

MEMO: on the “The Ellen MacArthur Foundation’s Plastics Initiative 2022 Recycling Rate Survey results summary.” How EPS post-consumer packaging is in fact **recycled ‘in practice and at scale’**.

1. Executive Summary

This memo critically reviews the replies to the Ellen MacArthur Foundations survey for EPS recycling rates and examines them with reference to publicly available data as well as reports from NGO’s and government published reports. For many regions the Ellen MacArthur Foundation respondents underestimate the recycling rate of post-consumer EPS packaging waste.

It is hypothesized that this underestimation is due to a mix of the following factors.

- 1) EPS recycling volumes are a mix of EPS packaging and EPS construction waste, the latter having a tendency to lower the overall recycling rate for EPS as a material, as generally construction waste is currently less likely to be recycled
- 2) Respondents confuse EPS and XPS packaging, which are made from different production methods to produce packaging with different functions. Here respondents are given the example of an XPS clamshell for that of EPS packaging. Clamshells are like pizza tray applications that are difficult to recycle for a number of reasons; however as discussed, the clamshell does not represent the majority of polystyrene foam packaging and is not even EPS packaging. A further aspect is that EPS is often referred to by a trade name or other name than EPS, which may confuse some respondents.
- 3) There seems to be a focus among respondents to look at collection via mixed plastic streams, whereas EPS packaging is often collected separately because compacted EPS material is a highly sought-after commodity, being sold at premium prices.

All these factors have a negative impact on the assessment of the recycling rate for EPS for the respondents, causing a negative bias on reported EPS recycling rates.

In order to provide more reliable data on EPS recycling rates, we recommend that the category for EPS (Expanded Polystyrene) is clarified and does not contain XPS (Extruded Polystyrene). It is further recommended that XPS and EPS fast food packaging is included in the category polystyrene, as these packaging applications will typically be collected and recycled together with mixed plastic, whereas other EPS packaging applications typically are collected through separate waste streams.

Furthermore, a review of the dataset found that, of the 63 assessments for plastic recycling rates in the Survey, replies from **just three** respondents accounted for more than 52% of the responses. A review of the replies showed that, out of 63 assessments for EPS in the various countries, 13 replies did not have any comments on EPS recycling rates, 31 replies were based on assessments without an underlying dataset. These replies amount to almost 70% of the EPS related replies. 17 replies in the EPS dataset claimed to have data on EPS recycling rates, but 9 of these came from the same respondent, and it is documented that in at least one case their dataset does not correspond with publicly available data from the national EPR scheme.

Consequently, the data quality of the survey, when it comes to EPS is rather low, but could be improved by applying the assessments in this memo.

The Ellen MacArthur Foundation criteria for recycling at scale is that a recycling rate of at least 30% is achieved in countries from at least two regions and covering a total of 400 million inhabitants.

A look at publicly available data, which is published either by NGO's or government sources, reveals that the recycling rate for EPS packaging in the EU, a region of around 447 million people, does in fact exceed 30%.¹ The EU + 3 covers the report already included that the recycling of EPS packaging also in Japan, with 126 million people, exceeds 30%.

With the combination of Japan and Europe it is documented that EPS recycling for packaging exceeds 30% in countries with a total of at least 573 million inhabitants in Europe and Japan. EPS packaging therefore meets the threshold criteria for being classified as recycled at scale by the Ellen MacArthur Foundation.

Furthermore, review of US data shows that recycling of EPS post-consumer packaging also exceeds 30%. The US population is app. 331 million people.² The total global population, which have access to proven EPS packaging recycling at scale then exceeds 900 million.

For US the reason for incorrect assessment of recycling rates seems to be linked with the terminology "post-industrial recycling," which according to the North American EPS association, EPS-IA, covers used B2B materials, such as imported EPS fish boxes. The term is not linked to pre-consumer waste or waste recycled in the production process, consequently the recycled volumes of EPS in the US includes both post-consumer (B2C) and post-industrial (B2B).

1.1 Recommendations for a better survey dataset

It seems clear that there are several potential biases in the survey responses, which lead to incorrect replies when it comes to "EPS rigid." And here it has not even been considered if the respondents are taking into consideration that post-consumer includes the B2B market, or that they think that the survey only covers B2C packaging.

EPS-branchen finds that EPS packaging (Expanded Polystyrene) does in fact meet the criteria for recycled in practice and at scale, as the recycling rates are sufficient to meet the definition when looking at EPS recycling in Europe and Japan. Based on the analysis of US, then US should also be included.

¹ EU population is 447,7 million people (https://european-union.europa.eu/principles-countries-history/key-facts-and-figures/life-eu_en), where as EU + 3 is 529 million people (according to Ellen MacArthur Foundation Survey data). The population of Japan is in accordance with Ellen MacArthur Foundation Survey data.

² According to Ellen MacArthur Foundation Survey.

EPS-branchen recognize that a small fraction of EPS packaging, namely EPS packaging used together with XPS fast food packaging, is currently collected and recycled at a limited level together with mixed plastics.

EPS-branchen recognizes that these fractions should not be collected at collection points, because separately collected material should be without food contamination. However, these fractions can be collected with PS rigid, which allows for up to 65% recycling rate, according to TOMRA.³ Collection of small amounts of EPS/XPS together with PS will increase volumes of that fraction making it more profitable and thereby increasing – ceteris paribus – recycling rates.

EPS-branchen therefore recommends that the survey EPS-rigid is split into two categories:

- EPS (polystyrene foam) packaging (incl. protective packaging and insulation packaging but excluding fast food packaging).
- Fast food packaging of XPS and EPS (such as clamshells, cups, and similar packaging where the content of the packaging is meant for immediate consumption by a single person).

EPS-branchen finds that the first category is already documented to be collected and recycled at scale, since this occurs in Europe and Japan, whereas the second category should be reported on together with PS rigid, which already includes food packaging, such as yoghurt containers, etc.

Failure to split up EPS into two categories and merging Fast food packaging of XPS and EPS with PS rigids will lead to the later fraction being captured by the high recycling rate of EPS in general, without the material being recycled.

EPS-branchen further recommends that the EPS Industry be included in the Survey to ensue valid data on the recycling rates for EPS across the globe. We are happy to partner with the Ellen MacArthur Foundation in efforts to collect this data.

1.2 Updating the 2022 Survey

Based on the analysis and data presented in this document, we suggest that the following actions are taken in regard to the 2022 Survey;

- Update the survey categories, as suggested above.
- Include Europe (EU, Norway, Switzerland and UK) as a region where the EPS (polystyrene foam) recycling rate is above 30%.
- Include United States as a country where EPS recycling rate is above 30%.

Therefore, the summary table should be updated to reflect that EPS packaging is recycled in practice and at scale. Hence the column: “Evidence found that a system for recycling exist in practice and at scale today”, should be changed and the related value changed from NO to YES.

³ <https://www.tomra.com/en/circular-economy/polystyrene-recyclate>

This seems especially important, since the packaging category; “HDPE Other rigids” is classified as an application where there is found evidence “*that a ‘system for recycling’ exist in practice and at scale today*” even though the latest Ellen MacArthur Foundation Survey (2022) only documents recycling in countries and regions covering 340 million people, because there are mixed responses for areas covering a total of more than 400 million people. The same practiced should be included here.

1.3 Update revisions to draft shared with Ellen MacArthur Foundation.

In June 2022 a draft version of this report was shared with Ellen MacArthur Foundation to the email; reportingqc@ellenmacarthurfoundation.org, by EUMEPS’ Managing Director. There has been no response to the report, nor the below conclusions. In the subsequent period the basic conclusion that EPS is indeed recycled at scale and in practice has been voiced many times over on various social media platforms. This has extensively included “tagging” of Ellen MacArthur Foundation, which have not objected to such statements. For instance, on LinkedIn, where Chresten Heide-Anderson shared post on misconceptions re the recyclability of the EPS including a mentioning of the Ellen MacArthur Foundation.⁴

Mr. Heide-Anderson has subsequently to the drafting of this report shared concerns about data validity with Danish NGO, Plastic Change, who reported the data for Denmark. In August 2022 Plastic Change confirmed receipt of the outreach and promised to do follow up, so they would ensure correct reporting on EPS-recycling rates in Denmark. As such a verification that their assessment for EPS in the Ellen MacArthur Foundation Survey was not originally correct.

On September 13, 2022 UNEP published a draft report referencing the Ellen MacArthur Foundation Survey and stating, “**26. Most other packaging formats and polymers have not been shown to be recycled in practice** and at scale (e.g., PET trays and other thermoforms; PP other than bottles; all formats of PS and expanded polystyrene (EPS); all flexible formats except PE in business-to-business contexts), even if they might technically be recyclable.²⁴ While the survey sample is relatively small, it provides a first step towards better data availability and transparency on plastic recycling, and indicates the most problematic packaging formats.”⁵

Subsequently EUMEPS has reached out to the EPS Associations of Japan, Australia and North America for verification and updates in this report. Additional remarks and reflections based upon this is explicitly pointed out in the report, to distinguish between the draft shared with Ellen MacArthur Foundation and this final version. Such changes are marked with paragraphs starting with “**Added in November 2022;**” Typo’s and grammatical errors are changed without marking.

EUMEPS has furthermore reached out to

1.4 Further conclusions based on review and update of the memo.

⁴ https://www.linkedin.com/posts/heideanderson_circulareconomy-eps-polystyrene-activity-6988767387466530817-dEvq?utm_source=share&utm_medium=member_desktop

⁵ p. 6 in UNEP/PP/INC.1/7 Intergovernmental negotiating committee to develop an international legally binding instrument on plastic pollution, including in the marine environment First session

Based on the above-mentioned review and update the following can be stated around EPS recycling rates for EPS post-consumer packaging:

- EPS post-consumer recycling rates exceeds 30% in Europe, where EUMEPS estimates app. 40%, Conversio finds the recycling rate is at least 37,3% and a JRC Survey finds a midrange of app. 40%.
- EPS post-consumer recycling rates exceeds 30% in Japan in accordance with the Ellen MacArthur Foundation Survey, which assess 39% recycling rate. The Japanese government has found EPS recycling rates to be at 50% or above since 2007.
- In Norway and Denmark Ellen MacArthur Foundation respondents can verifiably be shown to underreport on EPS recycling rates.

The underreporting in Japan was by 12 percentage points, or approximately 40% of the required recycling rate to meet the Ellen MacArthur Foundation definition of recycling at scale and in practice. For Norway the underreporting exceeded 45 percentage points, or more than 150% of the required recycling rate. In Europe at large the underreporting was at least 30 percentage points compared to the required definition of **recycled at scale and in practice**.

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2. Introduction

The Ellen MacArthur Foundation's Plastics Initiative 2022 Recycling Rate Survey Results Summary invites readers to contribute and provide feedback to the yearly exercise: "If you find more data points (either in line with or contradicting the survey contributors' opinion), we invite you to share these data points with us, indicating if they can be shared with other Global Commitment signatories or not. This will help to improve data availability for future reporting cycles. "

- In this memo, EPS-branchen, reviews the data set and will comment on the data submitted for Europe. The assessment for Europe does not match actual recycling rates. This assessment will include reflections on why the data set is incorrect for Europe.
- Subsequently the memo will document, using only NGO, Peer-reviewed or Government data, that the EPS recycling rate in Europe exceeds 30%.
- The memo will furthermore assess the recycling rate in the North America and Australia, as well as document EPS collection and recycling on every inhabited continent.
- Finally, the memo will conclude on how EPS meets the Ellen MacArthur Foundation definition of Global Recycling. It will make this conclusion on a) only NGO, Peer-reviewed or Government data and afterwards b) on other available data as well. We would be happy if our suggestions would lead to a correction of the 2022 report and would be happy to be invited to contribute to the 2023 version.

3. Background

The Danish EPS (Expanded Polystyrene) Association (EPS-branchen – en del af Plastindustrien), represents converters, raw material suppliers, machine manufacturers, as well as other stakeholders within the value chain (including education institutions).

The EPS industry is fully committed to ensuring EPS is fully integrated into the circular economy. This has led to a steady increase of EPS recycling rates over the past decades, with value chain players working on recycling and circular economy long before it became a fashionable term.

The association has operated a packaging take back scheme since 1995, In 2019 the association revised and modernized the take back scheme, which strongly contributed to increased recycling rates for EPS in Denmark.

Another key part of the increased recycling of EPS in Denmark is the fact that Danish municipalities have increased separate collection of EPS. In 2018 a survey of municipal collection found that 17 out of 98 Danish municipalities collected EPS for recycling.⁶ This was despite the fact the there are

⁶ https://www.plastforum.dk/article/view/620793/kun_17_kommuner_genanvend

economic, climate and environmental benefits to recycling of EPS.⁷ EPS-branchen has subsequently entered dialogue with Danish municipalities on collection and recycling of EPS from both packaging and construction. The latest count found that 49 municipalities separately collect EPS via collection points. These 49 municipalities collect waste from more than 50% of the Danish population, and at least five of them also collect EPS curbside (primarily as part of the bulky waste collection system).⁸

Added in November 2022; Subsequently (September 2022) the number has increased to 51⁹ and the Municipal Waste Management Company, Vestforbrændingen, which manages and collects waste for 19 municipalities at 23 collection sites have placed EPS collection for recycling in Public Tender for launch May 1st, 2023.¹⁰

EPS-branchen has further worked with other stakeholders, including the Danish Seafood Association, to increase separate collection and recycling of EPS packaging in a B2B environment. This has ensured separate collection from a variety of sources, such as retailers, installers of white goods, fish factories, etc.

It is therefore our best assessment that EPS post-consumer packaging recycling rates exceeds not only 30% in Denmark but is substantially closer to the Norwegian recycling rate of 76,4%, as reported by the Norwegian EPR-scheme, Grønt Punkt.¹¹

Added in November 2022; In the email to the Ellen MacArthur Foundation from June 2022, Mr. Jürgen Lang from EUMEPS wrote; “*For European data, I am sending you [the link to our “The EPS industry’s journey towards circularity – Progress report”](#)¹², which presents the most recent recycling figures for EPS available in Europe. We have presented our report after Conversion completed their critical review. The data shows a **steady yearly increase of the EPS recycling rate of around 4%** over the last years. The main driver for EPS recycling has been packaging. **Our data shows an European average recycling rate for EPS post-consumer packaging of 38% in 2019.** We have observed a recycling rate of above 76% in countries such as Norway, which is also reported by the Norwegian PRO. Furthermore, the recycling rate for EPS post-consumer packaging already exceeds 50% in five EU-countries, namely in Portugal, Denmark, Netherlands, Austria, Ireland and Belgium. Specifically for [EPS fish boxes](#), we have found recycling rates of above 70% in at least eight European countries, including Portugal and Norway, where the recycling rates are at 90%.*”

⁷ <https://dakofa.dk/element/stort-potentiale-for-genanvendelse-af-eps/>

⁸ <https://eps-airpop.dk/2022/04/faktaomeps-kommunal-genanvendelse-i-danmark-april-2022/> (it should be noted that a number of municipalities have started collecting EPS in 2022, however even in 2020 the number of municipalities covered more than 30% of the population.

⁹ <https://eps-airpop.dk/2022/09/faktaomeps-kommunal-genanvendelse-i-danmark-september-2022/>
¹⁰ https://www.energy-supply.dk/procurement/view/167716/udbud_af_eps_flamingo

¹¹ <https://www.grontpunkt.no/gjenvinning/eps/>

¹² <https://eumeeps.org/content/7-film/the-eps-industry-s-journey-towards-circularity-progress-report-final.pdf>

Based on this data we kindly ask for a meeting to discuss how we can ensure that EPS is correctly classified as recycled in practice and scale in accordance with The Ellen MacArthur Foundation criteria.

*We have been able to document collection of EPS Household waste from collection points in at least 17 out of the EU+3 countries as well as in the UK. The 15 EU countries cover 88% of the EU population. **We would also be very interested in discussing with you how we have work together to ensure even more collection and recycling of EPS packaging waste, because the solutions do still not cover all European inhabitants.***

Added in November 2022; The EUMEPS data and report was prior to publication reviewed and approved by the consultancy; Conversio. The Conversio review concluded that, *“the best assessment for the recycling rate of EPS post-consumer packaging waste in 2021 is at least 37,3%.”* In March 2022 JRC published the report, *“Scoping possible further EU-wide end-of waste and by-product criteria,”* in which they write, *“For example, for the polystyrene and expanded polystyrene stream, stakeholders reported higher recycling rates (a midrange recycling rate of 40% for polystyrene and expanded polystyrene versus a median reuse/recycling rate of 35% for all the candidate streams) and lower collection rates (a midrange collection rate of 50% for polystyrene and expanded polystyrene versus a median collection rate of 55% for all the candidate streams)”*¹³

Added in November 2022; As can be seen from the JRC report, polystyrene and expanded polystyrene is actually reported to have a higher recycling rate than other candidate streams, with a midrange recycling rate of 40%, i.e., fully in line with the EUMEPS and Conversio assessments. The higher EPS recycling rates occurs despite a slightly lower collection rate than all the candidate streams, thereby underpinning the very recyclability of EPS.

4. EMF survey data set review

EPS packaging is collected for recycling at large scale in several European countries, where citizens can drop off EPS packaging at collection points. This is widely implemented in countries such as Denmark, the Netherlands and Switzerland, while also occurring at several places in a large number of other European countries, as well as in the United States, Australia and New Zealand.

Furthermore, used EPS fish boxes are a highly sought-after commodity being traded at premium prices. Many cases document that recycling of EPS fish boxes occur in several countries.¹⁴

However, when reviewing the replies to the 2022 Recycling Rate Survey from The Ellen MacArthur Foundation’s Plastics Initiative it can be seen that estimated recycling rates for EPS Rigid in both Norway (where the respondent is Grønt Punkt) and Denmark is below 30%. This leads to the logical conclusion that there are errors in the answers to the survey when it comes to EPS.

¹³ https://publications.jrc.ec.europa.eu/repository/bitstream/JRC128647/JRC128647_01.pdf (p. 21)

¹⁴ <https://www.compactor-runi.com/cases/seafood-industry/north-landing-eps-fish-boxes>

The Ellen MacArthur Foundation criteria for recycling at scale is that for the material a recycling rate of at least 30% is achieved in countries from at least two regions and covering a total of 400 million inhabitants.

A look at publicly available data, which published by either NGO's or government sources reveals that the recycling rate for EPS packaging in the EU, a region of around 450 million people, does in fact exceed 30%. The report already included that the recycling of EPS packaging also in Japan, with 125 million people, exceeds 30%.

Added in November 2022: Review by JEPSA, the Japanese EPS Association led to further data on EPS recycling in Japan, where the data from the Japanese Ministry of Economy, Trade and Industry shows that EPS recycling rates in Japan have reached 50% in 2007 and have subsequently exceed this level. In 2019 the recycling rate for EPS in Japan was 51,4%.¹⁵ This number should be compared with the Ellen MacArthur Foundation survey data of Japan, which reported a recycling rate of 39%. In underestimation of the EPS recycling rate by more than 25% and by more than 12 percentage points.

Added in November 2022: Dialogue with EPS-IA, the North American EPS association confirms that their definition of post-consumer EPS, covers household EPS, whereas commercial EPS waste (B2B) is registered as post-industrial. In accordance with EMF's definition of post-consumer, which includes B2B materials, then EPS recycling rates for post-consumer packaging also exceeds 30% in the United States.

With the combination of Japan and Europe it is documented that EPS recycling for packaging exceeds 30% in countries with a total of at least 575 million inhabitants in Europe and Japan and EPS packaging therefore meets the threshold criteria for being classified as recycled at scale by the Ellen MacArthur Foundation.

In fact, data indicates that EPS recycling rates for packaging in Japan and Europe are between 35-40%. It is further documented that EPS recycling occurs on every inhabited continent, with a recycling rate in North America, which exceeds 30%.

Hence according to the definition set forth by the Ellen MacArthur Foundation, this memo documents that **EPS post-consumer packaging is indeed recycled 'in practice and at scale'**.

In a discussion of survey responses, it is noted that more than half of the survey responses are given by just three stakeholders, and 15 responses are from one stakeholder, where it is evident, that their assessment of EPS recycling is incorrect, despite the claims of that stakeholder that they have data to support their assessment.

EPS-branchen has several recommendations for how to improve Survey data at the end of this memo.

¹⁵ <https://www.meti.go.jp/policy/recycle/main/data/pamphlet/pdf/handbook2021.pdf>

5. Defining recyclability

Before discussing the recycling rate and reviewing the data it is important to agree on the definition of recyclability. The Ellen MacArthur Foundation dedicates a section of the survey summary, which includes the definition of 'recyclable packaging' which states that:

“A packaging or packaging component is recyclable if its successful post-consumer collection, sorting, and recycling is proven to work in practice and at scale.”

And it continues:

*“In clearly going beyond mere ‘technical recyclability’, this definition is important to achieve real-world progress. The test and threshold to assess if the recyclability of a packaging design is proven ‘in practice and at scale’ for the Global Commitment is: does that packaging achieve a **30%** post-consumer recycling rate in multiple regions, collectively representing at least **400 million** inhabitants? An alternative, especially relevant for more local players, is to check if a 30% post-consumer recycling rate is achieved in all the markets where their packaging is sold.*

The test and threshold to assess if the recyclability of a packaging design is proven ‘in practice and at scale’ for Plastics Pacts is to assess: does that packaging achieve a 30% post-consumer recycling rate in multiple regions, collectively representing at least 400 million inhabitants, and is a 30% post-consumer recycling rate achieved in the Pact market(s)? If the threshold is met either globally or locally then it can be concluded for the purposes of the Plastics Pact reporting that a ‘system for recycling’ exists for that plastic packaging category.

Making recycling work is a shared responsibility of a wide range of stakeholders, from design through to sorting and recycling. Therefore, the definition does not ask signatories to commit to the recycling of all their plastic packaging being proven to work in every market where their products are sold. It does, however, ask for clear proof points that recycling is happening in practice and at scale, showing replicability, indicating that the design of the packaging (which is entirely within the producer’s control) is not a barrier to making recycling work in practice.”¹⁶

It is further defined by The Ellen MacArthur Foundation that recycling includes mechanical and chemical recycling, which leads to the assumption that physical or dissolution-based recycling is also covered, since this recycling method is often seen as either mechanical or chemical. The key to the definition is that the recycled material does NOT become fuel and is NOT energy recovered.

EPS-branchen further finds that it is important to clarify what may be meant by the term; “post-consumer.” Here it can be deduced from the questionnaire category terms in the Ellen MacArthur Foundation survey, that post-consumer is not limited to private households, since the categories surveyed include “A4 mono-material PE flexibles in B2B context.” Post-consumer is therefore not

¹⁶ The Ellen MacArthur Foundation’s Plastics Initiative 2022 Recycling Rate Survey results summary

limited to the B2C market but does also include the B2B market. Again, this can be deducted from the survey categories, since there is a category called; “A4 mono-material PE flexibles in B2C context.”

Hence and by default the categories for which there are no separation of the packaging categories, they include both B2B and B2C packaging. Post-Consumer waste therefore appears to mean “waste, generated by the end-users of products, that has fulfilled its intended purpose and can no longer be used for its intended purpose.” For all practical purposes this will often mean waste not generated at the production site, but which has been used in subsequent steps of a value chain. This interpretation is of post-consumer is inline with ISO 14021: **Post-consumer material**; material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose.”¹⁷

EPS-branchen fully supports this interpretation of what defines recycling and recyclability.

6. A review of the European data set

“The Survey, intended to be repeated annually, has been designed to help in the assessment of whether the recyclability of a given category of plastic packaging is proven ‘in practice and at scale’ by gathering and collating data on recycling rates by packaging category across a broad range of geographies.” The survey was sent to organisations connected to the Ellen MacArthur Global Commitment platform and UN Environment Programme’s combined network.

The EMF survey sent to the EMF and the UN relevant network in 2022 resulted in a total of 30 responses from 33 organisations, some of them responded on a joint basis. These responses resulted in a total of 63 datasets, which assess recycling of the common plastic applications identified by the Ellen MacArthur Foundation.

We note that the data sources referred to are based upon a wide variety of reference years, which means it is difficult to derive development or timelines from this survey. This means that a fair assumption is, that unless data indicates otherwise, then recycling volumes are perceived to grow on an annual basis.

The results cover 19 countries in Europe of which 15 are members of the European Union (these are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain, Sweden). Of the remaining 4 countries Switzerland, United Kingdom, Norway, and Russia - EPS-branchen has information on recycling rates in two, namely Norway and United Kingdom. For Switzerland EPS-branchen has data showing that EPS is collected for recycling at local collection points, similar to what is occurring in most countries of the European Union. Of the countries included in the report, the only European Country where EPS-branchen does not have any assessment of the recycling rate for EPS is in Russia.

¹⁷ <https://www.iso.org/obp/ui/#iso:std:iso:14021:ed-2:v1:en> (reference added November 2022).

Below EPS-branchen has reviewed the response for the European Countries, where we have access to data. Subsequently we present reflections on why some survey respondents may have replied as they have in the survey and how that is likely to have impacted the overall survey.

6.1. Review of Austria

For Austria the survey respondents have different answers: one by Tomra and one by Alstoff Recycling.

It seems plausible that TOMRA, which concludes that with their estimate of 5% the recycling is not above 30%, is based upon their assessment of EPS recycling as part of the yellow bag, mixed plastics packaging stream.

Alstoff Recycling Austria AG is making their assessment on a complete view. As documented below in the review of Belgium it seems likely that the Alstoff scope better fits with the scope of the survey, than the more limited view of Tomra.

6.2. Review of Belgium

In Belgium there are three respondents, Fost Plus, Suez and TOMRA. Fost Plus has no view, whereas Suez and TOMRA estimates that the EPS recycling rate is below 30%.

The assessment of TOMRA and Suez differs from a recent study by Scottish NGO in which they write; *“Average numbers for end of life processing of EPS packaging in Europe (388 kT) in 2017 are 32.7 % for recycling, 35 % for recovery and [3]2.7 % for landfill. More specific numbers for Region Central, including UK, the Netherlands, Belgium, France, Germany and Austria, show an overall collection rate of 45 %. A total of 142 kT of packaging waste is processed, with 20 % via mechanical recycling to EPS, 24 % via mechanical recycling to PS, 46 % via energy recovery and 10 % via landfill.”*¹⁸

The Scottish NGO clearly indicates that EPS recycling in Belgium is likely to exceed 30% or at least that the region including UK, the Netherlands, Belgium, France, Germany and Austria has a recycling rate close to 45%.

According to a study published by Repak in Ireland the EPS recycling rate for Belgium was 46% in 2013.¹⁹ It seems unlikely that the recycling rate has drastically decreased in the subsequent period.

¹⁸ <https://www.bestfishes.org.uk/wp-content/uploads/TAUW-2021-Assessment-of-alternatives-for-EPS-fish-boxes.pdf> (note there appears to be missing a digit in the quote. Reviewing other data the percentage for landfill is corrected to 32,7 – fractions not adding to 100 due to rounding.

¹⁹ See; https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

6.3. A review of Bulgaria, Cyprus, Italy, Spain, Sweden, Switzerland

In these countries TOMRA is the sole survey respondent, as will be discussed further below on how EPS is in fact collected for recycling in Europe, the EPS does not go through the TOMRA sorting systems.

EPS is typically collected in B2B systems, where the material is compressed and sold to recyclers; household waste is rarely collected in the mixed plastic stream but rather in separate collection streams, such as municipal collection points or ECO-islands. This is certainly the case in Switzerland.²⁰

According to a study published by Repak in Ireland the EPS recycling rate for Italy was 38% in 2013.²¹ Whereas the recycling rate was below 30% for the other countries covered in the study in this section (Spain – 18%, Sweden – 14%).

In Sweden EPS is primarily collected with mixed waste, although some collection from municipal collection points occurs. There is also some recycling of EPS fish boxes. For the purpose of current data in Sweden the recycling rate may be below 30%, but it is also worth noting that they are building Site Zero in Sweden, which will sort all plastic packaging from Sweden,²² and this site will also ensure that EPS packaging is sorted out and recycled.²³ The technology is consequently there, which is why we recommend that EPS packaging from households for white goods, brown goods, etc. are collected in a separate waste stream, as occurs already in Denmark, the Netherlands, parts of Sweden, Switzerland and many other countries. Smaller volumes from households or those contaminated by food (e.g. fast food packaging) should be collected together with mixed plastics including rigid polystyrene.

6.4. A review of Czech Republic, Portugal

In these countries the respondents had no view on EPS post-consumer recycling. EPS-branchen is aware the EPS is collected in local collection points in the Czech Republic²⁴, and in Portugal the recycling rate for EPS fish boxes exceeds 70%.²⁵

6.5. A review of Denmark

In Denmark 46 municipalities have a system in place to ensure EPS is collected for recycling. This system is primarily a bring system, where EPS packaging is collected at Eco-collection points. Some of municipalities furthermore provide a system which allows for EPS to be picked up curbside. These

²⁰ See for instance; <https://www.swissrecycling.ch/de/wertstoffe-wissen/wertstoffe/styropor>

²¹ See;

https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

²² <https://www.svenskplastatervinning.se/en/site-zero/>

²³ <https://bewi.com/press-releases/bewi-to-recycle-eps-from-site-zero-the-worlds-most-modern-facility-for-plastic-recycling/?lang=da>

²⁴ See for instance; <https://brnodaily.com/2022/02/03/brno/new-partnership-is-increasing-recycling-of-waste-polystyrene-in-brno/>

²⁵ See for instance; <https://eumeps-powerparts.eu/news/eps-fish-box-recycling-supports-sustainable-fishing-industry>

48 municipalities cover more than 50% of the Danish population, as documented in the introduction of this memo. This is an increase in EPS municipal collection from 17 to 48 since 2018.

There are furthermore many cases of EPS fish box recycling, and cases of electronic stores and installers of white goods, which take back EPS packaging for recycling.

In the study published by Repak in Ireland the EPS recycling rate for Denmark was 17% in 2013.²⁶ Given the increase in municipal recycling from 2018 to 2022 alone it is clear that, that EPS recycling exists and the recycling rate is, by best estimate, far above 30%.

The sources used by Plastic Change do not give the information needed to get the information desired. It is correct that ARC does not collect EPS for recycling in the City of Copenhagen, but it does in other regions. The Danish Waste Statistics does not provide a separate dataset for EPS, hence there is no validity on a view of EPS recycling or not (granted Plastic Change does not have a view on EPS recycling).

The challenge is that since there are no separate waste codes for EPS packaging, then public data does not show the recycling rate for EPS.

6.6. A review of France and Germany

The respondents in France are CITEO, ADME and ELIPSO as well as TOMRA, whereas in Germany they are Suez and TOMRA. In both countries assessment of EPS recycling is assumed to be below 30%. Only in Germany is there an estimate of the recycling rate, where TOMRA assess 10%.

However according to a study published by Repak in Ireland the EPS recycling rate for France was 38% and for Germany it was 56% in 2013.²⁷ While the Scottish NGO, FIDRA found average recycling for “UK, the Netherlands, Belgium, France, Germany and Austria, show an overall collection rate of 45 %,” with 20 % be recycled via mechanical recycling to EPS, 24 % via mechanical recycling to PS.²⁸ The Repak report concludes that recycling rates for EPS and XPS are 33% in Germany.²⁹

Based on the above it seems clear that the answer of the survey respondents may not reflect actual recycling rates for EPS packaging.

²⁶ See;

https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

²⁷ See;

https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

²⁸ <https://www.bestfishes.org.uk/wp-content/uploads/TAUW-2021-Assessment-of-alternatives-for-EPS-fish-boxes.pdf>

²⁹ See;

https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

6.7. A review of Greece

For Greece the survey gathers responses from EUNOMIA, which estimates 41% recycling rate of EPS packaging, whereas TOMRA estimates 5% recycling rate. Given that EPS packaging collection in Europe occurs through collection points, such as ECO-islands, that indicates that estimation of EPS recycling based on mixed plastic waste sorting is not accurately depicting the actual recycling rate of EPS.

6.8. A review of the Netherlands

There are two survey respondents, TOMRA and Suez, both estimate that the recycling rate is below 30%. Whereas the Dutch EPS association has published a fact sheet estimating 59% recycling rate for EPS packaging.³⁰

According to a study published by Repak in Ireland the EPS recycling rate for the Netherlands was 60% in 2013.³¹ And again the Scottish NGO, FIDRA found average recycling for “UK, the Netherlands, Belgium, France, Germany and Austria, show an overall collection rate of 45 %,” with 20 % be recycled via mechanical recycling to EPS, 24 % via mechanical recycling to PS.³² The Repak report concludes that recycling rates for EPS are 45,5% in the Netherlands.³³

6.9. A review of Norway

In the Ellen MacArthur Foundation survey there are two respondents TOMRA and Green Dot Norway. Both assess the recycling rate to be 5%. However according to a study published by Repak in Ireland the EPS recycling rate for Norway was 35% in 2013.³⁴ Whereas the Repak study finds a recycling rate of 70% in 2018.

What is even more relevant is that looking at the Green Dot Norway website for EPS recycling rates they state that it is 76,4%.³⁵

³⁰ https://stybenex.nl/wp-content/uploads/2022/03/Factsheet_recycling_EPS-2022.pdf

³¹ See; https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

³² <https://www.bestfishes.org.uk/wp-content/uploads/TAUW-2021-Assessment-of-alternatives-for-EPS-fish-boxes.pdf>

³³ See; https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

³⁴ See; https://repak.ie/images/uploads/reports/Expanding_the_Knowledge_Base_of_Expanded_and_Extruded_Polystyrene.pdf

³⁵ <https://www.grontpunkt.no/gjenvinning/eps/>

It seems clear that the survey reply does not match the public figures. In the discussion below, the potential reason for this is hypothesized.

6.10. A review of Poland

According to TOMRA the recycling rate is app. 10% whereas the Polish Plastic Pact has “No View.” However, a study by Aarhus University and COWI from 2019 finds that in certain areas of Poland fish box recycling reaches 100%.³⁶

6.11. A review of United Kingdom

The UK respondent WRAP estimates a recycling rate of 0%. However the Scottish NGO FIDRA writes in a report on EPS and EPS fish boxes.

In the report they write; “Average numbers for end of life processing of EPS packaging in Europe (388 kT) in 2017 are 32.7 % for recycling, 35 % for recovery and [3]2.7 % for landfill. More specific numbers for Region Central, including UK, the Netherlands, Belgium, France, Germany and Austria, show an overall collection rate of 45 %. A total of 142 kT of packaging waste is processed, with 20 % via mechanical recycling to EPS, 24 % via mechanical recycling to PS, 46 % via energy recovery and 10 % via landfill.

It must be noted that from this group the UK had the lowest level of recycling in comparison to the other countries that are considered leaders in the field of EPS recycling in Europe. The BPF EPS Group states that 54 % of all EPS packaging in the UK is currently recycled. It is difficult to substantiate these figures as there is very limited data available, but it seems likely that the 55 % is somewhat on the optimistic side of the expected range for the UK. Estimated amounts of EPS produced and recycled in the UK are shown in Table 4.1.”³⁷

6.12. A review of Europe in general

As can be seen from the FIDRA study there was in 2017 a 32,7% recycling rate for EPS packaging, with several countries combined exceeding 40% including the Netherlands, Belgium, France, Germany and Austria.³⁸

In the Survey of Polystyrene Foam (EPS and XPS) in the Baltic Sea, funded by EU and the Danish government, conducted by Aarhus University and COWI it is stated that; “The recycling rate for EPS waste in Europe in 2017 was 27% in total; for EPS packaging waste 34%, and for EPS construction waste 8%.”³⁹ The relevant number for the Ellen MacArthur Foundation assessment here being 34%.

³⁶ https://pure.au.dk/portal/files/152361896/Survey_of_EPS_in_the_Baltic_Sea_final.pdf

³⁷ <https://www.bestfishes.org.uk/wp-content/uploads/TAUW-2021-Assessment-of-alternatives-for-EPS-fish-boxes.pdf> (note there appears to be missing a digit in the quote. Reviewing other data the percentage for landfill is corrected to 32,7 – fractions not adding to 100 due to rounding. See also review of Belgium

³⁸ <https://www.bestfishes.org.uk/wp-content/uploads/TAUW-2021-Assessment-of-alternatives-for-EPS-fish-boxes.pdf>

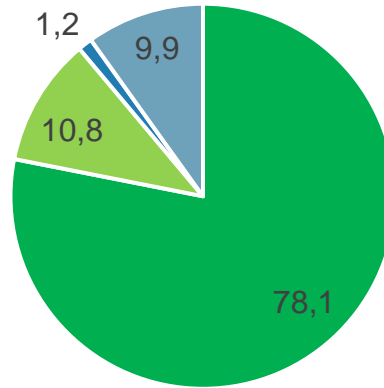
³⁹ https://pure.au.dk/portal/files/152361896/Survey_of_EPS_in_the_Baltic_Sea_final.pdf

In February a review of 21 of the 27 EU countries as well as Switzerland, Norway, UK found that collection points could be identified in at least 18 of these countries, and curb side collection in further two countries. This documented that EPS is collected through collection points in countries covering 78% of EU population and an additional collection through mixed waste in countries accounting for 10% of the EU population. (*See map and figure below*).

There is no indication that recycling rates or collection of EPS should have declined since 2017 – on the contrary EPS collection and recycling is rapidly increasing. Consequently, it is relevant to consider, what errors there may be in the Ellen MacArthur Foundation Survey, which will be done in the following section.

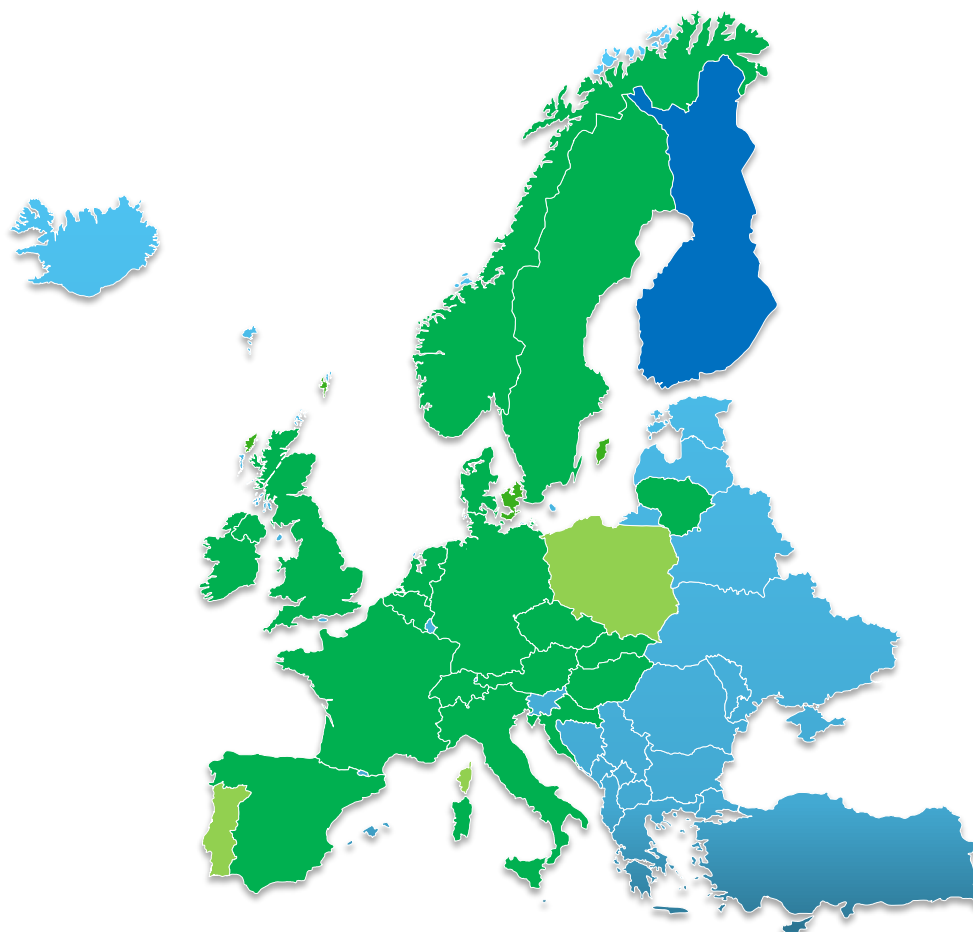


EPS Household Recycling in % (by country population)



- WITH EPS household recycling via Collection points
- WITH some EPS household recycling via Mixed Plastic
- Collected, but not recycled, in mixed plastic
- Without documented EPS household recycling





7. EPS recycling rates in other regions

Assessing the recycling rate of EPS in the rest of the world is a little more complex. However, what is a valuable and relevant information here is that EPS is not only recycled in Europe and Japan, but also indeed recycled in every region.

7.1. EPS recycling in Oceania

In Australia, part of Oceania, the national EPS association has a map of EPS collection points⁴⁰ and assess those 5800 tonnes of EPS was recycled in 2018/2019.⁴¹ And there are also cases of EPS recycling in New Zealand, which use the same system of EPS collection points as is the case in Europe.⁴²

⁴⁰ <http://epsa.org.au/where-can-i-recycle-eps/>

⁴¹ <http://epsa.org.au/about-eps/eps-recycling/>

⁴² <https://www.aucklandcouncil.govt.nz/rubbish-recycling/Pages/recycle-item.aspx?ListItemId=381>



7.2. EPS recycling in Africa

In reviewing the survey response to the Ellen MacArthur Foundation questionnaire it is worth noting, that while there were statements of plastic recycling rates for a number of plastic types in South Africa, there were only a percentage for all plastic packaging and not the separate fractions. This estimate was of 30,9% for all plastic packaging.

What is however important here is that EPS is actually being recycled in South Africa.⁴³

7.3. EPS recycling in the Americas

EPS is also being recycled in North America, and there is EPS recycling in Mexico⁴⁴ and Brazil.⁴⁵

In North America (US and Canada) the recycling is more developed. And according to this article the recycling rate for US and Canada reached 35% in 2014. In 2014 there was collected 72,8 million pounds of post-consumer EPS for recycling.⁴⁶ The amount collected dropped to 25,9 million pounds 2017; “This decrease is a direct result of export restrictions on recycled plastics and a reprocessing plant closure that previously recycled large quantities of EPS. Newer EPS recycling technologies to facilitate EPS collection and reprocessing launched in 2018 indicate growth rates will continue on an upward trend in the future.”⁴⁷

In an email reply to EPS-branchen, EPS-IA writes; “*EPS fish boxes are included under the ‘post-industrial’ data. They include imported and domestic fish boxes. To give you an example, Walmart imports the majority of its fish from Chile. The EPS fish boxes are recycled (densified) at the Walmart distribution centers in the U.S.*” It is consequently clear that EPS-IA’s definition of post-industrial is to be included with the post-consumer in order to meet the Ellen MacArthur Foundation criteria.

In 2019 a total of 136,8 million pounds of EPS was recycled, compared to 133,7 million pounds in 2014. Of these 136,8 million pounds 46,4 million were post-consumer (B2C) EPS.⁴⁸ This indicates that the EPS recycling rate in North America is somewhere between 20-25% when it comes to B2C. Of course, there is an unknown in the terms of actual import and sales volumes for EPS packaging, which may or may not have declined during that period. Similarly, it seems that the survey for EPS packaging in North America is primarily focused on collection conducted by EPS Industry Alliance members, so it is likely that some recyclers are not covered by the survey. This is especially the case for companies, which receive high volumes of EPS, which they compact and sell themselves. Furthermore, there may, as is the case in Europe, be a shadow figure of retailers and similar, which grind EPS packaging and use it for light-weight concrete or EPS cavity wall insulation.

⁴³ <https://polystyrenerecycling.co.za/>

⁴⁴ <https://anipac.com/>

⁴⁵ <http://www.plastivida.org.br/index.php/contato?lang=pt>

⁴⁶ <https://recyclinginternational.com/plastics/innovation-boosts-eps-foam-recycling-in-north-america/5277/>

⁴⁷ <https://www.epsindustry.org/sites/default/files/2017%20RRR%20-%20Single%20Pages%20-%20small.pdf>

⁴⁸ <https://www.epsindustry.org/sites/default/files/2019%20RRR.pdf>

EPS fish boxes in North America are incorrectly classified as post-industrial and not post-consumer recycling.

EPS-branchen has asked the North American EPS industry whether or not their survey of EPS recycling includes EPS fish boxes. As mentioned above they have answered that the fish boxes are included in the post-industrial category. However, for the purpose of the Ellen MacArthur definition of recycled in practice and at scale EPS fish boxes used to transport fresh fishes are to be included in the post-consumer volumes.

According to Current Fishery Statistics No. 2019 published by NOAA, US imports 2.287.859 metric tons of fresh or frozen edible fish in 2019.⁴⁹ EPS fish boxes typically transport between 10 and 20 kgs of fish. And a fish box weighs app. 500 grams. Assuming all fish is imported in EPS fish boxes containing 20 kgs. of fresh fish, then US fish import would lead to a little over 57.000 tonnes of EPS fish boxes being imported. Assuming similar volumes of inter-continental fish transport in the US gives a recycling rate for EPS fish boxes of app. 39%.

Assuming, as mentioned above that the post-consumer (B2C) recycling of EPS is 20% then there are app. 108,500 tons of EPS waste from this stream. Combining that with app. 114,000 tons of EPS B2B waste from fish boxes, and you get app. 222,500 tons of EPS post-consumer waste. Of this at least 66,900 tons was recycled in 2019 according to the EPS-IA data. This gives a EPS post-consumer packaging recycling rate of at least 30% in 2019, and since then EPS recycling in the US have also increased. Data consequently indicates that the US does indeed meet the criteria for EPS recycling or should at least be in the potential column and treated as “HDPE Other rigids,” when it comes to the US.

8. Frequently made errors in reporting of recycling of EPS

Based on years of experience in discussing EPS recycling with various stakeholders we want to share with you our reflections on the responses. The following errors might have occurred in the assessment of the EPS recycling rate.

8.1. Mixing EPS application recycling rates

EPS is a material used for packaging (20% of the European use of EPS) as well as for construction (insulation is about 80% of the European use of EPS). For the purpose of meeting the recycling targets set forth by the Ellen MacArthur Foundation, only the packaging application is relevant.

Looking at the Aarhus University and COWI study, they wrote; “The recycling rate for EPS waste in Europe in 2017 was 27% in total; for EPS packaging waste 34%, and for EPS construction waste 8%.”⁵⁰

⁴⁹ <https://media.fisheries.noaa.gov/2021-05/FUS2019-FINAL-webready-2.3.pdf?null=>

⁵⁰ https://pure.au.dk/portal/files/152361896/Survey_of_EPS_in_the_Baltic_Sea_final.pdf

Since construction is generally less recycled, then a likely error in estimating the recycling rate is looking at the overall recycling rate, which for EPS was 27% in 2017, when the relevant number for packaging was 34%. This is a critical error, because according to the Aarhus University and COWI study EPS packaging in Europe is actually recycled above the 30% threshold defined by the Ellen MacArthur Foundation.

8.2. What is EPS, XPS, Styropor or Flamingo?

Another cause for misunderstanding is that EPS is rarely referred to as EPS, rather is called by (brand-)names such as Flamingo (Denmark), Isopor (Norway), Styropor (Germany and Austria), Piepschuim (the Netherlands) as well as Frigolit (Sweden). In many countries it is referred to as either polystyrene, which is in fact only the polymer, or Styrofoam, which is in fact the DOW brand name for XPS.

And furthermore, EPS and XPS packaging are rarely used for the same applications. EPS is often used for fish boxes and protective packaging for white and brown goods. XPS is more often used in applications such as more clamshells, plates and the like. The example in the Ellen MacArthur Foundation survey of EPS packaging is “Clamshells, etc,” as non-exhaustive examples.

However, clamshells are NOT EPS. They are in fact made from XPS. Furthermore, they do not make up the majority of polystyrene foam packaging. The clamshell and similar single use applications are rarely recycled due to their usage and food contamination. The same issue arises with recycling cardboard pizza trays. But that does not lead to a conclusion that cardboard cannot be recycled. However, such food contaminated EPS/XPS packaging can in fact be recycled, if properly sorted – unlike the cardboard pizza tray, which cannot be recycled due to the grease.

The primary use for EPS packaging is insulating packaging for fish boxes, meats and vegetables as well as for protective packaging for white goods, brown goods and furniture. Here effective separate collection systems are in place and such compacted EPS packaging waste is sold at premium prices, as documented in the Danish case.

8.3. Mixed waste vs. Collection points

Many of the respondents of the Ellen MacArthur Foundation Survey seem to be primarily looking at EPS recycling rates through the mixed plastic streams. However, EPS is typically not collected through this stream, but rather in a separate stream at local/municipal collection points; the reason being that waste managers get premium prices for EPS collected in this manner.

There is little doubt the EPS packaging recycling rates are low when it comes to mixed waste, simply because it is collected in a different manner.

For the material not collected through separate collection systems, promising developments have been announced towards chemical recycling. The residual stream from the sorting lines will follow the chemical recycling route where the EPS content will be recycled into recycled styrene, which then can be used again for the production of new plastic applications from EPS and PS.

8.4. Representativeness of the responses

As illustrated above there are a number of potential bias issues in regard to the respondent replies. That these impact the survey data can be further assessed when reviewing the 63 different data sets for EPS recycling rates. 13 replies indicated no view on EPS recycling rates, whereas 31 replies gave the answer, that EPS recycling rate where below 30%, but that they had no evidence to support their claim. Of the 17 replies that EPS recycling was below 30% and the respondent claimed to have data, 9 were replies given by TOMRA in Europe – and as documented above the TOMRA reply in Norway does not match actual data. The same issue arises in the Netherlands, where there is also strong evidence of recycling rates above 30%, despite TOMRA claiming to have evidence for their assessment. Only one other European respondent claimed to have evidence for their statement of EPS recycling rates below 30%.

Of the remaining replies that estimate recycling rates for EPS packaging being below 30%, and that they have data for this statement, two are in regard to Africa (where recycling rate is generally low), three are in Oceania (where the data for Australia and New Zealand is discussed above) and one is in Canada. Finally, there is an anonymous reply for India to the EPS packaging recycling rate. It is also worth noting that in China the reply is No View, even though one of the largest EPS recyclers is active in China, namely, GreenMax.⁵¹

It is furthermore worth noting that TOMRA accounts for 15 of the survey responses, while another sorter mixed waste plastic, SUEZ, accounts for 5 replies. In the Americas “Fundacion Avina, Inter-American Development Bank” account for 13 of the total survey responses. In short those three repondents account for more than half of the data provided for the survey. As for the replies of “Fundacion Avina, Inter-American Development Bank” it might also be worth noting that the answer for all 13 different countries is identical, namely that only PET Bottles have a recycling rate above 30%, a statement for which they have no supporting evidence. For the rest of the plastics in South America the replies are that recycling rates are lower than 30% with no evidence or that they have no view. Here another aspect worth noting is that there are three replies for PET bottles in Brazil, two of them assume higher than 30% recycling rate, while the third estimate lower than 15% recycling rate for PET bottles. This “mixed response” is not mentioned in Appendix III of the survey report, despite this being a section for just that.

8.5. Summary of potential errors in the survey respondents’ answers

On this basis it seems likely that respondents base their answers on the following aspects, which lead to incorrect assessment for EPS packaging recycling rates. And each one of them are likely to reduce the overall assessment of EPS recycling rates, combined they will lead to a substantial error:

- Including EPS construction and demolition waste in the recycling rate for EPS packaging.
- Including XPS Single Use packaging in the EPS recycling rate. Potentially only assessing EPS recycling rates based on XPS Single Use Packaging Applications.

⁵¹ <https://www.intcorecycling.com/Intco-Group-History.html>

- Basing the reply on only one waste collection stream, which is not part of the primary EPS separate waste collection streams.

9. EPS recycling rate based on other published sources

As documented above in it is highly likely that the European respondents, and potentially other respondents, have answered too low for EPS recycling for packaging, because they have included several materials (EPS construction waste as well as XPS packaging) in their assessment as well as having over-looked the primary EPS packaging waste collection and recycling streams.

Based on this assessment it seems relevant to look at other sources for EPS recycling rates identified and used by NGO's, in peer-reviewed articles or government publications.

Obviously looking at the Ellen MacArthur Foundation Survey, it seems very clear that the Japanese response of 39% recycling rate for EPS packaging seems valid. Japan covers a market of 126 million people, and the recycling rate exceeds 30%.

Added in November 2022; As mentioned earlier in this report it has become clear from review by the Japanese EPS Association, that the Ellen MacArthur Foundation Survey drastically underreported on EPS recycling in Japan by as much as 25% and more than 12 percentage points. The actual recycling rate in Japan for EPS exceeds 50% and have been at this level since 2007 according to the Japanese Ministry of Economy, Trade and Industry.⁵²

As documented above the recycling rate for EPS packaging in Europe also exceed 30% when looking at the FIDRA study as well as the Danish study by Aarhus University and COWI.

The Repak Study found that in 13 European countries the average EPS recycling rate in 2013 was 28%, however it is not entirely clear if that average is based on population or solely an average of the country recycling rates. It does appear that the average is based on countries overall and not population, which would be the relevant aspect to consider recycling rate. There are, however, still clear indications that EPS recycling is indeed increasing in the area covered by the Repak Study as well, which make it likely that also here meanwhile the 30% threshold was passed.

Looking only at the FIDRA report and the Aarhus University and COWI study it is clear that EPS recycling rates in Europe exceed 30% for packaging, especially when taking into account that there is an increase in EPS recycling projects, as illustrated in Denmark and the high recycling rate in Norway as well as other projects.

⁵² <https://www.meti.go.jp/policy/recycle/main/data/pamphlet/pdf/handbook2021.pdf>

According to the European Union website EU has 447,7 million inhabitants.⁵³ Whereas Norway according to the Ellen MacArthur Foundation survey has a population of 5 million and the UK population is 68 million people.⁵⁴

It has been documented above that both UK and Norway have an EPS recycling rates above 30% for a total of 73 million people. Estimating conservatively for the European Union, by taking account the population of only the countries in which EPS recycling was documented with local collection points, hence not Poland and Portugal, then the European Union has 348 million inhabitants, which live in a country with average recycling rates of above 30%.

Hence government and NGO data supports European recycling rates of at least 30% for EPS packaging for at least 421 million people. Together with the Japanese recycling rates it means at least 547 million inhabitants in multiple regions live in countries where EPS packaging recycling exceed 30%.

To avoid these misunderstandings going forward EPS-branchen therefore recommends that the survey EPS-rigid is split into two categories:

- EPS (polystyrene foam) packaging (incl. protective packaging and insulation packaging but excluding fast food packaging).⁵⁵
- Fast food packaging of XPS and EPS (such as clamshells, cups, and similar packaging where the packaged material is meant for immediate consumption by a single person).

EPS-branchen finds that the first category is documented to be collected and recycled at scale, since this occurs in Europe and Japan, whereas the second category should be reported on together with PS rigid, which already includes food packaging, such as yoghurt containers, etc.

EPS-branchen further recommends that the 2022 survey is updated to reflect the actual state of play, namely that EPS is recycled in practice and at scale in Japan, Europe and potentially in the United States.

⁵³ https://european-union.europa.eu/principles-countries-history/key-facts-and-figures/life-eu_en

⁵⁴ <https://www.worldometers.info/world-population/uk-population/>

⁵⁵ These categories cover the EPS packaging for which Recyclass has developed design guides. See; <https://recyclclass.eu/recyclability/design-for-recycling-guidelines/>