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The fate of EU plastic waste

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Summary

Trends in plastic waste trade have changed significantly in recent years as a result of a series of policies intervention, including a growing number of plastic waste import and export restrictions, as well as a stronger focus on circular economy and the waste management of plastics.

This report explores recent trends in both the cross-border intra- and extra-EU plastic waste trade. It finds that there has been a steady decline in the export of EU plastic waste trade, which, since 2017, has been surpassed (both in volume and value) by a growing flow of intra-EU waste trade. It also finds that the composition of traded plastic waste polymers has been more or less constant within the EU (Intra-EU), while after 2018 (the year of the Chinese ban) the share of polymers of ethylene in extra-EU exports has increased, which may suggest an improvement in recyclability of extra-EU exports. This evidence is coupled with the increase in the average value of traded waste between 2020 and early 2022, again going in the direction of suggesting an improving quality of extra-EU flows in recent years. The relevance of these conjectures and the drivers of these changes need, however, additional investigation.

The implications of this data assessment for the ongoing circular economy transition in the EU need, however, to be confronted with the degree of circularity of plastic waste management in destination countries, both inside and outside the EU. In this report, we adopt a case-study based approach, also in relation to the difficulties in rigorously matching trade and waste management data sources.

The key issues vary across the EU-based case studies. While in Germany the fate of plastic waste imported depends on whether its source is from industry or households, the Netherlands appears to be a central EU "hub". In Poland, imports feature a high rate of composites making them very difficult to recycle.

Turning to plastic waste destinations outside the EU, the Chinese ban has indeed created a "domino" effect, first by re-routing plastic waste exports to new destinations, and then experiencing further re-routing due to additional import restrictions by the same countries. There are, however, also pull factors for extra-EU trade. Recyclers operating in the receiving countries often depend on imported plastic waste, which is often preferred to domestic-sourced plastic waste, as it is perceived to be better quality. Our extra-EU case studies – Malaysia, Türkiye and Vietnam – show that lacking waste management infrastructures in destination countries still raise significant environmental concerns, so that the overall reduction of plastic waste exports outside the EU and the changing policy scenario may indeed be seen as an encouraging signal in terms of circular waste management inside the EU.

The report concludes with a call for better and more comparable data between trade and waste management dimensions.

1 Introduction

Annual global plastic production has grown significantly in recent decades – doubling between 2000 and 2019 to reach 460 million tonnes (Mt), and on track to tripling from now to 2060 (OECD, 2022a). At the same time, global efforts on plastic waste management do not match the increasing production rate, and plastic pollution may reach 53 Mt per year by 2030 (Borrelle et al., 2020). This makes plastics and plastic waste an urgent environmental issue. The EU is not an exception in this respect, as there is a lack of capacity to manage growing amounts of plastic waste in a circular and sustainable way. A recent report estimated that there is a need for an additional 2.9 Mt of polymer waste management capacity to keep up with the current growth trends of plastic (COWI et al., 2019). In addition, the EU was, until recently, dependent on exporting much of its plastic waste. In 2015 and 2016 the EU exported up to 300 000 tonnes each month, primarily to China and Hong Kong. In 2017, China imposed an import restriction, known as the Chinese Sword, on low quality plastic waste and the following year, EU plastic waste exports dropped significantly to an average of around 183 000 tonnes per month (ETC/WMGE, 2019). Most significantly, the volumes of plastic waste exported to China and Hong Kong in 2018, were, respectively, 96 % and 73 % lower than in 2015.

Policy action on the international trade of plastic waste has developed considerably in recent years. In addition to China and Hong Kong, several other Asian countries have introduced restrictions on the import of plastic waste. At global level, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal has included an amendment restricting movements of plastic waste. At an EU level, the Waste Shipment Regulation (WSR), which is currently under revision, not only translated the Basel Convention into an EU context but also strengthens it.

In light of these policy changes, this report investigates dynamics of the trade in plastic waste, both within EU and beyond it. It identifies recent trends and the resultant policies and also focuses on the fate of plastic waste once it reaches its destination country. The contribution of plastics to the global transition to a circular economy, as well as the EU's contribution to the global problem of plastics pollution, partly depends on the fate of plastic waste in receiving countries. Countries cannot rely on exporting their way out of the growing amount of plastic waste. Similarly, these trade restrictions should not lead to an increased use of incineration and landfilling of plastic waste in Europe or elsewhere. Knowing the fate of plastic waste is therefore an important part of the puzzle of transitioning towards a more circular and sustainable plastics system.

This report builds on previous work by the EEA (EEA, forthcoming), the European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE, 2019), and aims to:

- update data mapping on transboundary shipments of plastic waste, both within and beyond the EU;
- interpret the most recent evolution in trade data in light of recent EU and extra-EU policy evolution;
- highlight, through the use of relevant case studies, the fate of plastic waste traded inside and beyond the EU;

The report is organised as follows. Section 2 introduces the materials involved in this analysis and the potential issues related to its recyclability and environmental problems it poses. It also details the state of EU and global legislation relevant to the trade in plastic waste. Section 3 highlights barriers to and opportunities for the trade in plastic waste. Section 4 highlights trends in intra- and extra-EU trade in plastic waste and discusses, through the use of several case studies, of the fate of wastes according to their destination country. Section 5 discusses policy relevant conclusions.

2 Plastic waste: materials and policy context in the EU

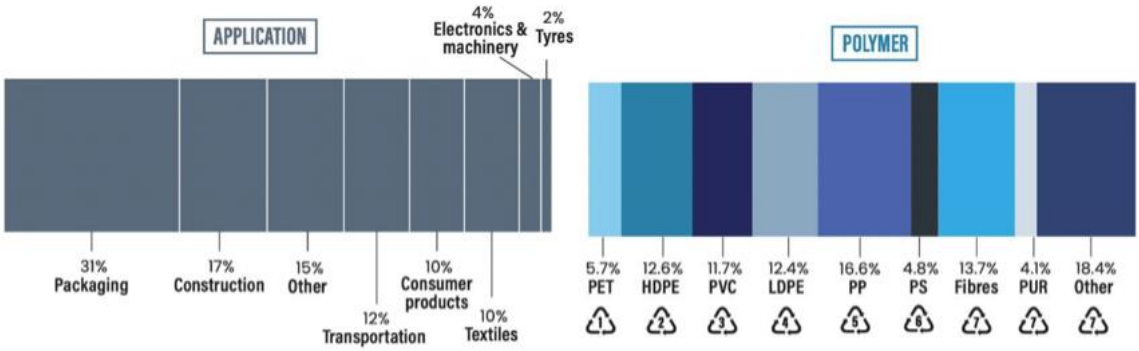
2.1 Plastic materials, waste and environmental impacts

The term plastics covers a wide range of synthetic or semi-synthetic polymer materials that are used in a growing range of applications. While the first synthetic plastic was created in 1862, it was not until the 1940s that industrial production of plastics became possible through the use of fossil fuels as feedstock; soon thereafter, in the 1950s, the global plastics market took off. The global plastics market in 2022 was worth around EUR 535 billion ([1]) and is expected to grow at an annual rate of 3.2 % (Rikhter et al., 2022). Between 1950 and 2015, 8.3 billion tonnes of plastic were produced, half of which has been produced since 2000 (Ibid.). There are several reasons for this rapid growth of plastics including:

- their unique properties: high strength-to-weight ratio, high moldability, impermeability to liquids, resistance to physical and chemical degradation;
- low cost;
- ability to replace other materials, such as glass, metal, wood and natural fibres, in a wide range of applications; and
- capability of enabling new types of applications and services from take-away food to information technology (IT).

The wide range of plastic polymers offer various properties. Low-density polyethylene (LDPE), for example, is tough, flexible and transparent and is therefore used in films, while polyethylene terephthalate (PET) does not allow gases or liquids to pass through it and is therefore a popular material for beverage bottles. Polypropylene (PP) has a high melting point, which makes it attractive for hot liquids, and is resistant to chemicals. Polystyrene (PS) can be rigid, brittle, clear or foamed, making it a versatile plastic for protective packaging and food containers. Plastic has become indispensable in the construction of vehicles and aircraft, trains and ships because of the material's durability, lightness and flexibility. In addition, plastic parts require less maintenance and are flexible enough to withstand vibrations over the long term. No car could drive today without plastics. Most are in the car's interior trim, seats, bumpers, upholstery, electronics and dashboards. As the need for lighter ships with lower fuel consumption increases, fibre-reinforced plastics, such as glass- or carbon-fibre, are also increasingly used . Furthermore, these materials do not rust, nor are they affected by seawater. This extends maintenance intervals and reduces operating costs. Figure 1 shows the global share of specific types of plastics and their applications.

Figure 1 Global share of plastics by application and polymer, 2019, per cent



Source: OECD (2022)

Some of the desirable qualities of plastics, however, turn to challenges. They often, for example, reduce the repairability of product components (OECD, 2022a), while their high resistance to physical and chemical degradation means that they can persist as waste in the environment for decades or even

[1] Billion = 10^9

centuries. Nonetheless, plastics serve as a key material in daily life. Though plastics have brought many benefits to human wellbeing and materials welfare thanks to their durability, versatility and low cost, the production, consumption, and end-of-life management have raised environmental concerns ranging, amongst others, from their persistence, their presence as marine debris, their greenhouse gas emissions in their extraction, production, use and waste phases and the risks to human health they can pose (Ryberg et al., 2019).

Many of these challenges are linked to the generation and fate of plastic waste. Of the almost 10 000 Mt produced between 1950 and 2019, about 7 500 Mt have become plastic waste (OECD 2022; Geyer et al., 2017). Over the last two decades global annual plastic waste has more than doubled, from 156 Mt in 2000 to 353 Mt in 2019. Almost two thirds of this comes from applications with lifespans of less than five years: packaging, 40 %; consumer products, 12 %; and textiles, 11 % (OECD, 2022a). Only 55 Mt of this waste was collected for recycling, but 22 Mt ended up as a recycling residue that needed final disposal. Ultimately, 9 % of global plastic waste was recycled, 19 % was incinerated and almost 50 % went to sanitary landfills (OECD, 2022). The remaining 22 % was disposed of in uncontrolled dumpsites, burned in open pits or leaked to the environment. If the current production trend continues, roughly 12 000 Mt of plastics waste will have been landfilled by 2050 (Geyer et al., 2017). Looking at specific plastic types, HDPE, LDPE and PP are clearly predominant and are even more so in the waste stage because they are often used for packaging applications with short lifetimes. Similarly, since PET is mainly used for packaging, it will become waste after its initial use. By contrast, PUR and PVC are mainly used in applications with long lifecycles and therefore only become was after many years. It is important to note that the recyclability of types of plastic differs significantly from the very easily recyclable PET to, for example, PVC or PS, which are not (EuRIC, 2020), leading to diverging economic incentives to keep the materials in the loop – Table 1 provides a summary of the main difficulties related to recycling of key polymers. In summary, compound materials and polymers, hazardous substances, contamination of other substances and lack of transparency are among the key recycling challenges for plastics.

Table 1 Degree of recyclability for key polymers

Polymer	Main recycling difficulties
Polyethylene terephtalate (PET)	Proper collection needed to avoid cross-contamination
High-density polyethylene (HDPE)	Small fraction recycled in EU due to pre-treatment complexities, e.g., separation from harder fractions.
Vinyl/polyvinyl chloride (V/PVC)	Presence of hazardous substances, e.g., chlorine, cadmium and lead.
Low-density polyethylene (LDPE)	Need for sorting from harder plastics fractions and treatment in adequate recycling processes.
Polypropylene (PP)	Difficulties in collection, contamination and mixture with other materials, like colorants.
Polystyrene (PS) and expanded polystyrene (EPS)	Difficult to be recycled through standard recycling processes.

Source: EuRIC (2020)

Widespread plastics use coupled with inadequate end-of-life disposal resulted in 22 Mt of plastic materials leaking into the environment in 2019, contributing to persistent plastic pollution. The vast majority, 19.4 Mt, is macroplastics ([2]), and most, 82 %, found their way into the natural environment as a result of inadequate collection and disposal. Leakage occurs in all regions, but there are significant geographical differences in leakage drivers. Organisation for Economic Co-operation and Development (OECD) countries ([3]) contribute 14 % to the global macroplastic leakage but 36 % of microplastic ([4]) leakage. Non-OECD countries account for the remaining plastic leakage, driven mainly by the lack of adequate waste

2 Macroplastics are typically objects larger than 5 millimeters.
3 OECD countries see https://www.oecd.org/about/members-and-partners/.
4 Microplastics are typically objects smaller than 5 millimeters.

management infrastructure. This problem is becoming worse – leakage from mismanaged waste has more than doubled since 2000.

These numbers highlight the urgent need to address waste management practices, while also taking account of littering and the steadily increasing microplastic leakage around the world. Plastic leakage is fundamentally altering marine and terrestrial ecosystems, whilst also posing substantial risks to human livelihoods that depend on the integrity of such environments, such as tourism and fishing. Plastics are also a source of concern for human health through the leaching or adsorption of hazardous chemicals, as well as their bioaccumulation in substances and organisms consumed by humans. Plastics may also act as a sink and transportation media for chemicals and persistent organic pollutants (POPs), which accumulate on the surface of plastics while in seawater (OECD, 2022). Furthermore, marine plastic leakage has substantial economic costs for coastal communities due to potential negative impacts on fishing and tourism, estimated at around USD 3 300 (approximately EUR 3 000) per tonne of marine plastic per year ((Beaumont et al., 2019)). Specific impacts differ significantly between different countries and regions in Europe, nevertheless it is obvious that circular solutions for plastics are urgently required for environmental and economic reasons.

2.2 The Waste Shipment Regulation

The shipment of waste within and beyond the EU is regulated by the Waste Shipment Regulation (WSR; EU, 2006), which implements the obligations of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989), as well as the provisions of the OECD Decision establishing a control system for waste shipments for recovery (OECD, 1992). The WSR lays out different procedures and control regimes for the shipment of waste depending on its destination, EU Member States, OECD countries or non-OECD countries; its characteristics, hazardous or non-hazardous waste; and its treatment, recovery or final disposal.

Within the EU, the shipments of waste for disposal and of hazardous waste for recovery are subject to the most stringent control procedure – written notification and consent ([5]), while the general information requirements apply to the shipment of non-hazardous waste for recovery.

With regard to the shipment of waste beyond the EU, the WSR prohibits the export of waste for disposal, except to European Free Trade Association (EFTA) countries ([6]) that are party to the Basel Convention – in that case prior written notification and consent applies with some adaptations and additions. The export of hazardous waste for recovery is also banned, unless directed to countries to which the OECD Decision applies – again subject to the notification procedure, with the related adaptations and additions. Information requirements apply when non-hazardous waste is shipped for recovery to OECD countries. Finally, the shipment of non-hazardous waste for recovery to non-OECD countries is regulated by WSR Article 37, which stipulates that the European Commission has to send a written request to each non-OECD country seeking confirmation in writing that non-hazardous waste may be exported for recovery in that country, and under which control procedures, if any. Non-OECD countries' replies have been published within the Commission Implementing Regulation No 1418/2007 (EC, 2007). According to its latest update (EC, 2022) most non-OECD countries have decided to ban the import of non-hazardous waste for recovery or to allow it only under specified control procedures (ETC/WMGE, 2019). The fact that Regulation No 1418/2007 is not able to immediately reflect policy changes related to waste acceptance/control procedures in the importing countries may lead to a lack of a level playing field for the global waste trade. An overview of current bans in Asia is provided by Section 2.5.

5 This procedure requires that the competent authorities of all countries concerned by the shipment, i.e., dispatch, destination and transit countries, give their consent to the shipment within a certain deadline before it can take place. The requirement of a financial guarantee also applies.

6 EFTA countries: Iceland, Liechenstein, Norway and Switzerland.

Under WSR Article 49, all parties involved in the shipment ([7]) must ensure that waste is managed in an environmentally sound manner and comply with EU and international rules throughout the period of shipment and when the waste is recovered or disposed of. This requirement means that the exporter or the destination country needs to demonstrate that the facility which receives the waste will be operated in accordance with human-health and environmental protection standards that are broadly equivalent to standards established in EU legislation (European Parliament, 2022). Member States have developed different approaches for verifying that the recovery of exported waste takes place in the importing country under broadly equivalent conditions to those prescribed by EU legislation. The adverse environmental impacts associated with waste imports reported in many third countries highlight shortcomings of the exporting countries to monitor and control their shipments of non-hazardous waste for recovery. A 2015 study (McKinsey & Company and Ocean Conservancy, 2015) shows that around 60 % of all the plastics in global waters originates, not least because of waste mismanagement, in five Asian countries – China, Indonesia, the Philippines, Thailand, and Viet Nam – that used to import, and partially still import, large amounts of plastic waste from the EU.

More stringent rules on plastic waste shipments were introduced in May 2019 by the 14th Conference of the Parties to the Basel Convention. These rules have been implemented in the EU through a delegated Regulation (EC, 2020a), which has been applied since January 2021. The new provisions are as follows.

- A ban of the export of hazardous plastic waste (A3210) and plastic waste that is hard to recycle (Y48) from the EU to non-OECD countries.
- The export of clean, non-hazardous plastic waste for recycling (B3011) from the EU to non-OECD countries, is only allowed under specific conditions. In particular, the importing country must indicate to the European Commission (based on EC, 2007) which rules apply to such imports.
- The application of the notification procedure is required for the export of hazardous plastic waste (AC300) and plastic waste that is hard to recycle (Y48) from the EU to OECD countries.
- For intra-EU shipments, the application of the notification procedure is required for shipments of hazardous plastic waste (AC300) and non-hazardous plastic waste that is hard to recycle (EU48). All other shipments of non-hazardous plastic waste for recovery (EU3011) are exempt from these new controls.

These amendments will limit the export of hazardous waste and non-hazardous waste that is difficult to recycle, thereby, encouraging the development of Member States' treatment capacity of such waste and promote the use of plastic materials that are easier to recycle.

The WSR is currently undergoing a new and broad revision process. In 2020, the European Commission published its evaluation of the Regulation (EC, 2020b) under five criteria – effectiveness, efficiency, relevance, coherence and EU added value – also taking into account of Commission Regulation No 1418/2007 (EC, 2007). According to the main findings of the evaluation, the WSR has established a robust legal framework that has been implemented by Member States, which has led to a better control of waste shipments and contributed to the environmentally sound management of shipped wastes at national and EU levels. Different ways of applying/enforcing the WSR, combined with different interpretations of its provisions and various inspection regimes, have, however, hampered its optimal implementation across the EU and tend to discourage legal shipments of good quality materials for recycling. When it comes to the export of waste beyond the EU, the European Commission has emphasised that a major shortcoming is the insufficient supervision of the conditions under which these wastes are managed in destination countries, especially developing ones, which has often resulted in severe environmental and public health impacts. Finally, illegal shipments remain a considerable problem, due to the general nature of several WSR provisions, such as those related to the environmentally sound management of waste, as well as to shortcomings in the implementation and enforcement of the Regulation, due, for example, to incomplete and inconsistent data sets for monitoring waste streams and limited financial penalties in some Member States.

[7] The producer, the notifier and other entities involved in a shipment of waste and/or its recovery or disposal.

In addition, the WSR revision has also been planned by the 2020 Circular Economy Action Plan (CEAP) (EC, 2020c) to facilitate the shipments of waste for reuse and recycling within the EU; ensure that the EU does not export its waste challenges to third countries; and tackle illegal waste shipments.

Proposed amendments to the WSR include provisions on harmonisation of waste classifications, such as thresholds for contaminated waste; further digitisation of the shipment procedure; new mechanisms to ensure that waste exported beyond the EU is managed in an environmentally sound manner; and provisions to reduce illegal exports of waste (EC, 2021b).

According to the Commission (EC, 2021b, p. 14), the proposal could potentially lead to 2.4–6 Mt of waste being retained in the EU each year and processed into secondary materials. For this to materialise, however, further investment into waste management systems is required. According to a 2019 report, an additional 2.9 Mt of plant capacity would be required within the EU27 + UK to recycle all waste generated in its territory and essentially stop the need to export it (COWI, DG ENV, Eunomia 2019).

Additional efforts to improve the quality and comparability of data in relation to both the waste trade and its role in waste management are also needed. This is crucial to guarantee the monitoring of the status of the circular economy transition in EU Member States.

2.3 Overview of the EU legislative and policy framework on plastic

The EU has established a legislative framework regulating the whole plastic value chain, with a specific focus on waste management. The 2015 (CEAP; EC, 2015) and the 2018 EU Plastic Strategy (European Commission, 2018) provided inputs to the development of such a framework, which is currently evolving further based on the 2020 CEAP (EC, 2020c). This identifies plastic and several products containing plastic – packaging, textiles, electronics/information and communications technology (ICT), vehicles, and construction and buildings – among key value chains to be addressed.

There are several provisions on plastic (e.g. Paleari (forthcoming)), including market-based instruments, such as extended producer responsibility, that target recyclability – from eco-design measures to recycling targets. These will impact the trade in plastics waste in different ways. Higher recyclability of plastics is expected to reduce the need to export unwanted plastic waste, as well as discourage illegal shipments and, instead, foster more cooperation on recycling plastics within the EU. To help facilitate this cooperation, legal provisions will need to be coupled with financial measures to further develop recycling operations by increasing the volume and types of plastics recycled.

2.4 Examples of voluntary initiatives by industry

This sub-section provides a short overview of initiatives voluntarily undertaken by companies that operate in the EU market. These and other similar commitments, if implemented, are expected, *inter alia*, to reduce the amount of plastic waste exported from the EU.

These voluntary initiatives include, but are not limited to, the following.

- The Circular Plastics Alliance: voluntary pledges to ensure that 10 Mt of recycled plastics find their way into new European products by 2025 (EC, 2021a).
- Plastics Europe: ensures that 60 % of plastic packaging waste will be reused/recycled by 2030 and 100 % of plastic packaging waste reused, recycled or recovered by 2040 in the EU (Plastics Europe, forthcoming).
- European PET Bottle Platform: PET bottle design guidelines for recycling (European PET Bottle Platform, 2022).

- The Polyolefin Circular Economy Platform: 1) will increase the volume of recycled post-consumer polyolefin used in European products to 4 Mt a year by 2025 – an increase of 2 Mt; and 2) reuse or recycle 60 % of collected polyolefin packaging by 2030 (Polyolefin Circular Economy Platform, 2022).
- The New Plastics Economy Global Commitment: launched by the Ellen MacArthur Foundation in 2018, this has more than 500 signatories, including companies that, together, are responsible for 20 % of all plastic packaging produced globally (Ellen MacArthur Foundation, 2022). It established a 2025 target to make 100 % of plastic packaging reusable, recyclable or compostable.
- The Alliance to End Plastic Waste: has committed more than USD 1 billion (approximately EUR 914 million) with the goal of investing USD 1.5 billion (approximately EUR 1.37 billion) over the next five years to finance the implementation of a strategy which prioritises infrastructural development, innovation, education and clean-ups (Alliance to end plastic waste, 2022).

In addition to the voluntary commitments by the plastic industry, another initiative has been launched to stop the export of plastic waste of all kinds from OECD to non-OECD countries, plus Türkiye and Mexico. Since 1 June 2022, one of the world's largest container companies, CMA CGM, which transported about 50 000 containers filled with plastic waste every year, is no longer transporting any plastic waste aboard its ships (CMA CGM Group, 2022; Basel Action Network, 2022).

2.5 Overview of trade bans/restrictions on the import of plastic waste by Asian countries

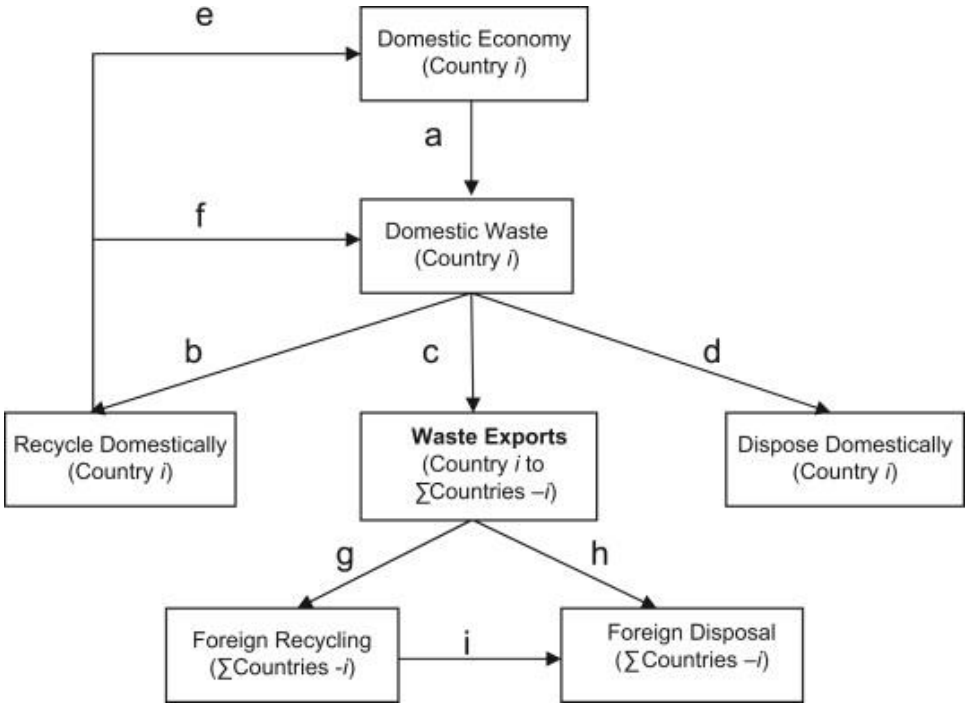
China was the main importing country of plastic waste and the largest plastic producer in the world but in 2017 it banned the import of 24 types of solid waste, including certain types of household plastic. The import ban came into force in January 2018 and was extended in the same year to post-industrial polyethylene (PE), PET, PS, PVC and other scrap plastic, while the import of waste electrical and electronic equipment (WEEE) has been banned since 2000 (ETC/WMGE, 2019). Since 2018, China has, therefore, lost its central role as an importer of plastic waste, and Hong Kong that of a key transit point.
Following the Chinese ban, several South and Southeast Asian countries recorded significant increases in plastic waste imports and started introducing import bans/restrictions, following China's example.

- Indonesia banned plastic waste imports in 2018 (Retamal et al., 2020).
- Viet Nam (Section 4.2.2.1) stopped issuing plastic recycling import licenses in June 2018. In 2019, the country took long-term steps to cut back on plastic waste imports with the announcement of Decree No. 40/2019 that will take effect in 2025. The decree includes the following provisions: 1) only 80 % of feedstock is allowed to be imported by each recycler; and 2) imported feedstock is only allowed to be made into semi-finished or finished goods and not into flakes or pellets (Vietnam Environment Administration - Ministry of National Resources and Environment, 2021; World Bank, 2021).
- Malaysia (Section 4.2.2.2) placed restrictions on the import of plastic waste in 2018. In order to operate, importing companies must fulfil specific conditions and only homogenous and clean plastic waste may be imported. The inability to control the emergence of illegal recycling facilities and imports of contaminated plastic waste led the Malaysian government to temporarily ban all imports in from July to October 2018 through the cessation of permit issuances (Retamal et al., 2020). Malaysia is also considering the introduction of a permanent and complete ban on all plastic imports (OECD, 2022c).
- Taiwan proposed a set of policies to regulate imports of plastic waste including permission for businesses to import plastic waste only originating from their own overseas production processes and prioritising the purchase of domestic over foreign waste. These policies became effective in October 2018 (ETC/WMGE, 2019).
- India (Section 4.2.2.4) banned the import of plastic waste in 2019. In March 2022, the ban was partially lifted and the import of PET flakes/PET waste is no more prohibited, but merely restricted.
- Thailand decided to reduce the import of plastic waste and totally ban its import for 2021–2026, so as to promote the use of its domestic waste. In 2021, however, the import of plastic waste was allowed to cover 50 % of its production capacity – no more than 250 000 tonnes. The amount of imported plastic waste will decrease by 20 % in each year until 2026 (OECD, 2022b).

3 Plastic waste trade – drivers and barriers

Several contributions address the driving forces of waste trade. They can be summarized adopting the framework by (Kellenberg, 2012), represented in Figure 2.

Figure 2 The fate of domestic waste



Source: Kellenberg (2012)

A domestic economic system generates waste due to consumption and production activities (arrow a). The domestic economy can deal with waste in three potential ways: recycling and reuse (arrow b), export (arrow c) or disposal – namely landfilling and incineration (arrow d). The recycling option may be intended, more generally, as any option for the reuse of materials in consumption and/or production activities (arrow e), but of course, as 100 % recycling is in most of the cases impossible, this generates additional domestic waste (arrow f). Exported waste can either be recycled in the destination country (arrow g) or disposed of in the same country (arrow h). The share of the two options clearly depends on the quality of the exported waste, which is driven by several factors, including the regulatory and institutional frameworks of the source and destination countries. The quality of exported waste also determines the volume of exported materials intended for recycling but that has eventually to be disposed of in the destination country (arrow i).

Based on literature and studies, Mazzanti and Zoboli (2013) proposed a more detailed set of drivers, which includes the following:

- Relative prices, transport and administrative costs: relative prices can be shown to guide waste streams, together with trade related costs.
- Regulatory barriers, such as tariffs, bans or limitations: for extra-EU destinations, import tariffs in destination countries or non-tariff provisions, such as trade bans, may explain changes in trade patterns over time and space.
- Differences in policy stringency: different countries may apply more or less stringent environmental regulations, such as smaller or larger environmental taxes, affecting, for instance, landfilling or incineration, stimulating trade between countries with more and less stringent policies. This is

expected to be relevant in driving the quality of exported secondhand goods, as well as the environmental impact of waste management in destination countries.

The role of institutional factors can be addressed on the basis of a 2019 report by the (ETC/WMGE, 2019). Table 2 summarises the main drivers of waste trade, their likely impact as well as their potential relevance to intra- and extra-EU trade. The combination of gate-fee differentials and transport costs is identified as relevant for extra-EU exports of plastics waste, while high overland transport costs may act against intra-EU trade. Of course, as already outlined in Section 2.5, and as will be discussed in Section 4, trade bans turn out to be a crucial factor in driving the waste trade, at least partly, from extra-EU to intra-EU destinations. Policy relevant aspects, for example, differences in landfill taxes, as well as infrastructural aspects, such as recycling capacity, may be relevant for both the intra- and extra-EU trade in waste plastics, the latter being among the more important due to the mismatch between the development of separate collection in EU Member States and recycling capacity. The relevance of differences in classification, legislation and administrative practice across EU Member States is also important, especially in driving extra-EU trade.

Table 2 Drivers of and barriers to the waste trade

Driver	*Possible indicator (–= difference between …; * = multiplied by …..)*	*Expected sign on trade (+ or -)*	*Likely importance for intra-EU trade*	*Likely importance for extra-EU trade*
Gate fees and transport costs	Gate fees in exporting country – gate fees in importing country (technology of treatment in importing country)	+	*	***
	Distance between exporting and importing countries * average transportation cost	-	**	
Administrative costs	Cost of exporting/importing practices	-		
Tariff and non-tariff barriers	Existence of bans	-/+		***
Differences in environmental taxes and policy stringency	Landfill tax in exporting country – landfill tax in importing country	+	**	***
Difference in treatment capacity (policy-driven excess supply or demand)	Capacity in exporting – capacity in importing (treatment in importing)	-	***	***
	Or: (Collection – capacity in recovery/recycling exporting country) – (Collection – capacity recovery/recycling exporting country)	+	***	***
Different incentives for recycling/energy recovery	Incentive on Renewable energy socurces in exporting country –	-		

	incentive on e-RES in importing country			
Differences in legislation/classification	Stringency of legislation in exporting country – stringency legislation in importing country	+	*	***
Need for specific technologies	Availability of X technology in importing country only	+ if available	**	
Geographical characteristics of countries region	E.g. common borders	e.g. + if the two countries have a border in common	***	

Note: + stands for drivers, - stands for barriers. The likely importance is measured by the number of stars.

Source: ETC/WMGE (2019)

4 Fate of plastics

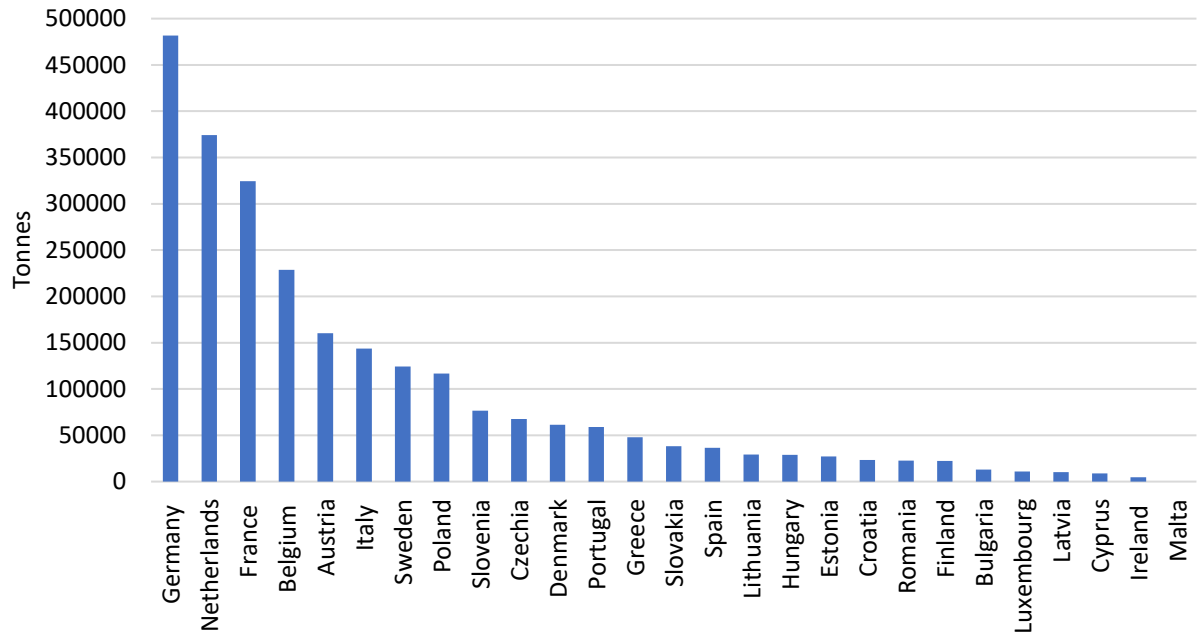
4.1 Fate of plastics: intra-EU

4.1.1 Trade data: intra-EU

This section addresses intra-EU trade using Eurostat data with a specific focus on trade between EU countries, excluding trade from EU Member States to countries outside the EU.

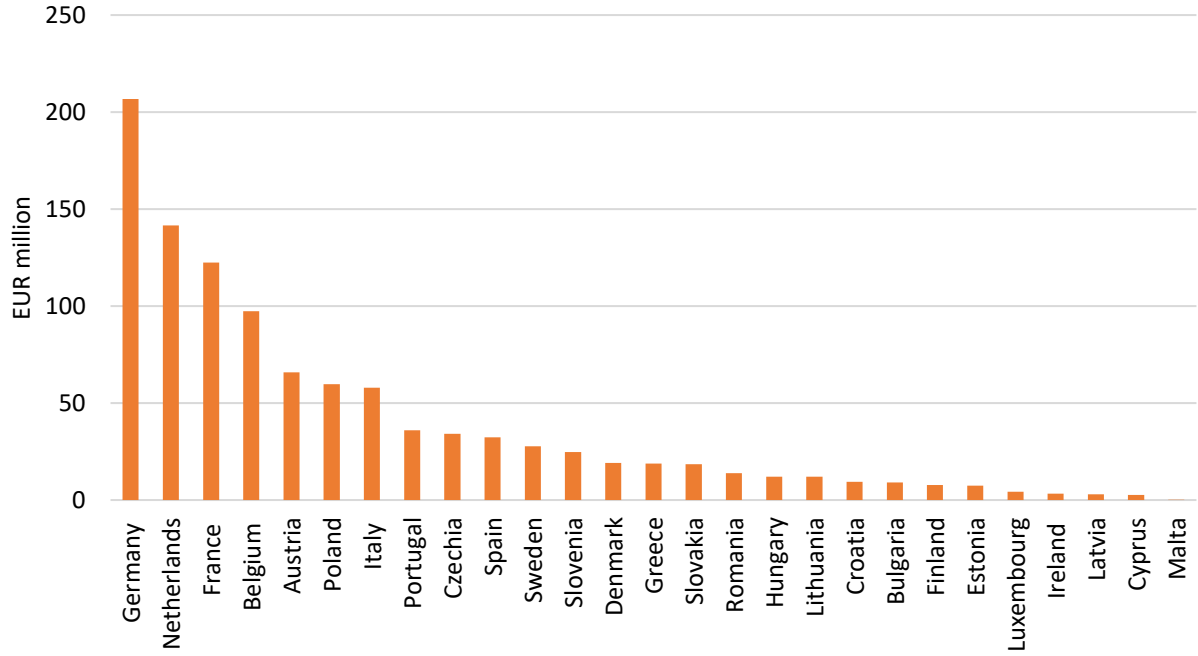
Figure 3 and Figure 4 report, respectively, the amount and value of plastic waste traded between EU Member States in 2021, regardless of the country of destination. The picture that emerges is consistent: the largest flows come from Germany, the Netherlands, France and Belgium, while the countries with the least cross-border plastic waste trade within EU are Latvia, Cyprus, Ireland and Malta. When analysing the average growth rate of the same variables between 2014 and 2021, in Figure 5 and Figure 6, this picture is reinforced: the countries with the largest plastic waste trade have also increased it the most, in particular the Netherlands and Belgium. There are, however, a few exceptions, such as Austria and France, where changes are ambiguous when comparing changes in terms of quantities or values.

Figure 3 Intra-EU plastic waste trade, 2021, tonnes



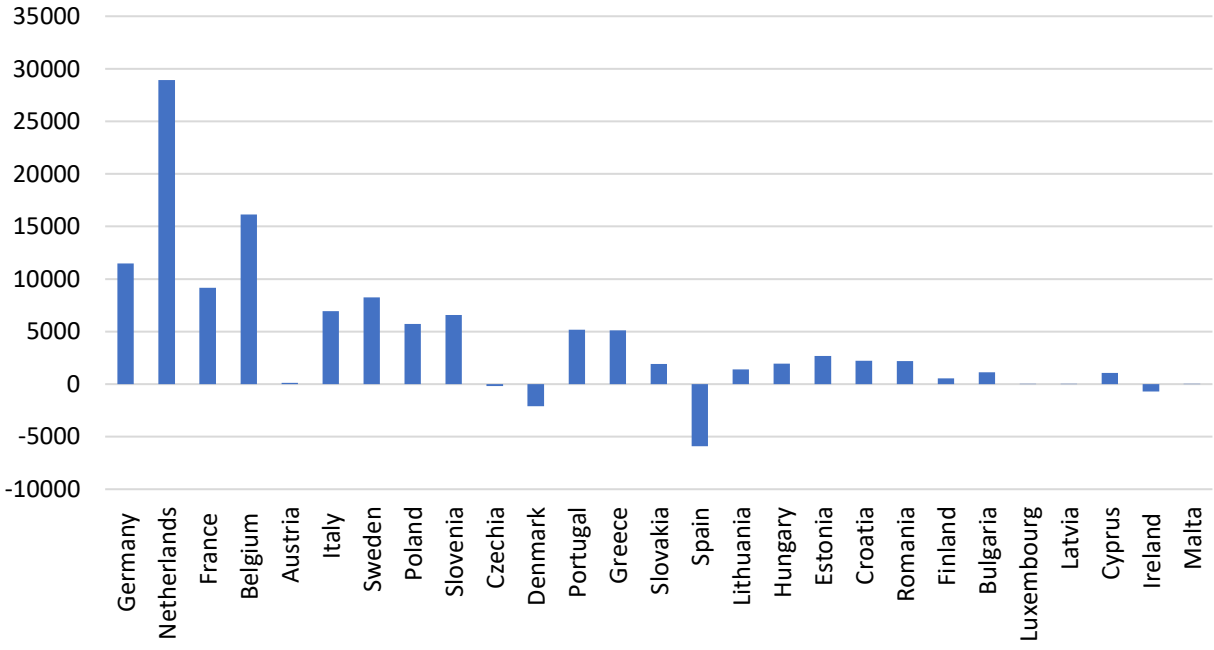
Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

Figure 4 Intra-EU plastic waste trade, 2021, EUR million



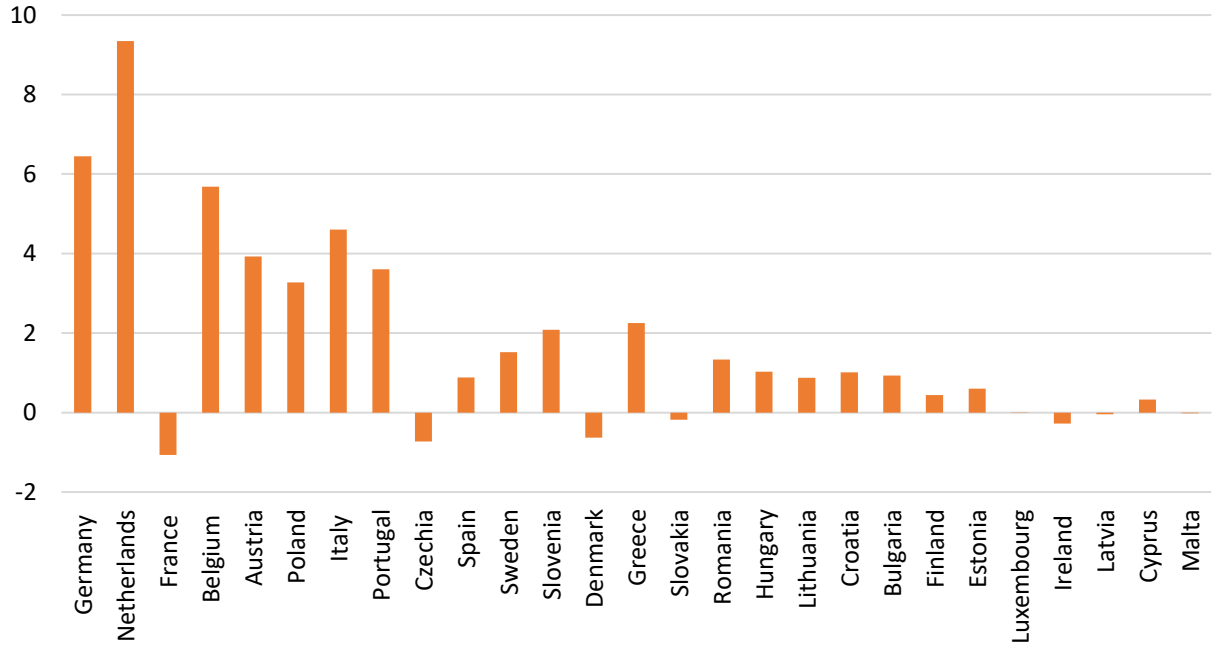
Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

Figure 5 Intra-EU plastic waste trade, average change between 2014 and 2021, tonnes



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

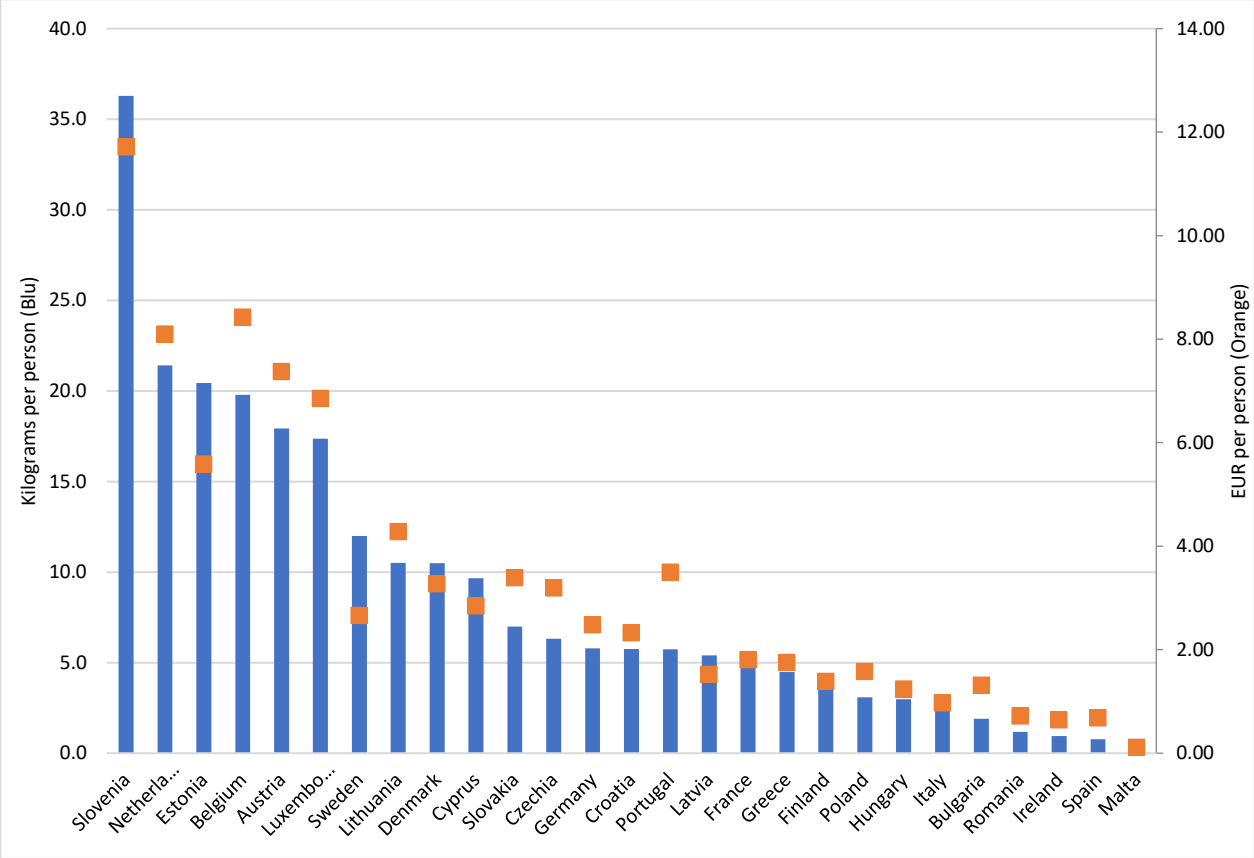
Figure 6 Intra-EU plastic waste trade, average change between 2014 and 2021, EUR million



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

Figure 7 reports the intra-EU plastic waste trade per person both by weight (blue) and value (orange). This changes the picture slightly: Germany and France are now in the middle, while Slovenia and Estonia appear among the largest per person exporters, both in terms of volume and value. The Netherlands, Belgium and Austria, on the other hand, are in similar positions as in Figures 3–6.

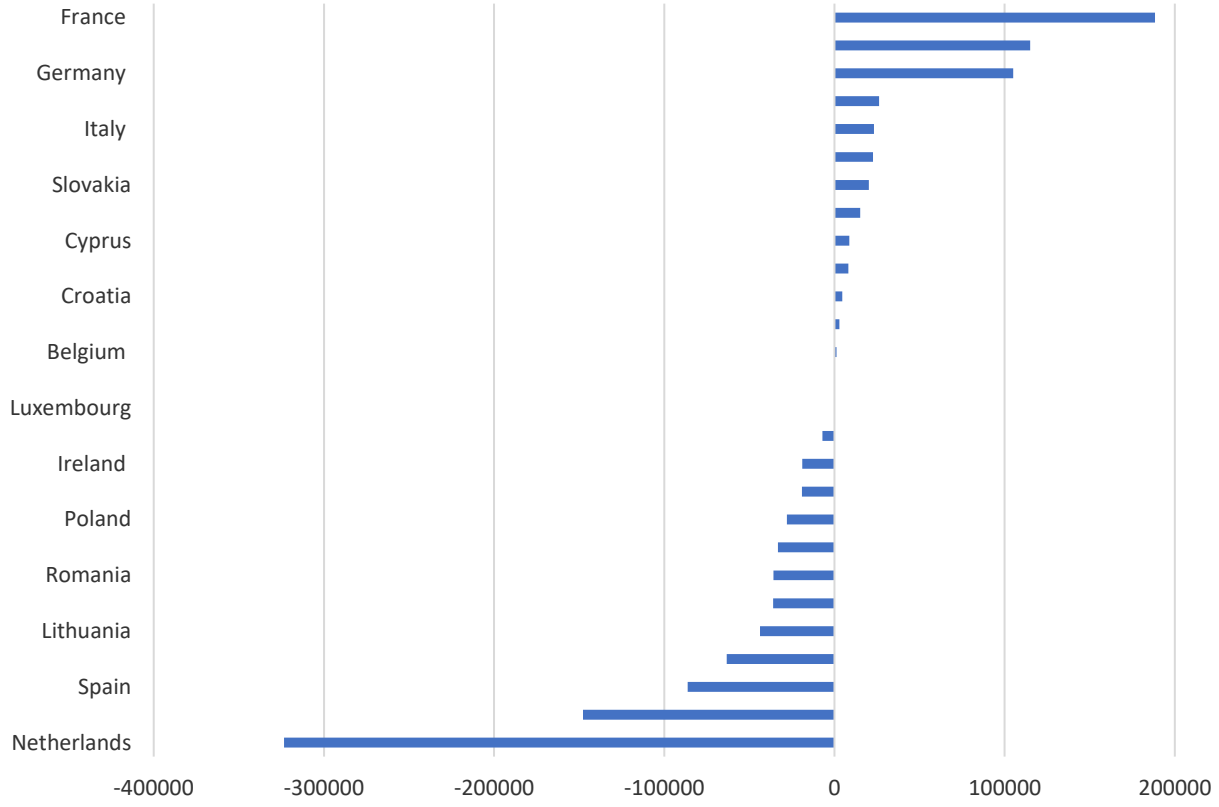
Figure 7 Intra-EU plastic waste trade per person, 2021, by weight (blue bars, kilograms) and vale (orange dots, EUR)



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/22

Figure 8 shows the intra-EU plastic waste trade balance for 2021. This is calculated as the difference, in tonnes, between the intra-EU traded plastic waste leaving (EU-based exports) and entering (EU-based import) a country. Countries which have a positive value in this indicator can be considered net intra-EU exporters, while those which have a negative value are net intra-EU importers. Interestingly, not all large intra-EU exporters also have a net intra-EU trade balance. Germany and France, for example, have a high volume of intra-EU exports but also classify as net exporters; conversely, the Netherlands, despite being the second in terms of waste shipped abroad, is also a net intra-EU importer. This illustrates that the Netherlands is an intra-EU plastic waste hub as well as an extra-EU exporter of plastic waste.

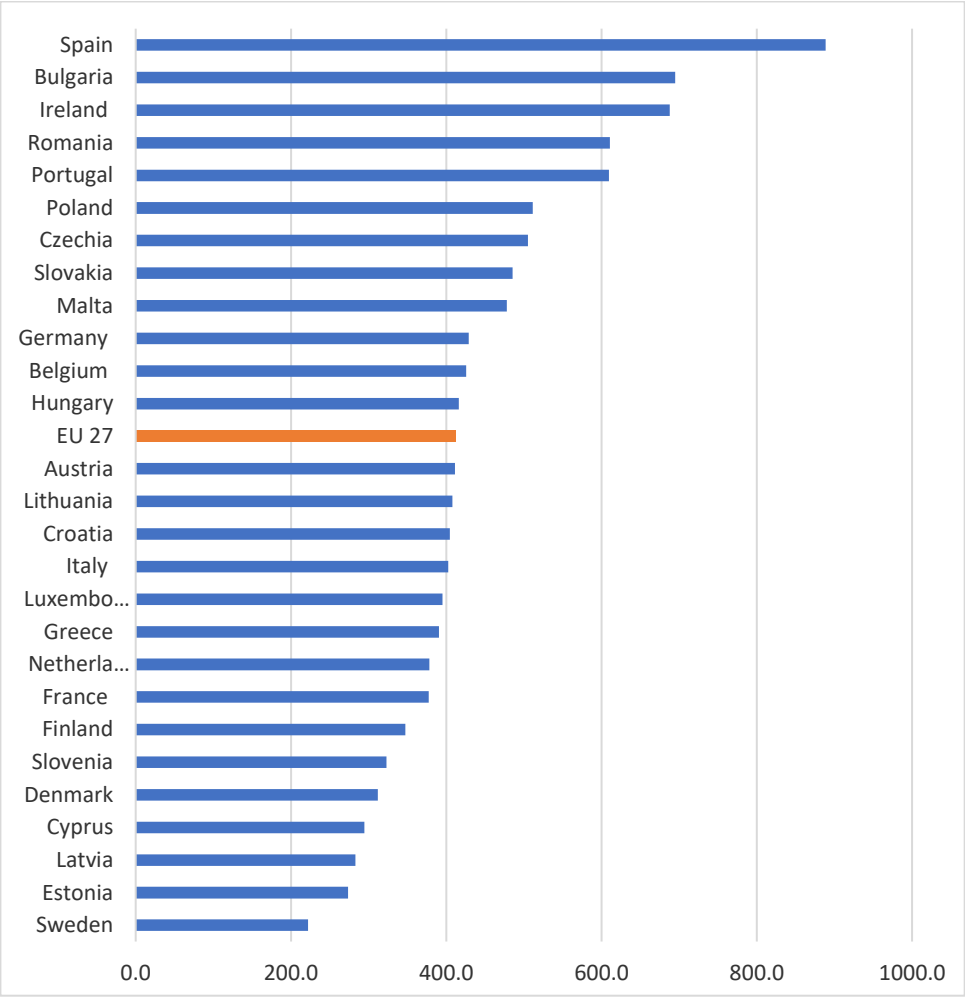
Figure 8 Intra-EU plastics waste trade, average difference between outflows and inflows, 2014–2021, tonnes



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

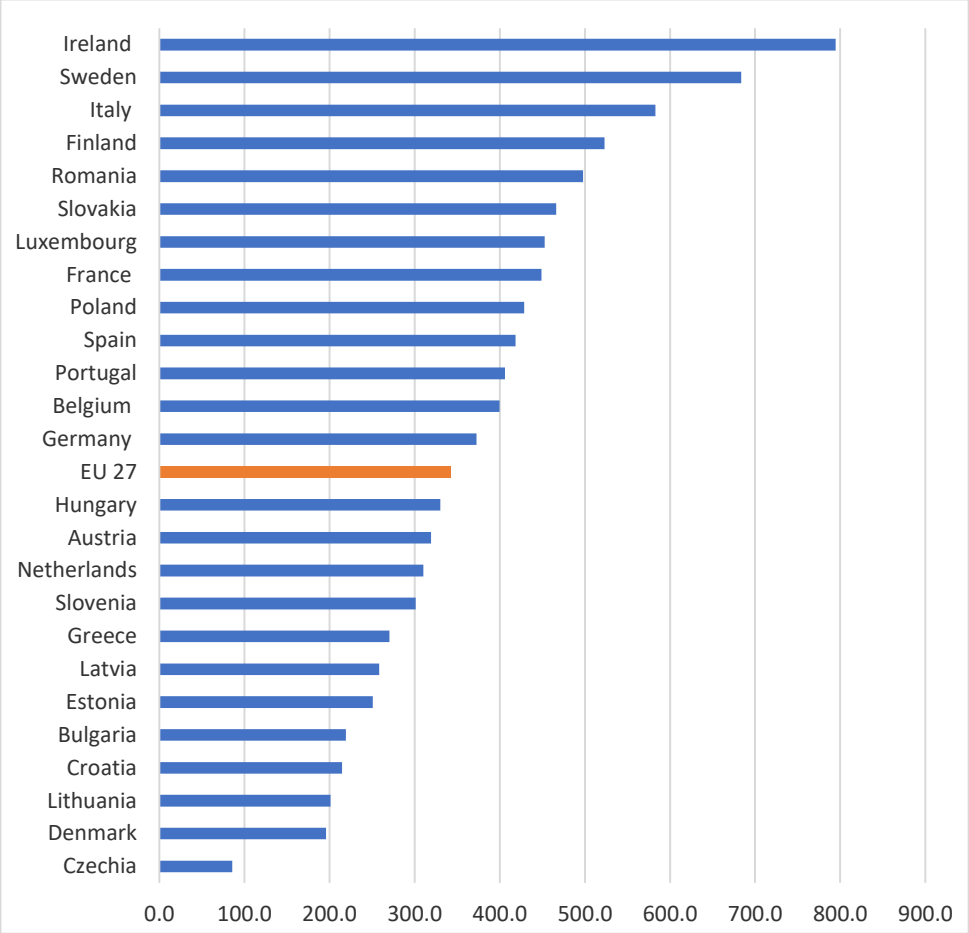
Figure 9 and Figure 10 show the value per tonnes of outgoing and incoming intra-EU plastic waste flows in 2021, respectively. In both cases, there are significant cross-country differences. The value of outgoing intra-EU plastic waste varies significantly between countries; for example, countries including Ireland, Bulgaria and Spain have an average value which is nearly twice that of the EU27 average, while countries including Sweden, Estonia and Latvia have much lower values. Similarly, the value of incoming intra-EU flows also differ significantly, with values above EUR 7 euros per tonnes in Sweden and Ireland, and values below EUR 2 in Denmark and Czechia. The value can be an indicator of the quality and recyclability of the plastic waste trade, meaning that if a country imports plastic waste with a low value/tonne, it is low-quality waste and may end up being incinerated rather than recycled. This is, however, only indicative.

Figure 9 Intra-EU plastic waste outflows, 2021, EUR per tonne



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/2022

Figure 10 Intra-EU plastic waste inflows, 2021, EUR per tonne

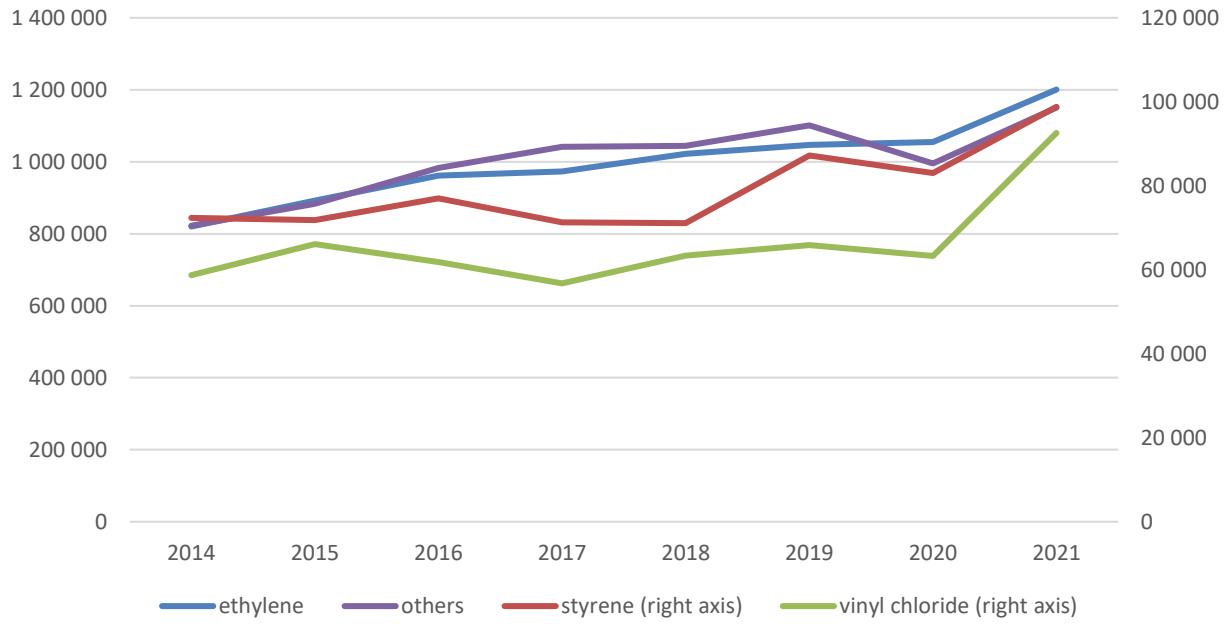


Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 9/6/22

Figure 11 shows the intra-EU plastic waste trade for ethylene (HS6 code 391510), styrene (HS6 code 391520), vinyl chloride (HS6 code 391530), and other polymers (HS6 code 391590) – the trend has increased for each since 2015. As shown in Figure 12, the shares of the polymers (by (CN8) code) within intra-EU trade have remained more or less constant over time ([2]).

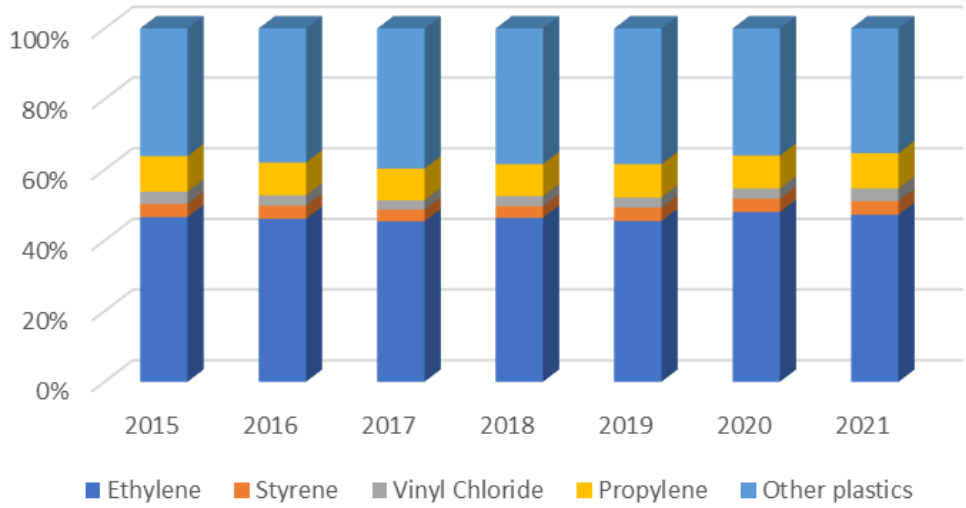
[2] The Combined Nomenclature (CN) is the EU's eight-digit coding system, comprising the Harmonised System (HS) codes with further EU subdivisions. It serves the EU's common customs tariff and provides statistics for intra- and extra-EU trade. See: https://trade.ec.europa.eu/access-to-markets/en/content/combined-nomenclature-0

Figure 11 Intra-EU27 plastics waste trade, selected polymers, 2014–2021, tonnes



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 7/6/2022

Figure 12 Intra-EU27 plastics waste trade, selected polymers, 2015–2021, per cent



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 7/6/2022

Summary

In summary, this section shows that the waste trade between EU countries has increased steadily over the last years for all the key polymers analysed. From the data the following patterns emerge: most flows come from Germany, the Netherlands, France and Belgium, but when per person values are considered, the picture changes and, together with the Netherlands, Slovenia and Estonia are the countries that ship the most plastic waste. Interestingly, among the large intra-EU exporters, the Netherlands is the only one to import a significant amount of waste, although this needs to be reinterpreted in light of extra-EU Trade figures as the Netherlands is one of the key extra-EU exporters. Therefore, the Netherlands may act as intra-EU plastic waste hubs, with much of the imported waste re-exported beyond the EU. Finally, the

analysis shows that there is a significant degree of heterogeneity in the value of waste streams with the average value of streams in some countries about three times higher than in others.

4.1.2 Plastic waste management: intra-EU

The aim of this section is to discuss plastic waste management withing the EU. This is expected to contribute, through the analysis of case studies, to the discussion on the role of Intra-EU trade in the circular economy transition. An important caveat for the content of this section is that the plastic waste considered may be different and broader as compared to data in the previous section.

4.1.2.1 Germany

In 2020, Germany imported around 22 Mt of waste, of which 15.8 Mt were non-hazardous waste and not subject to notification (BDE, 2020). Approximately 85 % was imported from other EU Member States (UBA, 2020a). Plastic waste accounted for 2 % of the intra-EU waste imported by Germany, about 491 000 tonnes (UBA, 2020b).
On a global scale and based on trade value, Germany is the sixth largest importer of plastic waste, and the second largest exporter. Since 2010, overall imports of plastic waste (HS code 3915) to Germany have increased by almost 40 % (BDE et al., 2020). The analysis by Trinomics (Trinomics, 2021) highlighted that intra-EU plastic waste imports to Germany decreased from 480 000 tonnes in 2016 to 380 000 tonnes in 2019. This might be linked to public operators reducing waste imports in order to dispose of the waste collected in their municipalities (Krafzik, S, 2016), as well as the fact that prices for the incineration of plastic waste increased significantly from less than EUR 100 per tonne to EUR 300, specifically for spot markets that are not based on long-term contracts.
About 60 % of Germany's plastic waste imports came from the Netherlands, Poland, Switzerland and Austria, highlighting a trend for Germany's cross-border waste transport mainly taking place between neighbouring countries. Some of the imports may eventually be re-exported, particularly to the Netherlands as Rotterdam port is a favoured destination for German plastic waste exports. There are, however, no figures on the exact amount of waste that is re-exported.
Germany is a net exporter of plastic waste in- general. In 2019, it generated 6.3 million tonnes of plastic waste, exported 1.1 million and import 0.5 million tonnes, yielding an export surplus of 0.6 million tons (Conversio Market & Strategy GmbH, 2020). Germany is also a significant net exporter of post-consumer plastic waste, mainly packaging.

Within the German intra-EU waste shipment statistics, other important waste streams that include significant shares of plastic are municipal solid waste (MSW), 578 000 tonnes or 9.5 % of all Germany's imported waste, and post-consumer packaging waste, 192 000 tonnes or 3.2 % of the country's imported waste. No further specific data exist for the share of plastic in the reported MSW or packaging waste streams, nor for imported WEEE or end-of-life vehicles (BDE, 2020). Municipal solid waste is subject to notification under the WSR.
The general differentiation between post-consumer and post-industrial waste seems to be important with regard to the final fate of plastic waste. Due to the landfill ban in Germany, more than 99 % of plastic waste is either recycled or recovered[3] – with the share of recycling differing significantly for post-consumer and post-industrial plastic waste (UBA, 2017). Due to increased mandatory MSW recycling targets transposed into the German packaging law from the EU's Waste Directive, the share of recycled post-consumer plastic waste will probably increase in the coming years. For post-industrial plastic waste, which is less contaminated by, for example, food waste, and of high quality, the analysis by Conversio (Conversio Market & Strategy GmbH, 2020) estimates material recycling rates of around 90 %. Taking this into account, the majority of imported post-industrial plastic waste is likely to be recycled and used to replace virgin plastics.

[3] https://www.statista.com/statistics/1265422/plastic-packaging-recycling-rate-germany/

In addition to the plastic waste discussed above, plastic waste is used as fuel to power, for example, cement kilns – residue derived fuels (RDF). According to Trinomics (2021) the net balance of plastic waste imports for incineration (codes: 19 12 10, 19 12 12 and 20 03 01), primarily used as RDF in cement kilns, was about 400 000 tonnes in 2018 down from around 800 000 tonnes in 2014. According to the German Association for Waste Management (DGAW, 2016), the United Kingdom (UK) was the main exporter of plastic waste for incineration plants in Germany using it as RDF but this has changed since the UK left the EU. Plastic packaging waste imported from Norway and Sweden have also been used as RDF, albeit to a lesser extent, in Northern Germany.

4.1.2.2 The Netherlands

In general, the Netherlands is considered a transport-hub country with very significant amounts of waste imported and exported through its large ports (Section 4.1.1; Trinomics, 2021). This needs to be considered as an influence on the level of waste imports for disposal because the Netherlands could be a transit country for waste to be shipped from other Member States beyond the EU (extra-EU shipments). In 2021 the Netherlands was EU's largest exporter of plastic waste to non-OECD countries with clear increases in recent years. On a per person basis, the Netherlands is the world's leading plastic-waste exporter to countries in the global South. One potential reason for this increasing trend compared to the overall EU development could be that tightened regulatory requirements can be more easily fulfilled by actors in large ports such as Rotterdam – for example, the Netherlands has developed a specific national IT system, Client import, that is used for the standardised handling of Common Health Entry Documents allowing automatic forwarding to relevant authorities). Additionally, historically close links to countries such as Indonesia and Viet Nam, which have replaced China as major importers, have increased the importance of the Netherlands as transport hub.

According to Trinomics (2021) in 2019 450 000 tonnes of plastic waste were imported to the Netherlands from other EU Member States – a similar amount to Germany. In contrast to Germany, however, this has increased in recent years, and the Netherlands was a net importer of plastic waste with a positive net balance/trade surplus of 240 000 tonnes in 2020 (Trinomics, 2021). One concern is that, as a result of East Asian countries having stopped accepting UK plastic waste exports, due to high levels of pollutants, some waste operators are laundering UK plastic waste through the Netherlands, declaring it as Dutch waste and re-exporting it to East Asia (Reintjes, 2018).

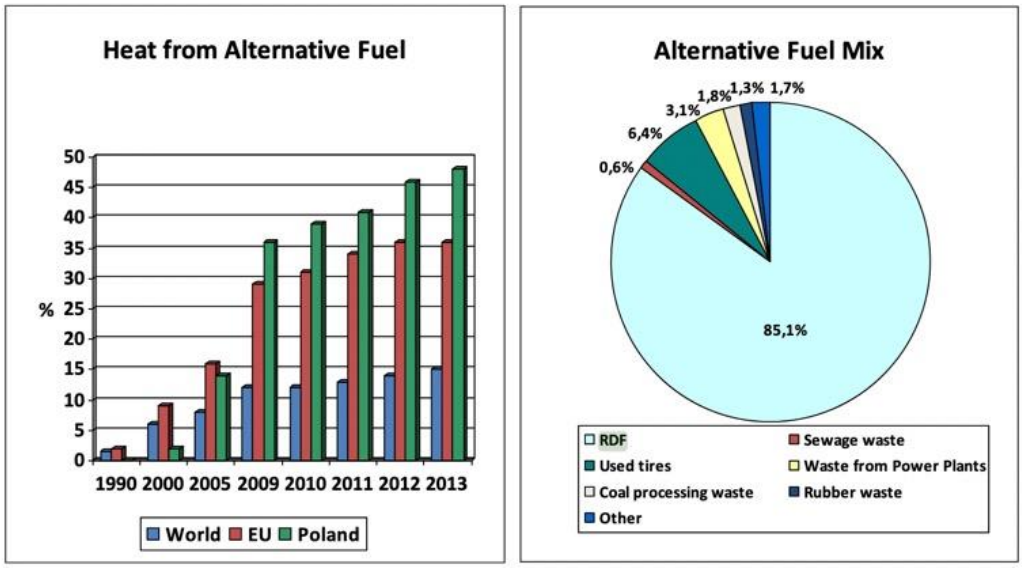
With regard to the final fate of imported plastic waste, a specific characteristic of the Dutch recycling system is a growing emphasis on chemical recycling – which is not yet operational but leads to an increasing interest in the availability of plastic waste streams. The Dutch circular economy transition agenda for plastics, for example, envisions that by 2030 10 % of all plastics used in the Netherlands will come from chemical recycling processes (CE Delft, 2020). Chemical recycling is viewed as an addition to the present mechanical recycling of plastics, since it can process different plastic waste streams and produce high-value resources for the chemical industry, which is already very strong in the Netherlands. The Saudi Basic Industries Corporation (SABIC) and Plastic Energy are building the world's first commercial-scale recycling unit to produce circular plastic polymers in the Netherlands, with an expected recycling capacity of 20 000 tonnes per year (Netherlands Foreign Investment Agency, 2021)(Plastic Energy, 2021). Nevertheless, most of the plants for chemical recycling in the Netherlands are still in ta pilot phase.

4.1.2.3 Poland

Poland has a positive net balance/trade surplus of 30 000 tonnes in 2020 (Trinomics, 2021). The UK is a key exporter of plastic waste to Poland – in 2021 Poland received 53 000 tonnes of UK plastic waste. That makes Poland the third largest recipient of British plastic-waste after Turkey and Malaysia (Greenpeace, 2021)(The First News, 2021).

According to a Greenpeace report (2021), half the plastic waste exported from the UK to Poland is mixed plastic with a high share of PVC, a plastic that is very challenging to recycle. Against this background, the Polish government tightened regulations for imports of plastic waste. Since 2022, all companies dealing with trans-frontier waste shipments must register each shipment through Polish Ministry of Finance's electronic Puesc platform. One of the key recipients for the plastic waste imported to Poland is its 13 cement plants with an annual production capacity of around 22 Mt, which use plastic waste to reduce the consumption of oil and thus improve the carbon footprint of their products. As illustrated in in Figure 13, these plants use large amounts of RDF, co-processing around 1.5 Mt of waste (Werkowski, A, 2017).

Figure 13 Fuel mix in Polish cement plants, heat generation (left) and alternative fuels (right), per cent



Source: Werkowski (2017)

In the last years, Poland also struggled with criminal activities and illegal waste imports linked to various burning dumpsites. In 2018, for instance, 2 600 tonnes of UK waste were sent to an illegal dump in Poland and, before the waste could be repatriated, a fire broke out at the dump. According to the Environment Agency, this was one of some 80 waste fires in 2018, most of which were suspected to have been set deliberately in an effort to destroy evidence (Greenpeace, 2021). The incidence of those events is expected to be decreasing due to national legislation amendments.

4.1.2.4 Italy

In 2020, Italy's imports of plastic waste amounted to almost 114 000 tonnes while the amount exported is almost 606 000 tonnes – Italy, however, uses a broader definition of plastics waste than is used elsewhere in this report. Imported plastics waste consist of 47 % plastic packaging waste ([4]), 27 % plastics and rubber wastes from the mechanical treatment of waste ([5]), 22 % are plastics waste from the manufacture, formulation, supply and use (MFSU) of plastics, synthetic rubber and man-made fibres ([6]), and other plastics waste ([7]) account for around 4 %. For all waste types, the main form of treatment is material recycling, while disposal treatments are carried out for small amounts of imported plastic wastes. More than 40 % of the imported plastics come from France, and are mostly municipal packaging waste imported by plastics manufacturers, who transform post-consumer PET bottles into recycled PET flakes and recycle other plastics into regenerated polymers, rLDPE flexible films and rPET sheets, LDPE, HDPE and PP granules

4 List of Waste (Low); see Commission Decision 2001/118/EC of 16 January 2001 amending Decision 2000/532/EC - code 150102

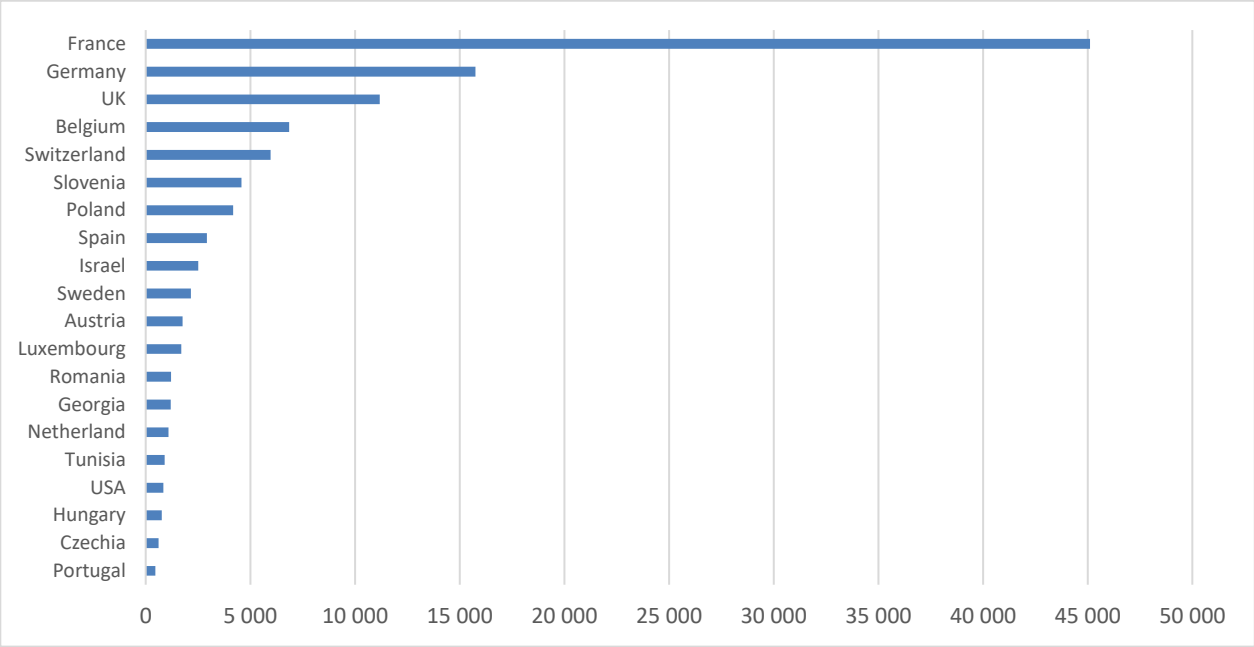
5 LoW code 191204

6 LoW code 070213

7 LoW codes 160119; 120105; 200139; 020104; 170203

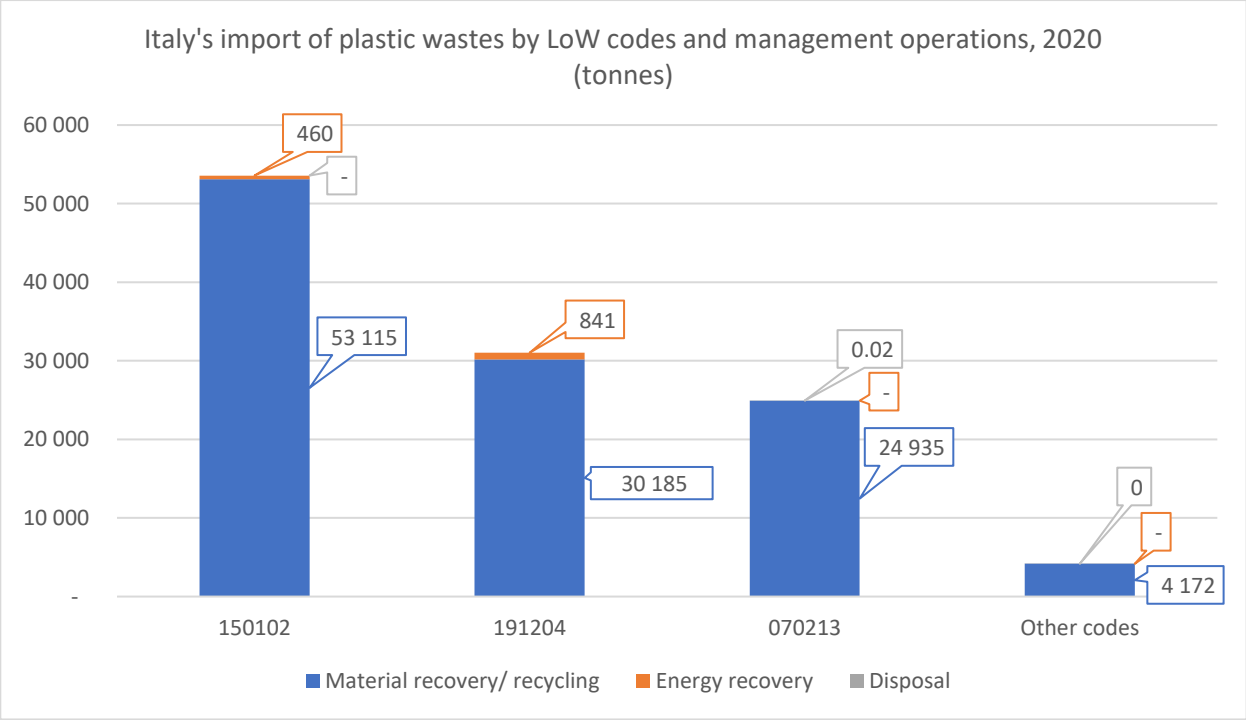
or flakes. Fourteen per cent is imported from Germany and is similar to imports from France, while 10 % is imported from UK, mostly waste from the MFSU of plastics which is always imported for manufacturing processes.

Figure 14 Italy's imports of plastic waste, top 20 countries, 2020, tonnes



Source: Developed by ISPRA, based on ISPRA data.

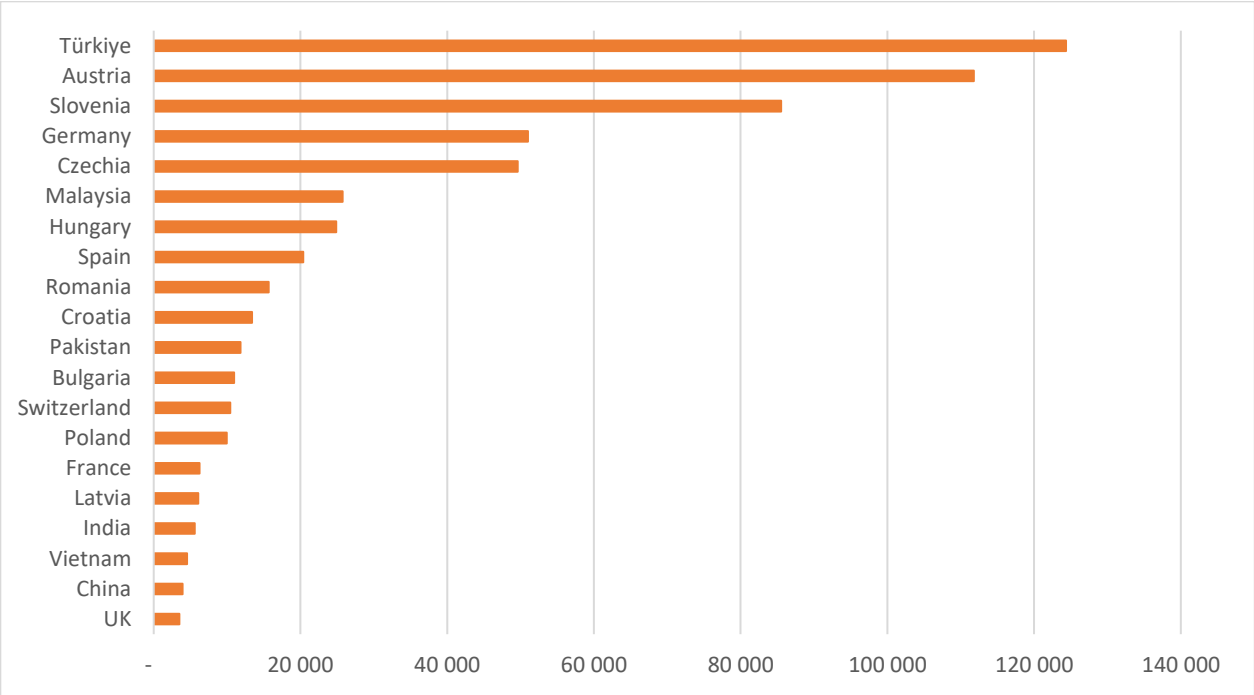
Figure 15 Italy's plastic waste import, LoW codes and management operations, 2020, tonnes



Source: Developed by ISPRA, based on ISPRA data

Of the plastic wastes exported, 92 % is plastics and rubber residual wastes from the mechanical waste treatment ([8]), 6 % is plastic packaging waste ([9]), and other waste codes make up the remaining 2 %. The primary form of treatment declared is material recovery/recycling, amounting to 79 %; energy recovery accounts for 20 % and other forms of disposal the last 1 %. Twenty-one per cent the plastics waste is exported to Türkiye, 18 % to Austria, 11 % to Slovenia.

Figure 16 Italy's export of plastic waste, top 20 countries, 2020, tonnes



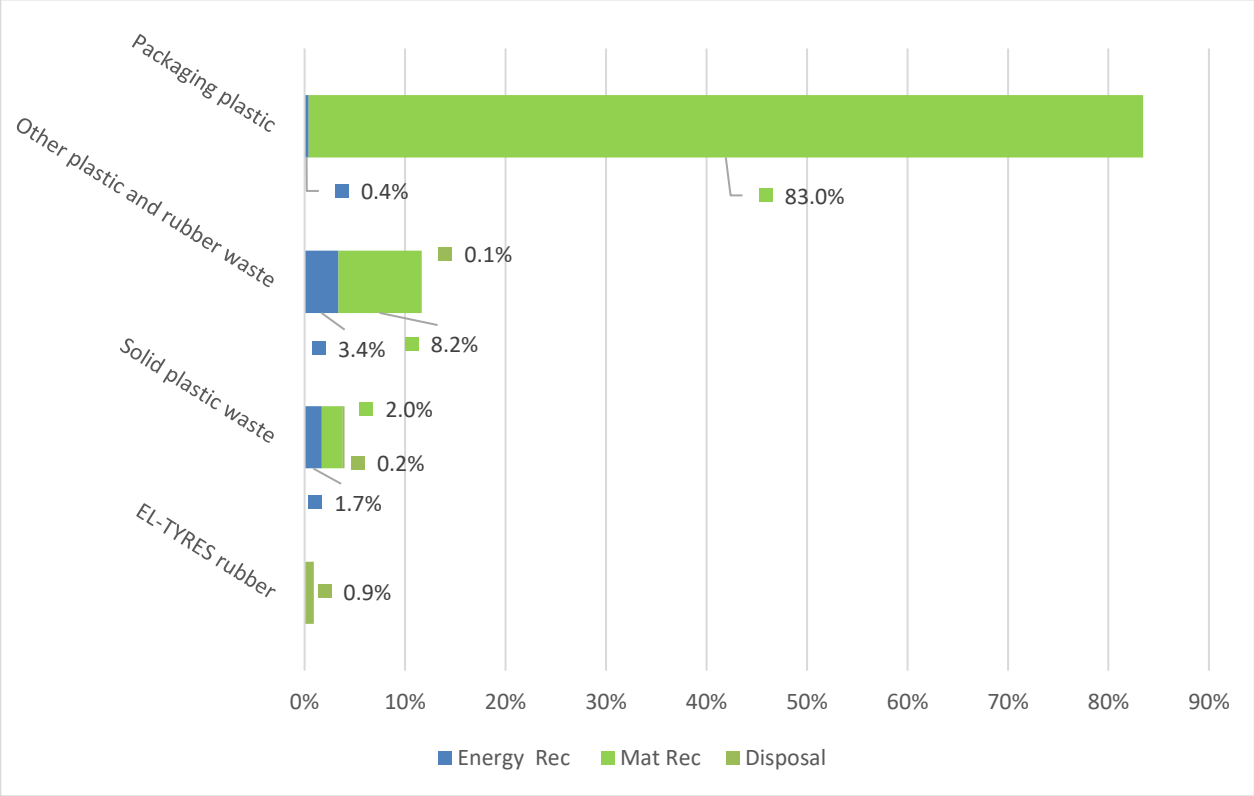
Source: Developed by ISPRA, based on ISPRA data.

A preliminary study by the Italian National Institute for Environmental Protection and Research (ISPRA) using LoW and EC 1013/2006 export codes provides an insight into the plastic waste streams exported – note this is indicative as the data are incomplete. The information on the treatment of waste in receiving countries is based on the exporter's reported declarations of recovery/disposal codes and does not necessarily reflect the actual quantities recycled, as defined in the rules for calculating the waste recycling rate.

8 LoW code 191204

9 LoW code 150102

Figure 17 Sources of waste exported from Italy to Austria, 2020, per cent

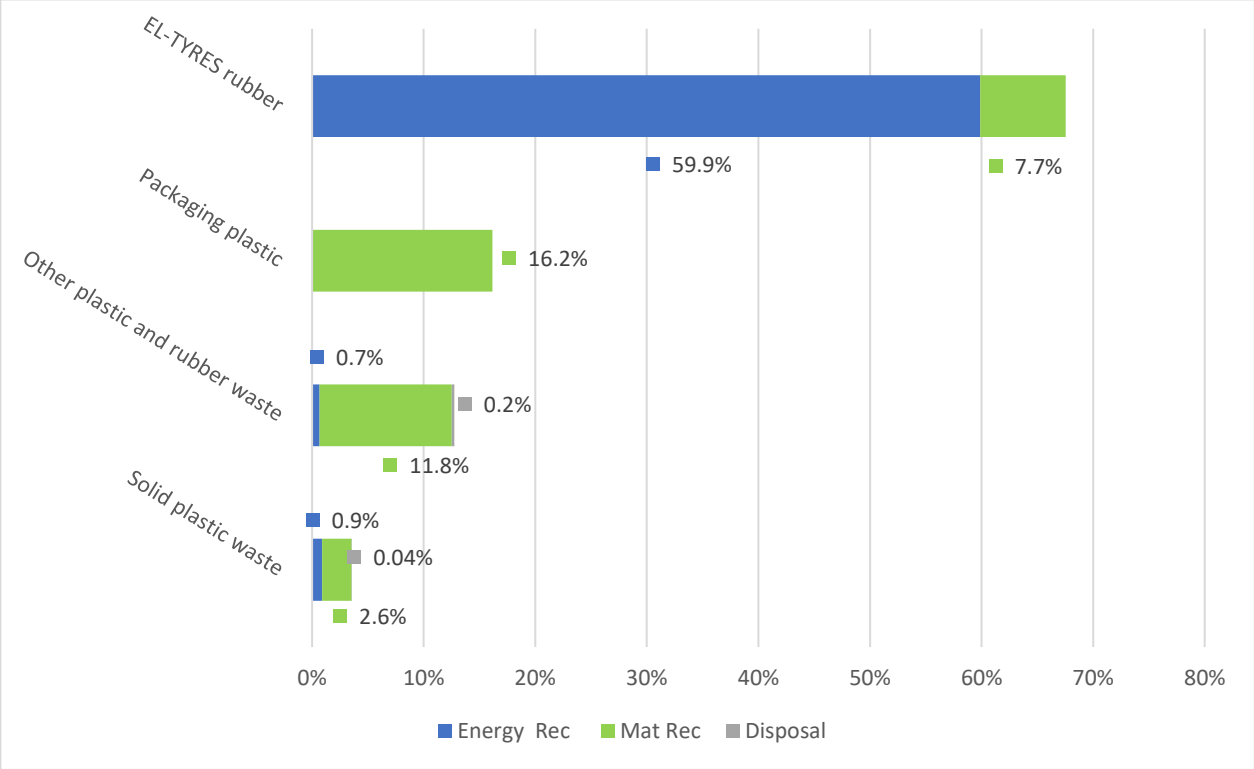


Source: Developed by ISPRA, based on ISPRA data

More than 80 % of plastics waste exported to Austria originated from the treatment of plastics packaging or the sorting of municipal plastics packaging and is destined for recycling companies to produce post-consumer low-density recyclates, such as (rLDPE). As mentioned before, a certain amount is sent to steelworks to be used as a secondary reducing agent.

Nearly 60 % of exports to Türkiye originated from the treatment of end-of-life EL-tyres. It is mainly used for energy recovery, for instance, as fuel in cement plants.

Figure 18 Source of waste exported from Italy to Türkiye, 2020, per cent



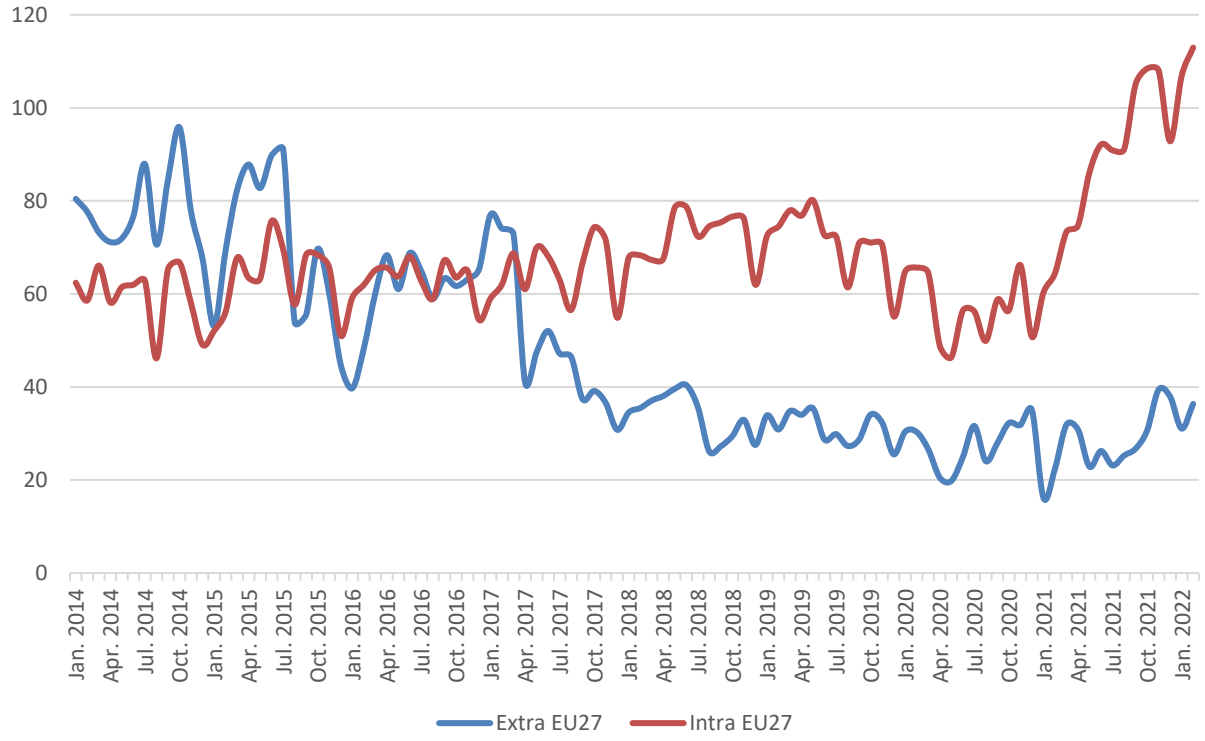
Source: Developed by ISPRA, based on ISPRA data

4.2 Fate of plastics: extra-EU

4.2.1 Trade data: extra-EU

The evolution of the extra-EU plastic waste trade in recent years has been affected by the significant restrictions and policy changes highlighted in Sections 2.2–2.5, together with a greater emphasis on the transition to a circular economy. In recent years, there have been substantial changes in the patterns of both intra- and extra-EU trade in plastic waste, as shown in Figure 19 and Figure 20.

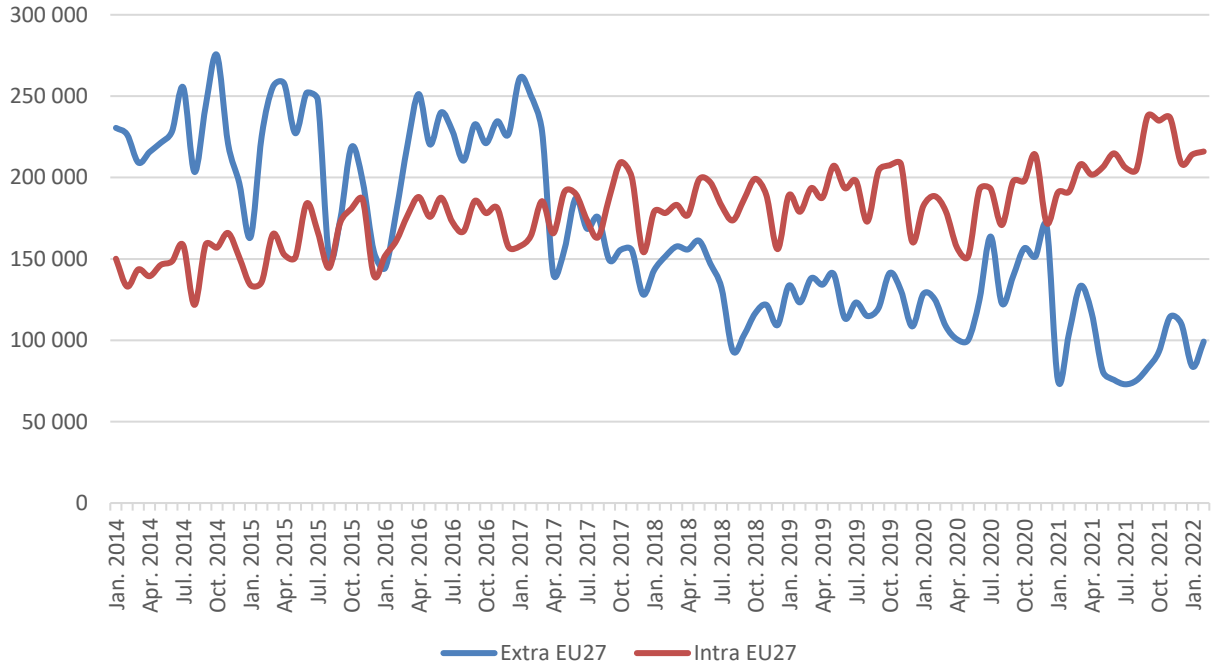
Figure 19 Intra- and extra-EU trade in plastic waste, EU27, 2014–2022, EUR million



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915. Monthly data). Extracted on 7/6/2022

Figure 19 shows that the value of plastic waste trade outflows from the EU have decreased until early 2020, and they have been overtaken by the value of intra-EU trade flows.

Figure 20 Intra- and extra-EU trade in plastic waste, 2014–2022, EU27, tonnes

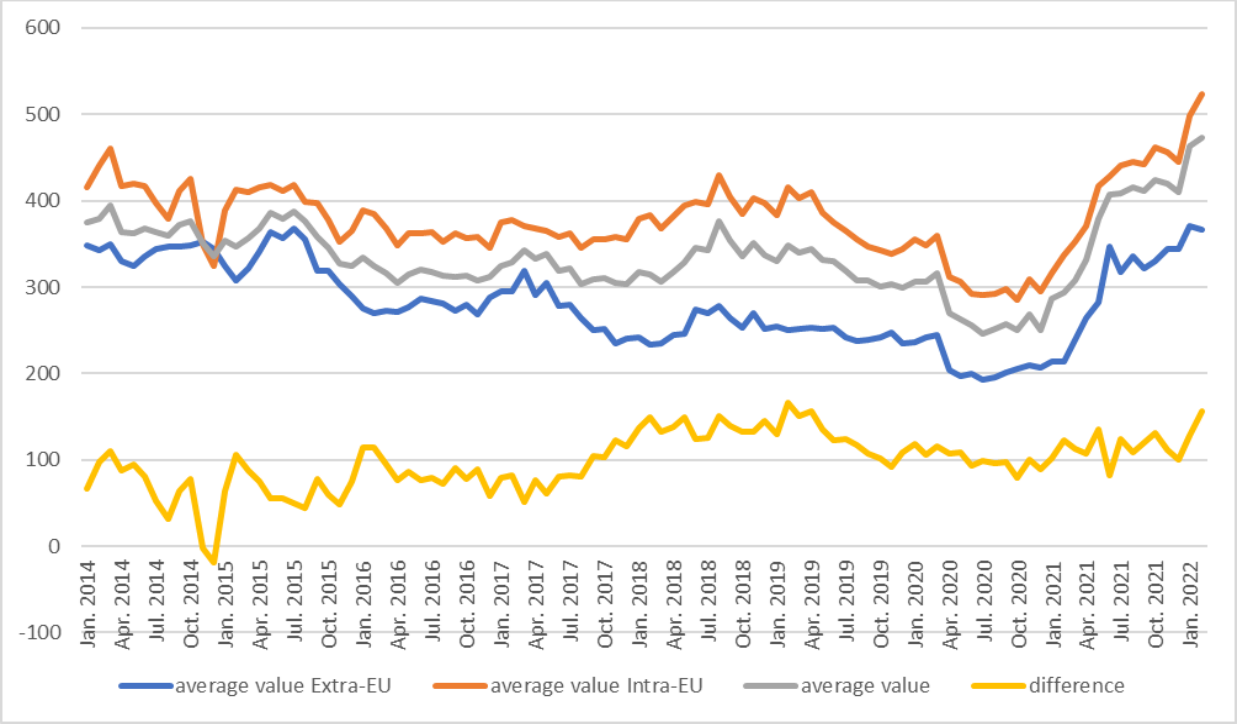


Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915. Monthly data). Extracted on 7/6/2022

Further, Figure 21 shows a larger difference in favour of intra-EU trade in terms of the average plastic waste price between 2014 and the beginning of 2022. This may suggest that the quality of the intra-EU plastic waste trade has increased – yielding an increase in prices – while the quality of the extra-EU plastic waste trade has remained almost the same. This is, of course, only an indication, as several factors may have affected prices over time, suggesting the need for a more detailed analysis. These factors include the potential drivers discussed in Chapter 3 – including the recycling technologies available in exporting countries, economies of scale in treatment, labour and transport costs, and, not least, petroleum prices.

By investigating the difference between intra- and extra-EU trade (Figure 21), similar trends, namely the value of plastic waste exported beyond the EU has been systematically lower than the corresponding average value of plastic waste traded within the EU, can be seen. Concerningly, an increase in the difference can be seen around the introduction of the Chinese ban, indicating a reduction in price and possibly also the quality of the extra-EU plastic waste trade as a result of re-routing the waste away from China. On the other hand, the more recent increase between January 2021 and February 2022 may be a hint of the potential effects of the Basel Convention and subsequent changes to WSR leading to an increase in the quality of traded plastic waste, although this needs further investigation.

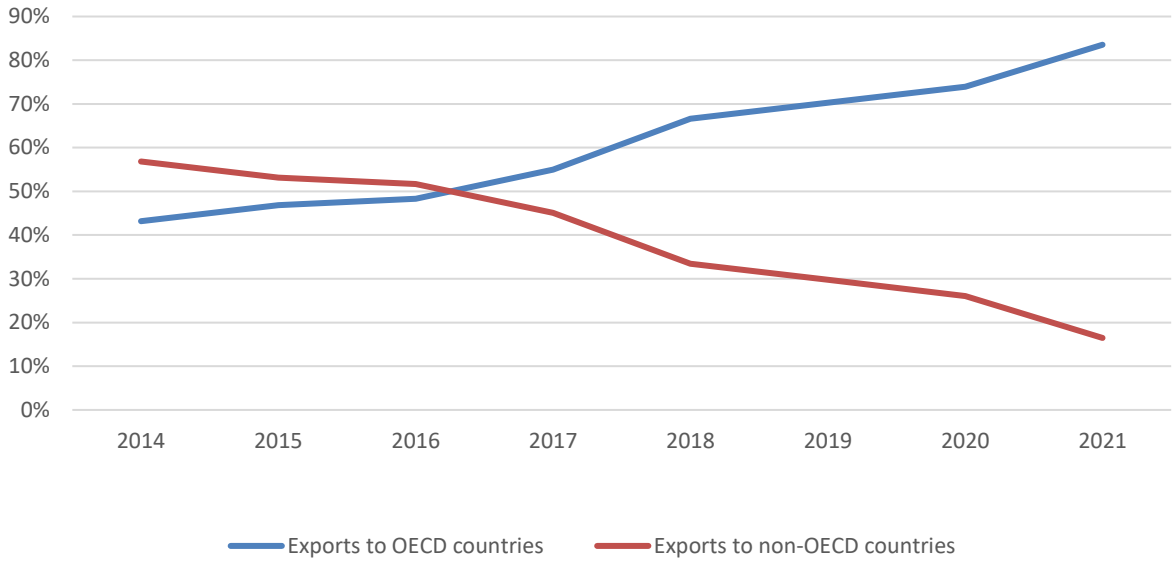
Figure 21 Value of plastic waste exported from EU27, 2014–2022, EUR per tonne

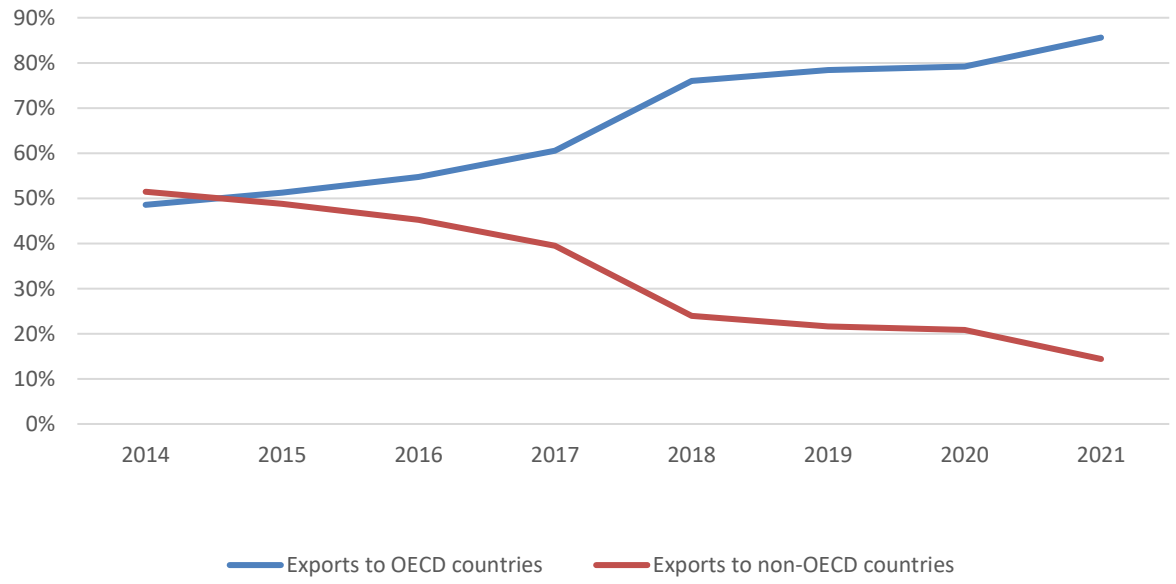


Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915. Monthly data). Extracted on 7/6/2022

Figure 22 explores these results in more detail by showing the share, and relative trend, of total EU27 plastic waste exports to OECD and non-OECD countries. The figure that emerges is very clear: considering weight alone, the share of plastic waste exports to OECD countries increased significantly, from ca. 40% in 2014 to ca. 80% in 2021. Consequently, the flow of plastic waste from the EU-27 to non-EU OECD countries decreased to 20% during the same period. If we look at the value of exported waste, we find a similar picture, but the difference across OECD and non-OECD countries is smaller in 2014 and larger in 2021. A possible explanation rests on the possibility that the quality of waste shipped to OECD countries (as measured by the average value) increased as compared to that shipped to non-OECD countries.

Figure 22 EU27 exports of plastic waste to OECD and non-OECD countries, per cent of total weight (above) and value (below).





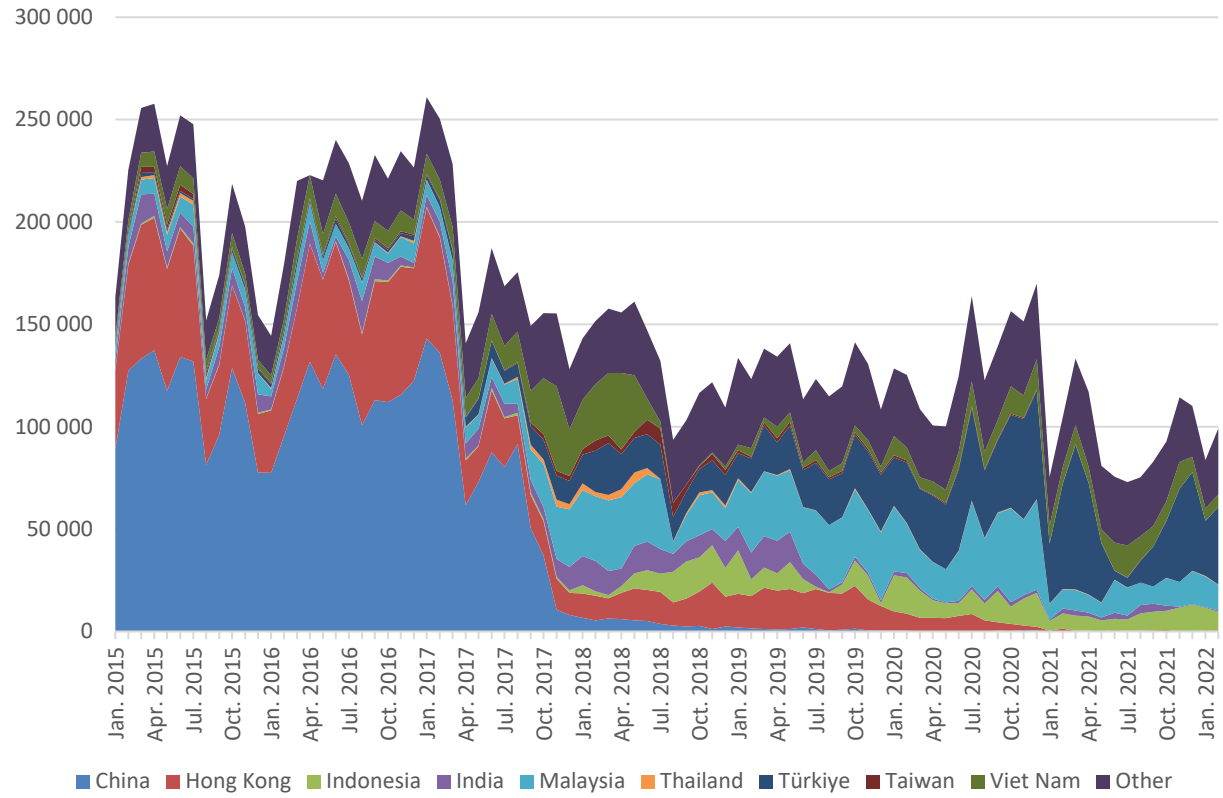
Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 13/01/2023

The evolution of the extra-EU plastic waste trade is reported in Figure 23 ([10]). As it clearly emerged from a previous report (EEA, 2019), the 2018 Chinese plastic waste import restrictions, together with subsequent restrictions introduced by other countries and the entry into force in 2021 of new global rules stemming from the Basel Convention has led to changes in extra-EU trade patterns. As expected, exports to China dropped to almost zero since the import restrictions. Other countries introducing import restrictions on plastics waste have also led to drops in Extra-EU trade. India banned the import of plastic waste in 2019, and this generated a drop during 2019 according to Eurostat data, while EU plastic waste exports to Thailand have declined as the country introduced a progressive reduction in allowed plastic waste imports which runs until 2026. Surprisingly, EU exports to Indonesia doubled between January 2018 and February

[10] Trade between EU and UK is detailed in Section 4.2.2

2022 despite Indonesia banning plastic waste imports in 2018. Shipments to Türkiye also increased significantly in the considered period.

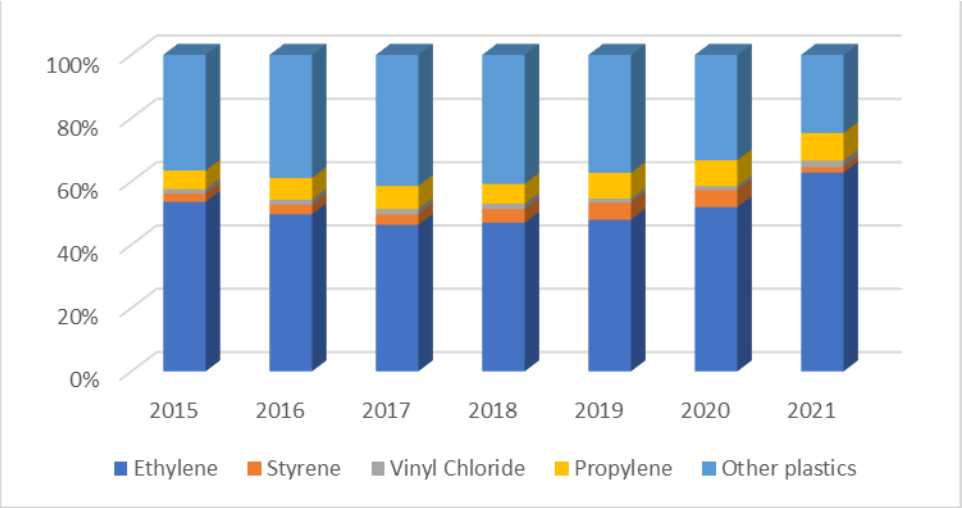
Figure 23 Extra-EU27 exports of plastic waste to selected destinations, 2015–2022, tonnes



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915. Monthly data). Extracted on 8/6/2022

Figure 24 shows a more detailed picture of extra-EU plastic waste flows grouped according to polymers (according to CN8 codes). It highlights that most of the EU exports are ethylene followed by other polymers. Since 2014, the observed evolution shows a fall followed by a rise for ethylene, while the opposite holds for all the other polymers.

Figure 24 Extra-EU27 exports of plastic waste, polymers,2015–2021, per cent



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915. Monthly data). Extracted on 7/6/2022

From Figure 24 it can be seen that after the Chinese ban in 2018 the share of polymers of ethylene in extra-EU trade increased, while the corresponding share of all other polymers has decreased. Whether this change implies an improvement of extra-EU trade is open for analysis but, as highlighted in Section 2.1, ethylene-based polymers such as PE and PET are, in general, more recyclable – albeit this is no guarantee that they actually are recycled. In addition, the steep reduction of export of other plastics in 2021 could be the result of the new Basel Convention rules – again this should be followed up by further analysis.

4.2.2 Waste management outside the EU

This section reports relevant case studies of waste trade and management outside the EU. Clearly, the fate of plastics outside the EU depends, in part, on the quality of the waste exported from EU, and also on local waste-related infrastructure, regulatory and institutional issues. A box on the peculiar case of UK is also presented. An important caveat also applies to the content of this section: considered plastic waste types may be different and broader as compared to data in the previous section.

4.2.2.1 Viet Nam

Total amount of plastic waste entering Viet Nam

As a result of China's import ban on scrap plastics in 2017, Viet Nam became one of the largest importers of plastic waste in the world, mainly from the Group of Seven (G7) countries ([11]) (Tze Ni Yeoh, 2020). A market study for Viet Nam by the (World Bank, 2021) shows that a total of 3.3 Mt of HDPE, LDPE, PET and PP waste were imported by Viet Nam in 2019. Due to the lack of an integrated solid waste management system and the various challenges faced by plastic recyclers in sourcing high quality, large and consistent quantities of plastics, many recyclers still prefer imported plastic waste. This is because imports can better meet their quality and price requirements and come from suppliers who can issue proper value-added tax (VAT) invoices for business expenses and tracking purposes. Out of 13 recyclers, five recyclers sourced more than 90 % of their feedstock from importers (World Bank, 2021). In 2019, approximately 35 % of all plastic waste imported into Viet Nam came from Japan.

Characterisation of Viet Nam's waste management system

There are currently no regulatory targets for municipalities to reduce landfilling and increase recycling. The plastic which is recycled tends to be exported to production facilities elsewhere and the country lacks

[11] G7 countries: Canada, France, Germany, Italy, Japan, UK and US.

a strong domestic secondary market for recycled plastics. Viet Nam's dependence on exporting recycled plastics has left its recycling industry fully exposed to the global price volatility that comes with the recycling business. In 2019, Viet Nam recycled about 33 % of plastic waste in treatment plants, an estimated 1.28 Mt. The remaining non-recyclable waste, 2.62 Mt was disposed of in sanitary and unsanitary landfills and dumpsites, incinerated, or burnt in open fires. Much of this waste, however, eventually leaks on to land or into waterways (World Bank, 2021). In addition to the loss of the material value, Viet Nam has severe environmental issues, particularly in waste management and plastic pollution. In the recycling craft village of Minh Khai, believed to be one of the largest sites for plastics waste imports in Viet Nam ([12]), 25–30% of the plastic waste collected for recycling is disposed of as residual waste.

Many of the existing waste management treatment plants are not able to invest in more advanced recycling technology. Due to a lack of local demand for recycled plastics especially for high-value end-use applications, treatment plants rely on outdated equipment and manual labour and make slim margins. Furthermore, the recyclables are of low quality due to a lack of design-for-recycling standards and existing contamination rates of up to 30 % of the feedstock. This includes contamination due to poor separation practices and poor packaging design. A study by the World Bank (2021) emphasised the need for basic infrastructure improvements to the collection and transport system, including a shift to containerisation, which would allow for modernisation and optimisation of the solid waste management (SWM) system. Separating wet (organic) and dry (plastic) waste at source would enable better recycling programmes while diverting waste from landfill. As of 2019, plastics manufacturers in Viet Nam have not announced plans to invest in plastic recycling facilities, although one processor, Duy Tan, is developing a bottle-to-bottle food-grade recycling facility which will be able to recycle 100 000 tonnes of plastics by 2025. In Viet Nam, however, much of the recycling is done separately from the SWM system through upstream diversion. This is done directly by the informal sector, consisting of collectors, scrap dealers and aggregators, who create a parallel economy for the collection of recyclables.

Viet Nam´s role as hub for plastic waste

Various key players in the market including the Viet Nam government, the private sector and plastic value chain actors are working to create a circular economy and a better waste management system. Since 2018, government regulations and laws have regulated the import of plastic waste. A temporary ban on the import of plastics waste was imposed in 2018 and in 2019 two restrictions were proposed by Decree No. 40/2019/ ND-CP: each recycler may only import 80 % of the feedstock and imported feedstock may only be processed into semi-finished or finished goods and not flakes or pellets. As a stop-gap measure, the government has tightened restrictions by halting the issuance of licenses to import plastic waste, with a full ban on plastic waste imports to be implemented by 2024. Viet Nam plans to increase local production capacity for new resins by 2.6 million tonnes – 1 050 000 tonnes of PP, 800,000 tonnes of PE, 400 000 tonnes of PET and 350 000 tonnes of other resins – from 2021 (World Bank 2021). Illegal imports of plastic waste and tax evasion on waste shipments, however, remain a major regulatory challenge in Viet Nam. Hence, policies to support a viable plastics recycling industry could alleviate regulatory pressure, while mitigating environmental risks arising from imported plastics waste (Tze Ni Yeoh, 2020). The Viet Nam government also adopted a revision of the Law on Environmental Protection and made several public commitments to reduce marine plastic litter. Now, the Viet Nam Plastics Association (VPA) and the Viet Nam Plastic Recyclers Association (VPRA), through their members, the Customs Department and the Ministry of Industry and Trade (MOIT) are responsible for monitoring and maintaining data sets on Viet Nam's production, exports and imports of virgin resins. Further reforms are needed, including a practical roadmap for monitoring and achieving results. In the private sector, there are ongoing initiatives, such as the Public Private Collaboration (PPC), the Packaging Recycling Organisation (PRO) and efforts led directly by individual companies, to reduce plastic waste and promote recycling. Actors in the plastics value chain in Viet Nam, such as global brand owners, resin producers, converters and recyclers, operate with different intentions. Brand owners and recyclers are the most likely to be able to effect change as the former have

[12] 'The Billionaires' Waste Recycling Village Is Seriously Polluted', News VietnamNet (https://vietnamnet.vn/en/the-billionaires-waste-recycling-village-is-seriously-polluted-E204224.html) accessed 24 January 2020

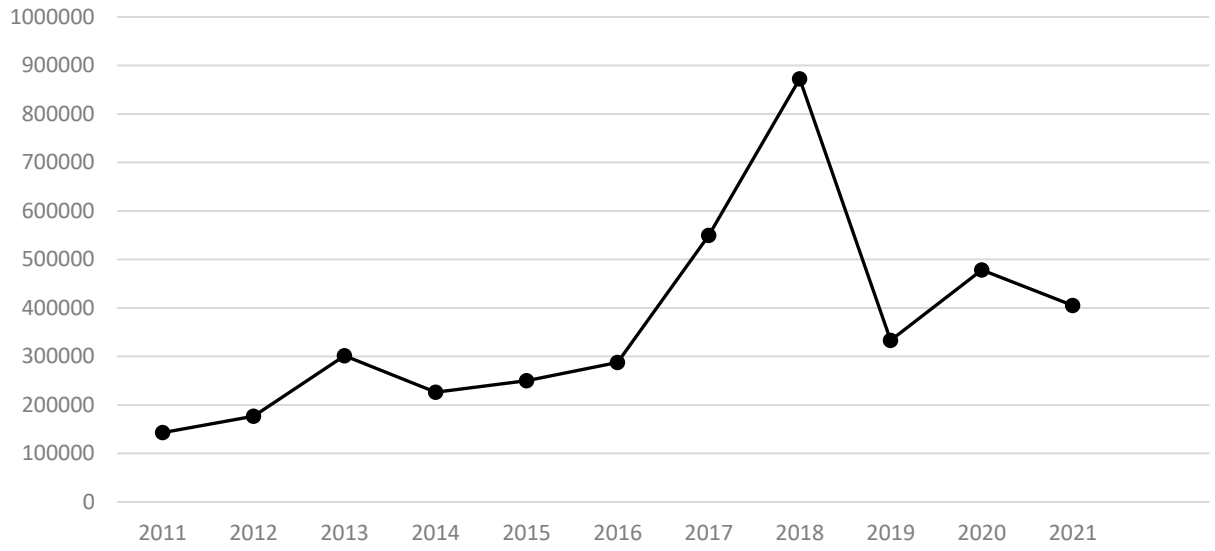
the greatest incentive to make commitments to persuade consumers, and the latter want to maintain their main business. Converters and resin producers are less committed but could, nevertheless, have a significant impact on plastics circularity in Viet Nam (World Bank, 2021).

4.2.2.2 Malaysia

Total amount of plastic waste entering Malaysia

In the aftermath of China's 2017 ban on imports of plastic waste, Malaysia, as other Southeast Asian countries, has seen its plastic waste imports increase – Malaysia rapidly became the world's largest plastic waste importer (ETC/WMGE(2019); UBA 2017). After reaching a peak in 2018, imports have since decreased (Figure 25). One key reason for this was the National Solid Waste Management Department (NSWMD), which, at the end of 2018, enforced 18 new terms for the issuance of the permits and increased the monitoring of the permit holders (Chen et al., 2021). Imports in 2020 and 2021 could have been affected by the Covid-19 pandemic and disruptions to global trade. Data for these years should therefore be taken with caution.

Figure 25 Total imports of plastic waste, Malaysia, 2011–2021, tonnes

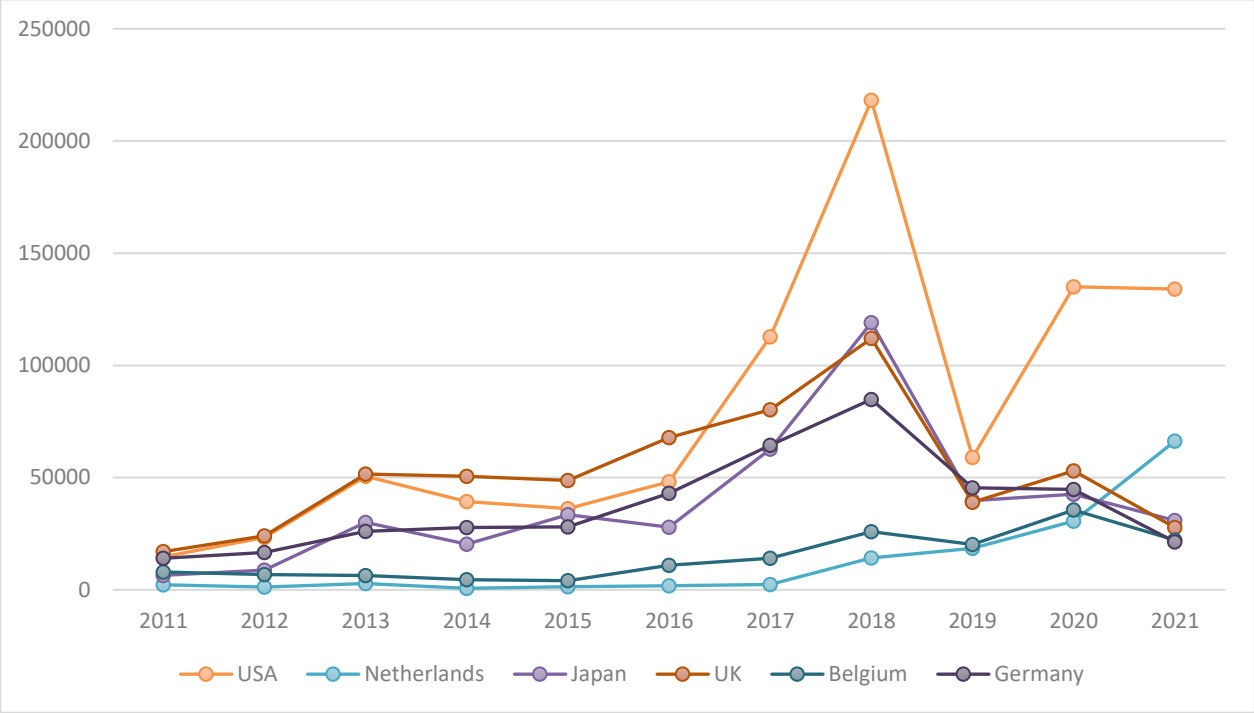


Source: UN Comtrade Database (trade code 3915). Extracted in June 2022.

In 2021, 405 010 tonnes of plastic waste registered with the commodity code HS3915 were imported into Malaysia from all around the world. Illegal imports using wrong commodity codes, i.e., using HS3920 instead of HS3915, mean that probably more plastic waste than shown in the official statistics entered the country (Wong and Jasmin, 2019).

The origin of the plastic waste imported in Malaysia has varied considerably since 2018, but due to illegal shipments it is difficult to provide an exact picture of its origin. Figure 26 provides an overview of the exporting countries that send their waste plastic to Malaysia. All the main countries of origin steadily increased their exports to Malaysia after the announcement of Chinese ban, including the EU27+the UK. Between 2015 and 2021, the Netherlands and Belgium saw the highest relative increases in exports of plastic waste to Malaysia of respectively 4 601 % and 447 %.

Figure 26 Plastic waste imports by Malaysia, selected countries, 2011–2021, tonnes

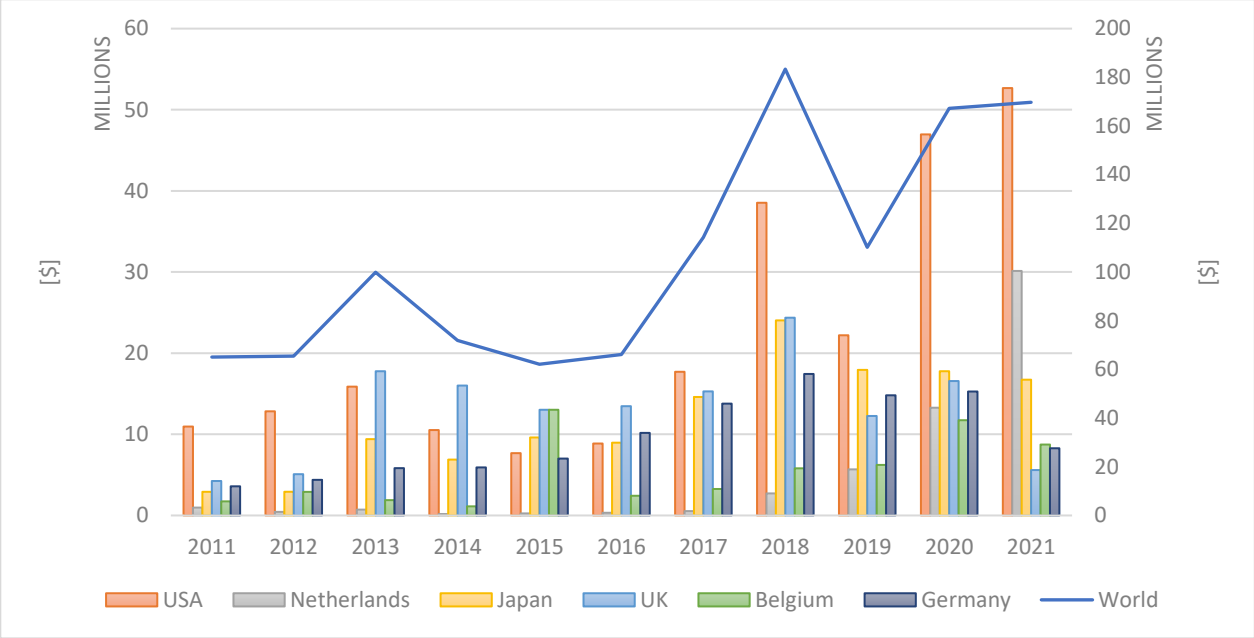


Source: UN Comtrade Database (trade code 3915). Extracted in June 2022

The total value of plastics waste imported in Malaysia in 2021 was close to USD 170 million (approximately EUR 155 million). Compared to 2011, when the total value was USD 65 million (approximately EUR 59 million), this is an increase of 162 % in just 10 years. Figure 27 shows the changes in value of the imported plastic waste. Overall and for each country separately, the value of the material follows the same trend as the total imports of plastic waste seen in Figure 26.

There is little or no information on the composition of imported plastic waste and the exact type of plastic entering Malaysia. In this case, the value of the imported waste can be an indication of the quality and/or type of plastics traded, as values change under those parameters.

Figure 27 Value of the plastic waste imported by Malaysia, selected countries (left axis) and world (right axis), 2011–2021, USD million



Source: UN Comtrade Database (trade code 3915). Extracted in June 2022.

Generally, most of Malaysia's waste ends up in landfills: it is estimated that 89 % of all its MSW is landfilled and only 1 % recycled (Yong et al., 2019). The waste system is simply designed to collect and dispose of the waste in landfills or dumpsites and not for recycling (The World Bank Group, 2021).

Of the 173 identified plastic recyclers in Malaysia, only 62 hold a permit to import plastic waste. This presence of plastic recyclers means that most rigid plastics can be recycled in the country, especially mono-material plastics – multi-material ones remain a considerable challenge (Chen et al., 2021). There are four main types of plastics which stand out in terms of recyclability in Malaysia – HDPE, LDPE, PP and PET. These resins are also the most widely recycled and produced in the country (The World Bank Group, 2021). The most common flexible plastic recycled in Malaysia is LDPE, but recyclers have strict conditions for its waste: it must be dry and clean to ensure higher quality output material. To meet these criteria, recycling companies often source post-industrial waste (Chen et al., 2021).

Given that national collection rates of plastics are very low, recyclers find it necessary to import foreign plastic waste as inputs for their business (Chen et al., 2021). Unfortunately, in the process, low quality and contaminated plastics are also illegally imported under false documentation, which means that many recyclers end up with large amounts of non-recyclable or less valuable plastics they have to get rid of and thus dump or eventually burn (Watson et al., 2019), serious harming human health and the environment.

Generally, the fate of plastics waste varies greatly between the low- and the high-quality plastics. The risk of low-quality plastic being landfilled or burned is very high – and waste incarnation plants are starting to emerge in Malaysia (MPMA, 2019). High-quality plastics, on the other hand, have greater chance of being treated in a recycling plant, especially PET, for which demand for recyclates outstrips supply, and to a lesser degree HDPE, LDPE and PP.

Why has Malaysia become a hub for plastic waste?

Malaysia's plastics' industry is of global importance and has no less than 1 300 plastics' manufacturers which together exported just more than 2 Mt of raw plastic in 2016. The country therefore has one of the largest plastic production industries in the world (Chen et al. 2021; MESTECC 2018). Because of the low

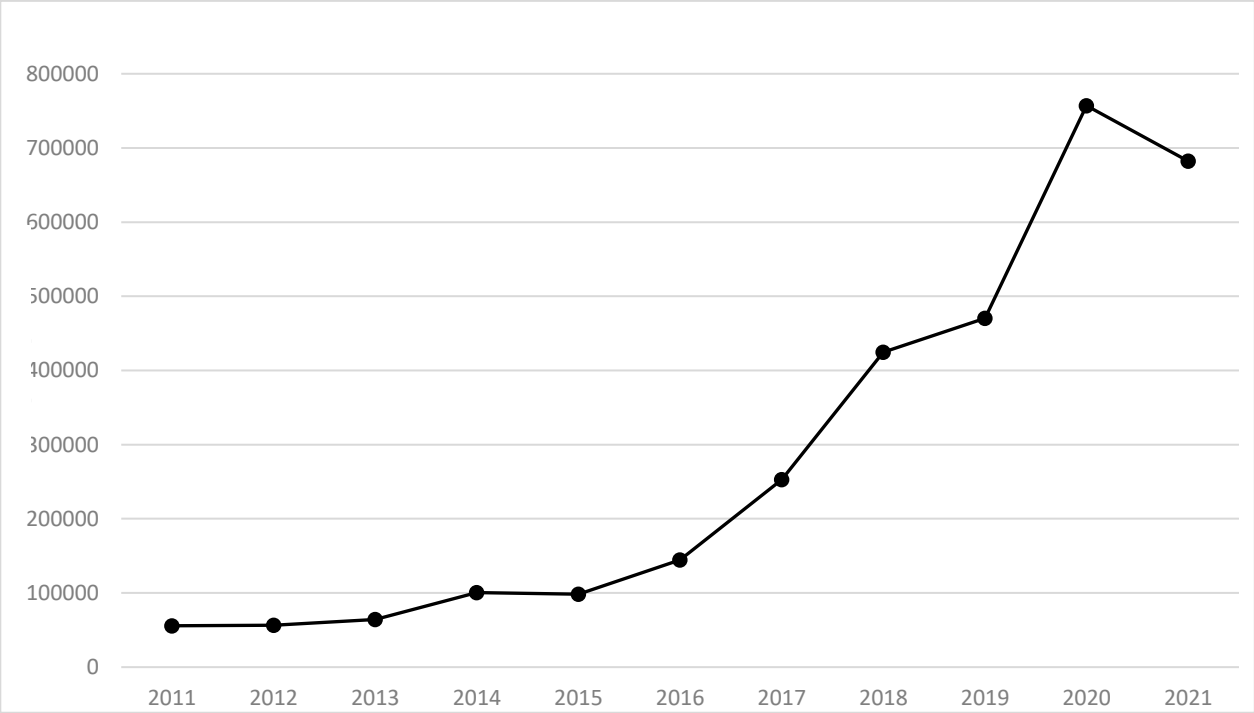
domestic collection rate of plastic waste, Malaysia's plastic recycling industry imports plastic waste to feed companies and make them profitable (Chen et al., 2021). After the Chinese ban on plastic imports, many Chinese recyclers relocated, sometimes illegally, including to Malaysia (Parker, 2018). The lack of an adapted and quick response to the Chinese ban from the Malaysian government allowed traders to import, sometimes illegally, plastic waste to Malaysia (Wong and Jasmin, 2019). The relocation of Chinese recyclers to Malaysia could help explain the sudden increase of plastic imports in 2018. Due to the illegal nature of some recyclers, it is highly probable that some of the EU27 plastic waste entering Malaysia does not meet the recyclability standards and therefore ends up being dumped or burnt.

4.2.2.3 Türkiye

Total amount of plastic waste entering Türkiye

Türkiye's import of plastic waste perfectly follows the global trend before and after the Chinese import restriction, as illustrated in Figure 28. Until 2016, the amount of imported plastic waste was relatively low and constant; it is only after the 2017 Chinese ban that the import of waste suddenly increased, reaching a peak in 2020 of close to 800 000 tonnes.

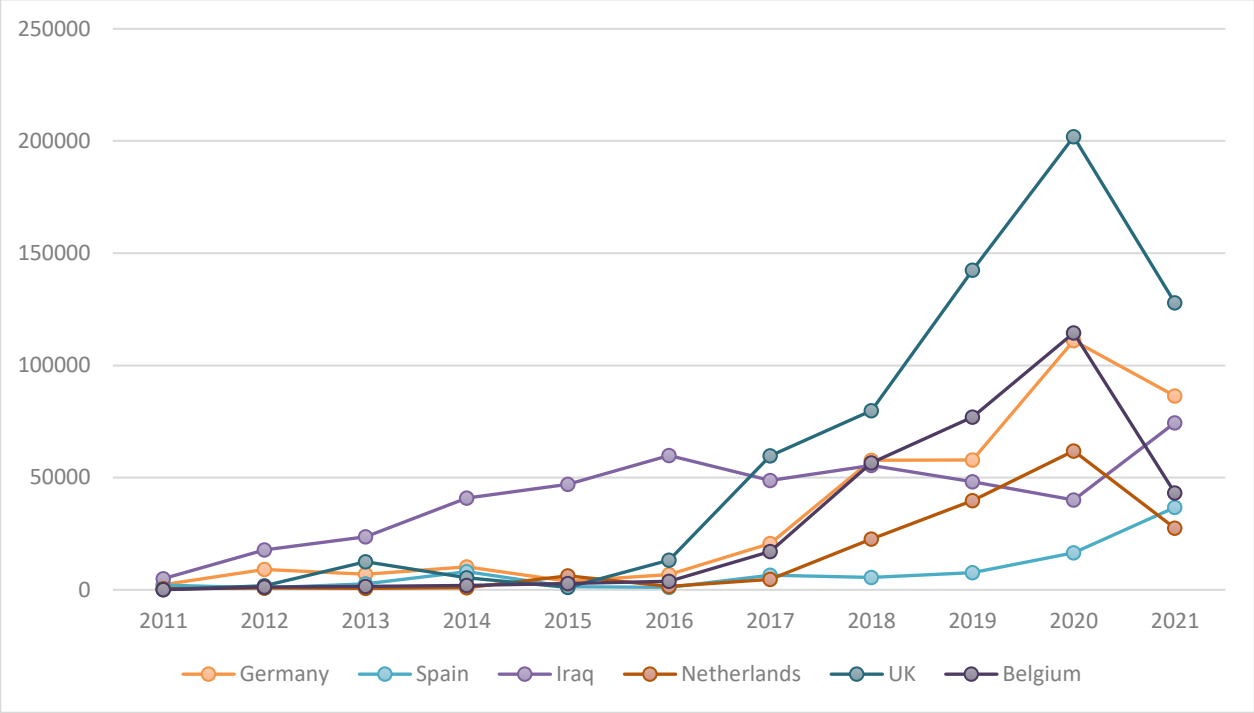
Figure 28 Total imports of plastic waste, Türkiye, 2011–2021, tonnes



Source: UN Comtrade Database (trade code 3915). Extracted in June 2022.

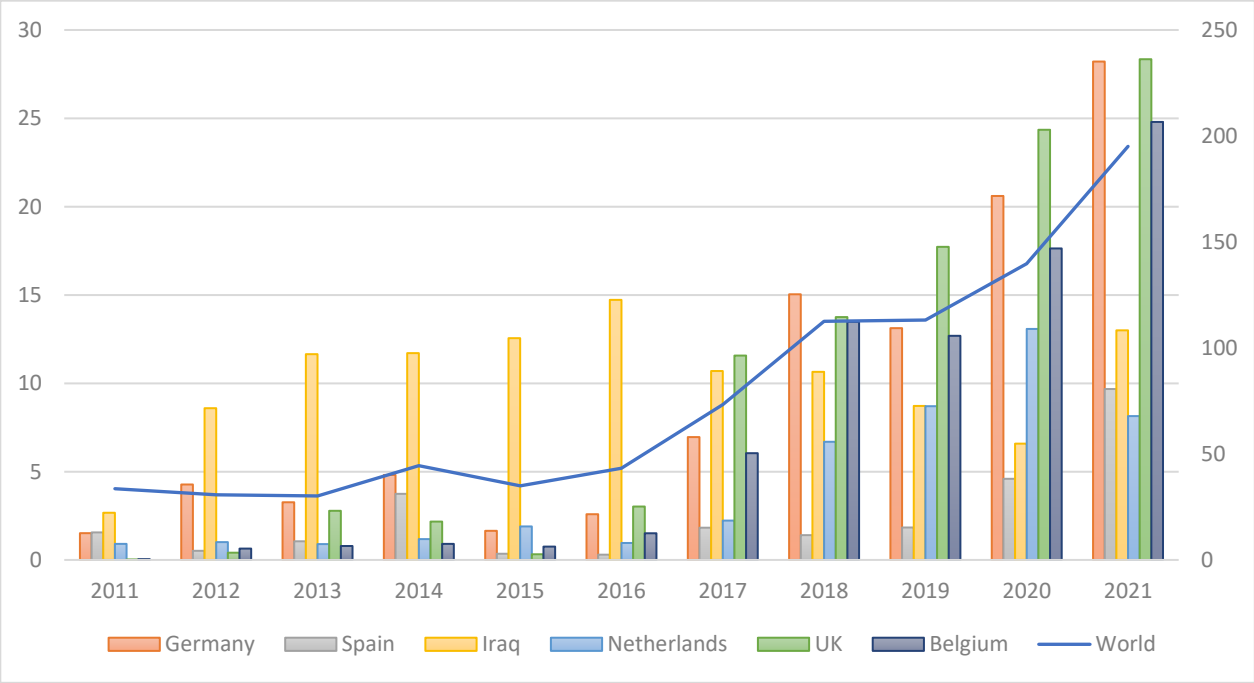
Figure 29 details the origin of the plastic waste which enters Türkiye. Although all the major countries of origin follow the same trend, the UK stands out with the largest increase in exports to Türkiye. Germany and Belgium are also major exporters to Türkiye, whereas the Netherlands has steadily increased in their exports (Gündogdu, 2022).

Figure 29 Imports of plastic waste by Türkiye, selected countries, 2011–2021, tonnes



Source: UN Comtrade Database (trade code 3915). Extracted in June 2022

Figure 30 Value of plastic waste imported by Türkiye, selected countries (left axis) and world (right axis) 2011–2021, USD million



Source: UN Comtrade Database (trade code 3915). Extracted in June 2022

Characterisation of Türkiye's waste management system

Prior to 2021, Türkiye accepted the import of all types of plastic wastes. In July 2021, however, the government imposed a ban on imports of polyethylene plastic waste, including PE, PET, HDPE and LDPE. This ban only lasted for a few weeks before it was repealed following pressure from the recycling industry

to allow the import of polyethylene as the industry relied on foreign waste as input in their recycling facilities. Some of the new regulations, however, stayed in place, for example, to be able to enter the country imported material now has to have less than 1 % of contaminated plastic (Gündoğdu and Walker, 2021). The rate a plastic recycling company can import is also more regulated as it can only import as much as its heat treatment (extrusion) capacity can accommodate. According to the government of Türkiye, this type of equipment is expensive and will thus limit the number of recycling companies able to import plastic waste (PAGEV, 2021).
Türkiye also ratified the plastic amendments of the Basel Convention in February 2022. These aim to enhance control of the transboundary movements of plastic waste and thereby limit the entry of plastic waste into Türkiye (Basel Convention, 2019).

Plastic waste entering the country is expected to be recycled. According to a World Wildlife Fund (WWF) report, imported plastic waste is destined for recycling as it is purchased by private recyclers as high-quality inputs for their production of secondary material (WWF, 2019). Although Türkiye's current waste management system and recycling capacity are very limited and cannot cope with the domestic production of waste, 90 % of Türkiye's MSW is landfilled, a large portion of the country's recycling capacity is dedicated to imported waste (Gündoğdu and Walker, 2021; WWF, 2019). The locally generated plastic waste is typically of lower quality than imported waste because of insufficient sorting (WWF, 2019). This could explain why recyclers in Türkiye prioritise imported plastic.

Another reason is also the availability of domestic plastic waste. Indeed, Türkiye is ranked among the lowest ranked OECD countries when it comes to overall waste-recovery rates. Collection rates are low and recyclers have to import waste to have sufficient to make their activities profitable (Ugurtas, 2020). This, however, risks reducing demand for domestic plastic waste and in turn may hamper the development of Türkiye's waste management industry and recycling targets.

Currently, recycling companies treating plastic waste must be registered and approved. According to the non-governmental orgainsation PAGEV, there are 751 licensed recycling plants in the country and 566 collection and separation plants. However, only 6 % of domestic plastic waste is treated through these (Laville and Saracoglu, 2018; WWF, 2019).

Along with the increase in imports, Türkiye has also seen an increase in criminal activities related to plastic waste. Illegal import of hazardous or non-recyclable plastics, as well as Illegal burning and dumping of such waste, have been reported several times (Gündogdu, 2022; INTERPOL, 2020; MEE, 2022). Treating problematic plastic wastes within the EU currently involves higher costs for some companies than shipping them to Türkiye.

Why has Türkiye become a hub for plastic waste?

Since the Chinese import ban on plastic waste, much of the EU exports has found its way to Türkiye. In part, the government has encouraged this flow, to ensure input for the country's industry by giving incentives such as tax rebates (KPMG, 2022; ULUSAL, 2022). Recycling of plastic and the production of new goods made of this recycled material represents an important source of income for the country and its recycling industry (The European Times, 2022).

Another factor in Türkiye being a hub for exported plastics waste from the EU is that, as of 2021, the EU banned the export of mixed and difficult to recycle plastics to non-OECD countries (European Commission, 2020). This blocked previous key Southeast Asian destinations, leaving Türkiye as an attractive alternative.

4.2.2.4 India

Total amount of plastic waste entering the country

Unlike the other countries considered in this analysis, India has a different trend when it comes to imports of plastic waste. After years of increasing imports, the total amount of plastic entering the country has

slightly decreased since 2013 and came to a total halt in 2020. Interestingly, the imports have started rising again since then and are expected to keep increasing in the coming years. The Chinese ban in 2017 does not seem to have had a great effect on imports of plastics waste to India. A slight increase in the imported plastic waste is observed in 2018, however this boost did not last for more than a year. In 2021, the largest EU exporters of plastic waste to India were the Netherlands, about 10 000 tonnes; Belgium, about 6 000 tonnes; and Germany, approximately 2 000 tonnes.

Characterisation of India's waste management system

Due to the rapid growth in consumption in these past decades, waste management in India has become a critical issue as the country struggles to keep up with the massive increase in waste production. Consequently, the Indian government decided, in 2019, to implement a total ban on the import of plastic waste (Liang et al., 2021). This was, however, overturned the following year with the government opting for stricter import controls instead, with for example PET waste bottles able to be imported again. The main reason behind this change was the recycling companies' economic losses as they no longer could access the international market for PET bottle waste and were unable to fulfil demand from domestic waste. This was not necessarily due to a lack of PET bottle waste in India, but rather a lack of collection and sorting infrastructure – an estimated 280 000 tonnes of PET are not collected each year (Koshy, 2022).

High quality plastic waste, in this case PET from bottles, is imported because of high demand from waste companies. As in the other countries discussed above, there are risks with this because India does not enforce of their law on waste imports properly and faces many waste management challenges (Kaur, 2019; Lahiry, 2017). Indeed, some containers of mixed plastic and hazardous waste, sent from the US and supposed to contain paper waste, managed to enter India even though they had already been stopped from entering other Asian countries (Kaur, 2019). European countries, particularly Belgium, Germany and the Netherlands, are among the biggest exporters of plastic waste to India, after the US (Hossain et al., 2022). It is thus highly probable that containers of mixed plastic, other than PET, exported from the EU also enter India and that some of these un-recyclable plastics is either dumped or burnt in the open (Kaur, 2019).

This raises the question of the impact of importing plastic waste, not only on the environment and human health but also on plastic waste management of India. Importing plastic is often easier for companies than developing proper collection and awareness raising schemes in the country. This can create a dependence on plastic waste imports, while hampering the development of domestic recycling systems (Koshy, 2022).

Why has India become a hub for plastic waste?

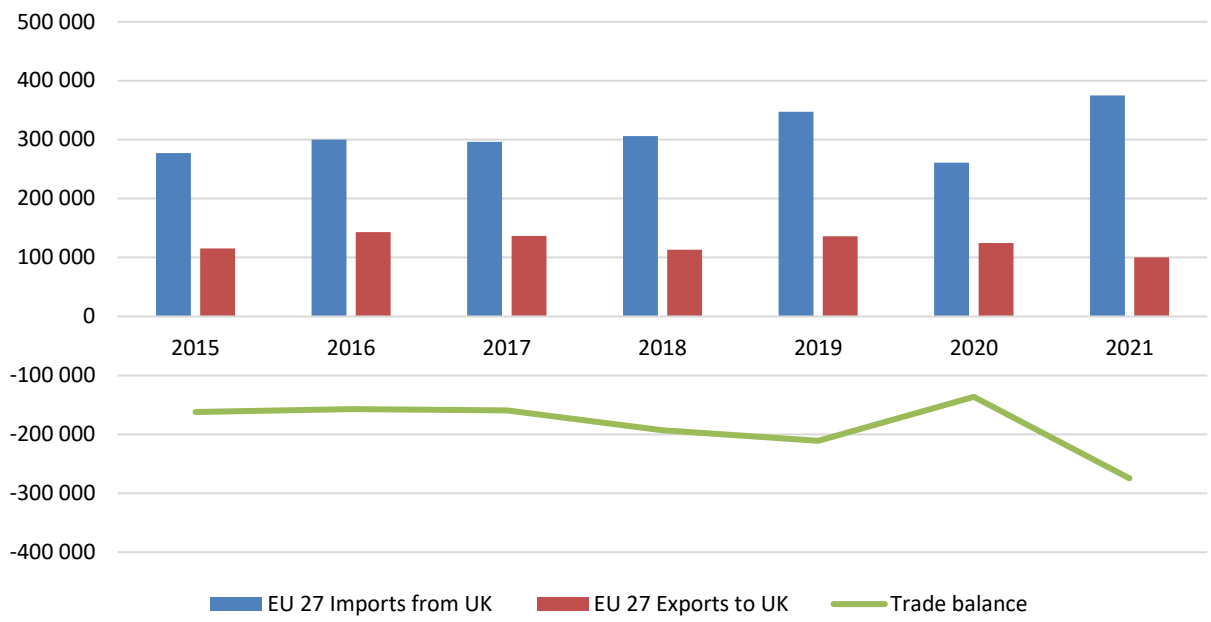
As in to the other countries considered in this analysis, it has been reported that the reason why plastic waste is imported is because of it is of higher quality than local waste and it is already sorted, which makes it cheaper and easier to recycle (The Pioneer, 2019).

BOX 1 United Kingdom

The UK is a specific example of a country that, over the last years, relied heavily on the export of plastic waste. Household plastic packaging waste, for example, 60 % of which is collected for recycling, has often been shipped abroad. Total plastic waste exports have increased massively since the turn of the 21st century, growing from less than 100 000 tonnes to a peak of 860 000 tonnes in 2011 and then dropping to 540 000 tonnes in 2020 ([13]). The recent drop was partly due to plastic waste import bans and partly to massive investment in waste incineration capacities. Of the exported plastic waste in 2029, 40 % was shipped to Türkyie. The UK is the world's second largest per person producer of plastic waste, after the US (OECD, 2022).

13 www.uktradeinfo.com (2021)

Figure 31 Imports, exports and net plastic waste trade, EU27 and United Kingdom, 2015–2021, tonnes



Source: Eurostat data. EU trade since 1988 by HS2-4-6 and CN8 (trade code 3915). Extracted on 8/6/22

Focusing specifically on trade between the UK and EU27 Member States, Figure 31 shows imports to the EU27 from the UK, exports from the EU27 to the UK and the net trade balance, exports minus imports. A negative trade balance arises, meaning that the EU27 is a net importer of waste from UK. The UK government has pledged to introduce tougher controls on illegal waste exports, and to develop more plastic processing infrastructures to reduce the reliance on exports in a bid to tackle the global plastic waste crisis. Further policy changes included, in April 2022 the introduction by the UK government of a tax on plastic packaging manufactured in or imported into the UK that does not contain at least 30 % recycled material([14]).

4.3 Possible unintended negative effects of plastic waste trade restrictions

While import restrictions, in particular by Asian countries, have reduced exports of plastic waste from the EU, they may have resulted in the rerouting of plastic waste shipments to new and more vulnerable countries. Effectively, when country A imposes import restrictions, plastic waste is simply shipped to other countries with less strict rules ('race to the bottom'). The rerouting is, however, also driven by the relocation of (Chinese) recycling industries. Following the Chinese ban, recycling companies saw a drastic fall in the supply of waste and in response are have established facilities in neighbouring countries that are now receiving higher volumes of waste imports, previously destined to China (Interpol, 2020).

Import restrictions can also lead to the emergence of new criminal trends. A 2020 report by Interpol, covering the period from 2018 (Interpol, 2020), highlights how the Asian routes of plastic waste have been heavily affected by illegal shipments. According to this analysis, the redirection of plastic waste exports to alternative South and Southeast Asian countries, as well as to Central and Eastern European countries and Türkiye, do not account for the volume that used to be sent to China and explains the growth in illegal waste exports. The increasing operating method for illegal shipments involves the use of transit countries to disguise the origin of the waste. It has also to be noted that requests from South and Southeast Asian countries to repatriate illegal containers of plastic waste have increased since 2018, but the process to do

[14] See https://www.gov.uk/government/publications/introduction-of-plastic-packaging-tax-from-april-2022/introduction-of-plastic-packaging-tax-2021

this remains long and challenging. Containers have often piled up in the destination country ports and are sometimes re-exported illegally to neighbouring countries in the region (Basel Action Network, 2019). Other fraudulent activities that have increased in frequency and complexity in recent years include:

a) plastic waste shipments that are falsely declared as destined for recovery, as non-hazardous or mis-declared as raw material; and
b) contaminated plastic waste that is concealed in a container by being placed behind clean plastic waste that is declared on shipping documents.

5 Conclusions

Trends in plastic waste trade have changed significantly in recent years as a result of a series of policies, including a growing number of plastic waste import and export restrictions under the updated Basel Convention, as well as a stronger focus on the circular economy and the waste management of plastics. This report has considered trends in both the cross-border intra- and extra-EU plastic waste trade.

The intra-EU trade of plastic waste has increased steadily over the past five years, with the largest overall flows coming from France, Germany and the Netherlands, while Estonia and Slovenia have the highest per person trade flows. There is a significant difference in the value of plastic waste traded, with the average value in some countries being about three times higher than in others. Zooming in on individual country case studies, different stories emerge. The case studies do not represent everything that is happening with plastic waste in the respective countries, but from them different aspects of intra-EU trade can be extracted. In Germany, the fate of plastic waste imported depends on whether this is post-industrial or post-household waste. The Netherlands appears to be a key EU transit country, to where plastic waste is shipped from other EU countries and then re-exported to other destinations – with a significant share leaving the EU. A different story can be told for Poland, where imports feature a high rate of composites making them very difficult to recycle. A significant share of this imported plastics waste is reportedly used in RDF plants in the cement industry. Finally, Italy provides insights into how waste from different plastic products is traded. Plastic packaging is mainly traded within the EU, while end-of-life tires are exported outside the EU, especially to Türkiye.

When focusing on extra-EU plastic waste trade, a significant drop resulted from the Chinese import restrictions and the entry into force in 2021 of the new rules on plastic waste agreed under the Basel Convention – the intra-EU trade is now larger than extra-EU trade. The extra-EU case studies suggest that the Chinese ban created a domino effect. First, plastic waste exports were re-routed to new destinations, most notably Malaysia and Viet Nam, then these new destination countries implemented their own import restrictions. This demonstrates that EU exports lead to significant challenges in destination countries forcing them to enforce import restrictions. On the other hand, it is not always a case of (EU) countries pushing their plastic waste on to other countries; there are also pull factors. In almost all the country cases studies, the demand for imports of plastic waste is partly created by domestic recyclers who are dependent on imported high quality plastic waste. This is often preferred to domestically sourced plastic waste as it is perceived to be better quality. This, however, risks creating a strong dependence on imported waste, while undermining the development of domestic waste management infrastructure.

When it comes to the difference between the intra- and extra-EU trade, there is a slightly increasing variance in the average value of plastic waste traded, the intra-EU trade value being the highest per tonne. This suggests the possibility of a persistent quality gap in the waste traded within and beyond the EU, with relatively lower quality plastic waste leaving the EU. On a more positive note, the change in the relative shares of plastic waste traded outside the EU has moved in favour of ethylene-based polymers. This may be positive as these include highly recyclable polymers such as PE.

The environmental impact of the extra-EU fate of plastic waste is linked to the waste management infrastructure of the receiving countries. This is of concern as key destination countries outside EU lack adequate waste management infrastructure. Another cause for concern is the steady increase in exports to Türkiye, suggesting its acceptance of an increasing percentage of EU waste exports. Another key concern is illegal plastic waste shipments. This study has found several reports of illegal plastic waste shipments, cases of relabeling, hiding hazardous plastic waste and misleading reporting of its fate in destination countries. These point to the need for more monitoring, as well as a broader range of action than import restrictions to combat illegal activities.

Policy changes are needed to facilitate the transition to a circular economy in the EU without negatively affecting extra-EU countries' environments. Importantly, the revision of the WSR, along with measures affecting the whole plastic value chain, should contribute to a further decrease in the amount of plastic waste exported from the EU, particularly to non-OECD countries. When it comes to intra-EU trade, the principle of proximity in waste management should be prevalent. Trade between countries, however, can be a way to optimise plastic recycling across the EU by sharing recycling capacity amongst Member States. A well-functioning EU plastic recycling market, along with adequate waste prevention measures, can prove more effective in reducing the export of plastic waste export from the EU than trade restrictions alone, which are always difficult to monitor and enforce.

A final remark is related to data availability. An important limitation of this report is linked to the difficulty of finding comparable data on the waste trade and waste management practices, both in and beyond the EU. More detailed and reliable analyses need detailed data that examines the role of trade in waste management practices.

List of abbreviations

C&D	construction and demolition
CEAP	Circular Economy Action Plan
CN	Combined Nomenclature
EC	European Commission
EEE	electrical and electronic equipment
EFTA	European Free Trade Association
e.g.	exempli gratia (for example)
ELV	end-of-life vehicles
EPR	extended producer responsibility
EPS	expanded polystyrene
ETC/CE	European Topic Centre on Circular economy and resource use
ETC/WMGE	European Topic Centre on Waste and Materials in a Green Economy
EU	European Union
G7	Group of Seven countries
GPP	green public procurement
HDPE	high-density polyethylene
HS	Harmonised System
Ibid.	ibidem (in the same place)
ICT	information and communications technology
i.e.	id est (that is)
ISPRA	Istituto Superiore per la Protezione e la Ricerca Ambientale (Italian National Institute for Environmental Protection and Research)
IT	information technology
kg	kilogram
LDPE	low-density polyethylene
LoW	List of Waste
MFSU	manufacture, formulation, supply and use
MOIT	Ministry of Industry and Trade (Viet Nam)
MSW	municipal solid waste
Mt	million tonnes
NSWMD	National Solid Waste Management Department (Malaysia)
OECD	Organisation for Economic Co-operation and Development
PE	polyethylene
PET	polyethylene terephthalate
POP	persistent organic pollutant
PP	polypropylene
PPC	Public Private Collaboration (Viet Nam)
PRO	Packaging Recycling Organisation (Viet Nam)
PS	polystyrene
PVC	polyvinyl chloride
PUR	polyurethane
rLDPE	recycled low-density polyethylene
rPET	recycled polyethylene terephthalate
RDF	residue derived fuels
SABIC	Saudi Basic Industries Corporation
SUP	single-use plastic
SWM	solid waste management
UK	United Kingdom (of Great Britain and Norther Ireland)
US	United States of America
V	vinyl

VAT	value-added tax
VPA	Viet Nam Plastics Association
VPRA	Viet Nam Plastic Recyclers Association
WEEE	waste electrical and electronic equipment
WSR	Waste Shipment Regulation
WWF	World Wildlife Fund

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