utforming, vil kunne sikre bedre kontroll over emballasjemengdene satt ut på markedet og at produsentene etterlever kravene. Etter vår vurdering går likevel ikke forslaget til endringer i avfallsforskriften langt nok i å adressere svakheter i dagens regelverk. De regulatoriske endringene listet over regnes som en forutsetning for å nå målet om en sirkulær verdikjede for plast og forhindre plastforsøpling.

Andre tiltak

I tillegg til endringer i det juridiske rammeverket, vil også andre supplerende tiltak være viktige for å akselerere utviklingen av en sirkulær verdikjede for plast. For å ikke undergrave tiltak som gjøres innenfor dagens produsentansvarsordning er det nødvendig at disse tiltakene utvider eller supplerer, og ikke erstatter, produsentansvarsordningen. Noen av disse virkemidlene vil også kunne knyttes til produsentansvarsordninger. Følgende supplerende tiltak og virkemidler vurderes som hensiktsmessige for å oppnå en sirkulær verdikjede for plast:

- Innføring av avgift på jomfruelig plast
- Subsidier eller redusert MVA for bruk av resirkulert plast
- Krav til plastsmarte løsninger i offentlige anskaffelser

- Innføring av sertifiseringsordninger for plastprodukter
- Standardisering av produktdesign for plastprodukter
- Innføre panteordninger på flere plastprodukter
- Incentivere næringer til å redusere volumet plastavfall og sikre riktig sortering av plastavfall.
- Incentivere til investeringer i sentralsorteringsanlegg
- Utarbeide en nasjonal plan for innsamlings-, sorterings- og gjenvinningskapasitet i Norge
- Digital merking og sporing av plast

Eksport av norske virkemidler til andre land

Virkemidler innen dagens produsentansvarsordning for plastemballasje som har vist seg å være vellykkede vil være viktige å videreføre, og vil kunne være relevante både med tanke på å videreutvikle i Norge og eksportere til andre land:

- Produsentansvarsordningen for drikkevareemballasje kjennetegnes ved pantesystemet og at det er innført en egen miljøavgift som reduseres i takt med innsamlingsgraden. Dette har bidratt til en svært effektiv ordning med en høy innsamlingsgrad sammenlignet med andre plaststrømmer. Materiale som er samlet inn gjennom panteordningen har også en høy renhetsgrad som bidrar til å heve kvaliteten på det resirkulerte materialet.
- Sentralsorteringsanleggene i Norge gir en langt høyere innsamlingsgrad enn andre kommunale innsamlingsordninger for plast. Mens innsamlingsgraden for de andre kommunale ordningene betinges av hvor gode innbyggerne er til å kildesortere, samler sentralsorteringsanleggene inn all plast som fanges opp av sorteringsanlegget. Digital merking vil kunne gi en enda høyere presisjon på utsorteringen og minimere andelen plast som havner sammen med annet avfall. Norge har både et potensial til å utnytte etablert sentralsorteringskapasitet og etablere nye anlegg, i tillegg til at erfaringer fra utvikling av sentralsortering i Norge kan videreføres til andre land.

Etablering av en global bindende avtale for bekjempelse av plastforsøpling vurderes i dag i internasjonale fora. Regjerningen har forpliktet seg til å arbeide for etableringen av en slik avtale gjennom Nordisk ministerråds felles erklæring i 2019 og som en frivillig forpliktelse under Our Ocean Conference. Endringene i avfallsforskriften gir Norge en mulighet til å utforme et juridisk rammeverk som kan danne grunnlag for utarbeidelsen av retningslinjer og minimumsstandarder for produsentansvar som kan innlemmes i en slik global avtale.

Contents

"It’s just one straw", said 8 billion people

1. Background and objectives

Plastic pollution is a global challenge, in which Norway plays its part. The objective of this study is to provide an overview and assessment of current Norwegian EPR efforts, and identify changes needed to create a true circular economy for plastics and end plastic pollution in Norway.

The Global Challenge

Plastic can be found in every corner of the world — in the most remote environments, in our food and water, and in hundreds of different wildlife species. Every day, plastic items end up as waste in nature. These negatively impact ecosystems and their inhabitants in ways we are just beginning to understand.

At least 8 million tonnes of plastic enter our oceans every year. Floating plastic debris are currently the most abundant items of marine litter. Plastic has been detected on the shorelines of all the continents, with waste plastic making up 80 % of all marine debris from surface waters, to deep-sea sediments. Ocean Cleanup, a non-profit foundation, have estimated that over 5 trillion pieces of plastic currently litter the ocean today. One of the most noticeable and alarming impacts from this vast amount of plastic in our oceans is to the inhabiting marine wildlife such as seabirds, whales, fishes and turtles. Marine species can be entangled and suffocated by the plastics, or in other cases ingest the plastics, leading to starvation and death as their stomachs are debris.[1]

Marine plastic waste eventually gets fragmented into microplastics. Emissions, dispersal and accumulation of microplastics has become a major global problem and a growing environmental threat. Micro- and nano-plastics[2] have been identified in tap water, beer, salt, and within samples collected from all the of world's oceans, including the Arctic. Chemicals used in the production of plastic materials are known to be carcinogenic, as well as lead to developmental, reproductive, neurological, and immune disorders in both humans and wildlife. Improving the conditions and mechanisms for plastic recycling can contribute to reduction in land-based plastic waste as a source to microplastic pollution.[3]

Our use of plastics globally also poses a significant climate challenge. Over 90 % of the plastics we use are produced by refining fossil fuels. According to the Ellen McArthur Foundation, 6 % of global oil consumption is used for plastic production. If the current growth of plastics usage continues, the plastics sector will account for 20 % of total oil consumption, and 15 % of the global annual carbon budget by 2050. There are still many knowledge gaps on both the economic impact of land-based plastic pollution and the effects of micro-plastic ingestion on humans[4] and other animal species.[5]

[1] The International Union for Conservation of Nature (IUCN). *Issues Brief: Marine Plastic, May 2018*. https://www.iucn.org/sites/dev/files/marine_plastics_issues_brief_final_0.pdf ; The Ocean cleanup: https://theoceancleanup.com/oceans/

[2] Microplastics is used as a term to describe a mixture of plastic particles ranging in size form a few microns to several millimetres in diameter. Nanoparticles are of even smaller particle size (<1 µm). Bergmann, Gutow and Klages (2015). *Marine Anthropogenic Litter*.

[3] The International Union for Conservation of Nature (IUCN). *Issues Brief: Marine Plastic, May 2018*. https://www.iucn.org/sites/dev/files/marine_plastics_issues_brief_final_0.pdf ; The Norwegian Environment Agency. *Miljødirektoratets overordnede vurdering av kilder og tiltak mot mikroplast – utdypende notat.*

[4] A study finds on average people could be ingesting approximately 5 grams of plastic every week, which is the equivalent weight of a credit card. K. Senathirajah, T. Palanisami, University of Newcastle (May 2019). *How much microplastics are we ingesting? Estimation of the mass of microplastics ingested.* Report for WWF Singapore.

[5] WWF (2019). *Solving plastic pollution through accountability.*

There is an enormous opportunity to increase the circularity of plastics, to reduce the source of waste, as well as our demand for new plastic production. Due to low collection and recycling rates, 95% of plastic packaging material value, or USD 80–120 billion annually, is lost to the economy after a short first use.[6]

The global scale of the plastic challenge demonstrates the need for a global agreement to combat plastic pollution. The establishment of a new legally binding international agreement to combat plastic pollution is currently being considered in international forums. The Norwegian government has committed to work for the establishment of such an agreement in a Nordic Ministerial declaration from 2019 and as a voluntary commitment to the Our Ocean Conference.

The circularity of plastic in Norway

It is estimated in this report that over 300,000 tonnes of plastic products are put onto the Norwegian market each year. Of this amount, 222,000 tonnes relate to plastic packaging[7] and 80,000 tonnes is the estimated amount of other plastic products put on the market each year.[8] For households, this equals to a plastic consumption of approximately 20,5 kg per capita each year.[9]

In 2018, the Producer Responsibility Organizations (PROs) in Norway ensured that approximately 75,000 tonnes of plastic packaging waste were recycled. Although Norway has established EPR schemes, they only cover plastic products defined as packaging. PROs do not receive payment for the recycling and treatment of plastic waste not covered by the current EPR schemes, and these products are most often not recycled. Examples of such plastic products include plastic toys or outdoor furniture.

According to Statistics Norway, 113,000 tonnes plastics were sent to recycling in 2018.[10] Most of the plastic packaging and other plastic products that are not recycled, is sent to incineration and energy recovery. 141,000 tonnes plastic were incinerated, and 18,000 tonnes plastic were landfilled in 2018.[11] While the total volume plastic sent to recycling has decreased each year since 2015, the share of plastic that is sent to incineration and landfills has increased over the last decade.[12] The statistics do not cover the last 25,000 tonnes plastic that are estimated put on the market each year and this volume is therefore not included in Figure 1.

[6] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy — Rethinking the future of plastics* (2016, http://www.ellenmacarthurfoundation.org/publications).
[7] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje.*
[8] Østfoldforskning and Mepex (2017). *Utsortering og material-gjenvinning av biologisk avfall og plastavfall*, p. 46.
[9] Based on volumes from 2017 from Østfoldforskning and Mepex (2017). *Utsortering og material-gjenvinning av biologisk avfall og plastavfall*, p. 37 and population 1. January 2017.
[10] The term "sent to recycling" refers to the volume reported sent to further sorting and recycling and does not necessarily equal the actual volume of recycled end-product.
[11] In addition, 3 tonnes plastic waste were sent to "other treatment".
[12] Statistics Norway. *Plastavfall.* https://miljostatus.miljodirektoratet.no/tema/avfall/avfallstyper/plastavfall/

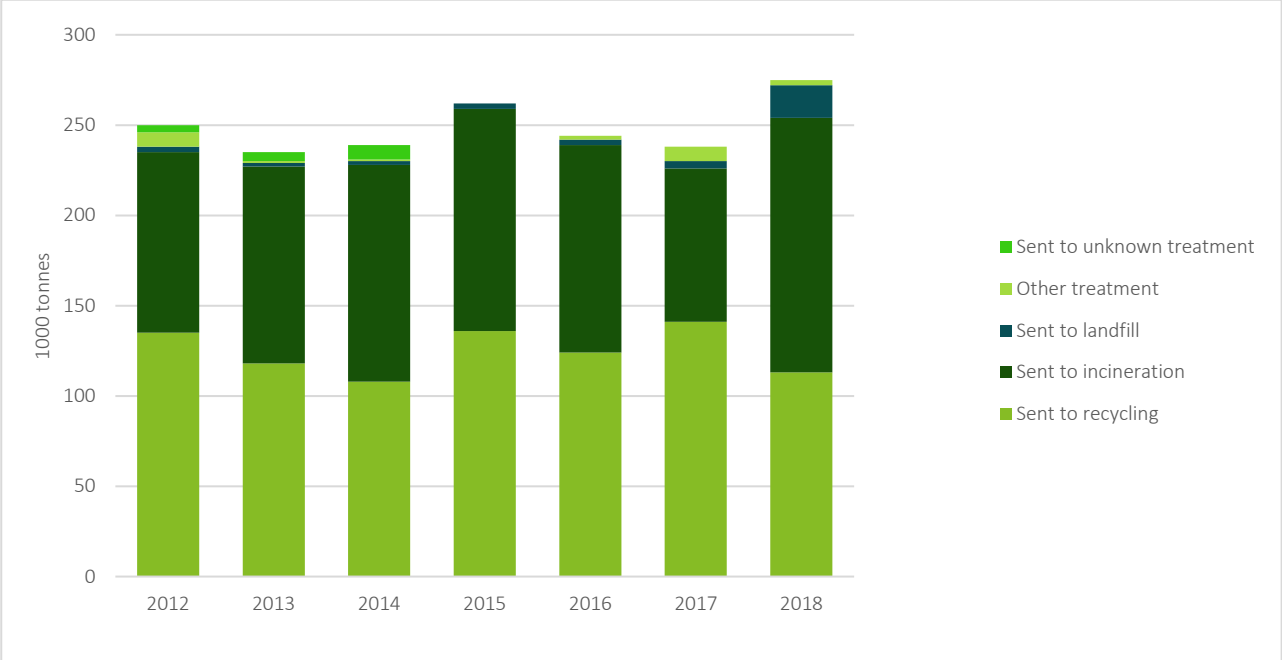


Figure 1. Plastic waste treatment methods and volumes in Norway. Source: Statistics Norway

The loss of plastic materials from the value chain increases the risk of pollution. Every year, an estimated 8,400 tonnes of land-based plastic from Norway ends up as litter in the ocean.[13] The greatest source to microplastic pollution in the oceans comes from land-based plastic. Several of the most frequently found as litter in Norwegian nature are plastic packaging such as plastic bags, plastic beverage bottles, caps and lids and EPS pieces.[14]

Principles of Extended Producer Responsibility

The OECD has defined EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. In practice, EPR involves producers taking responsibility for collecting end-of-life products, and for sorting them before their final treatment, ideally, recycling.[15]

EPR builds on the principle of polluter-pays. The polluter-pays principle is a guiding principle at European and international levels, which stipulates that the producer of waste should bear the costs of waste management in a way that guarantees a high level of protection of the environment and human health. EPR implements this principle by shifting the definition of the polluter from the consumer that generates the waste, to the actors placing the products onto the market. The reasoning behind the EPR concept is that producers internalize the costs of treatment and disposal so that they have an incentive to design durable and recyclable products, which in turn contributes to reduce pollution.[16]

EPR has two primary environmental goals:

- Ensure an effective end-of-life collection, environmentally-sound treatment of collected products, and improved reuse and recycling
- Provide incentives for manufacturers to design resource efficient and low impact products

These two goals are interconnected as it is expected that improving the products' design will both optimize its

[13] Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan R. & Law, K. L. (2015). *Plastic waste inputs from land into the ocean*. Science, 347 (6223).
[14] The Norwegian Environment Agency. *Reduced Littering of Single-Use Plastics: Mapping and Analysis of Potential Measures to Reduce the Littering of Certain Single-Use Plastic Products* and *Miljødirektoratets overordnede vurdering av kilder og tiltak mot mikroplast – utdypende notat*. https://www.regjeringen.no/contentassets/57531d6df37b4f53b0e8318caf55d3f5/miljodirektoratets-overordnede-vurdering-av-kilder-og-tiltak-mot-mikropl....pdf
[15] OECD (2016). *Extended Producer Responsibility: Guidance for efficient waste management.*
[16] European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR).*

environmental performance and minimize the costs of end-of-life management. EPR therefore encompasses both the upstream and downstream stages of the product life cycle. Additionally, EPR schemes provide financial benefits by shifting financial responsibility for the treatment of waste upstream from municipalities and public authorities to producers, thereby reducing the burden on public budgets as well as encouraging producers to optimize the cost efficiency of collection and recycling processes, leading to lower waste management costs. Countries that have implemented EPR policies have generally achieved higher collection and recycling rates than other countries.[17]

There is a consensus that the EPR schemes should cover the full net costs of the collection, sorting and treatment, minus revenues from recovered material sales. Full costs are defined by the EU Commission as the following:

- Collection, transport and treatment costs of both separately and non-separately collected waste (waste collected together with mixed municipal waste);
- Costs for public information and awareness raising to ensure participation of consumers within the scheme (i.e. through separate collection);
- Costs related to waste prevention actions;
- Costs for litter prevention and management;
- Costs related to the enforcement and surveillance of the EPR system (including, auditing, measures against free riders, etc.).[18]

For packaging, producers may be defined as the producers of packaging, the "packers and fillers" or the distributors of a product. While the producers of packaging play an important role in developing recyclable plastic packaging and the distributors influence which products are put on the market, the "packers and fillers" determine the design and the type of the plastic packaging needed to optimize the quality of their products and fulfil their own marketing needs. "Packers and fillers" also add labels and sleeves which can impact the recyclability of the packaging.

"Packers and fillers" are most commonly defined as the producer in the European EPR schemes. The rationale for this is that the producers of plastic packaging respond to the demand from the plastic packaging manufacturers and the distributors sell the products that the "packers and fillers" offer. However, there are exceptions to this. The distributor is classified as the producer if it owns its own brand and the fillers only play a functional role. Furthermore, the manufacturers of plastic bags and other similar packaging products, who deliver packaging to thousands of smaller commercial shops, kiosks etc., are also defined as producers. This is because it is not considered practical to define the high number of these smaller outlets as producers. Importers and distance retailers usually also fall under the definition of a producer. Most importantly, the producer is the actor that holds influence over the design of the product.[19]

Different organizational models for EPR

There are a variety of different ways of organizing EPR schemes, which is reflected in different practices across countries:

- The producers may exert their extended responsibility either individually or collectively through PROs. Usually, producers organize and finance collective Producer Responsibility Organizations (PROs) that will carry out the collection and/or recycling of end-of-life products on behalf of their member.
- EPR can be voluntary or mandated by law.
- EPR may be implemented through a variety of range of instruments, such as product take-back requirements, economic and market-based instruments (e.g. deposit-refund systems or advance disposal fees), or a combination of these.

[17] E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink (2017). *EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging*; OECD (2014) *The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges*; Gupt and Sahay (2015). *Review of extended producer responsibility: A case study approach.*

[18] European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*. OECD (2014). *The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges*

[19] Interviews.

- EPR regulations may range from specific requirements to a target-oriented approach. There is however a consensus amongst stakeholders that there is a need for minimum legal requirements that ensures a level playing field amongst the actors.[20]
- The producer may assume operational responsibility for the collection and treatment of waste, or assume a financial responsibility where municipalities have the operational responsibility (see text box).[21]

Different grades of responsibilities assumed by the Producer Responsibility Organizations (PROs)

The level of responsibility between producers and municipalities varies broadly across countries. PROs in some countries only compensate the municipalities financially for the end-of-life treatment of waste, whilst PROs in other countries also assume operational responsibility for collection and/or sorting of the waste.

Financial model
In the financial model, the PRO only assumes a financial responsibility, while the municipalities are responsible for all operational tasks (collection, sorting and disposal of packaging waste). The producers and importers cover the costs of the municipalities. Afvalfonds Verpakkingen (AV) (Netherlands) follows this model.

Operational model
In the operational model, the PRO assumes the responsibility for both the financing and handling of the waste across the value chain. The EPR schemes in Sweden and Germany are characterized by an operational model, where the PROs FTI (Sweden) and Der Grüne Punkt (Germany) are responsible for financing and performing operational tasks such as collection or / and sorting.

Hybrid model
In the hybrid model, the operational responsibility is shared between the municipalities and the producers. The responsibility for packaging waste often shifts between the collection and sorting stage. Grønt Punkt Norge (Norway) and FORT Plus (Belgium) are currently following a hybrid model.

Achievements and challenges in current EPR schemes

Many achievements have been identified in the EPR schemes:

- Increased collection and recycling rates (environmental effectiveness).
- Reduction of public spending on waste management.
- Reduction in overall waste management costs.
- Eco-design innovations

However, several weaknesses of EPR schemes have also been identified, including:

- Unclear and overlapping roles and responsibilities of different actors, including the relationship between public authorities and PROs
- A lack of control and monitoring of data and enforcement mechanisms
- Free riding, defined by producers who do not adequately comply with their obligations under EPR, is a common challenge facing many EPR schemes. Free-riding issues are expected to be more common in markets with many competitors, making it more difficult for policy makers and PROs to monitor
- Difficulty to implement differentiated fees and lack of incentives for eco-design
- The fees paid by the producers does not cover the actual cost of waste treatment and recycling
- The costs are passed on to consumers, reducing the incentive for producers to invest in eco-design
- The producers often carry out their responsibility collectively through PROs. This entails a risk of 'averaging' the costs among producers, thereby de-incentivising individual efforts for eco-design.[22]

[20] Minimum legal requirements that have been identified are: "Specify the definitions of household / commercial and industrial waste; Equal obligations among PROs, and particularly minimal geographical coverage so as to avoid cherry-picking; Minimal operating license, in order to prove it is a credible system; Minimum requirements on consumer information and auditing; Strict enforcement by authorities (parties must be audited)". Source: European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)* (p. 106).
[21] OECD (2016). *Extended Producer Responsibility: Guidance for efficient waste management;* European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*; OECD (2014). *The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges*
[22] E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink (2017). *EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic;* OECD (2014). *The State of Play on Extended Producer Responsibility (EPR): Opportunities and Challenges;* Miljøstyrelsen i Danmark (red. Deloitte). (2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald;* European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*.

Objectives and Methodology

Objectives

The objective of this study is to provide an overview and assessment of current Norwegian EPR efforts, with the goal of achieving a true circular economy linked to plastic production and use in Norway.

The study shows the relevant principles and applicable legal frameworks for EPR for plastic in Norway, the efficiency of the current principles and organization, and changes needed to create a circular value chain and end plastic pollution.

The objective of the measures that are suggested below is the following zero-waste scenario:

- Only use of plastic where there is no better alternative
- Only products that can be reused or recycled are placed on the market
- All plastics that are technically possible to recycle material remain in the value chain
- No plastic littering in nature or the sea.

Methodology

Methods applied in this study are desktop analysis, a workshop and interviews. Relevant literature, and current and suggested legislation have been examined through a desktop analysis. Actors from the value chain participated in a workshop held 19.03.2020, and additional four interviews were held. The input from the actors is supplemented with information additional sources.

The following actors have contributed with input to the study: Empack NOR, Grønt Punkt Norge, Looping, Norgesgruppen, Norsirk, Norsk Gjenvinning, Norwegian Digitalisation Agency, Orkla, Oslo municipality and Ringnes. Contributing actors are not liable for the content in this report.

2. Status of the EPR scheme for plastic packaging in Norway

This chapter gives an overview of the status of the EPR schemes for plastic packaging in Norway. The organization, sharing of responsibilities, financing and performance is described.

Current organization of the EPR schemes for plastic packaging

As of April 2020, two non-profit organizations had approval as PROs for plastic packaging in Norway: Grønt Punkt Norge and Norsirk. Grønt Punkt Norge was established in 1997, and until September 2019, was the only PRO for plastic packaging. Grønt Punkt Norge is owned by the material companies, amongst which Plastretur AS is the material company for plastic packaging. Grønt Punkt Norge is responsible for financing and operating the producer responsibility scheme for plastic packaging on behalf of Plastretur. In September 2019, Norsirk, through their subsidiary Emballasjegjenvinning AS, was approved by the Norwegian Environment Agency to run a competing practice within plastic packaging (and other packaging). Prior to September 2019, Norsirk has been a PRO for WEEE[23] and batteries since 1998.[24]

Grønt Punkt Norge and Norsirk, through agreements and support schemes, contribute to recycling of plastic from both households, and the commercial and industry sectors. The logistics, responsibilities, and financial instruments in the value chain for plastic packaging differ between the different waste streams. The municipalities are responsible for the

[23] Waste Electrical and Electronic Equipment
[24] Norsirk: https://norsirk.no/om-oss/

collection of household waste. However, within the industry sector, businesses are responsible for handling waste themselves.

Infinitum is the PRO for beverage cans and boxes, which is covered by a separate legal framework (see chapter 3). Bottles and boxes used for beverage packaging is being collected today primarily through a separate deposit return scheme (DRS). Infinitum owns and operates the DRS for taxable beverage containers. Everyone who produces or imports beverages in recyclable plastic PET bottles can become part of the deposit return scheme by paying a fee to Infinitum and mark the bottles with the deposit mark. In contrast to other countries with a beverage DRS, is it not mandatory for manufacturers and importers of beverage packaging to be part of the DRS. However, manufacturers and importers that are not connected to the DRS are required to be a member of an approved PRO.[25]

Financial and organizational responsibility

The current Norwegian EPR scheme for plastic packaging (excluding plastic bottles) is characterized by the PROs having a financial responsibility and partial organizational responsibility for the collection and further handling of plastic packaging waste. The municipalities are required by law to organize for the collection of household waste, which in practice includes plastic packaging. The organizational responsibility is transferred from the municipalities to the PROs after the collection of the plastic packaging waste. The PROs are responsible for ensuring the further treatment of the plastic packaging waste, including sorting and recycling. Currently, the PROs pay a compensation to the municipalities for organizing the collection of the plastic packaging waste. However, the municipalities' costs vary significantly according to the collection scheme that is chosen, and even within municipalities with the same collection scheme. One study suggests the net additional costs of a sample of municipalities range between NOK -273 to 1562 per tonne, with some even higher. The negative value is due to the saved incineration gate fee. The average net cost is NOK 617 per tonne (2017). Not counting the saved gate fee to the incineration plants, the median cost is NOK 1,271.[26] The study states that calculations are conservative, and numbers could be higher.

The municipalities that have invested in mixed waste sorting plants[27] also have the organizational responsibility for the next step in the value chain, notably the sorting of the plastic. These facilities sort the plastic material into fractions, most commonly HDPE, LDPE, PP and PET bottles[28]. The inter-municipal company IVAR also carries out the washing and recycling of HDPE, PP and LDPE that is sold on the market. Currently, municipalities that have invested in mixed waste sorting plants have not been fully compensated by the PROs for their costs, and must finance the remainder of the investment through an increase in refuse collection charges that the citizens pay.[29] The municipalities with mixed waste sorting plants receive income from the sale of sorted or recycled material. For some fractions however, the value of sorted material has a negative value, and the municipalities must pay for the incineration or the recycling of the material.

The Norwegian Pollution Control Act[30] defines that industrial waste shall be delivered to a lawful waste treatment and disposal plant, unless it can be recovered or used in another way. However, it does not place any operational responsibility on the waste producers in the commercial and industry sectors. Consequently, the waste producers bear little of the financial and operational responsibility for the collection and handling of plastic packaging waste from commerce and industry. On the contrary, waste producers in commerce and industry sector often have an economic incentive to collect plastic packaging separately, as this reduces the volume and the cost of the treatment of residual waste.

The waste companies collecting waste from commerce and industry receive compensation from the PROs to collect and organize further treatment of the waste, and report on recycling rates to the PROs. Private waste companies therefore carry out the organizational responsibilities on behalf of the PROs. The incineration of mixed plastic packaging waste

[25] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje*; Infinitum, *The Deposit System* https://infinitum.no/english/the-deposit-system
[26] Avfall Norge (2018) Kostnader ved utsortering av husholdningsavfall
[27] As of April 2020, two inter-municipal companies had invested in mixed waste sorting plants; ROAF and and IVAR. The two mixed waste sorting plants cover approximately 700,000 citizens. Additional two mixed waste sorting plants are planned for the near future: ØAS and Sesam. These are planned to receive residual waste from 900,000 citizens.
[28] The machinery may be tuned, so the facilities also can sort other fractions, such as PS, PET trays and PP film.
[29] The highest compensation given by Grønt Punkt Norge in 2019 was 1500 NOK per tonne. Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje,* page 19.
[30] Pollution Control Act - Act of 13 March 1981 No.6 Concerning Protection Against Pollution and Concerning Waste

from commerce and industry, which is similar in nature and composition to waste from households, indicate that the PROs do not provide full cost coverage of the recycling of these fractions.[31]

Performance of the current EPR schemes for plastic packaging in Norway

Table 1 shows the estimated recycling performance of the plastic packaging waste streams that are covered by a producer responsibility scheme. As Norsirk was first approved in September 2019, the numbers below are reported by Grønt Punkt Norge and Infinitum.

Table 1. Market volumes and estimated recycling rates for plastic fractions covered by an EPR scheme, 2018

Plastic fraction	Put on the market Member reported volume in tonnes	Collected Official reported volume in tonnes	Recycled Estimated volume in tonnes	Recycling rates Estimated
Household	80,669	31,284	23,990	30 %
Industry	46,055	22,291	17,177	37 %
Agriculture[32]	12,844	10,725	10,564	82 %
EPS	6,392	4,474	3,132	49 %
Plastic beverage bottles	25,385	21,426	20,774	82 %
Total	**171,344**	**90,246**	**75,637**	**44 %**

Put on the market is based on 2018 statistics from Grønt Punkt Norge[33] and Infinitum[34].

Collected represent reported figures from Grønt Punkt Norge and Infinitum on plastic waste material *sent* to a recycling facility.

Recycled is calculated using available estimates on recycling yields for the different volumes reported by Grønt Punkt Norge and Infinitum. Yields are based on the Deloitte study on value chain for plastic packaging[35].

Volumes of plastic packaging used for hazardous substances is split fifty-fifty on the household and industry categories.

Reported data from Grønt Punkt Norge and Infinitum shows that their members brought a total of 171,344 tonnes of plastic packaging on the Norwegian market in 2018. Of the 171,344 tonnes, an estimated volume of 75,637 tonnes was recycled. The recycling rate was highest for the plastic streams that are separately collected, notably plastic bottles, plastic waste from agriculture and Expanded polystyrene (EPS). Most plastic bottles are handled through Infinitum and the deposit return scheme. The combination of an environmental tax and a separate deposit return system provides efficient incentives for the collection and recycling of plastic beverage bottles (see chapter 7). Household plastic makes up close to 50 % of the reported volume of plastic packaging put on market but has the lowest estimated recycling rate.

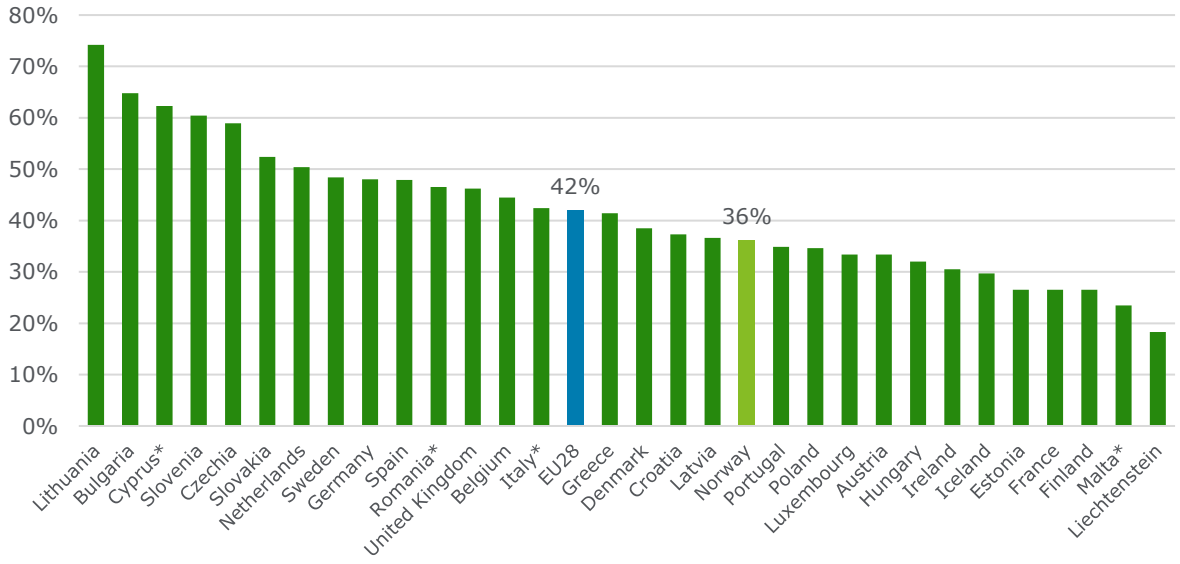
Table 1 shows the volume of plastic packaging that the PROs report that their members put on the Norwegian market. According to analyses of plastic packaging volumes found in household and industry waste, however, the total volume of plastic packaging waste put on the market is around 222,000 tonnes. This is approximately 50,000 tonnes more than the volume of plastic packaging reported by the PROs. There are several reasons for this difference. Firstly, not all plastic packaging is covered by the EPR scheme.[36] This concerns plastic packaging from private import (internet trade and cross-border shopping) and plastic packaging put on the market by small producers not covered by the current EPR legislation in Norway.[37] Secondly, the difference may also be explained by producers who do not adequately comply with their obligations under EPR, that either "free ride" or underreport. Thirdly, inaccuracy in weight estimates in the PRO reporting methods may also explain some of the difference between the amount of plastic packaging found in the

[31] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje.*
[32] Plastic waste from agriculture is not included in the current legislation but is covered by a collection scheme organized by Grønt Punkt Norge.
[33] Statistics 2018 Grønt Punkt Norge: https://www.grontpunkt.no/om-oss/fakta-og-tall/
[34] Infinitum Annual Report 2018
[35] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje.*
[36] This is further described in chapter 5.
[37] Producers and importers that supply the market with less than 1,000 kg packaging a year are not covered by the current Norwegian Waste Regulations, chapter 7.

waste and the amount reported put on market by the PROs.[38] This volume of plastics is not accounted for or financed and is therefore likely to leave the value chain for plastics. In turn, this increases the risk of leakage of plastic waste into nature.

Comparing the performance of the current EPR schemes across the EU, Norway ranks below the EU average. In 2017, a total of approximately 16,8 million tonnes of plastic packaging waste was generated by EU countries, of which approximately 7 million tonnes were recycled, giving a combined recycling rate of 42 % for EU. This compares closely to numbers reported by Grønt Punkt and Infinitum, with a combined recycling rate of 36 % for Norway[39]. Within the EU countries, the recycling rate varies from 18 % in Liechtenstein to 74 % in Lithuania.[40] The recycling rates are not completely comparable, as different calculation methods are allowed when Member States calculate the amount of packaging put on the market. Often Member States report data on packaging waste that is collected for recycling instead of stating the amounts that have been recycled.[41] The introduction of a new calculation methods to measure recycling waste following the amendments to the EU Waste Framework Directive and the Packaging and Packaging Waste Directive, is expected to lead to more comparable data across the EU countries.[42]

Table 2. Recycling rate of plastic packaging waste in the EU member states – Eurostat (2017)[43]



*indicates data is from 2016

[38] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje.*
[39] The denominator used in the Eurostat figures for Norway, is higher than what the PROs report to the Norwegian Agency of Environment, and corresponds to the estimated total amount of plastic packaging waste put on the market. This explains why the recycling percentage is lower than reported by the PROs (see table 1).
[40] The success of Lithuania has been explained by the deposit return scheme for bottles, introduced in 2016. The recycling rates of plastic packaging increased from 54.8 % in 2015 to 74.4 % in 2016. Sources: The Economist. *Why Lithuanians cash in on their trash,* 11.01.2020; Balcers, O., Brizga, J., Moora, H., Raal, R. (2019) *Deposit Return Systems for beverage containers in the Baltic states*, Riga: Green Liberty; Eurostat.
[41] Deloitte Sustainability (2017). *Blueprint for plastics packaging waste: Quality sorting & recycling*.
[42] Norwegian Environment Agency (2020). *Utkast til høringsnotat med konsekvensutredning: Endringer i avfallsforskriften kapittel 6 og 7*.
[43] Statistics from Eurostat: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191105-2

Deep dive: Household plastic packaging waste

Collection of plastic packaging waste is carried out by the municipalities in Norway, together with the collection of residual waste. The municipalities are free to choose their own waste collection system. Currently, three different systems for collection of plastic packaging waste are used in the different municipalities (see table below).

Collection System Types

Separate collection system	Optibag collection system	Mixed waste sorting plants
• Most of the municipalities in Norway use a separate collection system to collect plastics. • Plastic packaging waste is collected together with residual waste. • The municipality ensures that all households get a separate container or a large bag for throwing plastic packaging waste. • The refuse collection vehicles either have two compartments to separate the plastic packaging waste from the residual waste or collect the plastic packaging waste separately.	• Approximately 40 municipalities in Norway have implemented an optibag system. • The households receive colored bags for throwing plastic packaging waste, which are thrown in the same bin and collected together with the residual waste. • The plastic packaging waste bags are brought to a waste treatment facility, where the colored bags are separated from other bags using cameras with optic readers. • Due to sorting errors, the weight of the bags is controlled. Bags above approx. 600 grams are sent for energy recovery. In this step, 4-5 % of the bags collected leave the value chain. • The sorted bags are then compressed and shipped to sorting facilities abroad.	• There are currently two larger mixed waste sorting plants in Norway that cover approx. 30 municipalities (ROAF and IVAR). • This method does not involve separate sorting of plastic packaging waste in the households, as plastic packaging waste is thrown together with the residual waste. • Plastic waste is separated from other waste fractions using Near Infrared (NIR) technology. The facilities sort out not only plastic packaging, but all plastic waste. The NIR facilities can be adjusted to sort out different plastic polymers.

The performance of the different municipal systems varies broadly. By comparing figures on collection of plastic waste per capita between the different municipal systems, the optibag system has the lowest performance with only an estimated 3,93 kg plastic waste collected per capita each year. The separate collection system is performing somewhat better, but both perform significantly below the collection figures for mixed waste sorting plants, which collected an estimated 17,74 kg per capita in 2017. While plastic packaging that is not separately sorted by the citizens is incinerated in the former systems, the mixed waste sorting plants receive and may sort all plastic packaging that is technically feasible.

Compensation offered by Grønt Punkt Norge to municipalities is tiered according to the collection rate. As of 2018, the lowest level of compensation of NOK 800 per tonne, was given to municipalities that collected less than 8 kg per citizens a year. Compensation increases steadily with the collection rate, with the highest amount of NOK 1500 per tonne awarded to those municipalities that collect over 16 kg per citizen per year. As of 2019, municipalities that have invested in mixed waste sorting plants were only compensated for the sorted plastic fractions (HPDE, LDPE, PET and PP), but receive no compensation for the remaining mixed fraction. However, municipalities that do not sort their plastic waste into separate fractions will receive full compensation for the total volume sent, even though a proportion will still in the further sorting process be sent to incineration due to low or negative value.

The PROs are responsible for retrieving collected plastic from the municipalities and for the further treatment of this waste. Plastic packaging from households that is collected through the different schemes described above is packed in bales at a waste treatment plant before being shipped to sorting plants under the auspices of the PRO. Today, most of the plastic packaging is sent aboard for sorting and recycling, primarily to sorting and recycling facilities in Germany. Plastic that is not suitable for material recycling in this section goes to energy recovery.

Plastic packaging that is collected through the mixed waste sorting plants is sorted at the plants of ROAF and IVAR in Norway. IVAR has a facility to wash and recycle the sorted plastic fractions, while ROAF sells the sorted plastic fractions to recyclers.

Deep dive: Industry and agriculture packaging waste

Unlike household waste that the municipalities are responsible for collecting, most commercial businesses have an agreement with a waste company for collection of waste that they produce. PROs have agreements with waste companies and pay a compensation to the collector for transportation, sorting and recycling of the plastic packaging waste.

In general, plastic packaging collected from the industry and agriculture sector has significantly better quality than plastic packaging from households because it is less contaminated and is usually sorted into homogenous waste streams. At the same time, there is a great variation in the quality of plastic packaging from commerce and industry as well, because not all companies clean the plastic waste properly before collection.

Not all the plastic packaging that is collected from businesses is sent on to recycling, due to the high costs of recycling of certain plastic packaging streams. This especially concerns multi-layered plastic packaging and EPS, which often end up being incinerated rather than recycled. Plastic waste that has not been correctly sorted or cleaned well enough at the company site is also often sent to incineration. Although waste companies receive a compensation from the PROs to send the material to recycling, this compensation is not enough for the companies to achieve a marginal profitability for recycling these waste fractions.[44]

Current fee structure

Fees for plastic packaging excluding plastic beverage bottles

The financial contributions paid by the producer of the product to the PRO to comply with its EPR obligations are to cover the costs of collection, sorting and treatment of the plastic packaging waste, including recycling. Grønt Punkt Norge currently has a fee model differentiating between different plastic packaging waste streams, with thirteen different categories. The fees for consumer plastic packing in Norway charged by Grønt Punkt Norge as of April 2020 are situated around 1.85 NOK/kg for most waste streams while fees for EPS and plastic used in industry and agriculture varies from 1.13 to 4.00 NOK/kg. The fees are generally higher in other European countries than Norway. Fees charged by Norsirk are not publicly available.[45]

Recyclability is to a certain extent internalized in Grønt Punkt Norge's fees, as industrial films have a lower fee than household waste, which reflects the recycling yields of different plastic waste categories. However, the current fees follow high level product categories and are not differentiated according to their durability, reparability, re-usability and the presence of hazardous substances within each product category. This differs from many other European countries, where the PROs differentiate the fees according to eco-design (see chapter 4).

Table 3. Fees charged by PROs in in comparable European countries

Country	Plastic fraction	Current fee	From date
Sweden	Household – plastic (low)	0.317 EUR/kg	January 1. 2020
Sweden	Household – plastic (high)	0.477 EUR/kg	January 1. 2020
Sweden	Manufacturing – plastic (low)	0.254 EUR/kg	January 1. 2020
Sweden	Manufacturing – plastic (high)	0.382 EUR/kg	January 1. 2020
Netherlands	Plastics (including biodegradable plastics)	0.640 EUR/kg	2019
Netherlands	Plastics, differentiated fee (only upon request)	0.380 EUR/kg	2019
Belgium	PET bottles and flasks (and PET caps)	0.346 EUR/kg	2019
Belgium	HDPE bottles and flasks (and HDPE caps)	0.342 EUR/kg	2019
Belgium	Other plastics	0.510 EUR/kg	2019

[44] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje* and interview.
[45] The fees charged by Grønt Punkt Norge were publicly available until April 2020.

Fees for plastic beverage bottles

The fees charged by the PRO for plastic beverage bottles, Infinitum, vary according to whether the bottle is made of PET or HDPE plastic and according to the color / sleeve. The administration fees for the different bottles are shown in the table below (tax excluded).

Table 4. Fees charged by Infinitum for plastic beverage bottles[46]

Quality	Current fee for goods only traded in Norway	Current fee for goods also traded outside Norway
Transparent PET bottles	0.10 NOK/unit	0.16 NOK/unit
Light blue transparent PET bottles	0.18 NOK/unit	0.24 NOK/unit
PET bottle in other color or sleeve covering 75% or more of the bottle	0.25 NOK/unit	0.31 NOK/unit
HDPE bottles	0.25 NOK/unit	0.31 NOK/unit

[46] Infinitum. *Calculator*. https://infinitum.no/calculator. [accessed 16.04.2020]

3. Existing principles and legal framework for the EPR schemes for plastic packaging in Norway

The implementation of recent EU directives on waste and plastic packaging is expected to result in substantial changes to the current legal framework for the EPR schemes, with strengthened obligations for the PROs. The revision of the legislation also provides an opportunity for addressing weaknesses in the current legal framework.

The EPR schemes for plastic packaging are regulated in the Norwegian Waste Regulations by Chapter 6 (plastic beverage packaging) and Chapter 7 (other plastic packaging).[47] Norway is expected to implement the amendments to the EU Waste Framework Directive and the EU Packaging and Packaging Waste Directive, in addition to the Directive on the reduction of the impact of certain plastic products on the environment.

Current legal framework for the EPR scheme for plastic packaging

The EPR scheme for plastic packaging that is not used for beverages is regulated by Chapter 7 in the Norwegian Regulation about Recycling and Treatment of Waste (Waste Regulations). According to the regulations, all producers and importers that supply the market with at least 1,000 kg packaging per year shall fund the collection, sorting, recycling and other processing activities for plastic packaging waste through membership of a producer responsibility organization that has been approved by the Norwegian Environment Agency, cf. § 7-5. If the PRO is not able to carry out its responsibilities, the producer is responsible to carry out the obligations in the regulation.

The regulations set out the following main requirements and obligations:

- Producers are responsible to work towards waste prevention. Efforts made with respect to waste prevention are required to be reported by producers, either alone or as part of a PRO (§§ 7-6, 7-7).
- The PROs shall:
  - Collect plastic packaging from commerce/industry and households
  - Receive plastic packaging from waste collectors
  - Collect and receive a fair share of the same type of packaging that their members have put on the Norwegian market. The collection shall be carried out continuously and across the whole country.
  - Achieve material recycling of at least 30 % of the plastic packaging and 50 % of expanded polystyrene (EPS) that their members have placed on the market (§ 7-9)
- The PROs shall ensure that adequate information is given to the consumers and to commerce and industry about the handling of waste (§ 7-10)
- All producers shall have access to become a member in the PRO (§ 7-11)
- The PROs have an obligation to report yearly to the Norwegian Environment Agency on the total volumes of packaging their members supply to the market, the volume of packaging waste that is collected, treated and sent to waste treatment facilities and total recycling rates. The PROs are obliged to ensure the quality of the information prior to the reporting (§ 7-12).

[47] Forskrift om gjenvinning og behandling av avfall (avfallsforskriften) - Kapittel 7. *Emballasjeavfall* - Lovdata, https://lovdata.no/dokument/SF/forskrift/2004-06-01-930/KAPITTEL_7#KAPITTEL_7 [accessed 15.04.2020].

Plastic packaging for beverages, which mainly consists of PET-bottles, is separately regulated in Chapter 6 of the Waste Regulations. The PROs for plastic beverage bottles are defined as "return systems". The individual producer or importer of beverages can establish and administer, or join, a return system for the packaging. The requirement for approval is that the return system attains a return rate of minimum 25 % and that the packaging is recycled in an "environmentally sound" way, cf. § 6.4.

An environmental tax is imposed on all beverage packaging, which gives a strong incentive to collect beverage packaging waste. The environmental tax is reduced according to the return rate, starting at 25 %. When the return system achieves a 95 % return rate, the environmental tax is offset. As of 2020, the environmental tax per plastic beverage packaging unit is 3.62 NOK.[48] The PROs report on the actual return rate each year to the Norwegian Environment Agency. Based on the reporting, the Norwegian Environment Agency decides on an estimated return rate for the following year. Based on this rate, the Norwegian Tax Administration[49] gives a reduction in the environmental tax the following year.[50] The act allows the Norwegian Environment Agency to prohibit the use of primary packaging that prevents the appropriate implementation of established deposit schemes. Return systems based on energy utilization are only approved if reuse or recycling is not technically, environmentally or economically feasible.

The return systems for plastic beverage packaging are both organized with and without a deposit refund system. The return system with a deposit refund system must follow the deposit rates defined in the Waste Regulations. The rates were increased in 2018, and the current deposit rates are:

- 2.00 NOK per unit for plastic beverage packaging under 50 cl
- 3.00 NOK per unit for plastic beverage packaging over 50 cl

When the return type of a certain kind of beverage packaging is deemed to be too low, then a return system may apply to the Environmental Directorate to introduce a higher rate of deposit.

Current legal framework for waste in Norway

The Pollution Control Act regulates the responsibilities of the waste producers. According to the Pollution Control Act § 30, the municipalities are responsible for the collection of household waste.

The Pollution Control Act § 32 regulates the management of industrial waste and defines that industrial waste shall be delivered to a lawful waste treatment and disposal plant unless it can be recovered or used in another way.

[48] A basic tax is set at NOK 1.23 for all bottles regardless of collection rate.
Infinitum. *The environmental tax system*. Available from: https://infinitum.no/english/the-environmental-tax-system
[49] Skattedirektoratet.
[50] Norwegian Waste Regulation Chapter 6 - *Forskrift om gjenvinning og behandling av avfall (avfallsforskriften) Kapittel 6. Retursystemer for emballasje til drikkevarer*; Miljødirektoratet. *Utkast til høringsnotat med konsekvensutredning: Endringer i avfallsforskriften kapittel 6 og 7*, 27.02.2020.

EU Directives to be implemented in Norwegian legislation

There are currently four EU Directives on waste and packaging that are EEA relevant, and that are expected to be implemented in Norwegian legislation. The table below gives an overview of the four relevant directives.

EU Directive	Implications for the EPR for Plastic Packaging
Directive (EU) 2018/851 of 30 May 2018 amending Directive 2008/98/EC on waste	The new Article 8a in the Directive introduces general minimum requirements for the EPR schemes. Inter alia, the financial contributions paid by the producer of the product to comply with its EPR obligations shall cover the following costs: • costs of separate collection of waste and its subsequent transport and treatment, including treatment necessary to meet the Union waste management targets, and costs necessary to meet other targets and objectives • costs of providing adequate information to waste holders • costs of data gathering and reporting The financial contributions paid by the producer of the product to comply with its EPR obligations in the case of collective fulfilment of extended producer responsibility obligations, are modulated, where possible, for individual products or groups of similar products, notably by taking into account their durability, reparability, re-usability and recyclability and the presence of hazardous substances, thereby taking a life-cycle approach and aligned with the requirements set by relevant Union law, and where available, based on harmonized criteria in order to ensure a smooth functioning of the internal market. Furthermore, the financial contribution shall not exceed the costs that are necessary to provide waste management services in a cost-efficient way. Such costs shall be established in a transparent way between the actors concerned.
Directive (EU) 2018/852 of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste	The Directive introduces new targets for the recycling of plastic packaging waste: • 50 % by 31 December 2025 • 55 % by 31 December 2030 Furthermore, the Directive introduces new rules on the calculation of the attainment of the targets are introduced. This involves that the recycled weight of packaging waste shall be measured when the waste enters the recycling operation. Member States shall establish an effective system of quality control and traceability of the packaging waste generated and recycled.
Directive (EU) 2015/720 of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags	The Directive covers plastic carrier bags with a wall thickness below 50 microns ('lightweight plastic carrier bags'), which represent most plastic carrier bags consumed in EU. These plastic bags are less frequently reused than thicker plastic carrier bags and are more prone to littering. The Directive introduces obligations to Member States to take measures to achieve a sustained reduction in the consumption of lightweight plastic carrier bags on their territory. Those measures may include the use of national reduction targets, maintaining or introducing economic instruments as well as marketing restrictions.

EU Directive	Implications for the EPR for Plastic Packaging
DIRECTIVE (EU) 2019/904 of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Single-use plastics Directive)	The Directive covers plastic products frequently found as a source of littering on European beaches. Article 8 obligates member states to ensure that extended producer responsibility schemes are established for all single-use plastic products. The producers of the listed products shall cover at least the following costs[51]: • Costs of awareness raising measures • Costs of waste collection for those products that are discarded in public collection systems, including the infrastructure and its operation, and the subsequent transport and treatment of that waste. The costs may include the setting up of specific infrastructure for the waste collection for those products, such as appropriate waste receptacles in common litter hotspots • Costs of cleaning up litter resulting from those products and the subsequent transport and treatment of that litter. • Costs of data gathering and reporting.

Proposed changes to the current waste legislation

The requirements following the four EU Directives are expected to be implemented in the Norwegian Waste Regulations. The Norwegian Environment Agency proposed in February 2020 a change in the Waste Regulations Chapter 6 and Chapter 7 to implement requirements in the EU Packaging and Packaging Waste Directive and the Directive on reducing the consumption of lightweight plastic carrier bags.

Some of the proposed changes with the possible greatest impact are listed below:

- Change of the primary subject of producer responsibility from "packers and fillers" to the producers and importers of packaging products and the importers of packaged products.
- Increase of the recycling target for plastic packaging from 30 % to 47 % by 2025 and 52 % by 2030.
- Applying the same requirements for composite packaging waste as for other plastic packaging.[52]
- Introduction of new rules on the calculation of the attainment of the targets. The amount of recycled plastic is measured when the waste enters the recycling operation.
- Introduction of a national plastic packaging register financed by the PROs.
- Requirement that the information reported by the PROs is accurate and reliable, and that the information is quality assured prior to reporting.

A plan for the implementation of the general minimum requirements for the EPR schemes following the EU Waste Framework Directive and the Single-use plastics Directive has not yet been presented by the Norwegian Environment Agency.

Following the EU Directive as regards reducing the consumption of lightweight plastic carrier bags, a large share of the commodity trade is member of “Handelens Miljøfond”. To participate in the fund, members pay a membership fee of 0.50 NOK per plastic bag. Most of the fund's members choose to pay an extra 0.50 NOK per bag consumed, which provides an incentive to reduce consumption and waste. The fund covers about 90 % of the market and have annual revenues of approximately 400 MNOK. A large proportion of their funds go to measures that can reduce plastic waste (for example, clean-up and prevention), mainly at a national level.[53] Following this Directive, the Norwegian Environmental Agency has proposed to introduce a reporting obligation for the PROs on the number of all plastic carrier bags put on the Norwegian market in the Waste Regulations Chapter 7.

In 2019, a working group was appointed by the Norwegian Government to assess and recommend measures for a new binding agreement between businesses and the Norwegian Ministry of Climate and Environment. The working group issued recommendations in April 2020 and advised that the new agreement should be designed to implement the EU Single-use plastics Directive. This would be enforced by introducing requirements for commercial businesses to report

[51] The obligations differ according to the different products.
[52] For products where plastic packaging constitutes more than 5 % of the packaging volume.
[53] Norwegian Environment Agency (2020). *Overordnet vurdering av produsentansvar for emballasje og opprydning av forsøpling.*

on the current volume of the single-use plastic products they put on the market and measures they plan to reduce this. Subsequently, quantitative targets could be introduced for reduction of the single-use plastic products covered by the Directive, as well as additional plastic products that the parties agree upon. The working group also suggested that an environmental agreement may implement the EPR requirements in the Directive, but that this producer responsibility should be regulated in order to ensure compliance by all businesses. It is also suggested that the agreement may include targets for increasing the amount of recycled plastic material in new products.[54]

In 2018, the Norwegian Environment Agency proposed the introduction of new obligations on waste producers with regards to separate collection of all plastic waste.[55] It is proposed that the municipalities shall ensure that the following share of plastic waste is separately collected:

- 50 % in 2025
- 60 % in 2030
- 70 % in 2035

Separate collection may by be substituted by another collection method with minimum the same performance rate, such as mixed waste sorting plants. The requirements cover both plastic packaging waste and other plastic products, and the Norwegian Environmental Agency has stated that the targets are not enough to reach the targets set in the EU Packaging and Packaging Waste Directive.

It is also proposed that commerce and industry should be obliged to ensure separate collection of waste which is similar in nature and composition to waste from households, although without setting a quantitative target. The proposed changes have by April 2020 have not entered into force.

[54] *Miljøavtale om plastprodukter. Rapport med anbefalte tiltak fra arbeidsgruppe opprettet av Klima- og miljødepartementet.* 1. april 2020.
[55] The Norwegian Environment Agency proposed a new Chapter 10a to the Waste Regulations.

4. Overview of legal framework and existing principles for EPR for plastic packaging in comparable countries

This chapter gives an overview of EPR schemes for plastic packaging in selected countries. Whilst the different countries have approached EPR in different ways, the countries face some similar challenges. A combination of factors such as the degree of financial and operational responsibility, competition between PROs, the design of monitoring systems and the definition of the producers that are subject to EPR, have an influence on the performance in each country.

Sweden

Sweden introduced an EPR scheme for plastic packaging in 1994, with national targets for recycling[56]. The legislation states that the producers and importers have the financial and operational responsibility for collection and treatment of plastic packaging waste, including the establishment of an infrastructure for collection of plastic packaging waste. Apart from this, the legislation gives the producers and importers a large degree of discretion in the establishment of an efficient collection system. The households are responsible for the separate sorting of plastic packaging waste. The PROs have both the financial responsibility for collection, sorting and recycling and the full organizational responsibility for the collection and treatment of plastic packaging waste.

There are two competing PROs in Sweden, which both are non-profit organizations. The PROs cover plastic packaging both from municipalities and commerce/industry. The largest PRO is Förpacknings- och tidningsinsamlingen (FTI), which has a market share of over 90 %. FTI owns the collection and infrastructure for plastic packaging, which is the same across all municipalities and relies on separate sorting by the households. The collection rate is relatively low due to the strong dependence on the households' ability to ensure separate sorting.[57] On the other hand, FTI has invested in its own plastic sorting facility, and carries out one extra step of the value chain compared to other European PROs.[58] Instead of exporting collected plastic packaging for sorting and recycling as Grønt Punkt Norge does, FTI has chosen to carry out the sorting operation itself. This reduces the number of intermediaries and allows FTI to send the sorted plastic packaging directly to a recycler, which gives FTI better overview and tracking of the plastic waste. FTI is also planning to install machinery that can wash and granulate the plastic, which will allow FTI to take operational responsibility of the entire value chain.[59]

[56] *Förordning om producentansvar för förpackningar*.
[57] Miljøstyrelsen, ed. Deloitte (January 2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald*.
[58] Förpacknings- och tidningsinsamlingen. *Ny Anläggning för sortering av plastförpackningar* https://www.ftiab.se/plastanlaggning.html [accessed 16.04.2020]
[59] FTI. *Cirkulärt tänkande a-la FTI*. https://www.naturvardsverket.se/upload/miljoarbete-i-samhallet/miljoarbete-i-sverige/avfall/avfallsradet/mote-20170510/fti-om-plast.pdf [accessed 16.04.2020].

All producers, regardless of the amount of plastic packaging waste they put on the market, are obliged to pay a fee to a PRO for the plastic packaging they put on the market (no lower limit). The number of free riders is estimated to be low, due to limited competition.

The fees charged by FTI are modulated according to whether the product is proved recyclable or not. Products that are proved recyclable attain the lowest fee, while the fees for other products are higher. For attaining the lower fee, the product must be composed of FTI's recommended plastic types (PE, PP and PET) and free of fillers. Black or multi-layered plastic packaging and packaging with a label that covers more than 60 % of the packaging product are excluded from the lower fee.[60]

By having one large PRO with a significant operational responsibility provides economies of scale, the Swedish model ensures cost efficiency in the system and supports the domestic recycling industry by pooling large volumes.[61]

According to Eurostat, the Swedish recycling rate was 48 % in 2017.[62]

The Netherlands

In the Netherlands, the EPR for packaging has been implemented in the law "Besluitbeheer verpakkingen 2014". The law imposes a legal obligation on manufacturers and importers of packaged products to ensure the prevention, collection and recycling of packaging.

The EPR scheme in the Netherlands is characterized by a pure financial model, where one monopolist PRO, Afvalfonds Verpakking (AV), provides full cost coverage to municipalities for collection, sorting and recycling of plastic packaging waste. The municipalities are free to choose collection and recycling system. In addition, AV finances several activities related to prevention, research, interdisciplinary collaborations, campaigns, etc.

The EPR applies to companies that market more than 50 tonnes of packaging annually. These companies pay a weight- and material-dependent fee to the PRO, which carries the producer responsibility for the members.

The Dutch waste sector is characterized by extensive supervision and control. Both AV and the central government regulator (Inspectie Leefomgeving en Transport (ILT)) conduct supervision of manufacturers and importers. For example, in-depth audits of the 150 largest companies are conducted every five years. Challenges related to "free riders" and adverse selection are close to non-existent.

The Dutch fee system minimizes the use of plastic packaging by imposing a very high fee rate (640 € / tonne). It incentivizes manufacturers to better packaging choices because of the high general fee imposed on packaging whose material composition cannot be specified by the manufacturer.

The producers state that the municipalities' responsibility for sorting, recycling and marketing of the recycled materials creates inefficiencies. It is argued that the freedom of the municipal waste companies results in excessive costs and lower quality in the recycled materials that they pay for. A secondary challenge to the above is ongoing discrepancies between the municipalities and the producers and thus an uncertainty about the future, which dampens private players' desire to invest in infrastructure.[63]

According to Eurostat, the recycling rate in the Netherlands was 50 % in 2017.[64]

Germany

With the adoption of the Packaging Order in 1991, Germany was among the first countries to introduce EPR for packaging in Europe. The German EPR system is characterized as an operational model. A key element of the German system is that waste from consumer packaging is handled in a separate waste system - a so-called "dual system". While

[60] Förpacknings- och tidningsinsamlingen. *Avgifter 2020*. https://ftiab.se/2914.html [accessed 16.04.2020]
[61] Miljøstyrelsen, ed. Deloitte (January 2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald*.
[62] Statistics from Eurostat: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191105-2
[63] Miljøstyrelsen, ed. Deloitte (January 2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald;* E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink (2017). *EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging*; Ocean Conservatory (2019). *Plastics Policy Playbook*.
[64] Statistics from Eurostat: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191105-2

the municipalities are responsible for the collection of organic and residual waste, the PROs are responsible for both the collection and treatment of post-consumer packaging. The PROs organize this in practice by contracting with local waste management companies and recycling facilities. The EPR scheme only covers household packaging.

EPR has been implemented as a fully operational model, with producers being fully responsible for - and controlling - costs. To ensure that the dual waste system delivers the service that citizens expect, minimum requirements are set for the PRO's coverage, communication, coordination with municipalities, documentation and verification.

In the first ten years of the system, Der Grüne Punkt - Duales System Deutschland (DSD) was the only (non-profit) PRO. It ceased in 2001 when the monopoly was broken, and since 2005 DSD has been a for-profit PRO in competition with about ten other players. DSD has today a market share of around 40 %. The overall assessment is that the competition has resulted in lower costs and improved service, but conversely has worsened the challenge of free riders due to limited supervision and compliance. In 2014, the percentage free riders were estimated to be around 25 %[65].

In response, Germany passed in 2017 a new packaging law with effect from 1 January 2019. A key element of the new law is the establishment of the Zentrale Stelle Verpackungsregister (Zentrale Stelle) and an online register (LUCID) with mandatory registration of all manufacturers and importers (no minimum limit for marketed packaging). The new rules also require manufacturers to register the quantity and material for all used packaging. Overall, the new German Packaging Act creates the foundation for a much tighter supervisory regime, which places high demands on data reporting and registration, and where the newly created central regulator sharpens its efforts against free riding. With the new register and requirements for data collection, a significant boost in management and thus goal achievement in the sector is expected. In the long term, it is also intended that the new producer register should be used for the preparation of standards for assessing the reusability of materials, which should be used in connection with fee modulation and incentives for eco-design.[66]

All producers, regardless of the amount of plastic packaging waste they put on the market, are obliged from 2019 to register in Zentrale Stelle and pay a fee to a PRO for the plastic packaging they put on the market.

Only the Green Dot licence fee is currently publicly available for DSD. Beverage bottles are subject to a lower licensing fee than other plastic.[67]

According to Eurostat, the recycling rate in Germany was 48 % in 2017.[68]

Belgium

The Belgian system is organized in a hybrid model where the municipalities are responsible for collecting and sorting household packaging, while the producers are responsible for the disposal and for recycling. Business packaging is handled in an independent operating system. Two PROs are responsible for each of the systems: Fost Plus is the PRO for household packaging waste and VAL-I-PAC is the PRO responsible for commercial packaging waste. The two companies are accredited and given exclusive rights for four years at a time.

The EU Directive on packaging and packaging waste has been implemented in Belgian legislation by the 1996 Interregional Cooperation Agreement, which ensures uniform handling of both household and commercial waste across the regions. The law was subsequently updated with more ambitious objectives in 2008. The EPR applies to companies that market more than 300 kg of packaging annually.[69]

[65] European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*.
[66] Miljøstyrelsen, ed. Deloitte (January 2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald;* Ocean Conservatory (2019). *Plastics Policy Playbook*.
[67] E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink (2017). *EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging*; PRO Europe (2019). *Participation Costs Overview 2019*.
[68] Statistics from Eurostat: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191105-2
[69] Companies that put less than 300 kg on the market pay a fixed fee of 30 € per year. Companies that only put on the market reusable products are exempted.

All producers and importers are required to report and must submit data on quantities and materials used to the respective regional authority ensuring participation in the Interregional Packaging Commission (IRPC). The IRPC aggregates data and is responsible for the overall supervision of the system.

Companies pay a fee to Fost Plus, the PRO for household waste, based on the type and quantity of marketed packaging. The limit value for compulsory participation in a PRO is the production of 300 kg of packaging on an annual basis.[70] The share of free riders is estimated to 7 %.

Belgium has a fee structure which imposes higher fees on composite and non-reusable packaging. The fee for composite packaging is significantly higher than for pure materials. For example, the fee for plastics is for PET bottles 346 € / tonne, HPDE bottles 341 € / tonne, and other plastic 510 € / tonne. Composite packaging, in which the majority material is plastic is subject to a fee of 618 € / tonne.[71]

According to Eurostat, the recycling rate in Belgium was 44 % in 2017.[72]

Key take-aways from the selected European countries

The organization of the EPR schemes for plastic packaging varies broadly across Europe. While the PRO in the Netherlands only assumes a financial responsibility for the collection and treatment of plastic packaging waste, EPR in Sweden is characterised by an operational model, where the largest PRO both finances and operates both the collection and sorting process. Germany is also characterised by an operational model, but through a contract-based approach. Belgium is similarly to Norway characterised by a hybrid model, where the responsibility for the downstream handling of waste shifts from the municipalities to the PROs after the collection of the plastic packaging.

An advantage of the financial model is that the system benefits from the municipalities' knowledge within waste collection and communication with the citizens. As the municipalities have the operational responsibility, they are incentivized to invest in sorting infrastructure and may achieve scale advantages. A risk of the financial model is that the system relies on the performance of the municipalities. Without incentives to improve the waste management systems and collection rates, there is a risk that the plastic waste is not collected and leaves the value chain. A strategy for mitigating this risk in the Netherlands, is the establishment of a benchmarking system in order to track the costs and hold the municipalities that perform weakly accountable. In Norway, the variation of performance varies widely across the municipalities. However, there is currently no benchmarking system identifying the performance and the cost-efficiency of the individual municipal waste companies.

A strength with the operational model is that the PROs control and are held accountable for the performance of the entire post-consumer handling of plastic packaging. In Sweden, FTI finances and operates the infrastructure for both collection and sorting and are currently assessing an expansion of the sorting facility in Motala to washing and granulation of plastic packaging. This creates synergy effects across the value chain as FTI has oversight and control over the whole value chain. FTI is for instance in a position to modulate their fees according to whether products are technically sortable in FTI's sorting facility and may also adjust the collection systems in order to maximize the output from the recycling operations. By taking control of the sorting process, FTI ensures a better control of the sorting process and may communicate directly with the recyclers without an intermediary. This is expected to increase both the quantity and quality of the plastic packaging waste streams. In Norway, where the PROs send the collected plastic waste abroad for sorting, the plastic waste is mingled with waste from other countries. Although the PROs have control of the volume, they lose the traceability of the actual waste streams.

A drawback with the operational model, is that the municipalities are not incentivised to invest in sorting systems that potentially could have scale advantages. Whereas Norwegian municipal waste companies have or are planning to invest in mixed waste sorting plants that may improve the waste management for all types of waste, the "dual" collection systems in Germany and Sweden do not provide the municipalities with such incentives. In Sweden, the collection

[70] Miljøstyrelsen, ed. Deloitte (January 2019). *Nabotjek vedrørende udvidet producentansvar for emballage og emballageaffald;* E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink (2017). *EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging*.
[71] PRO Europe (2019). *Participation Costs Overview 2019.*
[72] Statistics from Eurostat: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20191105-2

system has a relatively poor performance compared to the Norwegian mixed waste sorting plants, as it relies on separate sorting by the households.

In a hybrid EPR model, which is established in Belgium and Norway, the responsibility of the downstream handling of the waste is divided between the municipalities and the PROs. Usually, the PROs assume the responsibility for the plastic packaging waste after the municipalities have ensured the collection of the waste. This model has the potential of combining the best of two worlds, as it incentivises the municipalities to invest in waste management infrastructure that benefit all waste streams, such as mixed waste sorting plants, and enables the PROs to achieve scale advantages through the organization of the sorting and recycling of the waste, including the sale of sorted or recycled materials. The disadvantage is that the municipalities do not necessarily have the same incentives to increase the performance of the plastic waste collection systems. As different actors are involved, no individual actor has the full overview of the process in order to organize the operations in a way that maximizes the quality and quantity of the recycled plastic.

Other factors, in addition to the different models of responsibility, affect the performance of the systems. The number of PROs and the degree of monitoring are important factors that affect the producers' compliance with their responsibility and number of free riders. Competition between several PROs may lead to producers registering a share of the packaging in one PRO and another share in another PRO, without any actor having the complete overview of the volume that the producer has brought to market. This has been the case in Germany, where the number of free riders is high. In the Netherlands, where there is only one PRO and a strong monitoring regime, challenges related to free riding are near to non-existent.

Another factor that may affect the performance is that, some countries, including Norway, have set limit values for how much packaging a producer puts on the market in order to be defined as a producer. One hypothesis is that the absence of such a limit may *increase* the number of free riders because it is more difficult to monitor a large number of producers.[73] On the other hand, the removal of such a limit may remove the possibility of different interpretations and actors intentionally or unintentionally exploiting the borderlines.[74]

[73] It is argued that this is the reason that the number of free riders is higher in Belgium than in the Netherlands.
[74] Interviews with Norwegian PROs.

Existing principles for EPR for plastic beverage packaging in other countries

In 2018, Deloitte did a review of five international regions to compare policies, EPR schemes, share of responsibilities, and waste management systems for plastic beverage packaging.[75]

The key findings from the review of the five regions were:

- **Policies on eco-design of packaging and reduction/avoidance.** Actions on eco-design of packaging as well as reduction and avoidance of waste are observed throughout the world, not only in the selected case studies. However, these measures are still limited in scope.
- **Extended producer responsibility (EPR) and deposit return scheme (DRS).** The various case studies have a scheme where industry and/or producers are involved in financing and/or organizing management of waste beverage containers. This involvement is generally in the form of an EPR without deposit or with deposit.
- **Share of responsibilities between the Government and industry.** The selected case studies show that the split of responsibilities between the Government and the private sector varies in each jurisdiction.
- **Performance of different recycling regimes.** System performance rates vary from country to country and a combination of factors have an influence on the performance in each country. Further, many jurisdictions export their collected materials for recycling and do not have oversight of whether it is truly recycled.
- **Local industry and end-market for recycled materials.** Case studies have shown that a systemic approach to waste management is a crucial condition for success. In summary, it is crucial to address issues prevailing throughout the whole value chain to drive meaningful improvements to the waste management system, rather than solely focusing on the collection and post-consumer stages, as often happens.

The comparison between the regions is summarized in Table 5.

Table 5. Comparison of EPR for plastic beverage packaging in selected case studies (Deloitte, 2018)

	Hong Kong	California	Germany	South Africa	South Korea	Taiwan
Success factors	Planned PAYT scheme Partial bans Nascent PRS schemes	Strong legislation Citizen support PAYT scheme Strong public-private sector partnership Collection infrastructure Mandatory sorting	Deposit scheme for containers EPR scheme and PROs Collection and recycling infrastructure	Strong informal collection network Voluntary EPR scheme Local recycling Focus on entrepreneurship	Mandatory EPR Annual targets Mandatory waste separation at source PAYT schemes Monitoring of citizens	Strict regulations Mandatory sorting PAYT scheme Eco-design regulations Financial support to recyclers
Shortfalls	Moderate government intervention Lack of recycling infrastructure Lack of financial incentives for parties in the value chain	Lack of local recycling infrastructure Lack of traceability system Fragile financial equilibrium	Free riding in the EPR system Fraud in deposit system Loss of material	Limited funding from government Limited transparency from government Weak monitoring	Lack of space for collection infrastructure Hand sorting	Free riding by producers Levy evasion by producers

Source: Deloitte (2018). Drink Without Waste: Research Report. Available at: https://drinkwithoutwaste.org/wp-content/uploads/2018/12/deloitte-cn-ra-drink-without-waste-en-181204.pdf

[75] Deloitte (2018). Drink Without Waste: Research Report. Available at: https://drinkwithoutwaste.org/wp-content/uploads/2018/12/deloitte-cn-ra-drink-without-waste-en-181204.pdf

5. Efficiency of the current legislation and principles for EPR for plastic packaging in Norway

The current legislation covering the EPR schemes for plastic packaging does not cover all plastic packaging placed on the Norwegian market. Subsequently, not all plastic packaging waste is accounted for or financed through the EPR schemes for plastic packaging. Lack of strong regulatory requirements for producers and PROs increase the risk of free riding and adverse selection.

Limited reporting obligations and monitoring leads to incomplete data on plastic packaging waste

Currently, there is no complete overview of the total amount of plastic packaging put on the market in Norway. The amount reported by the PROs is significantly lower than the amount of plastic packaging waste found by analysing the content of waste generated by Norwegian households.[76] While the PROs reported that approximately 170,000 tonnes of plastic packaging were put on the market in 2018, it is estimated that the actual amount of plastic packaging set on the market is 222,000 tonnes. In total, an estimated amount of over 50,000 tonnes plastic packaging is not reported, and the collection and treatment of this plastic is not financed.

The difference between the actual amount of plastic packaging reported by the PROs and the total amount of plastic packaging put on the Norwegian market is made up by the four categories:

- Plastic packaging that is brought to Norwegian market by companies placing less than 1,000 kg per year on the market and that are exempted from the EPR scheme
- Plastic packaging that is brought to the Norwegian market through private imports (internet or cross-border shopping)
- Plastic packaging that is brought to the Norwegian market by "free riders" (producers who do not adequately comply with their obligations under EPR)
- Plastic packaging that is not reported by current members of PROs (underreporting).

The lack of the total overview of plastic packaging put on the market (the denominator) also creates uncertainty about the actual amount of plastic packaging that is recycled. According to the numbers reported by the PROs, 53 % of the plastic packaging[77] was recycled. Taking the estimated total amount of plastic packaging waste put on the market into

[76] The number reported by Grønt Punkt Norge corresponds to each citizen in Norway throwing 18 kg plastic packaging waste each year. Analysis of the content of household waste (including plastic packaging waste sorted separately), shows that approximately 25 kg plastic packaging waste is generated by each citizen yearly. By deducting the amount of moisture and dirt, the pure amount of plastic packaging thrown by each citizen yearly is estimated to 21 kg.

[77] The PROs currently report on the volume of plastic packaging *sent* to a recycling facility. The percentage will decrease after the introduction of a new measurement point, cf. the EU Waste Framework Directive. Including agricultural plastic waste.

account, the official recycling rate for Norway was 36 % in 2017.[78] As the volume put on the market in Norway is based on an estimate, there are uncertainties related to the official recycling rate.

The current legislation poses limited reporting requirements on producers and PROs. The volume packaging reported by the producers, is based on templates developed by the PROs. This differs from the EPR Scheme for waste electrical and electronic equipment (WEEE). While the amount of EEE products supplied to the market is based on exact customs data on volume per piece or per kilogram put on the market, the volume of plastic packaging put on the market is calculated by templates and self-reporting. This creates a greater uncertainty as to how much plastic packaging is put on the market compared to EEE products.

While the legislation covering Norwegian EPR Scheme for WEEE sets out as a criterion that data reported by the PROs is to be controlled by an external auditor[79], there is currently no corresponding requirements for the reporting of packaging. While the proposed amendments to the Waste Regulations involves a strengthening of the requirements related to documentation and quality control, it is not suggested that reported volumes of plastic packaging waste should be subject to a third-party verification.

Although the PROs may carry out inspections to ensure that the volumes reported by the members is correct, there is currently no system on national level in place to control that companies comply with their obligations under EPR. Consequently, free riders have less chance of being discovered and facing sanctions.[80]

Due to the incomplete overview of the amount of plastic packaging waste placed on the Norwegian market today, there is a risk of plastic packaging waste exiting the value chain without being accounted for. It is likely some of this unaccounted volume is collected through the municipal waste collection systems and sent to incineration. However, it is known that plastic waste still is exported from Europe to Asia through third-party traders, reducing traceability[81]. This lack of tracking makes it challenging to know how much unaccounted plastic packaging waste ends up as litter, is destroyed through uncontrolled incineration, or is subject to unregulated export.

Few incentives for recycling of plastic waste that is not covered by EPR

There are three categories of plastic packaging not covered by the current legislation on the EPR scheme for plastic packaging. These are:

- Plastic packaging put on the market by companies that together put on the market less than 1,000 kg
- Privately imported plastic packaging (internet or cross-border shopping)
- Other plastic products, such as toys, outdoor furniture and fishing equipment

The current exemption for companies placing less than 1,000 kg per year on the market from the obligation of being a member in a PRO may create loopholes for companies to exploit. One risk is that companies may choose to import or place on the market plastic packaging products through several affiliated companies. In this way, companies may avoid paying fees to the PROs, although they in sum put on the market more than 1,000 kg plastic packaging waste each year. Another consequence of the threshold of 1000 kg is that the recycling of the plastic packaging falling into this category is not financed. For some types of plastic that have low density, which especially concerns Expanded polystyrene (EPS)[82], 1,000 kg constitutes between 30,000 and 90,000 litres of waste if not compressed. As an example, one fish box in EPS weighs 0,6 kg. This means that a producer may put 1667 units of fishing boxes on the market without being

[78] The Norwegian Environment Agency *Plastavfall.* https://miljostatus.miljodirektoratet.no/tema/avfall/avfallstyper/plastavfall/ This figure is also according to the current measurement point and will decrease after the introduction of a new measurement point, cf. the EU Waste Framework Directive.
[79] The legal framework of the EPR of WEEE in the Norwegian Waste Regulation requires that the PRO must have audited the annual report on the total amount of EE waste collected, and every two years carry out auditing of distribution keys and average weight distributing collected amounts of EE waste to product groups with subgroups. The returning company shall employ an approved auditor and ensure that the audits are performed in accordance with the requirements set out in the regulation. Forskrift om gjenvinning og behandling av avfall (avfallsforskriften) - Kapittel 1. *Kasserte elektriske og elektroniske produkter* Lovdata, https://lovdata.no/dokument/SF/forskrift/2004-06-01-930/KAPITTEL_1#KAPITTEL_1 [accessed 16.04.2020]
[80] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje*; interviews with Norwegian PROs;
[81] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje*; interview with waste company.
[82] The density of EPS is low compared to water, with a normal density range of 11 to 32 kg/m3. Expanded Polystyrene (EPS) Technical Data (PDF). *Australia: Australian Urethane & Styrene. 2010.* [accessed 28.04.2020]

obliged to finance the collection of these products through a PRO[83] Meanwhile, EPS is an important source of marine littering.[84]

Categories of plastic products that are not defined as packaging are currently not covered by an EPR scheme. There are thereby no incentives for the producers to reduce the amount of waste generated or design the products to increase their durability, reparability, re-usability and recyclability and reduce the presence of hazardous substances. Furthermore, the waste that is generated from these products is not financed as the PROs do not receive payment for the recycling and treatment of this waste. As the PROs' performance is only measured on the amount their members put onto market, the PROs do not have incentives to collect this volume of waste and the collected waste is most likely to be collected with other residual waste and incinerated.[85] Without including further plastic packaging fractions in the EPR scheme, or raising the recycling targets for the PROs, the EU targets for plastic packaging will not be achieved unless the PROs overperform (collect more plastic packaging waste than they are obliged to).

Another consequence of the exclusion of plastic products and certain categories of plastic packaging from the EPR scheme is the generation of a "surplus" of plastic waste compared to what the members of PROs put onto market. This surplus of waste increases when adding free riders and underreporting from producers. The "surplus" of plastic waste means that the PROs can be more selective in the plastic waste fractions they collect, as they will have a large volume of plastic waste to select from, increasing the risk of adverse selection.[86]

Limited incentives for creating a circular value chain for plastic packaging through the current legal framework for EPR

The current legal framework for EPR provides the actors with few financial incentives to reduce the total amount of waste, stimulate reuse systems, reduce climate change gas emissions and increase the value of plastic.

Although the PROs are required to work to reduce the amount of packaging waste, there is no requirement in the current legislation for the PROs to differentiate the fees according to the life-cycle costs of the products (fee modulation). The aim of fee modulation is to ensure that fees best reflect the real costs of end-of-life management of products, based on the strict application of the waste hierarchy, i.e. with clear priority given to prevention, reuse, preparation for reuse and recycling.[87]

The current fees charged by Grønt Punkt Norge are to a little extent differentiated its fees in according to the products' circularity (see chapter 2). This poses the risk that the PROs "average out" the costs between all the producers, which gives the individual producer few economic incentives for designing durable, reparable, re-usable and recyclable products. Producers that on the other hand design their products according to these principles are not rewarded, and indirectly carry out the costs for producers that put products that are expensive and difficult to recycle on the market. Fost Plus in Belgium and FTI in Sweden are examples of PROs that modulate fees according to recyclability, providing the producers with a financial incentive for designing circular products.

The PROs in Norway currently encourage producers to take measures to ensure the circularity of their products through voluntary pledges and initiatives. Initiatives carried out by the individual PROs, such as *Plastløftet* ("the Plastic Pledge") initiated by Grønt Punkt Norge, encourage producers to design their products according to a life-cycle approach. Approximately 50 of the largest producers that have taken Plastløftet, and thus pledged to increase use of recycled plastic packaging, avoid the use of unnecessary plastic packaging and design recyclable products. However, such voluntary pledges only cover a certain share of the producers and are not alone enough in order to reach all producers in order to create a true circular economy for plastic.

[83] Interviews with PROs.
[84] The Norwegian Environment Agency. *Reduced Littering of Single-Use Plastics: Mapping and Analysis of Potential Measures to Reduce the Littering of Certain Single-Use Plastic Products*
[85] Interviews; KS Bedrift Avfall (2018). *Plastavfallet ingen vil ha*. https://www.samfunnsbedriftene.no/aktuelt/avfall-og-ressurs/plasten-ingen-vil-ha/ [accessed 16.04.2020].
[86] Interviews
[87] European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*.

The leading PRO for plastic beverage bottles, Infinitum, has however set out its own criteria for admitting plastic beverage bottles into the system, which excludes the bottles that diminishes the value of the plastic waste stream. The plastic beverage products that are admitted are subject to a differentiated fee according to the recyclability of the product.[88]

Unclear definition of producer

Under current legislation, the "producer" is defined as the company that imports or produces plastic packaging products, *or* packaged products to the Norwegian market. According to this definition, the producer may be a Norwegian producer of plastic packaging itself *or* packaged products ("packer and filler"), or a Norwegian importer of plastic packaging *or* packaged products. The current legislation opens for different interpretations of which of these are subject to producer responsibility. For products that are packaged in Norway, it is not clear from the legislation whether the "producer" is the producer or importer of the packaging, or the "packer and filler".

Grønt Punkt Norge has in practice defined the "producer" of plastic packaging as the "packer and filler". This definition is also used in most other European countries. However, this definition is not fully formalized, and within a competitive market, there is a risk that the members that the PROs are competing for are not clearly defined. Further, it may create loopholes for companies deliberately seeking to "free ride", or a risk that companies interpret the legislation differently, resulting in an under-estimation or an over-estimation (double counting) of the packaging put on the market. An unclear definition of producers may also complicate monitoring and enforcement and distort competition amongst the PROs.[89]

Limited cost coverage and cost transparency

The current Norwegian Waste Regulations defines that the producers shall finance collection, sorting, recycling and other treatment of packaging waste. It does not provide any specific guidelines regarding what level of compensation PROs should pay to the municipalities. As shown in chapter 2, the current fees paid by the producers to cover the costs of collection, transport, sorting and recycling of plastic packaging waste are low compared to other European countries. In the Netherlands, where the PROs fully finance the collection and further treatment of the waste, the fees are significantly higher than in Norway. Although geographic and demographic factors must be considered, there are indications that the current level of compensation from Norwegian PROs does not adequately finance the costs of collection and treatment for municipalities that have invested in optibag or mixed waste sorting plants.

There is a lack of transparency regarding the true costs the municipalities have related to the collection and sorting of plastic waste. The costs are not split by municipality or collection system (i.e. separate collection, optibag or mixed waste sorting plant), which makes it difficult to define a benchmark for what the necessary costs are for the municipalities. There is currently a lack of transparency regarding the cost-efficiency of the different collection systems for plastic packaging, which makes it unclear what the actual costs for collection and further treatment are. The lack of benchmarking and monitoring of the municipalities costs and results also provides the municipalities with less incentives to increase the cost-efficiency of the collection systems.

Mixed waste sorting plants have a higher cost of collection and sorting per tonne plastic packaging than what they are compensated for. Since the current level of compensation municipalities receive is based purely on collection rate, the mixed waste sorting plants are not compensated for handling the sorting, and in the case of IVAR, recycling process.

The producer does not hold responsibility for the clean-up of littering

It is defined in the Pollution Control Act that no person may empty, leave, store or transport waste in such a way that it is unsightly or may cause damage or nuisance to the environment. Those in breach are responsible for the necessary clean-up measures. However, under the current legal framework, there is no provision that mandates the producer of the product has any operational or financial responsibility for cleaning up the litter.

[88] Black and silver bottles are not admitted by Infinitum. If the bottle has a design that complicates the recycling process the bottle is subject to a higher fee than other bottles. For instance, PET-bottles in light blue are subject to a higher fee than for transparent bottles.
[89] Interviews with PROs.

The EU Single-use plastics Directive states that the EU Member states, in line with the polluter-pays principle, should introduce EPR schemes to cover the necessary costs of waste management and clean-up of litter as well as the costs of awareness raising measures to prevent and reduce such litter.[90] This is also aligned with the principle of full-cost coverage, where costs related to littering are integrated as part waste management costs (see chapter 1). Currently, municipalities bear most of the costs related to cleaning up litter from single use products. A study done by Deloitte for the Ocean Cleanup on the total costs emerging from Marine Plastic Pollution in land-based water sources estimates USD 1.22 per capita in economic impact and clean-up costs in Europe in 2018.[91] Numbers for Norway is not available in the study, and given the long coastline and the relative to Europe larger share of economic activity related to the ocean, the costs per capita are most likely higher.

The current legislation provides the individual producers with few financial incentives to make efforts to design their products in a way that may reduce littering.

Limited requirements for collection of different plastic packaging waste streams

The current legislation regulating the EPR schemes for plastic packaging sets out few requirements regarding collection of different plastic waste streams, other than that the PROs shall collect and receive a "fair share" of the same type of packaging that their members have put on the Norwegian market. There is currently no link between the waste that the members of the PROs put on the market, and the waste that is collected by the PROs.

Collective targets for the collection of different plastic waste streams allow certain plastic waste streams to have a lower collection and recycling rate than others. Plastic waste streams from commerce and industry that are more expensive to collect and recycle, such as mixed plastic waste, is expensive to sort and is therefore often incinerated. Multi-layered plastic packaging and rigid plastic are also difficult and expensive to recycle, and as such, are also sent to incineration more often than other fractions. EPS is collected in smaller volumes and is also often incinerated, as it takes up a lot of volume, and weighs next to nothing. Volumes must be large enough for EPS collection to be profitable, though waste collector companies are dependent on machines to compress the material, which are expensive. There is especially a large potential to collect more plastic packaging waste from the fisheries and construction sector. As PROs have limited obligations regarding which plastic waste streams and sectors to collect from, they have incentives to choose those which are the most cost efficient to collect and recycle.[92]

Without specific requirements for collection and recycling of different plastic waste streams, there is a risk that the PROs may underbid each other to attract members, while competing on collecting and recycling the plastic waste streams with the highest market value. Such a scenario may counteract the goal of achieving a true circular economy of plastics, as certain plastic waste streams leave the value chain without any steps taken to ensure the treatment and recycling of these products. Furthermore, an adverse selection of waste streams is not aligned with the principle of full cost coverage, as the PROs do not cover the treatment costs of the plastic packaging products market which are most difficult and expensive to recycle.[93]

Unlike other plastic packaging waste streams, EPS and plastic beverage bottles are covered by specific regulations and requirements. These plastic packaging waste streams also achieve a higher recycling rate. The current legislation related to the EPR scheme for plastic packaging sets out an individual recycling target for EPS of 50 %. For comparison, the recycling rate for EPS is over 19 % higher than other plastic packaging waste collected from households, and 12 % higher than for other plastic packaging waste collected from commerce and industry.[94]

Plastic beverage bottles are covered by a different set of regulations than other plastic packaging waste (see chapter 3). While these regulations do not set specific recycling targets for plastic beverage bottles, the combination of an environmental tax and a separate deposit return system provides efficient incentives for the collection and recycling of plastic beverage bottles. As shown in Table 1 the performance of the bottle-to-bottle scheme outperforms the EPR

[90] DIRECTIVE (EU) 2019/904 of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Single-use plastics Directive).
[91] https://www2.deloitte.com/nl/nl/pages/strategy-analytics-and-ma/articles/the-price-tag-of-plastic-pollution.html
[92] Interviews.
[93] Interviews with PROs.
[94] According to current measuring point for recycling.

schemes for other plastic packaging streams. The quality of the recycled PET is also considered as higher than for other waste streams.[95]

New recycling targets will provide incentives to improve waste management and the recycling of plastic packaging

The current legislation sets out a recycling target of 30 % for plastic packaging waste and 50 % for EPS. This target is today measured by the volume *sent* to the recycling facility, and not the actual recycled volume. The current target of 30 % is reached by the PROs and thereby the current legislation does not provide an incentive for PROs to collect and recycle a larger share of the plastic packaging put on the Norwegian market.

Currently, a large share of the plastic packaging placed on the Norwegian market is incinerated. This is both due to the variable performance of the municipal sorting systems and that certain plastic packaging waste streams from commerce and industry are currently not profitable for private waste companies to collect and recycle with the current market prices and compensation from the PROs. The PROs are not incentivized through the current legislation to compensate municipalities and private waste companies for collecting more plastic packaging waste for recycling than what is required to meet the current targets.

To attain the recycling targets set out in the amendment to the EU Directive on packaging and packaging waste will require a significant improvement of the current performance of the EPR scheme for plastic packaging in Norway. The introduction of the new targets will create an incentive to significantly improve the current waste management, as the new targets will require both a higher collection rate and a higher recycling rate of plastic packaging.

In order to achieve the new EU targets for recycling, there is a need to address the large volumes of plastic packaging waste that are not covered by the EPR scheme, or to raise the recycling targets for the PROs above the EU targets. As shown in Chapter 2, Norwegian PROs currently achieve a recycling rate of 53 % for their members, yet the official recycling rate for Norway is only 36 %. This discrepancy is due to the large volume of plastic packaging waste unaccounted for by the members of the PROs. Unaccounted waste can be explained either because it is not covered by the current EPR legislation, or because producers may free ride or underreport the volumes they place on the market. The Norwegian Environment Agency has suggested that all plastic packaging that is not beverage packaging may have a lower recycling rate target (47 % vs. 50 %), since the Deposit Return Scheme for beverages overperforms and can compensate for the lower performance. This lower target of 47 % further reduces incentives for the PROs of other plastic packaging products to reach the same standards as beverage packaging and improve collection and recycling processes across the value chain.

However, the introduction of new targets, is not alone enough in order to create a circular value chain for plastics. Legal requirements that ensure monitoring, control, enforcement and equal obligations amongst PROs described in Chapter 5 must be addressed in order to ensure that actors compete under the same conditions, and to avoid free riding and adverse selection.

[95] Deloitte Sustainability (2017). *Blueprint for plastics packaging waste: Quality sorting & recycling*. This may also be explained by the modulation of fees introduced by Infinitum.

6. Necessary principles and legal framework to facilitate transition to a circular economy for plastics through EPR in Norway

An effective transition to a circular economy for plastics through EPR in Norway, should include standards and common rules. The legal framework for EPR should ensure that the full life cycle costs to nature and society are embedded as part of overall costs, as well as provide strong mechanisms that hold producers accountable for plastic pollution. The transition should also consider the barriers and challenges companies face, whilst be designed to create a level playing field with incentives to reduce overall plastics use and waste. A high level of transparency and effective monitoring are critical requirements to achieving this goal.

Strengthening the reporting requirements to ensure control over the amount of plastic put on to market and recycled

Without a complete view of the total volume of plastic put on the market today, there is an increased risk that plastic waste leaves the value chain without being accounted for. Further, this creates favourable conditions for producers who do not comply with their obligations under EPR.

A plastic packaging register, which is proposed by the Norwegian Environment Agency, may provide a tool for authorities to identify “free riders”. However, a registry must be supplemented with measures that ensure monitoring and sanctioning of businesses who fail to comply with the legal requirements. Experience from other countries shows that monitoring and enforcement of the legislation is decisive in order to create a level playing field for competing producers and PROs. In the Netherlands, where such reporting exists in combination with extensive monitoring and control measures, challenges related to “free riders” and adverse selection are close to non-existent (see Chapter 4).

To ensure that the total volume of plastic waste is accounted for, including traceability for the treatment of this waste, the legal framework of the EPR scheme should include:

- A registry that covers all plastic products put onto the Norwegian market. The registry should cover all companies putting plastic packaging waste onto market and be used to identify companies that do not adequately comply with their obligations under EPR
- Requirements that companies report the actual volume of plastic packaging they put on the market as far as possible and are held accountable for the accuracy of the reported amounts.
- Requirements for third party verification of the reporting that the PROs submit

- It should be considered whether producers should report the actual instead of estimated volume of plastic packaging they put onto market
- Producers should be held accountable for the accuracy of the reported amounts
- Sanctions on companies that do not adequately comply with their obligations under EPR.

The legal framework should be extended to include all products containing plastic put on the market

The current legal framework for the EPR scheme for plastic packaging waste, as described above, does not cover plastic packaging supplied to the market by companies that supply less than 1,000 kg per annum, nor privately imported plastic packaging. Likewise, plastic products that are not packaging are not covered by an EPR scheme today. This means that the collection, handling and recycling of these products are not financed by the producers.

The PROs for plastic packaging that have been interviewed as part of this study are positive to an extension of the current EPR scheme to also cover other plastic products. New plastic products may be added to current infrastructure and systems that the PROs already have set up. An extension of the current scheme to additional plastic products will however entail a significant increase in the number of members, and will incur extra administration costs, which will need to be financed by the members. While it may be argued that the life span of plastic products that are not packaging make these products less relevant for EPR schemes, the PROs point out that the EPR scheme for EEE products and the deposit return schemes for scrap vehicles are efficient systems despite the long life span of these products.[96]

To help incentivize the circularity of all plastic products, the legal framework of the EPR scheme should ensure that:

- All companies that place plastic packaging on the market, regardless of volume, should have a producer responsibility for the products they place on the market.
- Privately imported plastic packaging is subject to a fee by the purchase of the product that finances the collection, transport and recycling of the waste generated by these products.
- An EPR scheme should cover plastic products that are not packaging, introducing EPR on whole product categories where the plastic and other properties of the product pose a risk to the environment and littering.

The problem of artificial turfs could be solved by EPR

As of today, it is the infrastructure owners – volunteer sports teams – who must ensure that rubber granulate/fill in artificial turf fields do not end up in the environment. Most teams have routines in place to ensure that doesn't happen. However, when upgrading fields, many of the old artificial turf pitches are not possible to recycle, as the grass consists of one plastic type, while the base is a different plastic type. This places a high cost on football teams to get rid of old artificial turf pitches. The discarded old turfs often end up in landfills in other countries. By introducing extended producer responsibility for artificial turf pitches, manufacturers will have incentives to make good quality recyclable products, as well as moving the cost from voluntary associations and teams to the manufacturers.

Introduce requirements of modulation of fees according to the true lifecycle costs

Fee modulation is an efficient measure to incentivize producers designing durable, reparable, re-usable and recyclable products. Additionally, the modulation of fees may be used to further incentivize use of recycled material and to reduce the presence of hazardous substances. It is found that fee modulation works best in combination with a transparent cost and fee structure from PROs. Modulation of fees may also be made explicit and visible to consumers, in order to guide their choices.[97]

[96] Interviews with PROs for plastic packaging.
[97] Interviews with PROs for plastic packaging; European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*.

The current legislation covering the EPR scheme for plastic packaging does not set any requirements for the modulation of fees paid by the producers to the PROs. In a competitive situation, PROs may desist from modulating fees if competing PROs do not do the same.

The implementation of the amendment to the EU Waste Framework Directive is expected to introduce new requirements related to the modulation of fees. To create a level playing field for the PROs and producers, while achieving a true circular value chain for plastics, the legal framework of the EPR scheme should ensure:

- An obligation for all PROs to modulate the fees according to a standardized life-cycle approach, incentivizing the producers to design durable, reparable, re-usable and recyclable products without the usage of hazardous substances.
- The fees should as far as possible reflect the true cost of collection adjusted for revenues earned from its sale to recycler.[98]

Ensure a clear definition of the producer in relation to EPR

Under current legislation, the term "producer" accommodates several possible definitions: the manufacturer or importer of plastic packaging *or* the producer or importer of the packaged products ("packer and filler"). Grønt Punkt Norge has in practice defined the producer of plastic packaging as the "packer and filler" and importers of packaged products. This definition is also used in most other European countries.

After the PRO organization in Norway changed from a monopoly to competitive duopoly in September 2019, the Norwegian Environment Agency has proposed to change the primary subject of producer responsibility from "packers and fillers" and importers, to the manufacturers and importers of plastic packaging and packaged products. The intention of the proposal is to clarify which actors that are subject to the obligations under the EPR.

This shift entails a risk of "packer and fillers" being held less accountable for design choices and the products they choose to put on the market. The rationale for defining "packers and fillers" as producers is that these actors design the packaging, including labels, and drive the demand for plastic packaging. Producers of plastic packaging are also likely to have less incentives to reduce the amount of plastic packaging put on market and have less influence of the design of products; manufacturers of packaging often are based in other countries, whilst "packers and fillers" are closer to the national market and have a better exact amount of packaging put on the market.[99] However, manufacturers of plastic packaging are in position to solve technical challenges and optimize the packaging material and need to also be incentivized through the producers to optimize the products in order to achieve circularity.

To ensure that the EPR scheme incentivizes upstream producers to engage in a real shift towards more circular products, the legal framework of the EPR scheme should ensure that:

- The actors that are subject to the EPR regulations are clearly defined
- The upstream producers with the most influence on the design of the specific products that are put onto the market are subject to the producer responsibility.

Ensure that EPR schemes cover of the full costs of collection, transport, sorting and recycling

The current legal framework for EPR does not clearly define which costs the PROs shall cover of the collection carried out by municipalities and waste companies. Municipalities that have invested in mixed waste sorting plants not only bear the cost of collection, but also sorting and in some cases recycling. These municipalities are not compensated for all the costs incurred in these processes and they are also compensated for the collection of a relatively smaller volume than municipalities with other collection systems.

The necessary cost of collection, sorting and recycling should be defined to ensure that the financing of these operations is carried out through the EPR scheme and not the municipal waste charges. In practice, this will mean placing the cost on the consumer rather than the average citizen, which is aligned with the polluter-pays principle. This

[98] Interviews and input from workshop 20.03.2020.
[99] Interviews.

requires that the actual costs the municipalities have for collecting, sorting and recycling plastic are mapped. The implementation of the provisions of the EU Waste Directive article 8a, is likely to shift costs related to the collection of plastic packaging from the municipalities upstream to the PROs.

It may be argued that the producers shall not be held responsible for covering the costs of inefficient waste collection system that municipalities choose. A measure to incentivize municipalities with weak performance, is to benchmark the current costs the municipalities have related to the collection of plastic waste. The PRO in Belgium, Fost Plus, has been especially successful in collecting data from the municipalities that is used for bench-marking the performance and cost-efficiency of the different municipalities. Similarly, the EPR scheme in the Netherlands use data to benchmark the costs the municipalities have related to waste collection and the volume collected from each citizen. A benchmarking system organized through the EPR scheme will provide transparency and may support national efforts of increasing the efficiency of the waste systems. A benchmarking could also be used by the PROs to reward collection systems that with high cost-efficiency and high collection rates.

For private waste companies, not all plastic packaging waste streams are profitable to recycle due to the current sales prices. This includes having calculated in the current compensation paid by the PROs. This is especially the case for small volumes of multi-layered plastic packaging and EPS.[100]

To shift the costs according to the polluter-pays principle, the legal framework of the EPR scheme should ensure that:

- The fees paid by the producers to collective PROs cover the full cost of providing the collection and treatment of plastic packaging in a cost-efficient way
- The costs related to the collection, sorting and recycling of plastic waste are benchmarked across the municipalities to ensure transparency and incentivize cost-efficiency
- In a model with shared organizational responsibilities between the municipalities and the PROs, the municipalities should be compensated by the PROs according to performance.

Ensure that EPR schemes cover of the costs of littering

The current legislation does not place any costs related to littering on the producers. The implementation of producer responsibility on single use products through the EU Directive on single-use plastics, may provide incentives for reducing the total amount of littering through the EPR scheme.

To incentivize producers to take responsibility downstream in the value chain, the legal framework of the EPR scheme should ensure that:

- The costs of cleaning up littering is borne by the producer
- The producers are held responsible for measures to prevent the occurrence of littering, including awareness raising measures and infrastructure in litter hotspots
- The fees paid by producers placing products that are identified as a risk of littering cover the true costs of the collection, transport, and treatment of the products.

Regulations incentivizing closed loops for different plastic waste streams

Homogenous plastic waste streams covered by separate requirements in the current legislation outperform other plastic packaging collected from households, commerce, and industry. As each type of plastic has its own recycling processes and different melting points, purity of the waste fractions simplifies the recycling operations and increases the quality of the secondary raw material. Plastic packaging waste from households has the lowest recycling rate, as the waste stream is mixed and has been co-mingled with other waste.[101] Diversified regulations on different plastic waste streams may both incentivise closed loops and reduce the risk of PROs selecting the plastic waste streams that are least profitable.

[100] Interviews.
[101] Interviews; Input from workshop 20.03.2020; European Commission, Bio by Deloitte (2014). *Development of Guidance on Extended Producer Responsibility (EPR)*.

To achieve higher quantity and quality of the plastic material sent to recycling, the legal framework of the EPR scheme should ensure:

- Separate requirements for distinct types of plastic as far as possible.
- Maintain separate targets and regulations for EPS and plastic beverage bottles that currently have high performance.
- Introduce an obligation for the PROs to ensure the collection of a proportional share of each waste stream their members put on the market. This will require that the PROs map the plastic packaging their members put on the market to the waste fractions.[102]

[102] Interviews; Input from workshop 20.03.2020.

7. Other measures that could facilitate transition to a circular economy for plastics in Norway

While changes in the legal framework for EPR are necessary to increase the circularity of plastics, other measures may be necessary to accelerate the creation of a true circular economy for plastics and end littering from plastics. However, to not undermine the efforts under the EPR scheme, it is important that any alternative mechanisms complement or extend EPR.

Fees or price subsidies to increase the use of recycled material

While the price of virgin plastic material is lower than for recycled material, the quality of virgin material is also both higher and more predictable. Quality and price constitute important barriers against the usage of recycled plastic material in new products.[103]

A measure that has been suggested to increase the usage of recycled material in new products is to even out the price difference between virgin and recycled plastic material. This may be done either by subsidizing the use of recycled material, removing VAT from recycled plastics, or imposing a fee on virgin material.[104]

While imposing a fee on the usage of virgin material is pointed out as an efficient measure, this measure is not supported by all actors in the value chain. Several risks of introducing such a fee have been pointed out by actors. Firstly, a fee on virgin plastic material may only constitute a burden if there does not exist suitable alternatives. This is especially applicable for food material, where the plastic packaging often is the most efficient material in preventing food wastage and few recycled materials that satisfy the requirements for food safety. Secondly, a national fee on virgin plastic material may cause a distortion of competition towards products produced in other countries.[105]

A measure that has been suggested by several actors, is to introduce an environmental tax for virgin plastic, similar the environmental tax of plastic beverage packaging today. The environmental tax could be reduced according to the share of the recycled material used in the product, as the current environmental tax on plastic beverage bottles is reduced today according to the recycling rate.[106]

[103] EuPC (2019). *The Usage of Recycled Plastic Materials by Plastics Converters in Europe.*
[104] Input from workshop 20.03.2020; interviews.
[105] Input from packers/fillers in the plastic value chain.
[106] Input from workshop 20.03.2020; interviews; Infinitum *Produsentansvaret sentralt i sirkulærøkonomien.* https://infinitum.no/aktuelt/produsentansvaret-sentralt-i-sirkulærøkonomien [accessed 17.04.2020].

Application of environmental criteria within public procurement

Requirements posed in public procurements may be a powerful measure to strengthen the market for durable, reparable, re-usable and recyclable plastic products. Public procurement may also be used as a tool for increasing the demand for recycled material, if this is used as a criterion.[107]

The Norwegian Digitalisation Agency has issued guidelines on how to reduce plastic products in public procurements and how public purchasers can demand "plastic smart" products.[108] The guidelines hold recommendations amongst others on identifying whether there is an actual need for the product, whether old products could be repaired instead for procuring new, as well as suggestions on criteria that promotes recyclability or the usage of recycled plastic.

The public sector procurement process has great potential for improvement with regards to planning their procurements in order to reduce the usage of plastic. According to the Norwegian Digitalisation Agency, there is a need to upgrade the knowledge of public producers in order to ensure circularity in the procurements. By introducing better quality requirements in public procurements may lengthen the life span of the product, and in turn also result in cost savings.

Large public procurement organizations, such as the government procurement centre, have a great potential in taking in account the life cycle costs in their purchases. As these organizations purchase large volumes, they could for instance demand quantity packaging (i.e. they could considerably minimize the amount of packaging in their bulk orders if clear standards were set). By splitting up large public procurements into several procurements, there could also be more competition in offering plastic smart products.

Public procurers may also to a greater extent ensure that the supplier has proper systems for collection and sorting of waste. Furthermore, all contracts should also include a provision that the supplier of goods is registered as member in a PRO. It is also important that public sector institutions themselves have routines in place in order to ensure reuse of products.[109]

There are currently few good examples of plastic smart public procurements, but some organizations distinguish themselves from others (see text box).

Examples of "Plastic smart" public procurements

The municipality of Oslo has issued an action plan on how to address plastic littering in the Oslo fjord. The plan sets out targets amongst others on how Oslo can become the first municipality to eliminate the use of unnecessary single-use plastic products. Fredrikstad munipality also has an action plan for reducing plastic.

A good example of a public sector institutions has routines in place in order to ensure reuse of products is NTNU. NTNU has a reuse site for second-hand goods. Before a new procurement of furniture is carried out the unit that needs the product should first investigate whether the product is available on NTNU's reuse site.

Certification schemes

Introduction of certification schemes that defines criteria is suggested as a measure that may accelerate the shift towards a circular value chain for plastic. Certification schemes and standards may be developed for standardising the definitions for recycled plastic, reuse products and recyclability.

Given that the criteria are well specified and based on research, certification schemes may increase the producers' incentives to design products that are re-usable, recyclable and use more recycled plastic material. Certification

[107] Input from workshop 20.03.2020.
[108] https://www.anskaffelser.no/verktoy/veiledere/hvordan-redusere-plast-i-anskaffelser-og-bruke-plast-smartere
[109] Interviews.

schemes may also create a level playing field by rewarding efforts that contribute to increase the circularity of plastic products, which benefits all actors.

Certification schemes may facilitate the purchase of sustainable products, both for private consumers and public procurers. It is argued that the usage of a certificate scheme that is harmonized with the EU is more efficient than creating national certification schemes.[110] However, a certification scheme could be developed in Norway and linked to the current EPR schemes in Norway. Insight from the mixed waste sorting plants may also provide valuable information in order to establish the criteria for recyclability.

Standardization of product design

A great challenge towards increasing the quantity and quality of recycled material, is that each plastic waste stream that is collected and sent to recycling consists of a range of different variants of the same plastic type that degrade the quality of the output. Sorting and recycling of uncommon plastic types such as PS, PVC and PLA, as well as black or dark plastics, is often difficult due to technical limitations. The complexity of specific materials, such as multilayer packaging, degrades the quality further. Other variations such as additives and differences in viscosity also leads to a high variety of products and pose challenges in the recycling process.

Standardization of product design and the composition of plastics is an efficient measure to increase the quantity and quality of recycled material. Standardization may also be introduced to increase the reusability of products. Introducing standards for plastic products will lead to more homogeneous waste flows and a higher quality of recycled material.[111]

Standardization of design and the composition of plastic products may be obtained through increased communication and information measures across the value chain. There are examples of informal efforts to standardize product design in the value chain for plastic in Norway. For instance, waste companies have encouraged farmers to avoid colored agricultural foil, as the waste company experienced that the usage of colors degraded the value of the recycled material.[112]

The development and usage of international or national standards may be an efficient measure to reach this. A standard is a common "recipe" for how something should be created or implemented, and standardization is the process from need / idea to finished standard. Standards is also a means to promote innovation, as it gives a common starting point, novel solutions can be implemented more easily.

In Norway, standardization is done by both private and public actors in interaction, and Standard Norway leads the process towards a final standard. Proposals for a new standard can be made by Standard Norway's members, the board, sector boards, various stakeholder groups and other stakeholders. Standard Norway will evaluate the proposal based on market needs and resource access (participation and financing). The feedback from the market participants forms the basis for Standard Norway's further follow-up.

Innovation and optimization of product design

To create a circular value chain for plastic, further innovation and research is needed for optimizing packaging. Areas that need to be further explored are for instance:

- Development of recyclable plastic packaging of mono-material that makes collection, sorting and recycling more efficient
- Development of cellulose products that may replace plastic material
- Development of reuse products.

In parallel, it is important that the packaging keeps its functionality, especially for food packaging. Efforts to reduce the volume of plastic and increase the recyclability must be rigorously tested and researched to avoid undesired outcomes, such as food wastage and increased climate pollution.

[110] Input from workshop 19.03.2020.
[111] Input from workshop 20.03.2020; Deloitte Sustainability (2017). *Blueprint for plastics packaging waste: Quality sorting & recycling*.
[112] Interview with waste company.

Current efforts related to innovation and optimization of packaging are financed by individual companies that wish to contribute to creating a circular value chain. For more companies to innovate and research packaging to advance the progress towards a circular value chain, financial support may be necessary for the companies to keep their competitiveness. Such financial support could for instance come from EPR schemes and be targeted at promising initiatives.

To ensure synergies of the different efforts carried out, it is important that knowledge and guidelines for sustainable product design is communicated. The PROs, which interact with actors in all parts of the value chain, should play a leading role in ensuring the sharing of information.[113]

Deposit return schemes on additional plastic waste streams

Introduction of deposit return systems for additional waste streams is suggested as an efficient measure to increase the collection rates of plastic waste, and thereby increasing the circularity of plastics. A deposit return scheme may be introduced through EPR legislation, or as a voluntary measure coupled by other incentives. In the current legislation, the deposit return scheme has a high coverage though it is not mandatory. The reason for the high adoption rate is the environmental tax, which incentivizes producers to join a return scheme that achieves the environmental targets, which today is Infinitum. Deposit return schemes may be organized individually or collectively through PROs. For instance, Ringnes has newly introduced a deposit return system for beer casks. The user pays a deposit of 40 NOK when purchasing the cast and receives the deposit back when returning the cask. Infinitum organizes the collection of the casks.[114]

Deposit return schemes have overall a higher performance than other collection systems as they both achieve higher collection rates and higher quality of the material collected and recycled. The introduction of a deposit return scheme in Germany has for instance led to significantly higher collection rates compared to other countries.[115] Deposit return systems may be especially relevant for plastic waste streams from the industry sector, as the volumes of the different plastic types are higher. A deposit return system may also reduce the significant amount of plastic waste from commerce and industry that is incinerated.

[113] Input from workshop 20.03.2020.
[114] Infinitum. *Innfører pant på ølfat* https://infinitum.no/aktuelt/nå-er-det-pant-på-ølfatene
[115] Deloitte Sustainability (2017). *Blueprint for plastics packaging waste: Quality sorting & recycling*.

Incentives for commerce and industry to reduce the amount of plastic waste and ensure reuse and proper sorting

Today, commerce and industry are incentivized to have separate collection of plastic waste, because this reduces the costs of the collection of residual waste. However, many companies are still lagging in ensuring separate collection of waste. Lack of knowledge and awareness is an important reason for this.[116] In order to incentivize the efforts of companies that produce waste to reduce and ensure proper sorting of the waste, various measures may be carried out:

- Pose stricter and quantitative requirements for sorting plastic waste for commerce and industry
- Financial incentives for businesses that reduce the amount of plastic waste
- Customized collection systems for small companies
- Tax reliefs on reuse products
- Incentivize waste companies to offer washing and repair of plastic products as additional services.[117]

The incentives may be provided through governmental measures such as tax reliefs and financial subsidies, but also through the current EPR schemes. PROs may incentivize waste companies to organize better solutions for collection and raise awareness to increase the collection rates from all companies.

Incentivize investment in mixed waste sorting plants

Plastic products that are not collected by the municipalities today are primarily sent to incineration and energy recovery. As described in chapter 2, the performance of the collection systems for plastic packaging varies broadly across municipalities. Municipalities with a separate collection system for plastic packaging send the plastic packaging that is not sorted by the citizens to incineration, while municipalities that have invested in mixed waste sorting plants only send a remaining share of mixed plastic from the sorting process to incineration and achieves a significantly higher collection rate than other systems.[118] Similarly, private waste companies send plastic waste to incineration, depending on the value of the waste. Mixed waste streams are more often sent to incineration than homogenous waste streams.[119]

The Norwegian Environment Agency has assessed that to reach the EU recycling targets, most residual waste from households and sources that generate similar waste must probably go through a mixed waste sorting plants before incineration.[120]

In addition to ensuring full costs coverage of the operations that the mixed waste sorting plants through the EPR schemes, two central measures have been found to accelerate the establishment of mixed waste sorting plants:

- Fees on incineration of waste containing fossils
- Requirements of separate collection of plastic waste

Sweden has introduced a tax on waste incineration for production of electricity and district heating that will take effect from 2020. The tax will be SEK 75 per tonne in April 2020 and will increase gradually to SEK 175 per tonne by 2022. Certain waste streams such as hazardous waste, biofuels or animal-by-products among others will be exempted from the tax. The tax is intended to lead to higher incineration gate fees and to motivate an increased sorting of plastic waste prior to incineration.[121] The design of the tax has however been heavily debated, as it is argued that a general tax on incineration on waste actually may disincentivize the sorting of plastic waste as it does not reward sorting efforts.[122] Two central heating plants in the Stockholm area are currently planning sorting facilities to sort out plastic waste prior

[116] Interview; Input from workshop 20.03.2020.
[117] Input from workshop 20.03.2020.
[118] The mixed waste sorting plants sort out a mixed plastic fraction, which due to its negative value is sent to incineration plants. Potentially, more plastic could be recovered from this waste stream if sorted again.
[119] Deloitte (2019). *Sirkulær plastemballasje i Norge: Kartlegging av verdikjeden for plastemballasje.*
[120] Miljødirektoratet (2019). *Avfallsplan 2020-2025.*
[121] Sveriges Riksdag. *Skatt på avfallsförbränning*. https://data.riksdagen.se/fil/B008D5B9-4829-4B08-931D-D7A942CE2CD7
[122] See for instance: Socialdemokraterna (2019) *Motion om skatt på avfallsförbränning;* Tekniska Värken: *Skatten som motverkar återvinning.* *https://www.tekniskaverken.se/om-oss/tekniska-verken-tycker-bloggen/skatten-som-motverkar-atervinning/*.

to incineration. It is estimated that the amount of plastic that is sorted out will lead to a fivefold increase of the quantity plastic waste that is collected and sent to recycling.[123]

A tax on the incineration of fossil fuels in Norway may, if correctly designed, incentivize investments in sorting facilities prior to incineration. Zero has suggested a tax on incineration of waste in energy recovery facilities without CCS. It has been pointed out that it is important that a tax finances innovation to reduce the amount of waste that goes to incineration.[124] It is also argued that a tax will incentivise efforts to create pure waste streams, as these will obtain more favorable prices than those which supply unsorted waste.[125]

While the effects of a tax on incineration is debated, another suggested incentive that may increase the sorting of plastic material prior to incineration, is to introduce obligations on the waste producers to ensure the separate collection of plastic waste.[126] As described in chapter 3, the Norwegian Environment Agency proposed in 2018 an obligation for municipalities and commerce and industry to sort out plastic waste. It is argued that the introduction of a regulation on sorting can potentially trigger the construction of additional mixed waste sorting plants and material recycling facilities in Norway.[127]

To incentivize other municipalities in investing in such mixed waste sorting plants, adequate compensation is needed to ensure a full cost coverage of operations (collection and treatment of plastic) through the EPR scheme in order. Rewarding increased cost-efficiency in the collection of waste will both contribute to incentivize investments in mixed waste sorting plants, whilst also benefit the PROs as they will receive a higher output from these municipalities. PROs therefore play a key role in incentivizing the establishment of new mixed waste sorting plants.

National plan for sorting and recycling of plastic waste in Norway

An important measure named by actors in the various parts of the value chain, is the development of a uniform national plan on how to ensure an efficient infrastructure for the collection, sorting and recycling of plastic waste in Norway. It is acknowledged that it is not possible to achieve the EU targets with the current differences in efficiency across the municipalities. The establishment of additional sorting and recycling plants in Norway may also increase the traceability of the waste streams.

The actors have identified several points that should be addressed through a national plan:

- Better use the capacity of the existing Norwegian mixed waste sorting plants
- Identification of the need for additional mixed waste sorting plants
- Benchmarking of the performance of different municipalities
- Better organization of separate waste collection systems in vacation housing areas and outdoor areas.
- Better waste collection systems in ports to prevent littering or uncontrolled incineration of plastic waste.
- Support of the production of high-quality recycled material in Norway, which will in turn generate wealth creation.[128]

The mixed waste sorting plants of IVAR and ROAF only run at one and two shifts, whilst they technically could run at five shifts. While these municipal companies today over approximately 700,000 inhabitants in Norway, the full utilization of these existing plants may increase the number of inhabitants covered by a mixed waste sorting plant manifold. There are currently several barriers towards the establishment and full utilization of mixed waste sorting plants that such a plan should address:

- Uncertainties related to whether and how municipalities may legally send their waste to established mixed waste sorting plants in other municipalities.

[123] Sveriges radio. *Avancerade anläggningar i Stockholm ska öka plaståtervinningen*
[124] Zero (2019). *Nye forretningsmodeller for karbonfangst og -lagring*; Næringspolitikk.no. https://naringspolitikk.no/2018/12/07/kjenseths-forslag-treffer-riktig/ ;
[125] Input from workshop 20.03.2020. Norsk Gjenvinning: Svensk forbrenningsavgift på restavfall påvirker det norske markedet. https://blogg.norskgjenvinning.no/innforing-av-forbrenningsavgift-pa-restavfall-i-sverige-pavirker-det-norske-markedet
[126] Avfall Norge (2019*). Avfall Norges innspill til statsbudsjettet 2019*. https://s3-eu-west-1.amazonaws.com/avfall-norge-no/dokumenter/Horingsnotat-Avfall-Norges-innspill-til-statsbudsjett-2019_Energi-og-miljokomiteen.pdf
[127] Østfoldforskning and Mepex (2018). *Utsortering og material-gjenvinning av biologisk avfall og plastavfall*
[128] Input from workshop 20.03.2020.

- The existing mixed waste sorting plants only have dispensation to run two shifts
- There are currently few financial incentives for other municipalities to send waste to established mixed waste sorting plants, as the gate fee to the incineration facilities often is lower than the gate fee to the sorting plants.
- Investment costs of a mixed waste sorting plants affect the refuse collection charges that the citizens pay, especially the first years due to municipal rules for periodisation of capital expenditures.

A national plan for sorting and recycling of plastic waste in Norway should be considered in relation to the EPR schemes, as these currently constitute a significant part of the framework within which the municipalities operate.

Digital marking and tracking of waste

Digital marking and tracking of waste may improve the accuracy of the sorting of waste, which in turn may increase the material yields from the sorting process and the quantity of recycled material. In addition, digital marking may increase the output quality of recycled plastic and thereby increasing the value of the recycled material.[129]

HolyGrail is a pioneer project run by participants of the New Plastics Economy initiative. With the goal of improving the sorting of post-consumer packaging, with the help of chemical tracers and digital watermarks. One approach to improve automated detection and sorting is to tag the plastic product with a unique code, for instance using chemical tracers and digital watermark. This may enable sorting of much higher granularity and quality. The method may enable recycling data to be broken down to the individual product and give information that can be used to improve design choices and eliminate packaging that cannot be recycled. A lot of work is still to be done to until the methods can be used at scale. The time frame of the initiative is about five years.

In a Norwegian context, digital marking may be used to increase the quality and output from the mixed waste sorting plants in Norway. A suggested measure is to investigate the case for digital marking in Norway. Digital marking may also be a more cost-efficient investment for mixed waste sorting plants, rather than upgrading to more sophisticated detection technology based on material properties.[130]

Digital marking could also provide an opportunity to hold producers accountable for the specific products that they put on the market. By digitally tracking the products put out by the individual producers, it may be possible to connect the products that are put on the markets with the waste streams. This information could be used to estimate the true costs related to the treatment of specific products, which in turn could be reflected in the fees that are paid for the product. In addition, Digital marking could be used to support the prevention and clean-up of littering. Producers can be held accountable by digitally tracing products found as litter in nature back to the producers that put them on the market.

Other measures to increase the circularity of plastic

Other measures that are found by the actors to create a circular value chain for plastic and reduce the amount of littering are the following:

- Mobilization of industry actors to find which areas in which they can use recycled plastic.
- Development of chemical recycling for plastic that is not possible to recover by mechanical recycling. Chemical recycling will enable the usage of recycled plastic in plastic packaging for food. However, the total impacts of chemical recycling must be thoroughly researched.
- Requirements for better fastening of materials that are transported and stored to avoid plastic leakage into nature
- Closer collaboration between government and private sector in finding efficient solutions.
- Ban on plastic products that are not reusable or recyclable or pose a significant environmental risk.
- Introduce requirements of capturing micro plastics from municipal sewage systems.

[129] Input from workshop 19.03.2020.
[130] *HolyGrail: tagging packaging for accurate sorting and high-quality recycling* https://www.newplasticseconomy.org/assets/doc/Holy-Grail.pdf ; Input from workshop 20.03.2020

8. Conclusion

Extended Producer Responsibility (EPR) is a potentially efficient and powerful measure to achieve a circular economy for plastics. EPR builds on the principle of polluter-pays, by shifting the responsibility for the treatment of waste upstream to the producer. Well-designed EPR schemes can reduce the burden on public budgets and incentivize effective end-of-life collection and treatment. In addition, EPR may provide producers with increased incentives to design durable and recyclable products, which in turn can contribute to reducing pollution. Countries that have implemented EPR policies have generally achieved higher collection and recycling rates than other countries.

This study starts with an overview of the current organization and performance of EPR schemes for plastic packaging in Norway in Chapter 2, followed by details of the current legal framework for these EPR schemes in Chapter 3. Chapter 4 provides an overview of EPR schemes for plastic packaging in comparable countries to Norway, highlighting advantages and weaknesses of the different models.

Chapter 5 assesses the efficiency of the current legal framework for EPR for plastic packaging and identifies the barriers that hinder the transition to a true circular economy. Necessary changes to the legal framework are described in Chapter 6, while other measures that could accelerate the creation of a true circular value chain for plastics and prevent plastic pollution are presented in Chapter 7.

Key findings

This study has identified the following weaknesses with the current legal framework for EPR for plastics in Norway:

- **Limited reporting obligations and monitoring lead to incomplete data on plastic packaging waste.** There is currently no complete overview over the total amount of plastic packaging put on the market in Norway, which creates uncertainty over the actual amount that is recycled. Analyses of the content of waste generated by Norwegian households have shown that the amount of plastic packaging waste reported by the PROs was significantly lower.
- **Few incentives for recycling of plastic waste that is not covered under the EPR scheme.** Although Norway has established EPR schemes, they only cover plastic products defined as packaging. For plastic types not covered by the current EPR scheme, PROs do not receive payment for recycling and waste treatment. Therefore, they have few incentives to collect and recycle this additional plastic waste, and it will most likely be incinerated. Another consequence of the narrow scoping of the EPR scheme is the generation of a "surplus" of plastic waste compared to what the members of PROs put onto market. This means that the PROs can be more selective in the plastic waste fractions they collect, with incentives to focus on those which are most cost-efficient to process.
- **Limited incentives for creating a circular value chain for plastic packaging through the current legal framework for EPR.** The current legal framework for EPR provides the actors with few financial incentives to reduce the total amount of waste, stimulate reuse systems, reduce climate change gas emissions, and increase the value of plastic. There is no requirement in the current legislation for the PROs to modulate the fees according to eco-design. This poses the risk that the PROs "average out" the costs, which gives the individual producer few economic incentives for designing durable, reparable, re-usable and recyclable products.
- **Unclear definition of the producer that is subject to the EPR provisions.** Under current legislation, the term "producer" allows for several interpretations. Since it is the "producer" that is subject to ERP provisions, this imprecise definition may create loopholes for companies deliberately seeking to "free ride", or increase the risk that companies interpret the legislation differently.
- **Limited cost coverage and cost transparency.** In Norway, local municipalities are free to choose their own waste collection system. However, the PROs do not cover the full collection and sorting costs for those that have invested in expensive infrastructure, such as mixed waste sorting plants. There is currently low transparency regarding the cost-efficiency of the different collection systems for plastic packaging, which makes it unclear what the actual collection and sorting costs are. It also provides the municipalities with fewer incentives to increase the cost-efficiency of their waste management systems.
- **The producer does not hold responsibility for the clean-up of littering.** Under the current legal framework, there is no provision giving the producer an operational or financial responsibility for cleaning up the litter generated by

their products. This provides the producers with few incentives to make efforts to prevent and reduce plastic littering.
- **The PROs have limited obligations to ensure collection of all plastic waste streams.** This creates a risk that the PROs may underbid each other to attract members, while competing on collecting and recycling the plastic waste streams with the highest market value. Such a scenario may counteract the goal of achieving a true circular economy for plastics, as certain plastic waste streams leave the value chain without any steps taken to ensure the treatment and recycling of these products.

Recommendations

Changes to legal framework

To address the challenges above and achieve a circular value chain for plastics, whilst also eliminating littering, the following changes to the Norwegian legal framework have been identified as necessary:

- Strengthening the reporting requirements for the producers and PROs to ensure control over the amount of plastic packaging put on to market and recycled
- The legal framework for EPR should be extended to include all products containing plastic put on the market
- Clear definition of the actors that are subject to the EPR regulations. The legal framework should ensure that the producers with the most influence on product design are held responsible for the products they put on the market
- Introduction of requirements for modulating fees according to the true lifecycle costs
- Ensuring that the EPR schemes cover the full costs related to collection, transport, sorting and recycling
- Ensuring that the EPR schemes cover of the costs of plastic littering
- Introduction of regulations that incentivize closed loops for different plastic waste streams.

Today, EPR for plastic packaging is regulated by the Norwegian Waste Regulations. These are currently being revised following recent amendments to the EU Waste Framework Directive, and the EU Packaging and Packaging Waste Directive. Proposed changes include adoption of new EU targets for recycling of plastic packaging waste, as well as new criteria related to the measurement of recycled packaging waste. Both changes increase producer obligations further than today. In addition, the Norwegian Environment Agency has proposed the establishment of a packaging registry. Depending on the design, the new registry may support better control and oversight over the volumes of packaging producers put on the market and increasing transparency so that producers adequately comply with their obligations under EPR. While a key step forward, these proposed changes will not address all the weaknesses in the current framework and are only considered as a prerequisite to achieving the goal of a true circular economy for plastics and stop plastic pollution.

Other measures

While changes in the legal framework for EPR are necessary to increase the circularity of plastics, other measures including taxes, fees and other financial instruments, may be necessary to accelerate the creation of a true circular value chain for plastics and end littering from plastics. However, to not undermine the efforts under the current EPR scheme and legislation, it is important that any alternative mechanisms act as complementary measures or extend EPR. Selected alternative measures are listed below:

- Fees or environmental tax on the usage of virgin plastic material
- Price subsidies to increase the usage of recycled plastic material
- Application of environmental criteria in public procurement of plastic products
- Certification schemes for plastic products
- Standardization of product design
- Innovation and optimization of product design
- Deposit return schemes on additional plastic waste streams
- Incentivize commerce and industry to reduce the amount of plastic waste and ensure reuse and proper sorting
- Incentivize investments in mixed waste sorting plants
- Develop a national plan for sorting and recycling of plastic waste in Norway
- Digital marking and tracking of plastic products

Sharing Norwegian practices globally

The study also identifies features of the current EPR scheme in Norway that are deemed efficient in creating a circular value chain for plastic. There is both a potential for extending these measures in Norway and for exporting these measures to other countries:

- Plastic beverage bottles are covered by a different set of regulations than other plastic packaging waste. While these regulations do not set specific recycling targets for plastic beverage bottles, the combination of an environmental fee and a separate deposit return system provides efficient incentives for the collection and recycling of plastic beverage bottles. The performance of the deposit return scheme outperforms the EPR schemes for other plastic packaging streams. The quality of the recycled PET from beverage bottles is also higher than for other waste streams.
- Mixed waste sorting plants have a significantly higher recycling output than collection systems that rely solely on citizens to separate and sort of plastic packaging waste. Mixed waste sorting plants receive and may sort all plastic packaging that is technically feasible, while a large share of plastic packaging that is not sorted separately in other systems is incinerated. In addition, innovation related to digital marking increases the potential of the performance of the mixed waste sorting plants. The export of best practices from Norway related to mixed waste sorting plants may contribute to the global effort of achieving a circular economy for plastics.

The establishment of a new legally binding international agreement to combat plastic pollution is currently being considered in international forums. The Norwegian Government has committed to work for the establishment of such an agreement in a Nordic Ministerial declaration from 2019, and as a voluntary commitment to the Our Ocean Conference. The revision of the current legislation provides an opportunity to design best practice national regulations. These can serve as a base model for guidelines and minimum standards on EPR that could be included in an international agreement.

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