Research for Enhancing Investment and Export Opportunities in the Solid Waste Management Sector

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I. Introduction

This research report is created within the framework of the USAID Economic Security Program, specifically under the initiative titled "Research for Enhancing Investment and Export Opportunities in the Solid Waste Management (SWM) Sector", implemented by the Policy and Management Consulting Group (PMCG).

The objective of this initiative is to support the growth of the recycling industry in Georgia and improve the structure and operational effectiveness of producer responsibility organizations (PROs) by strengthening market connections within the SWM sector. To this end, PMCG, the Program's subcontractor, conducted a comprehensive study and generated a research paper with a primary focus on identifying Georgia's most promising export markets. The assessment covers five types of waste (waste oils, waste from electrical and electronic equipment, waste from tires, waste from batteries and accumulators, and waste from packaging materials), treating them as potential raw materials, along with considering recycled materials and products originating or potentially originating from Georgia.

The research report will serve as a valuable tool for Georgian recycling companies and PROs, enabling them to make informed decisions regarding export opportunities from Georgia. This will aid in optimizing waste management and recycling initiatives. The insights provided will be especially beneficial for potential exporters, offering them a comprehensive understanding of the export markets. This knowledge will empower them to make informed decisions, strategize effectively, and enhance their role in promoting responsible waste management within the country. Additionally, the research findings will be invaluable to public sector entities and donor-funded programs, particularly those involved in designing and/or implementing policy interventions or support programs aimed at fostering sustainable economic development, business growth, investment attraction, or export promotion within priority sectors and value chains.

The report concludes with a comprehensive list of 38 unique enterprises operating within the recycling sector across various countries, each accompanied by their contact information. These enterprises cover a range of activities related to the recycling of the five waste types. The inclusion of this list serves the purpose of supporting Georgian producers by facilitating future contacts and fostering potential trade partnerships. **The waste trade plays a crucial role in promoting the circular economy.** Not all waste generated within a country is necessarily handled or recycled locally; it can be exchanged between countries. The trading of waste enables the movement of materials to countries with a comparative advantage in recycling. The economies of scale facilitated by this trade are essential for strengthening waste markets and improving circularity. This approach reduces the need to extract natural resources, which is associated with significant environmental and climate impacts globally. Meeting the economy's needs through high-quality recycling of waste materials has the potential to significantly mitigate these effects. This is especially relevant for materials that are energy-intensive to produce (such as metals), derived from fossil resources (like plastics), or require substantial amounts of land and water for production (such as textiles)[1].

The adoption of circular economy business models can yield various economic, social, and environmental benefits. While not explicitly stated, the principles of the circular economy are embedded within the United Nations Sustainable Development Goals (SDGs), particularly in SDGs 8, 9, and 12. SDG 8, which focuses on fostering decent work and economic growth, advocates for enhancing global resource efficiency in consumption and production. SDG 9, focused on industry, innovation, and

[1] https://www.eea.europa.eu/publications/linking-cross-border-shipments-of/linking-cross-border-shipments-of

infrastructure, encourages the adoption of resource-efficient and environmentally friendly technologies. Similarly, SDG 12 emphasizes the importance of resource efficiency and waste reduction in responsible consumption and production practices.

The European Union (EU), identified as Georgia's potential and most advantageous export market, is making significant progress toward implementing a circular economy. In March 2020, the European Commission introduced the new *Circular Economy Action Plan*[2] *(CEAP)* as a fundamental element of the *European Green Deal*[3]*,* Europe's new agenda for sustainable development. Within this plan, EU waste policy aims to advance the circular economy by maximizing the extraction of high-quality resources from waste, prioritizing environmental protection and human health, and facilitating the EU's transition to circularity. The policy outlines objectives and targets aimed at fostering innovation in recycling.

Specifically, the EU aims to double its circular material use rate[4] (CMUR) from 2020 to 2030, as outlined in the Circular Economy Action Plan. The target is to raise this indicator from 11.5% in 2022 to 23.2% by 2030. This increased usage of secondary materials is expected to mitigate the extraction of primary raw materials and associated environmental impacts.

In the EU, recycling rates for various types of waste (including municipal, packaging, and e-waste), which also serve as significant sources of critical raw materials, have generally been on the rise, indicating progress toward a more circular economy. The overall recycling rate (defined as the ratio of total waste generated, excluding major mineral wastes, to the quantities managed through recycling) reached 46% in 2020. Packaging boasted the highest recycling rate at 64%, followed by municipal waste at 49% and e-waste at 39% as of 2021.

The research presented in this report not only sheds light on the promising export markets for Georgia's recycling industry but also underscores the importance of embracing circular economy principles to achieve sustainable development goals. By leveraging these insights and aligning with international trends, Georgia can position itself as a key player in the global waste management and recycling sector while contributing to environmental preservation and economic prosperity.

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN
[3] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[4] The Circular Material Use Rate (CMUR) is an indicator that assesses the circularity of materials within the economy. It represents the proportion of the total material utilized in the economy that consists of recycled waste. https://www.eea.europa.eu/en/analysis/indicators/circular-material-use-rate-in-europe?activeAccordion=ecdb3bcf-bbe9-4978-b5cf-0b136399d9f8#footnote-PD6JIZLQ

II. Research Methodology

The methodology aimed to identify and examine the target markets for five specific types of waste — waste oils, electrical and electronic equipment waste, tire waste, battery and accumulator waste, and packaging material waste. These waste categories are viewed as potential sources of raw materials and recycled products. The methodology consists of two main components: the first component involves identifying a preliminary list of products/materials with origins or potential origins in Georgia, while the second component outlines the strategy for identifying potential export markets.

Component I – Selecting Products

Prior to identifying export markets, **it is crucial to establish a list of products that can potentially be exported.** The primary goal of this phase was to **identify at least ten highly promising recycled products and/or materials from five waste types** that either currently originate from Georgia or have the potential to do so, qualifying them for export to the target markets. The information was collected through desk research and interviews and the following criteria were used to select the products:

I. The products/waste currently produced (or is produced to a limited extent) in the Georgian market,
II. Products/waste that are not currently produced but have foreseeable potential for production in the near future.
III. The products that are not subject to any technical or regulatory restrictions for export from Georgia or import into potential destination countries.

Component II – Selecting Export Markets

Identification and analysis of export markets were conducted in three steps:

Step 1: Compile a long list of export markets

The primary aim of this phase was **to identify countries with a demand for solid waste products and raw materials.** Neighboring countries of Georgia and EU countries were analyzed for this purpose. During this stage, a comprehensive list of countries meeting the following criteria was selected:

- Countries with the highest recycling rates
- Countries with the highest import of waste
- Import has increased over the last five years
- Countries with no restrictions on waste import

Ten countries satisfying these criteria were chosen for a more in-depth analysis in the next stage.

Step 2: Identify the top three export markets for Georgia's waste material and recycled products

The objective of this phase was **to identify up to three countries that offer the most favorable conditions for exporting waste material and recycled products from Georgia.** To achieve this, a more in-depth analysis was conducted on the markets and trade dynamics of the countries shortlisted in the initial phase, considering factors such as geographical proximity and regulatory conditions. In selecting the three countries, priority was given to those that fulfill the following fundamental criteria:

- Countries that recycle at least two types of waste.
- Countries where transportation and logistics are preferable.
- Countries with which Georgia has established bilateral or multilateral trade agreements.

Step 3: Market research

In the final stage, a more in-depth analysis was conducted on the following characteristics of the top three countries selected in the second stage:

Recycling and waste management policies: specific recycling and waste management policies and regulatory framework, incentives, and initiatives contributing to high recycling rates and a favourable environment for waste imports.

Market trends and growth patterns: current market trends and forecasts related to each country's solid waste and recycled products; the growth projections and emerging opportunities as a growing market signal a potential demand for additional sources of waste materials.

Economic and trade relationships: the economic and trade relationships between Georgia and each selected country; existing trade agreements, tariffs, and any barriers that may affect the export of waste materials and recycled products.

Infrastructure and technological capabilities: the recycling infrastructure, the efficiency and capacity of their waste management systems.

Logistical Considerations: logistical aspects of exporting waste materials to each country, transportation costs, proximity to Georgia, and the efficiency of existing trade routes.

Step 4: List of Recycling Companies

The study aimed to compile a list of 25 private enterprises operating within the recycling sector. This list ofcompanies encompass the five waste types in the selected countries. The list will then be shared with Georgian producers to foster future contacts and trade partnerships.

III. Results

Selection of Products

The research team has conducted a brief examination[5] of the recycling sector in Georgia, which involved interviewing local recycling companies, producer responsibility organizations (PROs), and the Ministry of Environmental Protection and Agriculture of Georgia.

The purpose of this overview was to identify products that could potentially be exported from Georgia. It's important to note that Georgia's recycling sector is not well-established and has limited capacity to recycle certain types of waste as outlined in the Extended Producer Responsibility (EPR) scheme. Despite this limitation, the research team identified waste materials and recycled products with significant potential in Georgia, particularly following the full implementation of EPR schemes. These products encompass those already available in the Georgian market with considerable export potential, as well as those not currently manufactured (or manufactured to a limited extent) in Georgia but with foreseeable potential for production in the near future. The table below details the identified products across five waste streams.

Table 1: Selected waste materials and recycled products

EPR Waste Streams	Waste Materials and Products
Packaging	PET Flakes
	PET Strap
	Recycled Plastics
	Glass Cullet
	Pulp (Paper and Cardboard)
	Aluminum Scrap
Tire	Rubber Granules
	Rubber Powder
	Metal Scrap
	Tire-derived aggregate
Oil	Waste Oil
	Primary oil
WEEE	Cricut Boards
	Metal Scrap
	Metal (Ferrous, Non Ferrous, Precious)
Accumulators	Accumulators
	Lead Bars

Table 1 excludes dry batteries (AA, AAA, C, and D type batteries) due to the absence of export markets. Recycling these batteries incurs a fee, and producer responsibility organizations (PROs) must pay recycling fees to battery recyclers.

[5] As per the Terms of Reference (ToR), the study does not entail a thorough and comprehensive examination of production factors and potential in Georgia; instead, it focuses solely on screening existing and potential products and raw materials through stakeholder interviews and desk research.

Relevant Harmonized System (HS) codes have been identified for selected products for the calculation of trade in waste. Table 2 presents specific products with their respective HS codes as identified under each waste category. The following HS codes have been selected to perform the calculations.

Table 2: List of HS codes used for the calculation of trade in waste

Waste Category (Georgian EPR)	Waste Category	Description	HS Code
Waste Oil	Oil	Waste oils containing mainly petroleum or bituminous minerals (excl. those containing polychlorinated . . .	271099
Waste Oil	Oil	Residues of petroleum oil or of oil obtained from bituminous minerals (excl. petroleum coke . . .	27101971
Packaging	Paper	Recovered "waste and scrap" paper or paperboard of unbleached kraft paper, corrugated paper . . .	470710
Packaging	Paper	Recovered "waste and scrap" paper or paperboard made mainly of bleached chemical pulp, not . . .	470720
Packaging	Glass	Cullet and other waste and scrap of glass; glass in the mass (excl. glass in the form of powder, . . .	700100
Packaging	Aluminum Scrap	Waste and scrap, of aluminium (excl. slags, scale and the like from iron and steel production, . . .	760200
Packaging		Waste, parings and scrap, of polymers of ethylene	391510
Packaging	PVC	Waste, parings and scrap, of polymers of vinyl chloride	391530
Packaging	PP	Waste, parings and scrap of plastics (excl. that of polymers of ethylene, styrene and vinyl . . .	391590
Packaging	Polystyrene (PS)	Waste, parings and scrap, of polymers of styrene	391520
Waste Tires	Rubber	Waste, parings and scrap of soft rubber and powders and granules obtained therefrom	400
Batteries and Accumulators	12 V Accumulators	Waste and scrap of lead-acid accumulators; spent lead-acid accumulators	854810
Batteries and Accumulators	12 V Accumulators	Lead waste and scrap (excl. ashes and residues from lead production "heading No 2620", and . . .	780200
WEEE		Waste and scrap of electrical and electronic assemblies and printed circuit boards, containing ...	854931
WEEE		Waste and scrap of electrical and electronic assemblies and printed circuit boards (excl. for ...	854939
WEEE		Electrical and electronic waste and scrap, containing primary cells, primary batteries or electric ...	854991
WEEE		Electrical and electronic waste and scrap (excl. for the recovery of precious metal, electrical ...	854999

Identifying Countries

Step 1: Compile a long list of export markets

Initially, 10 countries with a higher demand for waste were chosen (refer to component II, step I of the methodology). To achieve this, countries (including EU nations and Türkiye) were assessed based on the following criteria:

Criteria 1: Import value of waste

The scope of "waste" is defined and estimated using relevant product codes extracted from the list of Combined Nomenclature (CN) codes[6] used in International Trade in Goods Statistics. These codes are categorized into[7]:

- Plastics, including rubber
- Paper and cardboard
- Glass
- Metals (excluding precious metals)

The total is computed by aggregating these categories.

Criteria 2: Import growth

This is calculated using the compound annual growth rate (CAGR) over the last five years.

Criteria 3: Recycling rates

This indicates the percentage of recyclable materials recycled in each country. The Environmental Performance Index (EPI) provides a score ranging from 0 to 100, where 100 implies that a country recycles all recyclable post-consumer material, and 0 indicates no recycling of recyclable post-consumer material[8].

The research team has established minimum target parameters for each criterion required to qualify for the selection of export markets:

- Minimum import value: 400 million Euros
- 5-year growth rate: no less than 3%
- The minimum recycling rate of the country: 20%

Table 3 displays data on waste imports in the 27 EU countries and Türkiye. The data is presented in euros and encompasses imports of plastic, rubber, paper, glass, and metal waste categories for each country. Additionally, the table indicates the country's overall recycling rate and the 5-year growth of waste imports. The last column specifies whether each country meets the defined selection criteria for export markets. Countries marked as "yes" meet these criteria, while those marked as "no" do not.

[6] Note: For trade within and outside the EU, goods are categorized based on the Combined Nomenclature within the European Union. This classification system relies on the Harmonised Commodity Description and Coding System (HS), overseen by the World Customs Organisation (WCO). The HS employs a six-digit numerical code for product classification, while the Combined Nomenclature refines this classification further into an eighth-digit level tailored to EU requirements.

[7] List of CN-codes used for the calculation of Trade in waste.

[8] Wolf, M. J., Emerson, J. W., Esty, D. C., de Sherbinin, A., Wendling, Z. A., *et al.* (2022). *2022 Environmental Performance Index.* New Haven, CT: Yale Center for Environmental Law & Policy. epi.yale.edu

Table 3: Summary of Waste Imports, Recycling Rates, and Selection Criteria Compliance in EU Countries and Türkiye (2017-2021)

Country	2017	2018	2019	2020	2021	CAGR	Recycling Rate	Meeting Selection Criteria (Yes/No)
Germany	6,265,603	7,027,494	7,218,884	8,495,211	12,896,317	20%	50%	Yes
Belgium	1,661,893	4,907,831	5,780,141	6,460,923	8,245,283	49%	32%	Yes
Italy	2,963,274	3,209,911	3,721,788	4,204,006	5,432,641	16%	40%	Yes
Spain	2,455,709	2,377,546	2,456,895	1,819,544	2,797,799	3%	28%	Yes
Netherlands	1,499,238	1,414,644	1,503,351	1,292,529	1,970,443	7%	28%	Yes
Greece	579,728	792,108	917,928	993,404	1,666,159	30%	22%	Yes
Sweden	635,094	753,651	718,126	698,554	855,542	8%	40%	Yes
France	777,781	765,492	608,386	525,560	693,272	-3%	32%	No
Poland	221,474	274,572	440,852	416,576	623,193	30%	38%	Yes
Austria	542,876	509,724	534,582	456,832	612,446	3%	36%	Yes
Bulgaria	481,889	511,796	464,489	503,631	492,194	1%	30%	No
Lithuania	127,931	229,438	321,189	260,551	446,820	37%	35%	No
Czechia	100,734	98,712	103,976	186,365	327,286	34%	37%	No
Slovenia	159,034	196,325	142,264	121,800	248,012	12%	25%	No
Denmark	96,564	130,027	147,929	154,950	239,936	26%	35%	No
Portugal	349,587	324,851	257,542	274,073	224,442	-10%	24%	No
Luxembourg	48,056	61,797	54,157	87,825	146,991	32%	42%	No
Estonia	64,518	65,714	65,929	78,071	123,011	18%	39%	No
Slovakia	94,816	94,750	137,844	133,442	120,969	6%	13%	No
Ireland	143,900	132,527	131,345	91,768	108,941	-7%	42%	No
Latvia	41,505	57,899	45,911	49,002	84,382	19%	31%	No
Romania	62,811	71,482	47,303	43,386	72,037	3%	13%	No
Croatia	26,649	40,938	37,894	36,468	70,154	27%	20%	No
Finland	48,897	70,718	52,088	44,982	70,019	9%	35%	No
Hungary	27,319	24,269	18,372	29,361	50,563	17%	31%	No
Cyprus	500	38	45	156	4,763	76%	18%	No
Malta	242	606	528	529	376	12%	11%	No
Türkiye	-	6,659,593	5,713,174	6,352,992	10,884,464	18%	32%	Yes

Source: Eurostat

According to the provided data and the outlined selection criteria, the following ten countries meet the requirements: Germany, Belgium, Italy, Spain, Netherlands, Greece, Sweden, Poland, Austria, and Türkiye.

The import trends across the listed countries display varying patterns and growth rates in waste imports over the period from 2017 to 2021. Overall, many countries demonstrated growth in waste imports during this period, indicating an increasing demand for waste materials across various industries.

Several countries, such as Germany, Belgium, Italy, and Türkiye, experienced substantial growth in waste imports, with notable year-on-year increases and relatively high CAGR. Some countries, including the

Netherlands, Sweden, and Austria, demonstrated relatively stable growth in waste imports, maintaining moderate CAGR percentages over the five-year period. A few countries (such as Spain and Poland) showed fluctuating trends in waste imports, with periods of growth followed by declines or vice versa. Despite fluctuations, these countries generally maintained positive CAGR figures. Notably, some countries, like France and Bulgaria, did not meet the selection criteria for export markets due to insufficient growth in waste imports.

Recycling rates varied across countries, with some achieving higher rates than others. This indicates disparities in waste management practices and recycling infrastructure among the listed nations.

Step 2: Identify the top three export markets for Georgia's waste material and recycled products

In the subsequent stage, we examined the import of particular products (refer to Table 2) chosen as potential exports from Georgia for the ten selected countries. The heatmap below illustrates the import values for specific HS codes across these countries, indicating those with the highest imports for each product.

Table 4: Waste import in selected ten countries (2022)

HS Code	Category	Product label	Germany	Belgium	Italy	Spain	Netherlands	Greece	Sweden	Poland	Austria	Turkey
271099	Oil	Waste oils containing mainly petroleum or bituminous minerals (excl. those containing polychlorinated . . .	52,113	950	385	1,614	1,891	7,677	1,387	3,129	121	1
271390		Residues of petroleum oil or of oil obtained from bituminous minerals (excl. petroleum coke . . .	4,718	10,012	59,658	24,542	9,180	149	3,126	9,312	2,483	-
391510	Polymers of Ethylene	Waste, parings and scrap, of polymers of ethylene	156,593	98,286	65,707	66,611	124,072	5,946	13,146	38,718	17,418	158,493
391520	Polymers of Styrene (PS)	Waste, parings and scrap, of polymers of styrene	19,768	6,273	5,267	36,779	8,512	162	1,996	5,248	8,478	12,939
391530	Polymers of Vinyl Chloride (PVC)	Waste, parings and scrap, of polymers of vinyl chloride	11,998	3,394	361	3,540	7,391	11	116	9,241	503	1,160
391590	Plastic	Waste, parings and scrap of plastics (excl. that of polymers of ethylene, styrene and vinyl . . .	80,469	65,445	62,634	55,966	258,117	9,375	11,518	44,788	89,386	111,104
400400	Rubber	Waste, parings and scrap of soft rubber and powders and granules obtained therefrom	20,760	7,420	8,466	6,892	12,618	99	358	2,281	1,223	51,358
401220	Rubber	Used pneumatic tires of rubber	48,786	11,375	4,614	31,705	24,169	34	2,104	7,934	373	29
470710	Paper	Recovered "waste and scrap" paper or paperboard of unbleached kraft paper, corrugated paper . . .	296,793	35,184	41,343	62,341	256,329	2,543	14,873	53,056	170,623	137,293
470720		Recovered "waste and scrap" paper or paperboard made mainly of bleached chemical pulp, not . . .	216,462	5,190	36,146	18,134	45,396	1,777	4,615	229	47,095	728
470730		Recovered "waste and scrap" paper or paperboard made mainly of mechanical pulp, e.g. newspapers, . . .	299,176	82,983	4,047	56,300	46,415	2,724	27,147	5,230	70,493	17,101
700100	Glass	Cullet and other waste and scrap of glass; glass in the mass (excl. glass in the form of powder, . . .	36,485	12,056	20,954	10,596	19,651	179	344	1,272	4,852	1,596
760200	Aluminum scraps	Waste and scrap, of aluminum (excl. slags, scale and the like from iron and steel production, . . .	2,008,119	386,477	1,217,391	454,656	402,319	296,870	157,358	417,972	631,024	575,209
780200	12 v accumulators	Lead waste and scrap (excl. ashes and residues from lead production "heading No 2620", and . . .	35,829	35,448	1,896	70,211	44,374	2,445	5,136	24,273	2,589	-
854810		Waste and scrap of primary cells, primary batteries and electric accumulators; spent primary . . .	-	-	-	-	-	-	-	-	-	-
854911		Waste and scrap of lead-acid accumulators; spent lead-acid accumulators	54,888	65,377	44	50,844	18,838	6,772	36,164	-	19,436	-

'854931	WEEE	Waste and scrap of electrical and electronic assemblies and printed circuit boards, containing ...	1,069	-	79	2,549	2	-	-	-	5	-
'854939	WEEE	Waste and scrap of electrical and electronic assemblies and printed circuit boards (excl. for ...	362	1,118	345	29	215	11	804	-	9	-
'854991	WEEE	Electrical and electronic waste and scrap, containing primary cells, primary batteries or electric ...	1,488	-	19	-	1,060	-	2,283	-	31	-
'854999	WEEE	Electrical and electronic waste and scrap (excl. for the recovery of precious metal, electrical ...	4,121	1,037	613	1,112	1,632	94	1,677	-	1	-

Source: trademap.org

As the table shows, **Germany and the Netherlands generally demonstrate higher import values across various waste categories than other countries in the dataset.**

Germany shows notably higher import values across multiple waste categories, indicating a significant role in waste importation. Its import values are consistently higher than those of most other countries in the dataset across different waste categories. Germany's robust industrial base and efficient waste management infrastructure likely contribute to its higher import volumes.

The Netherlands also shows relatively high import values across various waste categories, although generally lower than Germany's. It demonstrates consistent import activity in several waste categories but may have slightly lower import values compared to Germany in most cases. The Netherlands' strategic location and well-developed logistics network make it a key hub for waste management and recycling activities in Europe.

Belgium, Italy, Spain, and Greece also exhibit moderate to high import values in various waste categories but generally fall below Germany and the Netherlands in terms of import volumes.

Countries like Sweden, Poland, Austria, and Türkiye generally display lower to moderate import values across different waste categories compared to Germany and the Netherlands; However, Türkiye 's import values for plastic and polymer categories exhibit some distinctive features compared to the rest of the countries. **Specifically, Türkiye 's import values for plastic and polymer categories appear to be relatively high compared to many other countries, suggesting a significant role in the global trade of these materials.** Its import values in the plastic category are notably high, indicating significant demand or reliance on imported plastic waste for recycling or industrial purposes. This suggests that Türkiye likely has a well-established plastic recycling industry or significant demand for plastic raw materials. In categories related to polymers (HS codes 391510, 391520, 391530), Türkiye also shows considerable import volumes, although not as consistently high as in the plastic category.

Overall, **Germany** and the **Netherlands** stand out as key importers of waste materials, reflecting their advanced waste management systems and strong industrial infrastructure. **Türkiye,** chosen as the third most promising export destination for Georgia, stands out due to its significant imports of polymers and plastics, which represent Georgia's primary potential export stream. Additionally, Türkiye's geographical proximity to Georgia serves as a considerable advantage in facilitating trade relations.

Step 3 – Analyses of Target Markets

Policy Background and Legal Basis for Waste Shipments to EU

Transboundary waste shipments within EU member states and imports in the community from third non-EU members countries are regulated by Regulation (EC) No 1013/2006 on Shipment of waste. The regulation reflects basic requirements of two international regulation about waste shipments: Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and OECD Council Decision C(92)39/FINAL on the Control of Transfrontier Movements of Wastes Destined for Recovery Operations.

As Georgia is the part of Basel Convention, it is allowed to ship waste and recycled products into EU community. The Basel Convention lists a wide variety of waste types as hazardous and shipment of such materials requires special consent from importing countries. In order to ensure efficient system for transboundary waste shipment, Basel Convention identifies three main goals:

- Reduction of hazardous waste and promotion of environmentally sustainable methods of hazardous waste management

- Restriction of transboundary waste movements unless it is perceived to be managed by sustainable methods.
- Application of regulatory system where transboundary waste shipments are permitted. A regulatory system means that, to carry out export activities, authorities of export countries should notify authorities of import or transit states, providing them with detailed information and characteristics of transported wastes. Shipments are allowed if authorities of related states provide written consent.

Regulation (EC) No 1013/2006 on Shipment of waste

The Regulation (EC) No 1013/2006 on Shipment of Waste defines terms and conditions under which are allowed transboundary waste shipments between EU member and outside EU from non-members states.

According to Article 18 of the regulation majority of the potential waste and raw materials identified in the study as most prominent export products from Georgia falls under "green list" (non-hazardous) of the Regulation. Mentioned "green list" is presented in Basel Convention as Annex IX and in Regulation (EC) No 1013/2006 as Annex V, Part 1, List B. The "green list" contains following categories from identified Georgian waste product/material list:

- B3010 Solid Plastic Waste, including polypropylene, polyethylene terephthalate, ethylene, styrene and other polymers.
- B3020 Paper, paperboard and paper product waste.
- B3040 Rubber Wastes.
- B2020 Glass Waste.
- B1020 Metal Scraps (including Aluminum and Lead scrap)
- B1110 Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries.

Remaining categories from identified Georgian product/material list by the same regulations are defined as hazardous waste:

- A1160 Lead-acid batteries, whole or crushed
- A3020 Waste mineral oils unfit for their originally intended use

Article 18 defines general information requirements (for member states) for the "green list" wastes. The companies which are interested in exports within EU should specify following characteristics and information:

- ✓ Information about the person/company arranging shipment (exporter)
- ✓ Contac Details of Importer/consignee
- ✓ Quantity of waste/material
- ✓ Date of shipment
- ✓ Name of the carrier
- ✓ Waste generator
- ✓ Recovery operation (D Code)
- ✓ Usual description of waste
- ✓ Recovery facility
- ✓ Waste identification with relevant codes (Basel Annex IX, EC list of waste, national waste code)
- ✓ Countries states concerned (export, transit and import countries)
- ✓ Declaration of the person who arranges the shipment.

As Georgia is not a member state of the EU, cannot benefit from "grin list" and relevant easy general information requirements during the waste shipments. Title 5 - IMPORTS INTO THE **COMMUNITY FROM** THIRD COUNTRIES, in Chapter 2, Articles 43 and 44 of The Regulation (EC) No 1013/2006 are explained terms and conditions when it is allowed to import waste for recovery into the community, for non-member states. Accordingly Georgian legal entities and companies have to satisfy additional requirements to export non-hazardous waste.[9]

Additional requirements for Georgian legal entities and companies

For Georgian companies and individuals who are interested in export of waste products and material to EU shall be subject to ***prior written notification and consent procedures***. The Articles 4, 5, 6, 7 and 9 of Regulation (EC) No 1013/2006 on Shipment of Wast describes mentioned procedures:

Article 4 - Notification

Person who intends to export waste (notifier) to EU shall submit notification to competent authority of dispatch country (in Georgian case MEPA). The notification should be fulfilled by two documents:

- The notification document set out in Annex IA of the Regulation No 1013/2006 (Annex 1 of this report)
- The movement document set out in Annex IB of the Regulation No 1013/2006 (Annex 2 of this report)

The notification document should be filled by notifier and the document shall contain following information:

1. Serial number or other accepted identifier of the notification document and intended total number of shipments.
2. Notifier's name, address, telephone number, fax number, e-mail address, registration number and contact person.
3. If the notifier is not the producer: producer's (producers') name, address, telephone number, fax number, e-mail address and contact person.
4. Recovery or disposal facility's name, address, telephone number, fax number, e-mail address, registration number, contact person, technologies employed and possible status as pre-consented in accordance with Article 14.
   If the waste is destined for an interim recovery or disposal operation, similar information regarding all facilities where subsequent interim and non-interim recovery or disposal operations are envisaged shall be indicated.
5. Consignee's (responsible person of recovery facility) name, address, telephone number, fax number, e-mail address, registration number and contact person.
6. Intended carrier's (carriers') and/or their agent's (agents') name, address, telephone number, fax number, e-mail address, registration number and contact person.
7. Country of dispatch and relevant competent authority.
8. Countries of transit and relevant competent authorities.
9. Country of destination and relevant competent authority.
10. Single notification or general notification. If general notification, period of validity requested.
11. Date(s) envisaged for start of the shipment(s).
12. Means of transport envisaged.

[9] The report still describes general information requirements for "green list" waste, as Georgia became EU member candidate and this decision might affect Georgian E and EU trade regulation requirements. Also, as Georgia is moving towards EU membership such description might be relevant in upcoming years.

13. Intended routing (point of exit from and entry into each country concerned, including customs offices of entry into and/or exit from and/or export from the Community) and intended route (route between points of exit and entry), including possible alternatives, also in case of unforeseen circumstances.
14. Evidence of registration of the carrier(s) regarding waste transports (e.g. a declaration certifying its existence).
15. Designation of the waste on the appropriate list, the source(s), description, composition and any hazardous characteristics. In the case of waste from various sources, also a detailed inventory of the waste.
16. Estimated maximum and minimum quantities.
17. Type of packaging envisaged.
18. Specification of the recovery or disposal operation(s) as referred to in Annexes II A and II B to Directive 2006/12/EC.
19. If the waste is destined for recovery:

(a) the planned method of disposal for the non-recoverable fraction after recovery;
(b) the amount of recovered material in relation to non-recoverable waste;
(c) the estimated value of the recovered material;
(d) the cost of recovery and the cost of disposal of the non-recoverable fraction.

20. Evidence of insurance against liability for damage to third parties (e.g. a declaration certifying its existence).
21. Evidence of a contract (or a declaration certifying its existence) between the notifier and consignee for the recovery or disposal of the waste that has been concluded and is effective at the time of the notification, as required in the second subparagraph, point 4 of Article 4 and in Article 5.
22. A copy of the contract or evidence of the contract (or a declaration certifying its existence) between the producer, new producer or collector and the broker or dealer, in the event that the broker or dealer acts as notifier.
23. Evidence of a financial guarantee or equivalent insurance (or a declaration certifying its existence if the competent authority so allows) that has been established and is effective at the time of the notification or, if the competent authority which approves the financial guarantee or equivalent insurance so allows, at the latest when the shipment starts, as required in the second subparagraph, point 5 of Article 4 and in Article 6.

The regulation provides detailed list of required information for the movement document as well and the document shall contain following information:

1. Serial and total number of shipments.
2. Date shipment started.
3. Means of transport.
4. Carrier's (carriers') name, address, telephone number, fax number and e-mail address.
5. Routing (point of exit from and entry into each country concerned, including customs offices of entry into and/or exit from and/or export from the Community) and route (route between points of exit and entry), including possible alternatives, also in case of unforeseen circumstances.
6. Quantities.
7. Type of packaging.
8. Any special precautions to be taken by the carrier(s).
9. Declaration by the notifier that all necessary consents have been received from the competent authorities of the countries concerned. This declaration must be signed by the notifier.
10. Appropriate signatures for each custody transfer.

Article 5 – Contract

Notifier is obliged to sign a contact with waste recycler (consignee) and the contact should include recovery methods of waste that are dedicated for shipment and other contractual obligations.

Article 6 Financial Guarantee

1. All shipments of waste for which notification is required shall be subject to the requirement of a financial guarantee or equivalent insurance covering:

(a) costs of transport;
(b) costs of recovery or disposal, including any necessary interim operation; and
(c) costs of storage for 90 days.

2. The financial guarantee or equivalent insurance is intended to cover costs arising in the context of:

(a) cases where a shipment or the recovery or disposal cannot be completed as intended,
(b) cases where a shipment or the recovery or disposal is illegal as referred to in Article 24.

Authorities of shipment and destination countries should approve financial guarantee.

Article 7 - Transmission of the notification by the competent authority of dispatch

Once the notification has been properly carried out, the competent authority of dispatch shall retain a copy of the notification and transmit the notification to the competent authority of destination with copies to any competent authority(ies) of transit and shall inform the notifier of the transmission. This shall be done within three working days of receipt of the notification.

Article 9 - Consents by the competent authorities of destination, dispatch and transit and time periods for transport, recovery, or disposal

The competent authorities of destination, dispatch and transit shall have 30 days following the date of transmission of the acknowledgement by the competent authority of destination in which to take one of the following duly reasoned decisions in writing as regards the notified shipment:

(a) consent without conditions;
(b) consent with conditions in accordance with Article 10; or
(c) objections in accordance with Articles 11 and 12.

Tacit consent by the competent authority of transit may be assumed if no objection is lodged within the said 30-day time limit.

As we observe in EU regulation Georgian companies and individuals who intend export even "green listed" waste/materials in European market formally should acquire consent according to described procedures. Although Georgia is not member state, representatives of MEPA confirm that European countries not always request consent and general information requirements, procedures for "green list" are sufficient for export. This chapter describes both procedures and each one can be applied based on country decision about concrete waste shipment.

Individual regulations of target countries

Besides EC regulation our research target countries have individual regulations and limitations. In Germany government authority that is responsible on permitting waste imports is State Agency for the Environment,

Nature Conservation and Geology. On national level The German Waste Shipment Law complements EC regulation 1013/2006 on Waste Shipment.

According to waste management national plan of Netherlands, flexible import restrictions are imposed in the country. But according to European Environmental Agency (EEA) study[10] Netherlands are not banning waste imports as its national waste recovery capacity is not overloaded and can handle imported waste. Also based on international trade statistics data can be observed waste imports in Netherlands.

Target Market 1 - Germany

The first country that was identified as target market for Georgian waste products and export materials is Germany. Germany has a well-developed and advanced recycling and waste management systems, which are considered as one of the most advanced in the world. Some key aspects of Germany's recycling and waste management policies:

- **Dual System** - Germany was one of the first countries introducing so called waste management dual system which involves both public and private sectors. Dual because it considers creating a second system to existing system of the public authorities. The system consists of municipal waste management operated by local authorities and a system of extended producer responsibility (EPR) managed by private companies.
- **Waste Separation and Recycling** - Germany developed complex system for waste separation at the source. Citizens sort their waste into separate bins for different materials such as paper, glass, plastic, and organic waste. This supports to increase recycling rate of the country and reduce waste for other less acceptable waste treatment technologies, such as incineration and landfilling.
- **Deposit System** - By various estimations Germany has one of the most advanced deposit systems in the world. Return rate for beverage packaging is more than 98%.
- **Extended Producer Responsibility (EPR) -** Germany's EPR system obliges producers to take responsibility for the entire lifecycle of their products, including collection, recycling, and disposal. In Germany EPR covers following specific waste products: Packaging waste, WEEE, Batteries, End of life vehicles and hazardous substances products. This encourages producers to design products that are easier to recycle and reduces the burden on local municipalities for waste management.
- **Landfill Restrictions** - Germany has strict regulations regarding landfilling of waste. Landfilling is seen as a last option, and efforts are made to minimize the amount of landfilled waste. Waste that cannot be recycled or composted is often incinerated in waste-to-energy plants, where the heat generated is used for energy production.
- **Circular Economy Initiatives -** Germany is committed to promoting a circular economy, supporting resources circularity and more efficient usage. The government supports research and innovation in sustainable materials and technologies to promote circularity.
- **Legislation and Regulation -** Germany has implemented various laws and regulations to support its recycling and achievement of targets in waste management: the Packaging Act which regulates packaging waste, and the Closed Substance Cycle and Waste Management Act which sets out the framework for waste management.

On of the key factor for the selection of Germany as a target export market for waste materials was developed recycling infrastructure and capacity in the country. Germany has:

[10] Expanding the Knowledge Base on Intra-EU Waste Movements in a Circular Economy – EEA, 2021

- Over 600 material recovery facilities (MRF)
- More than 2000 composting facilities and 9000 biogas plants,
- More than 500 plastic recycling facilities to process different types of plastic materials, including polyethylene (PE), polypropylene (PP), polystyrene (PS), and others.
- More than 100 glass recycling factories
- In 2017, 68 waste incineration plants with a capacity of around 20 million tons were operating in Germany
- In 2017, a total of 45 MBT plants with a capacity of around 5 million tons treated some 4.5 million tons of waste. [11]

Market Trends in Germany

According to trademap.org data Germany is one of the biggest waste importers in EU. Germany imports vide variety of waste for recovery and waste material from EU and other countries. The research team studied market trends and growth patterns of selected waste materials and products in German market. Particularly import data of selected waste materials are analyzed and studied.

Plastics

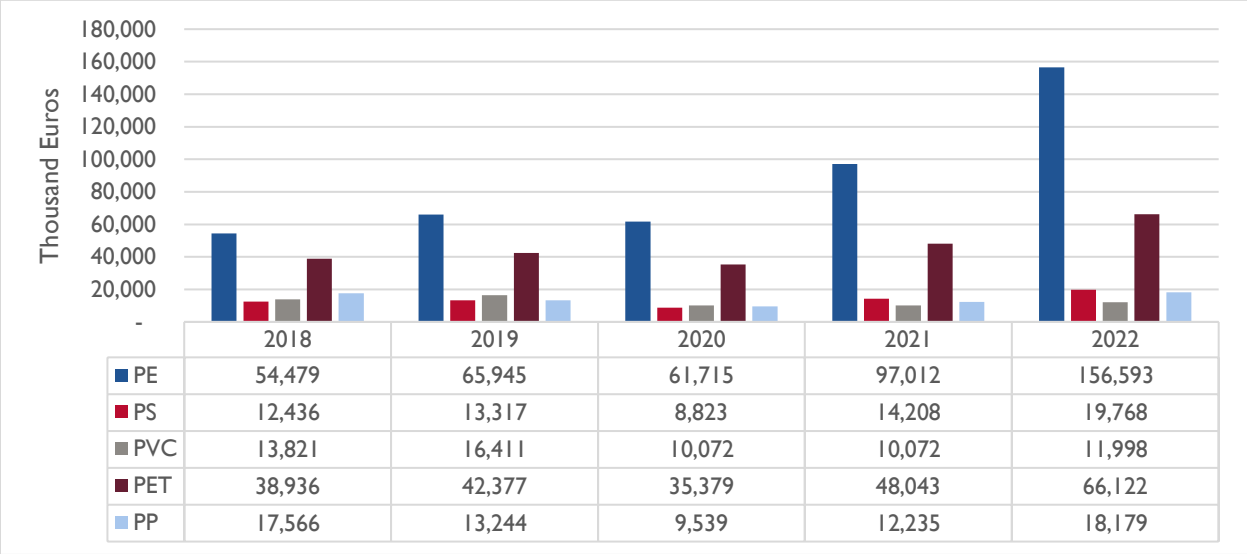
The research team has identified four main plastic categories that are traded in EU and Germany:

- Polymers of Ethylene (PE) - traded under 391510 HS code
- Polymers of Styrene (PS) – traded under 391520 HS code
- Polymers of Vinyl Chloride (PVC) – traded under 391530 HS code
- Other plastic waste – traded under 391590 HS code. This category additionally unites following categories:
    - Polymers of Propylene (PP) – 39159011 traded under 391530 HS code
    - Polyethylene Terephthalate (PET) – 39159080 traded under 391530 HS code
    - Other polymers of plastics

Some of the plastic waste imports were stable during last 5 years in Germany, some were growing, especially imports of PE and PP. Figure 1 shows imported value of plastics in Germany.

[11] Waste Management in Germany 2023 – Facts, data, figures (bmuv.de)

Figure 1 – Import Value of Plastic waste in Germany

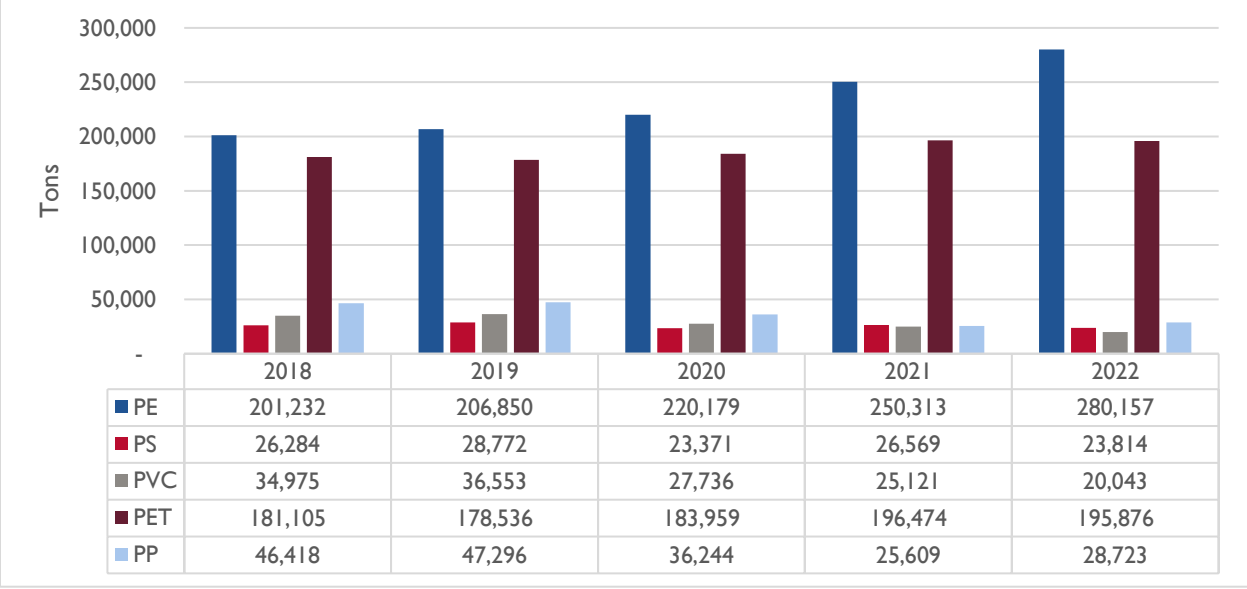


	2018	2019	2020	2021	2022
PE	54,479	65,945	61,715	97,012	156,593
PS	12,436	13,317	8,823	14,208	19,768
PVC	13,821	16,411	10,072	10,072	11,998
PET	38,936	42,377	35,379	48,043	66,122
PP	17,566	13,244	9,539	12,235	18,179

Source: www.trademap.org

Accordingly, quantities of imported plastic waste in Germany were also stable and rising in some of the categories, especially PE and PET categories. Imports of PE in 2022 reached 280,00 tons and PET – 195,000 tons. Additionally, there were significant amounts of imports for other plastics as well, average import of PVC for the last five years was approximately 30,000 tons, PP – 36,000 tons and PS – 25,000 tons. Figure 2 shows quantities of imported plastic waste in Germany.

Figure 2 – Quantities of imported plastic waste in Germany

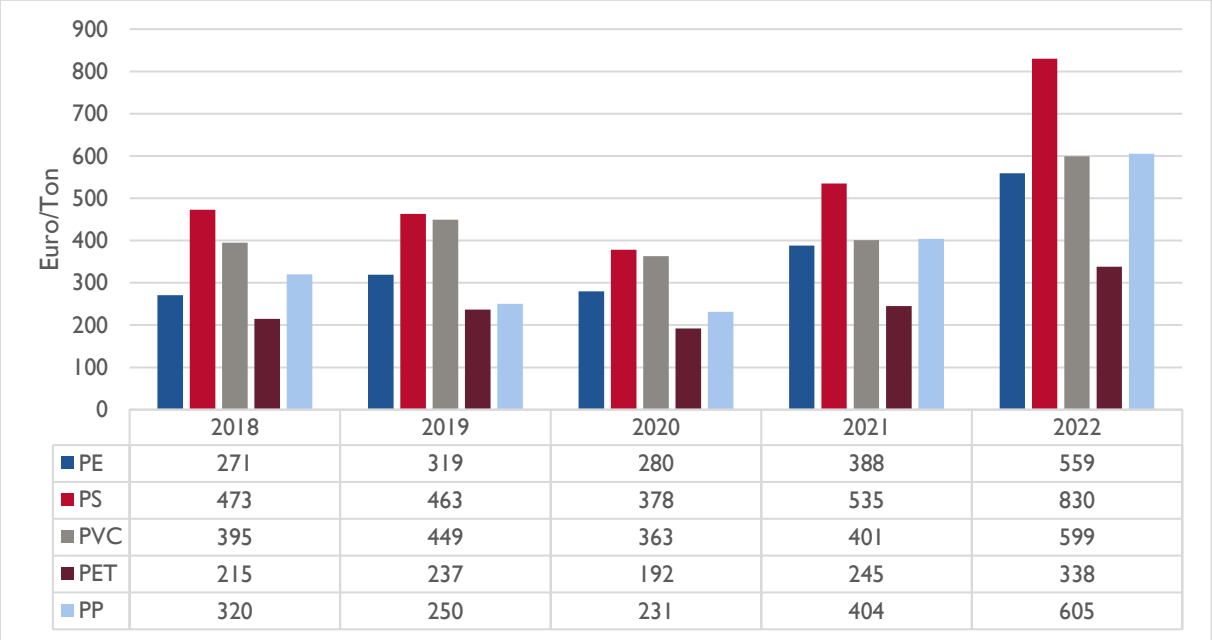


	2018	2019	2020	2021	2022
PE	201,232	206,850	220,179	250,313	280,157
PS	26,284	28,772	23,371	26,569	23,814
PVC	34,975	36,553	27,736	25,121	20,043
PET	181,105	178,536	183,959	196,474	195,876
PP	46,418	47,296	36,244	25,609	28,723

Source: www.trademap.org

Important factor in market analysis is the price for specific material and product. However, determining price during such studies is challenging, because the price depends on individual contracts between exporter and recycler in the destination country. To have some kind of price indication, the research team has estimated value of imported plastics based on trademap.org data.

Figure 3 – Value per ton of imported plastic wastes over the years



	2018	2019	2020	2021	2022
PE	271	319	280	388	559
PS	473	463	378	535	830
PVC	395	449	363	401	599
PET	215	237	192	245	338
PP	320	250	231	404	605

Source: www.trademap.org

Figure 3 shows the values per ton of imported plastic wastes in Germany. Among the plastic wastes the highest value has PS, 830 Euro/Ton. PP, PVC and PE in 2022 had value around 500 - 600 Euros per ton. The lowest value of plastic waste imports in Germany is observed in 2020, that might be associated with Covid 19 pandemic, but following years we observe that market is recovering and values are increasing.

Overall, Germany has well-developed plastic manufacture and recycling industry, which partially depends on imports from abroad. Imported plastics are used to supplement demand for plastic production industry and avoid usage of primary plastics. plastic waste imports play a crucial role in Germany's efforts to promote recycling, reduce plastic pollution, and transition towards a more sustainable and circular economy.

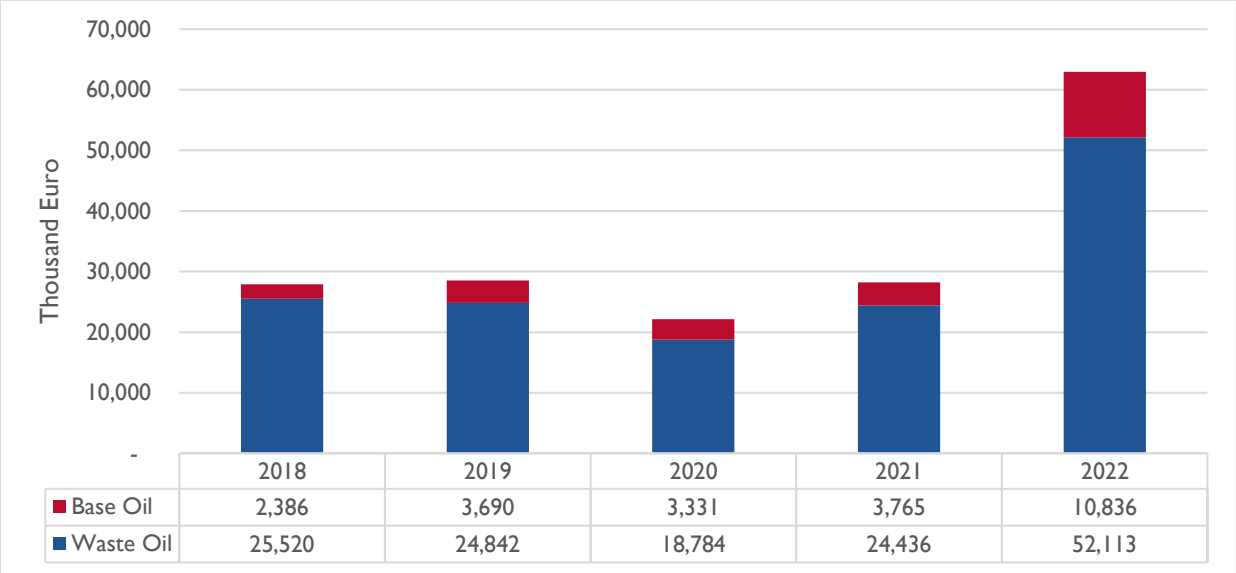
Waste Oils

Next category that is selected in potential waste materials and products is Waste Oils. We have identified two waste oils categories to study target market of Germany:

- Waste oil in primary forms (Shortly Waste Oil) – traded under 271099 HS code. This waste category comes from automotive industry, car maintenance and etc. Primary form means that it is not processed and has not undergone any treatment.
- Base oil – traded under 27101971 HS code. After refining the waste oil (mentioned in previous category) base oil is obtained.

The value of imported waste oils significantly increased in 2022, doubled compared to previous year up to 52 million Euro. Overall imports of Base oil are much less compared to waste oils, but it also increased in 2022, from 3.7 to 10,8 million Euro.

Figure 4 – Imported value of waste oils in German market

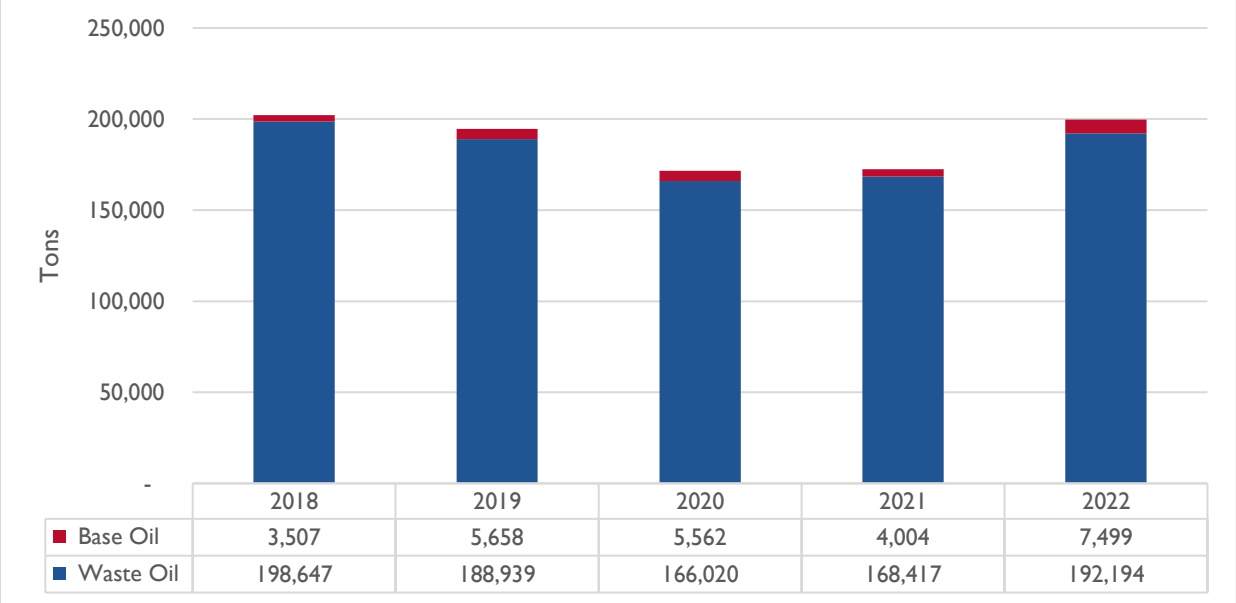


	2018	2019	2020	2021	2022
Base Oil	2,386	3,690	3,331	3,765	10,836
Waste Oil	25,520	24,842	18,784	24,436	52,113

Source: www.trademap.org

Regarding quantities, from 2018 to 2022 on average Germany imported around 180,000 tons of waste oil for recovery. Average Imports of base oil for the same period was around 5,200 tons, but imported quantity significantly increased in 2022, from 4,004 to 10,836 to 7,499 tons. Figure 5 shows imported quantities of waste oil and base oil in Germany.

Figure 5 – Import quantities of waste oils in Germany



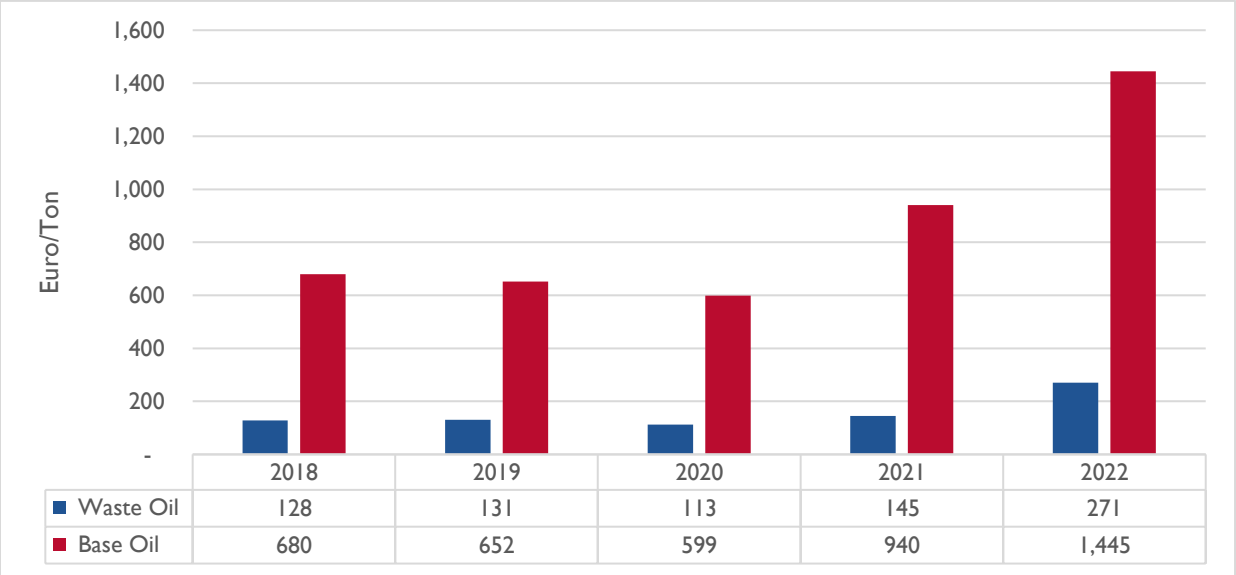
	2018	2019	2020	2021	2022
Base Oil	3,507	5,658	5,562	4,004	7,499
Waste Oil	198,647	188,939	166,020	168,417	192,194

Source: www.trademap.org

There are different patterns in values of waste oil and base oil, particularly, value of base oil is much higher than waste oil. As mentioned previously, to get base oil, waste oil needs cleaning from impurities and contaminants, additional refining and treatment. So base oil is much valuable product than waste oil and

imports of base oil can be very profitable for Georgian companies. According to trade data (Figure 6) value of base oil in was increasing and in 2022 reached 1,445 Euro/ton. Compared to previous years value of waste oil also increased in 2022, from 145 to 271 Euro/Ton.

Figure 6 – Value per ton of imported waste oils in Germany



	2018	2019	2020	2021	2022
Waste Oil	128	131	113	145	271
Base Oil	680	652	599	940	1,445

Source: www.trademap.org

As we have seen from trade data Germany imports significant amount of waste oils from EU and non-EU member states. Imported waste oils are used for refining and producing new products, some part of waste oils are used for energy recovery as well.

Rubber, Glass and Paper

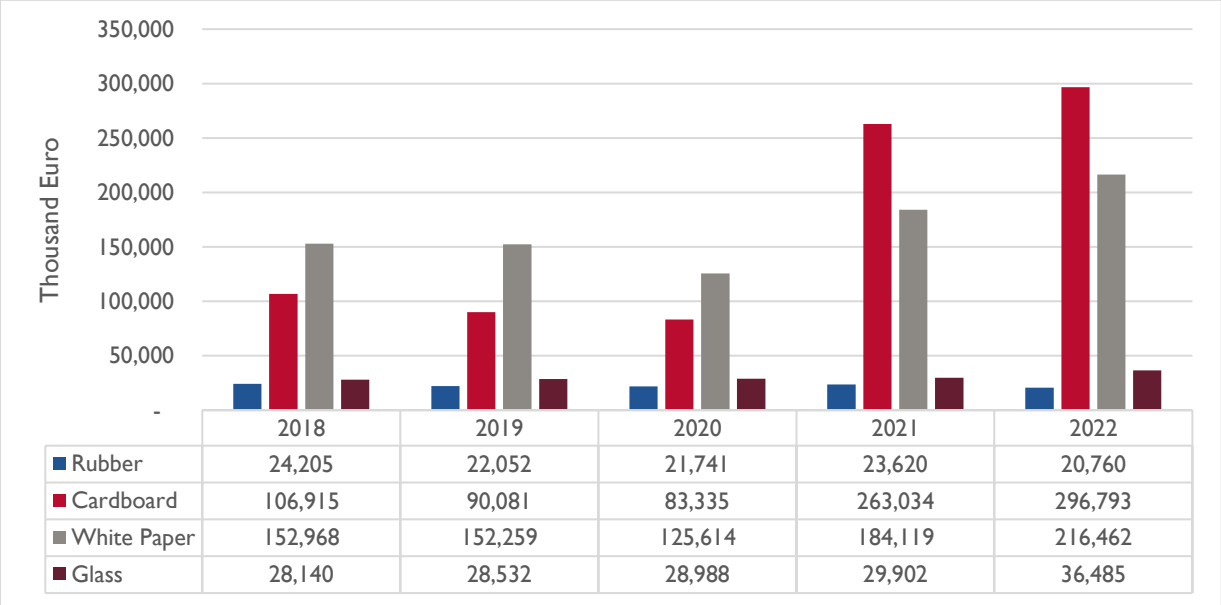
The next category of waste materials are Rubber, glass and paper, which are all in the green listed materials. To analyze market trends of mentioned waste materials, following HS codes are used:

- Glass Cullet – traded under 700100 HS code
- Cardboard – traded under 470710 HS code
- White paper - traded under 470720 HS code
- Rubber Granules and Powder (RGP) – traded under 400400 HS code

Rubber granules and powder produced from recycling of used tires are traded under the same code and cannot be differentiated during the analyses.

The values of imported waste materials from this category in German market (Figure 7) are significant and have been increasing during the last years. Highest imported value in 2022 had cardboard, with 296 million Euro, following with white paper – 216 million Euro, Glass – 36 million Euro and Rubber 20 million Euro.

Figure 7 – Value of imported materials (paper, glass, rubber) in German market

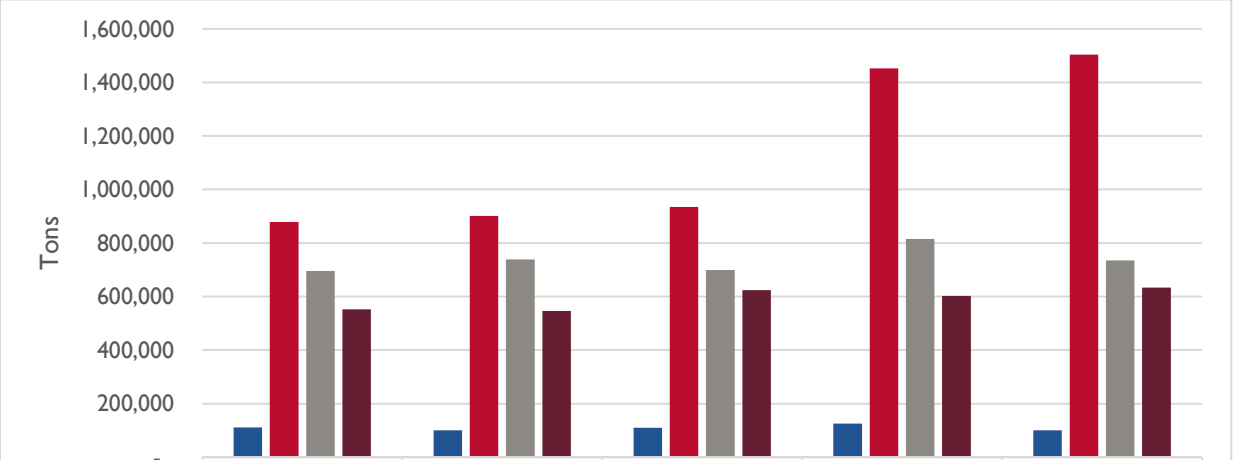


	2018	2019	2020	2021	2022
Rubber	24,205	22,052	21,741	23,620	20,760
Cardboard	106,915	90,081	83,335	263,034	296,793
White Paper	152,968	152,259	125,614	184,119	216,462
Glass	28,140	28,532	28,988	29,902	36,485

Source: www.trademap.org

Regarding the imported quantities of this waste category (Figure 8), cardboard is again leading with 1.5 million tons in 2022, next is white paper with 734 thousand tons, glass – 633 thousand tons and rubber – 100 thousand tons.

Figure 8 – Quantities of imported materials (paper, glass, rubber) in German market



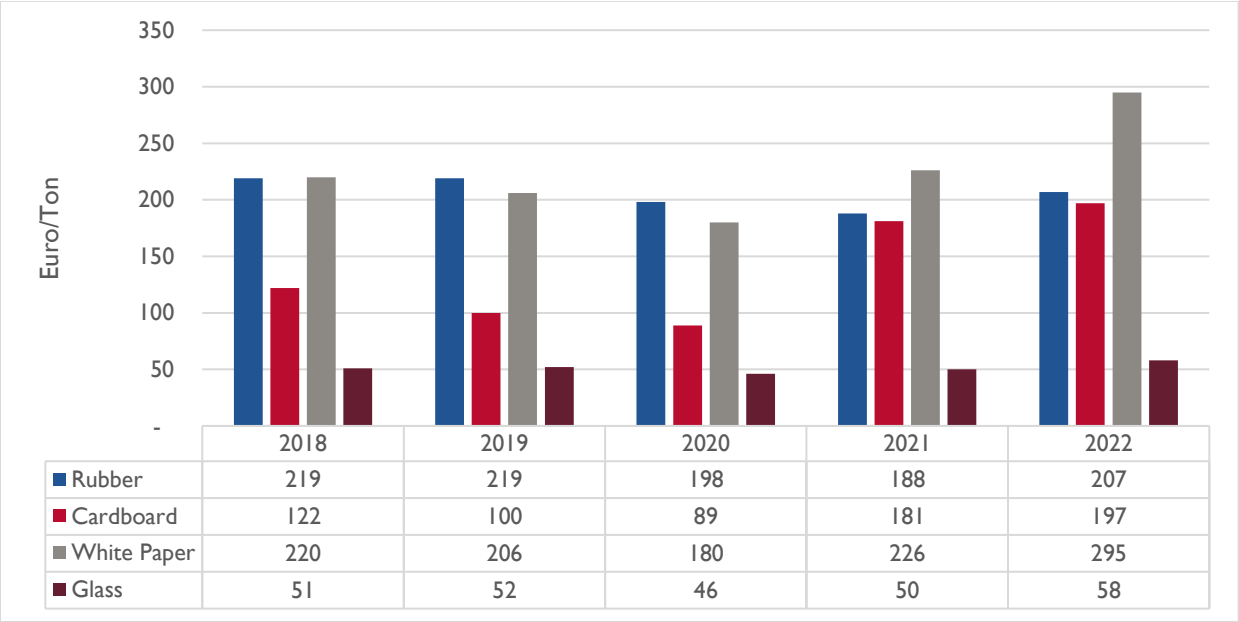
	2018	2019	2020	2021	2022
Rubber	110,743	100,505	109,570	125,612	100,512
Cardboard	878,688	901,182	934,280	1,452,962	1,503,687
White Paper	696,158	739,070	699,698	814,781	734,885
Glass	551,647	546,157	623,915	602,851	633,393

Source: www.trademap.org

The value/price per ton of these waste materials (also others) depend on market trends, quality, recycling capacity and other factors inside the market. Based on mentioned reasons values per ton of these materials

vary and change. In 2022 the highest value per ton had white paper (Figure 9), 295 Euro, followed rubber with 207 Euro, lowest value had glass with 58 Euro per ton.

Figure 9 – Values per ton of imported materials (paper, glass, rubber) in German market



	2018	2019	2020	2021	2022
Rubber	219	219	198	188	207
Cardboard	122	100	89	181	197
White Paper	220	206	180	226	295
Glass	51	52	46	50	58

Source: www.trademap.org

As we have seen Germany imports huge amount of paper, glass and rubber waste. **Paper** - Germany imports paper waste to supplement its domestic recycling industry. Imported paper waste is processed at recycling facilities to produce recycled paper products, packaging materials, and cardboard boxes. The demand for paper waste imports in Germany is driven by the need for raw materials, reduce dependence on virgin fiber, and promote sustainability in the paper industry.

Glass - Germany imports glass waste, such as cullet or broken glass, to support its glass recycling sector. Imported glass is used in the production of new glass containers, bottles, and other glass products. Importing glass waste helps Germany maintain a steady supply of recycled glass and reduces energy consumption and greenhouse gas emissions associated with glass production from virgin materials.

Rubber - Germany imports rubber waste, including rubber granules produced from used tires and other rubber materials, for production of new rubber products and energy recovery purposes.

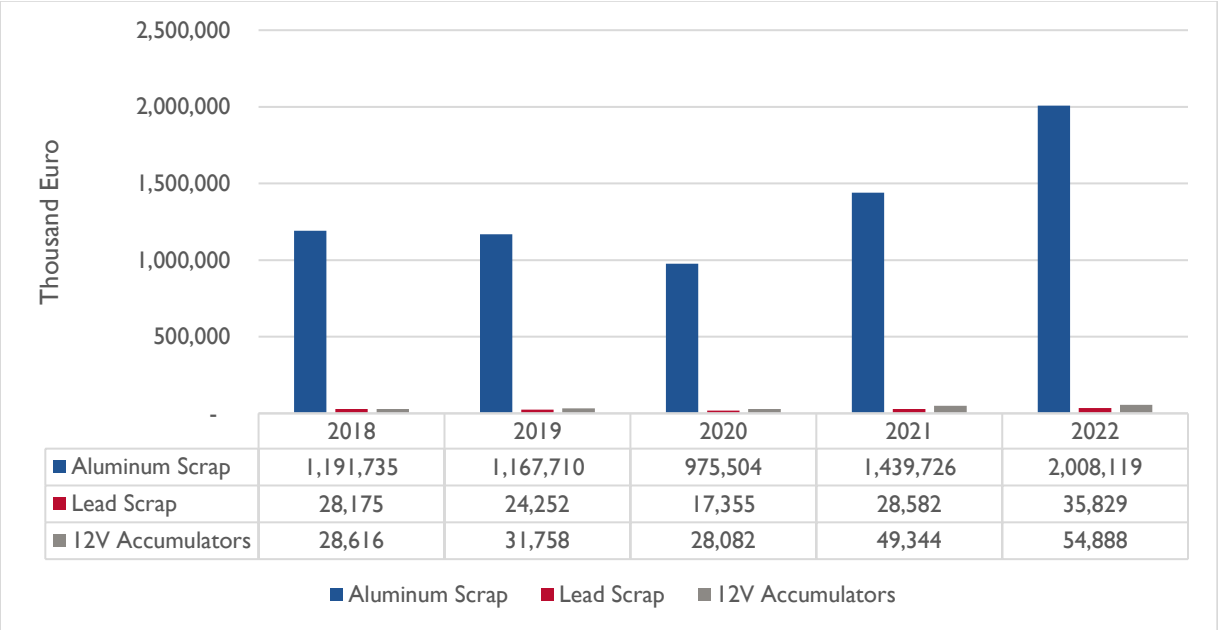
Metals

Next category from selected waste materials and products for Gemrna market analyses is metals, particularly aluminum scrap, lead scrap and 12V accumulators. We added 12V accumulators in metals category because their recycling gives mainly lead scrap. In order to study mentioned waste maerials There are following HS codes analyzed:

- Aluminum Scrap – traded under 760200 HS code
- Lead Scrap – traded under 780200 HS code
- 12V Accumulators - traded under 854810 HS code

Aluminum scrap had the highest value among the metals in 2022, exceeding 2 billion Euro (Figure 10), imports of 12V accumulators reached 53 million Euros and lead scrap – 35 million Euro.

Figure 10 – Value of imported metals in Germany

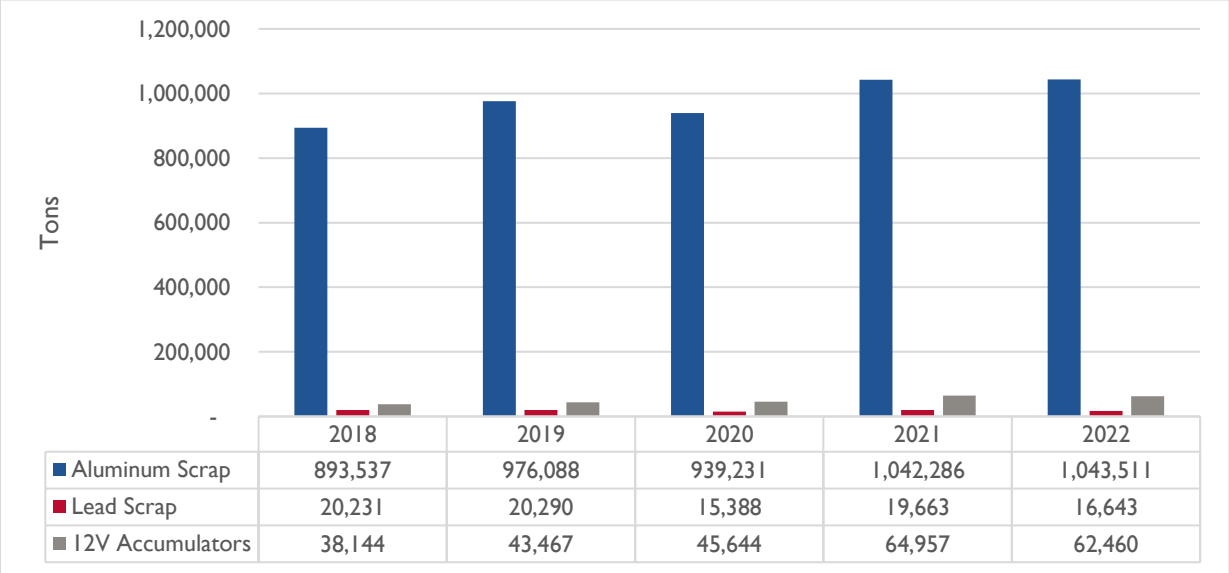


	2018	2019	2020	2021	2022
Aluminum Scrap	1,191,735	1,167,710	975,504	1,439,726	2,008,119
Lead Scrap	28,175	24,252	17,355	28,582	35,829
12V Accumulators	28,616	31,758	28,082	49,344	54,888

Source: www.trademap.org

Respectively quantity of imported (Figure 11) aluminum scrap for the last five years was the highest in metal category, on average 1 million tons per year, imports of lead scrap on average were 18 thousand tons per year and 12V accumulators - 50 thousand tons per year.

Figure 11 – Imported quantities of metals in Germany

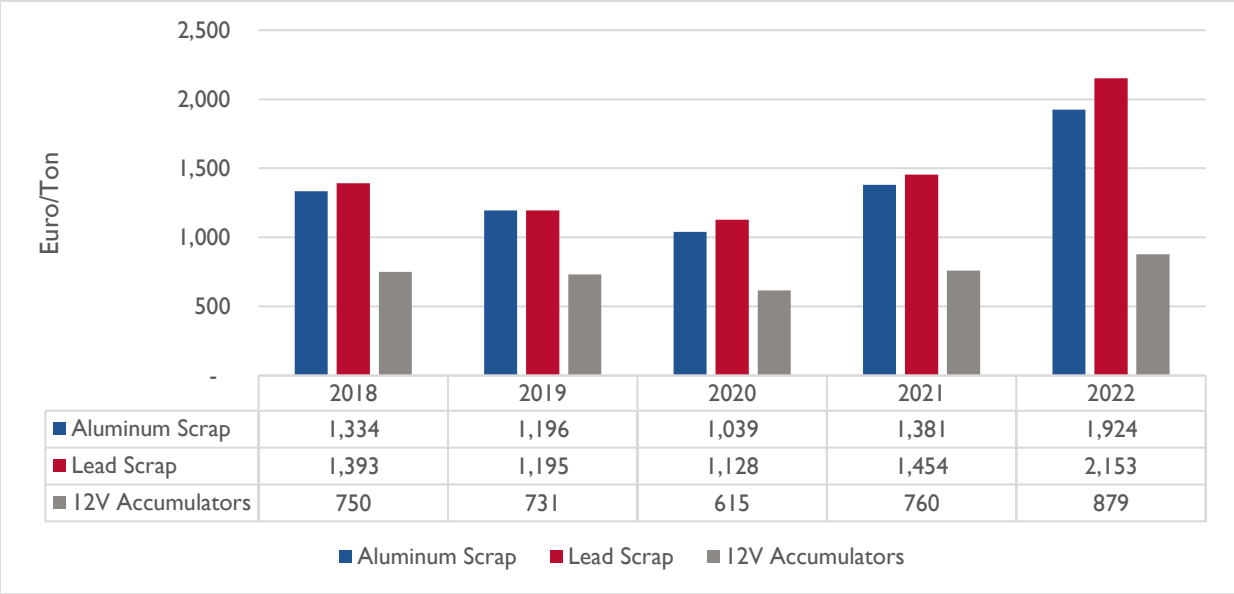


	2018	2019	2020	2021	2022
Aluminum Scrap	893,537	976,088	939,231	1,042,286	1,043,511
Lead Scrap	20,231	20,290	15,388	19,663	16,643
12V Accumulators	38,144	43,467	45,644	64,957	62,460

Source: www.trademap.org

One ton of imported metals in Germany are characterized with high values (Figure 12), particularly lead scrap value per ton in 2022 exceeded 2,000 Euro, value of aluminum was similar around 1,900 Euro and value of one ton 12V accumulators was 879 Euro. Figure 12 shows detailed per ton values of imported metals in Germany.

Figure 12 – Value per ton of imported metals in Germany



	2018	2019	2020	2021	2022
Aluminum Scrap	1,334	1,196	1,039	1,381	1,924
Lead Scrap	1,393	1,195	1,128	1,454	2,153
12V Accumulators	750	731	615	760	879

Source: www.trademap.org

Metal waste amounts to 70% of all waste shipments within the EU. Accordingly, Germany imports substantial quantities of aluminum and lead scrap, because there is big demand on these metals from various industries across the country, including automotive, aviation, construction, electronic equipment, packaging and etc. Most importantly, for Georgian companies, Germany is one of the top destination for lead and aluminum scrap export because its high value on the market.

Waste Electrical and Electronic Equipment (WEEE)

The last category of waste products and materials for German market analyses is WEEE. We have selected following categories WEEE:

- WEEE scrap used for precious metals recovery – traded under 854929 HS code.
- WEEE scrap not used for precious metals recovery – traded under 854999 HS code.
- Printed circuit boards – traded under 854931, 854939 HS codes.

The study has limitations for this category, because in open sources of trade platforms we were able to find data only for 2022. One of the reasons for this might be that mentioned categories were traded under different HS codes during previous years, but now its unidentifiable trade volumes for past years. So, in this paragraph we will discuss only 2022 data:

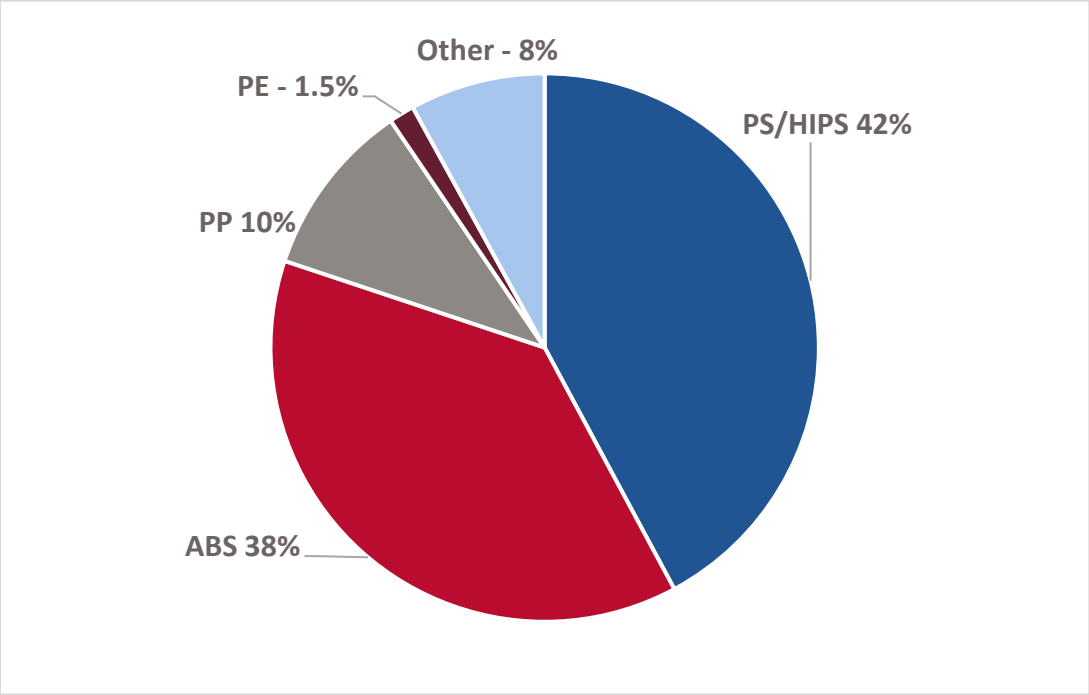
- WEEE for Precious Metals (854929 HS Code) – In 2022 Germany imported nearly 100 million euro worth of WEEE scrap, desired for precious metals recovery. Imported quantity was 62 thousand tons and value of one ton reached 4,400 Euro.
- WEEE (not for precious metals- 854999 HS code) – In 2022 Germany imported 3,000 tons of such WEEE, the value of import was 4.1 million Euro and value per ton exceeded 1,300 Euro.

- Circuit boards containing cadmium, mercury, batteries and PCBs (854931 HS code) – In Germany total import value in 2022 was 1.06 million Euro, import quantity – 3,080 tons and unit value – 437 Euro/Ton
- Circuit boards not containing above mentioned substances (854939 HS code) – In 2022, Germany imported 362 thousand Euro worth of such circuit boards, quantity of imports were 297 tons and unit value 1,219 Euro/Ton.

As we observe WEEE scrap is traded for the recovery of metals, ferrous and non-ferrous. But besides metals, WEEE contains a significant amount of plastics and this materials are keeping significant value as well. So, plastics in WEEE should also considered, especially in Georgia where common practice is when the most valuable parts from WEEE are removed and plastic is thrown away.

Various scientists have studied plastic composition of WEEE, one of the study results are shown on Figure 13.[12] Abbreviations used in this figure: HIPS – High Impact Polystyrene, ABS - acrylonitrile-butadiene-styrene.

Figure 13 - Value of imported metals in Germany



Source: www.trademap.org

Based on this composition study WEEE contains mainly styrene and propylene-based plastics. We have already discussed market trends for these plastics in previous paragraphs.

[12] Electronic Waste Plastics Characterisation and Recycling by Melt-processing, University of Technology, Gothenburg, Sweden, 2013

Target Market 2 – Netherlands

The next country selected as target market for our research is The Netherlands. The Netherlands has a comprehensive waste management policy aimed at promoting sustainability, resource efficiency, and environmental protection. The Netherlands are implementing following policies in waste management:

- **Circular Economy** – Since 2016 The Netherlands has adopted a circular economy strategy aimed at minimizing waste generation, maximizing resource efficiency, and promoting sustainable consumption and production practices. The ultimate goal of the strategy is to have waste free society in 2050.
- **Waste Hierarchy -** The Netherlands follows a waste hierarchy approach, prioritizing waste prevention, reuse, recycling, and recovery over disposal. This means that the country takes measures to minimize waste generation and maximize the recovery of valuable resources from waste streams through recycling, composting, and energy recovery.
- **Extended Producer Responsibility (EPR)** –The Netherlands has also implemented EPR system and successful deposit refund system, with high recovery rate.
- **Landfill Reduction -** The Netherlands has significantly reduced reliance on landfilling through waste elimination strategies, waste management regulations, and landfill taxes. Landfilling is considered the last preferred option for waste disposal.
- **Regulations –** On the national level the system is regulated by Waste Management Act and National Waste Management Plan.

The Netherlands has advanced waste treatment infrastructure, which allows to produce raw materials for various industries across the county, including automotive, packaging, aviation, agriculture, energy and etc. The Netherlands stands out for such recycling capacities as:

- Plastic – there are dozens of plastic recycling companies specialized in various variety of plastic waste, including PS, ABS, PE, HDPE, PVC, PET and etc.
- Metal recycling – The Netherlands imports large amounts of metal wastes.
- Paper - there are up to 10 paper recycling factories in the Netherlands with annual capacity of approximately 2 million tons.
- Waste oils.

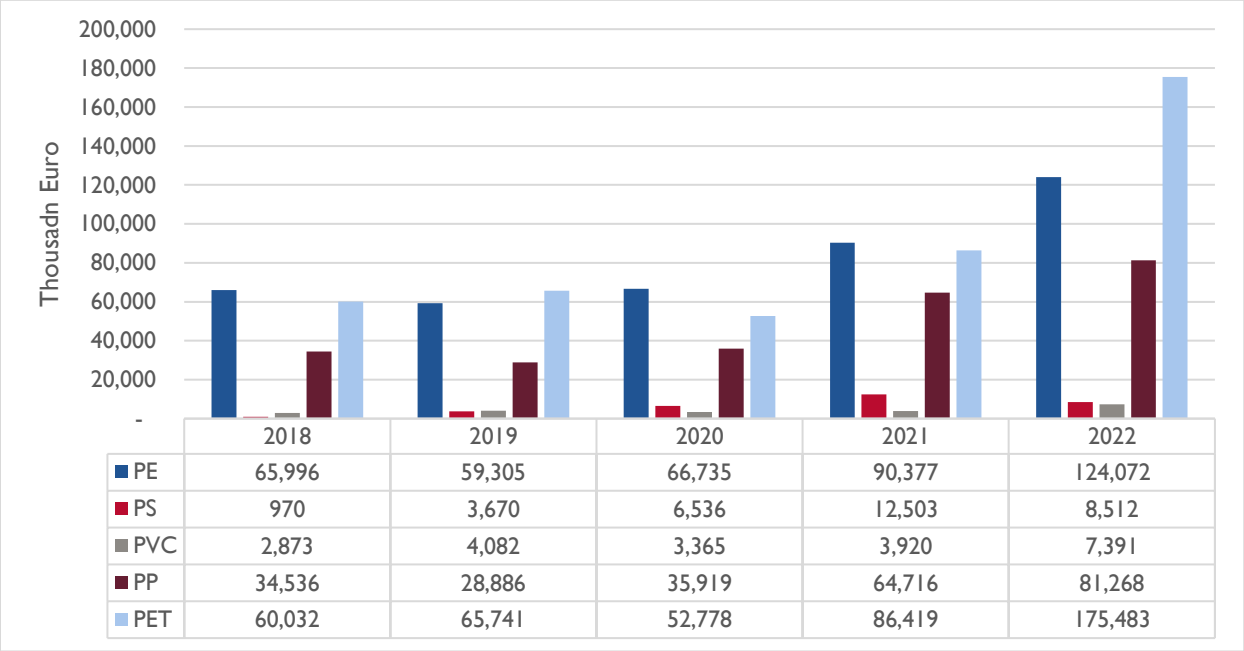
Market Trends in Netherlands

The Netherlands imports hundreds of thousand tons of waste for the recycling and raw material production. In order to study export potential, bellow paragraphs provide market analyses of imported wastes in the Netherlands.

Plastics

The Netherlands are one of the biggest plastic waste importers in the EU, the country imports wide variety of plastics to produce new products and raw materials. Figure 14 shows total imported value of plastic waste.

Figure 14 – Total value of imported plastic waste in the Netherlands

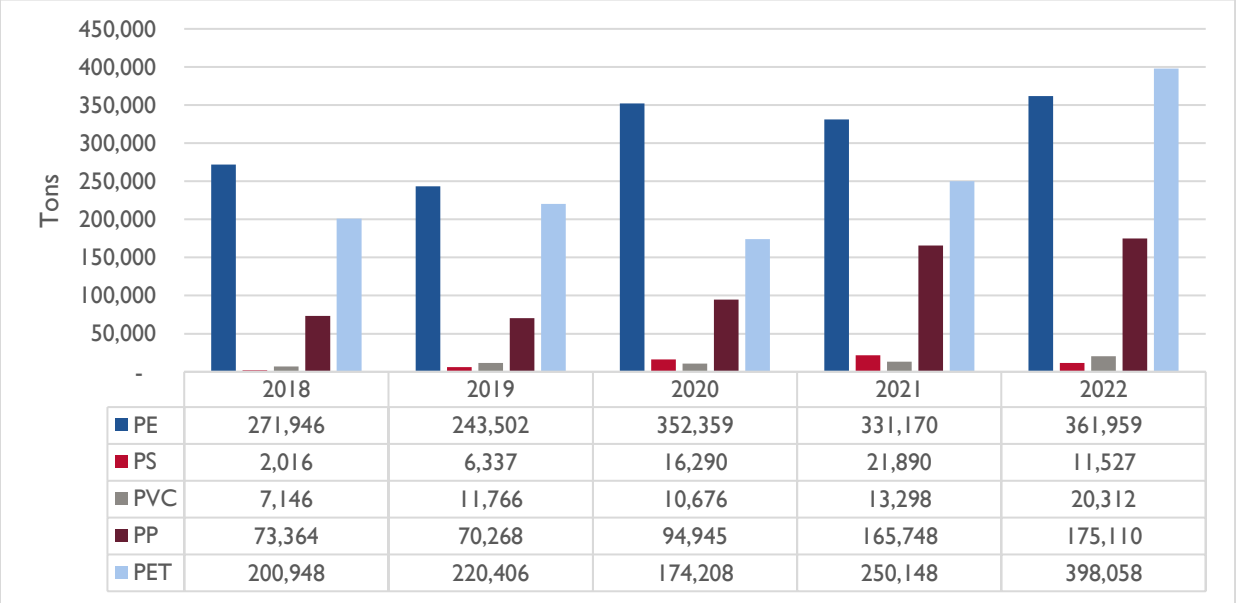


	2018	2019	2020	2021	2022
PE	65,996	59,305	66,735	90,377	124,072
PS	970	3,670	6,536	12,503	8,512
PVC	2,873	4,082	3,365	3,920	7,391
PP	34,536	28,886	35,919	64,716	81,268
PET	60,032	65,741	52,778	86,419	175,483

Source: www.trademap.org

Last couple of years value of imported plastic waste was increasing in the Netherlands, in 2022 highest value had PET – 175 million Euro, following with PE – 124 million Euro and PP with 81 million Euro. Value of PS and PVC imports were also rapidly increasing during the last years.

Figure 15 – Imported quantities of plastic waste in the Netherlands



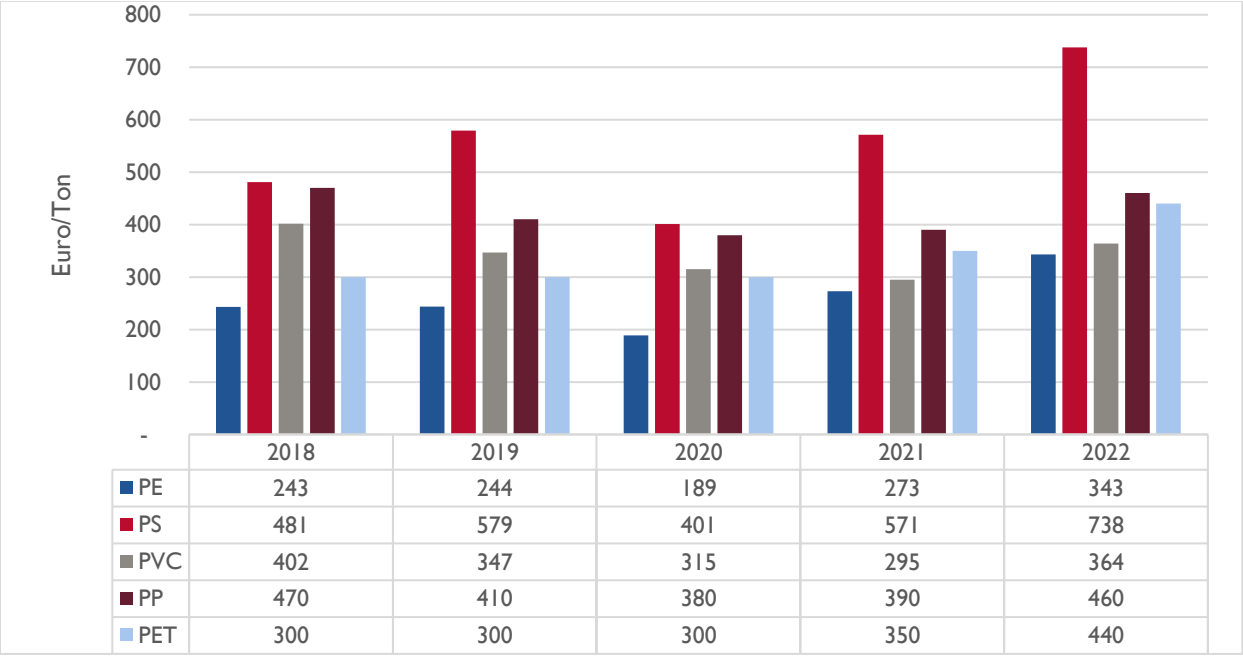
	2018	2019	2020	2021	2022
PE	271,946	243,502	352,359	331,170	361,959
PS	2,016	6,337	16,290	21,890	11,527
PVC	7,146	11,766	10,676	13,298	20,312
PP	73,364	70,268	94,945	165,748	175,110
PET	200,948	220,406	174,208	250,148	398,058

Source: www.trademap.org

In 2022 the Netherlands imported in total 966 thousand tons of various plastic waste, out of which PET was 398 thousand tons, PE – 361 thousand tons, PP 175 thousand tons, PVC 20 thousand tons and PS 11

thousand tons. It's also noteworthy that quantity of imports for all category were increasing for the last 5 years.

Figure 16 – Unit values of imported plastic waste in the Netherlands



	2018	2019	2020	2021	2022
PE	243	244	189	273	343
PS	481	579	401	571	738
PVC	402	347	315	295	364
PP	470	410	380	390	460
PET	300	300	300	350	440

Source: www.trademap.org

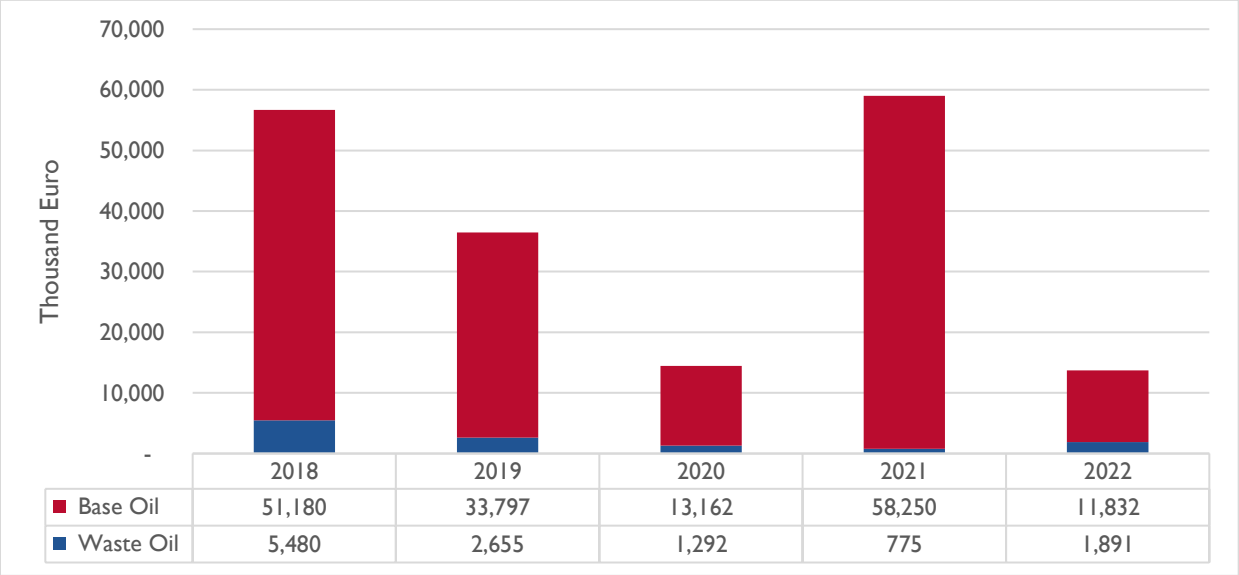
Highest value among the imported plastic waste imports has styrene-based plastics (Figure 16), in 2022 738 Euro per ton (on average 550 Euro per ton). Other plastic wastes also had significant value per ton over the last five years, especially PET and PP.

The imports of plastic wastes enable the Netherlands to recover valuable resources from plastic packaging, bottles, industrial and other plastic waste items through recycling. By importing plastic waste, the country can gain additional raw material for its recycling facilities, contributing to resource conservation and reducing the reliance on virgin plastic production.

Waste Oils

The Netherlands are importing substantial amount of waste oils products, particularly base oil. In 2022, imports of base oil amounted to 11 million Euro, in 2021 58 million Euro. Imports of waste oil were reducing until 2021, but in 2022 it increased and import value achieved to 1.9 million Euro.

Figure 17 – Value of imported waste oils in the Netherlands

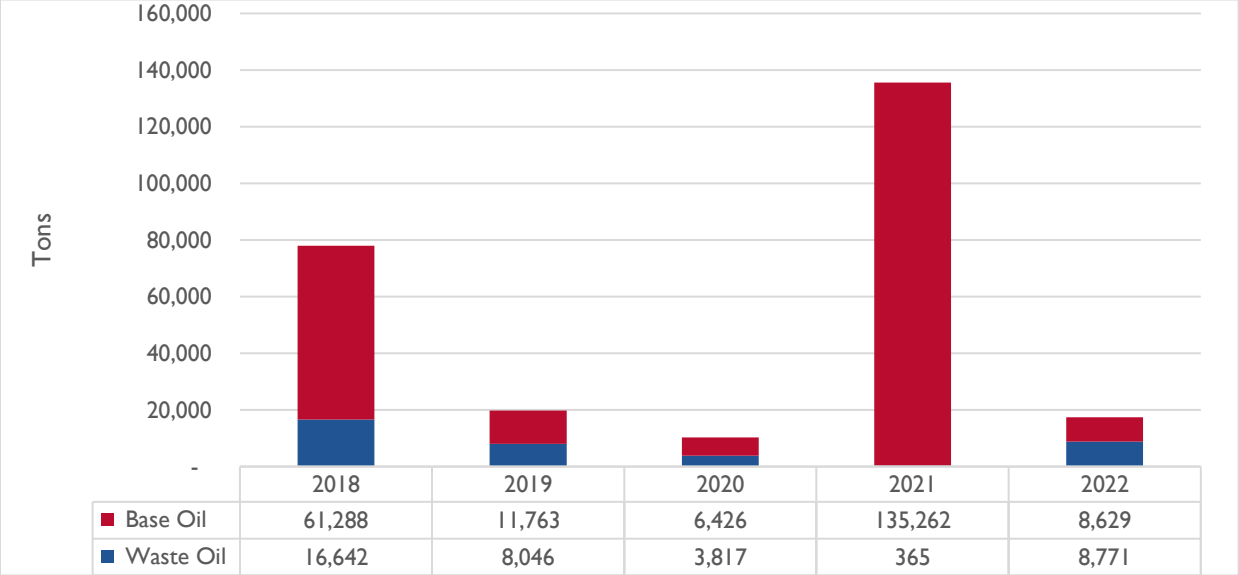


	2018	2019	2020	2021	2022
Base Oil	51,180	33,797	13,162	58,250	11,832
Waste Oil	5,480	2,655	1,292	775	1,891

Source: www.trademap.org

Imported quantity of waste oils in the Netherlands were fluctuating during the last years, peaking in 2021 to 135 thousand tons of Base Oil and in 2018 to 16 thousand ton of waste oil.

Figure 18 – Imported quantities of waste oils in the Netherlands

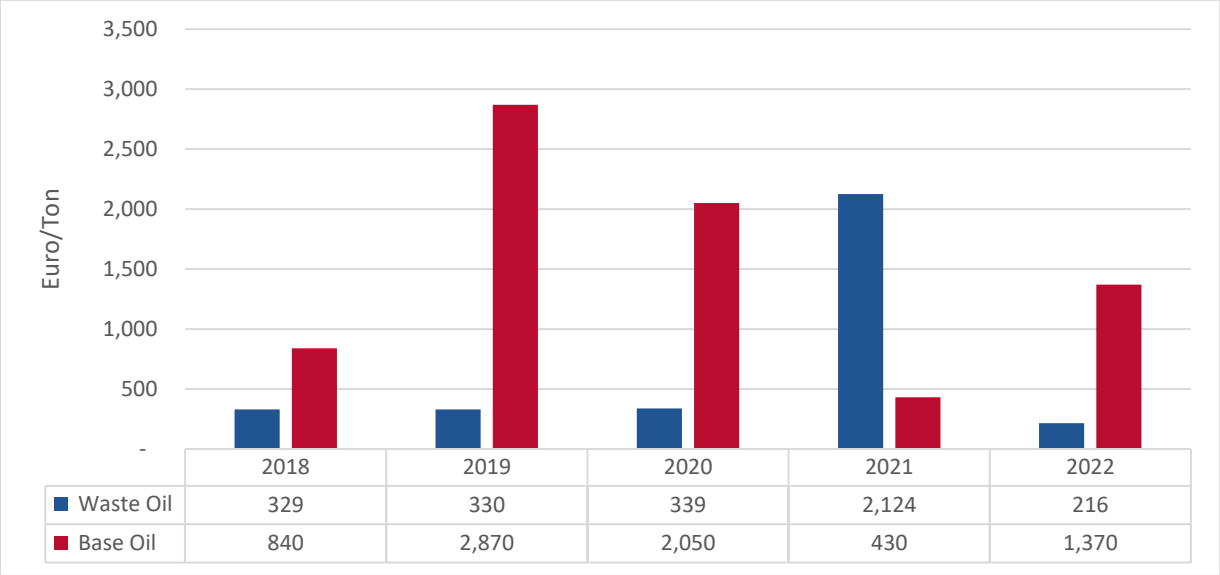


	2018	2019	2020	2021	2022
Base Oil	61,288	11,763	6,426	135,262	8,629
Waste Oil	16,642	8,046	3,817	365	8,771

Source: www.trademap.org

Import quantity fluctuations also affected value per ton and when the country imported the most amount of base oil in 2021 price dropped to 430 Euro/ton. In 2022 the value of base oil increased again and reached 1,370 Euro/ton.

Figure 19 – Unite value of imported waste oils in the Netherlands



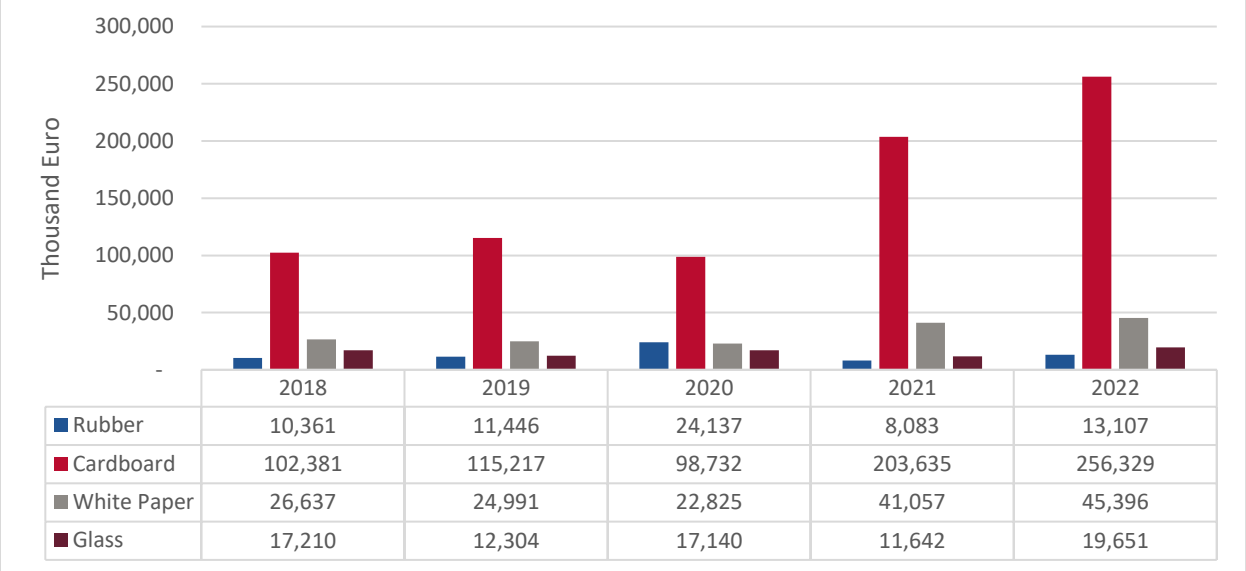
	2018	2019	2020	2021	2022
Waste Oil	329	330	339	2,124	216
Base Oil	840	2,870	2,050	430	1,370

Source: www.trademap.org

Rubber, Glass and Paper

The next category of waste materials for the Netherlands market analyses is paper, glass and rubber wastes. The biggest import value comes from cardboard waste (Figure 20) 256 million Euro in 2022, white paper 45 million Euro, glass 19 and rubber 13 million Euro. In all of the mentioned categories we can observe an increase over the last five years.

Figure 20 – Imported value of waste materials (Paper, glass and rubber) in the Netherlands



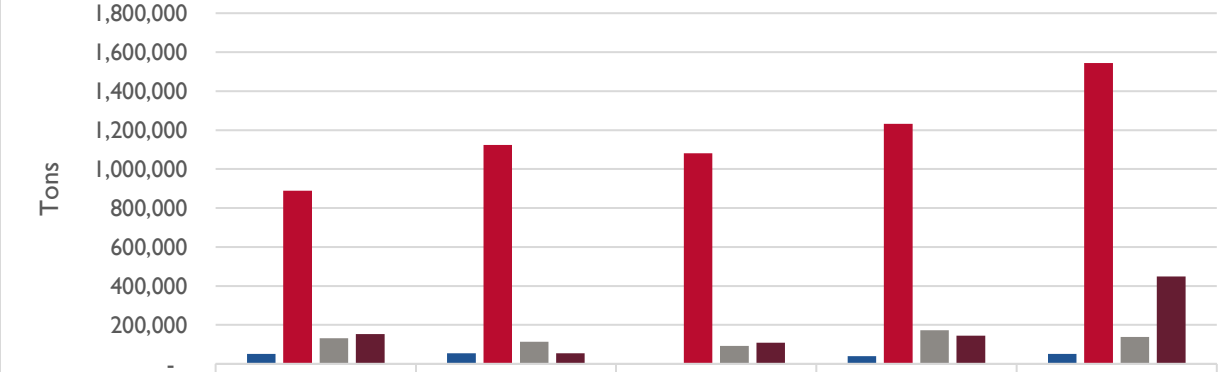
	2018	2019	2020	2021	2022
Rubber	10,361	11,446	24,137	8,083	13,107
Cardboard	102,381	115,217	98,732	203,635	256,329
White Paper	26,637	24,991	22,825	41,057	45,396
Glass	17,210	12,304	17,140	11,642	19,651

Source: www.trademap.org

Regarding imported quantities, cardboard imports were the largest among the category, cardboard waste import peak was in 2022, reaching 1.5 million tons, followed by glass – 449 thousand tons, white paper –

138 thousand tons and rubber – 51 thousand tons. On average all waste types in mentioned category have increased for the reporting period.

Figure 21 – Quantities of imported materials (paper, glass, rubber) in the Netherlands

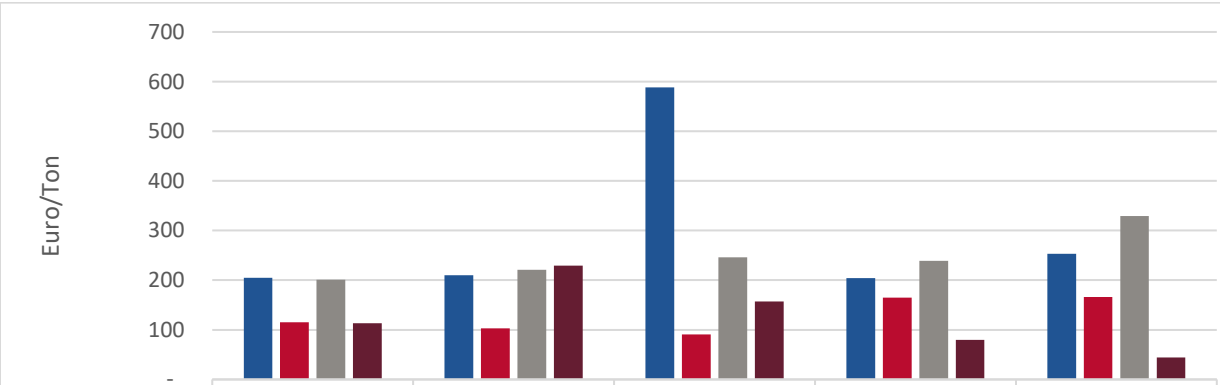


	2018	2019	2020	2021	2022
Rubber	50,530	54,447	-	39,664	51,843
Cardboard	888,491	1,123,598	1,081,052	1,232,605	1,543,810
White Paper	132,444	112,950	92,730	172,066	138,189
Glass	152,240	53,677	109,261	145,173	449,212

Source: www.trademap.org

Only per ton value of imported glass waste was decreasing during the last five years, the value from around 200 Euro/ton in 2019 decreased to 44 Euro/ton in 2022, that can be explained by increased quantities of imported glass that caused price reduction. Other waste materials experienced stable increase in unit value, highest value was observed for white paper in 2022, with 329 Euro/ton, rubber -253 Euro/ton and cardboard – 166 Euro/ton.

Figure 22 – Values per ton of imported materials (paper, glass, rubber) in the Netherlands



	2018	2019	2020	2021	2022
Rubber	205	210	588	204	253
Cardboard	115	103	91	165	166
White Paper	201	221	246	239	329
Glass	113	229	157	80	44

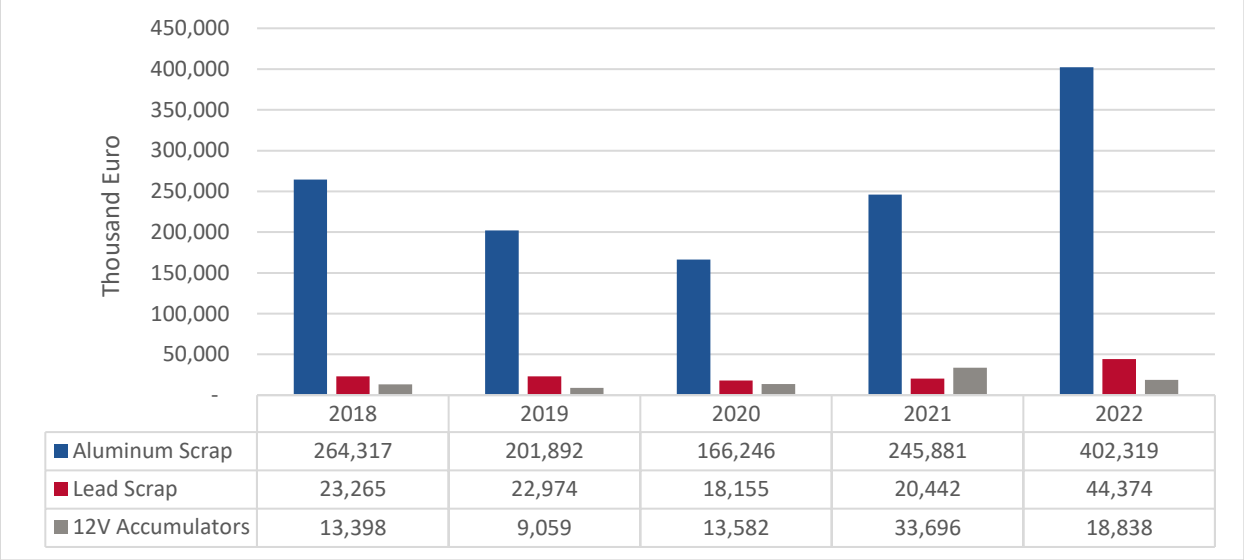
Source: www.trademap.org

Described category unites waste materials that are very important part of EPR (packaging and tires) across the Eu and Georgia and the Netherlands seems very attractive market for export of waste materials from this category.

Metals

The Netherlands is stable market for metal waste imports specifically for aluminum and lead scrap, there is also recycling of 12v batteries. The Netherlands in 2022 imported 402 million Euro worth of aluminum scrap, that was 150 million more than previous year. The country also imported lead scrap worth of 44 million Euro, that was 24 million more than previous year. Regarding 12V accumulators, in 2022 the total import value was 18 million Euro.

Figure 23 – Imported value of waste metals in the Netherlands

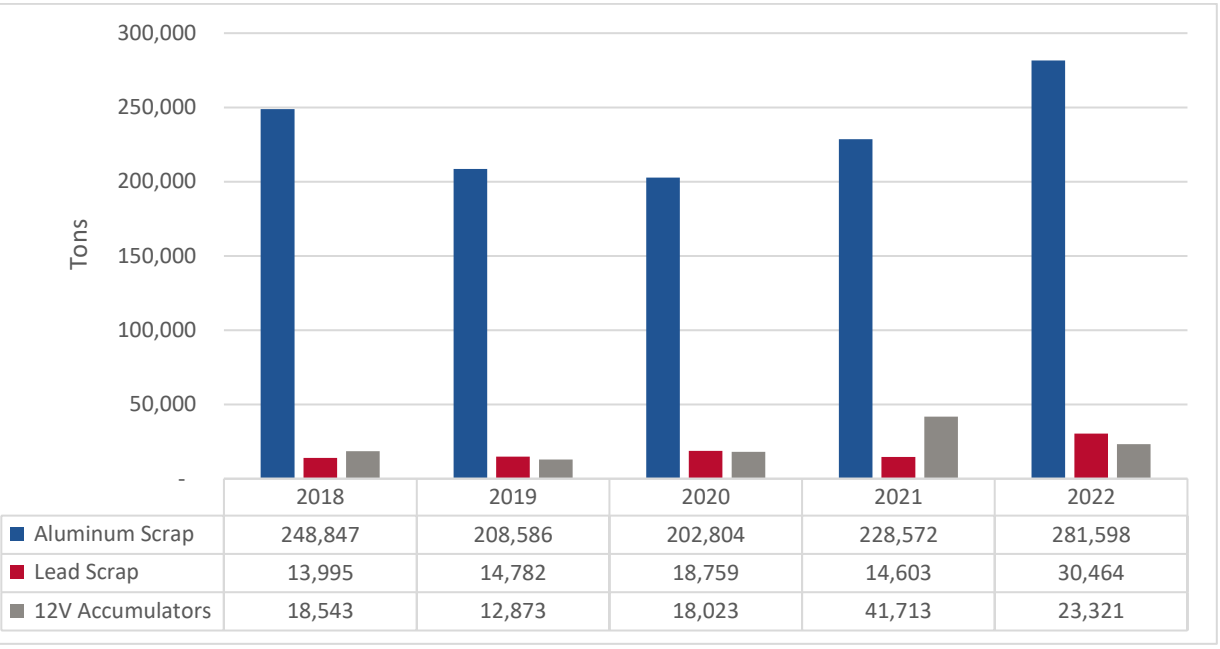


	2018	2019	2020	2021	2022
Aluminum Scrap	264,317	201,892	166,246	245,881	402,319
Lead Scrap	23,265	22,974	18,155	20,442	44,374
12V Accumulators	13,398	9,059	13,582	33,696	18,838

Source: www.trademap.org

In recent years Quantities of imported aluminum was also the biggest (Figure 24), in 2022 approximately 280 thousand tons, imports of lead scrap exceed 30 thousand and 12V accumulators 23 thousand tons.

Figure 24 – Quantities of imported waste metals in the Netherlands

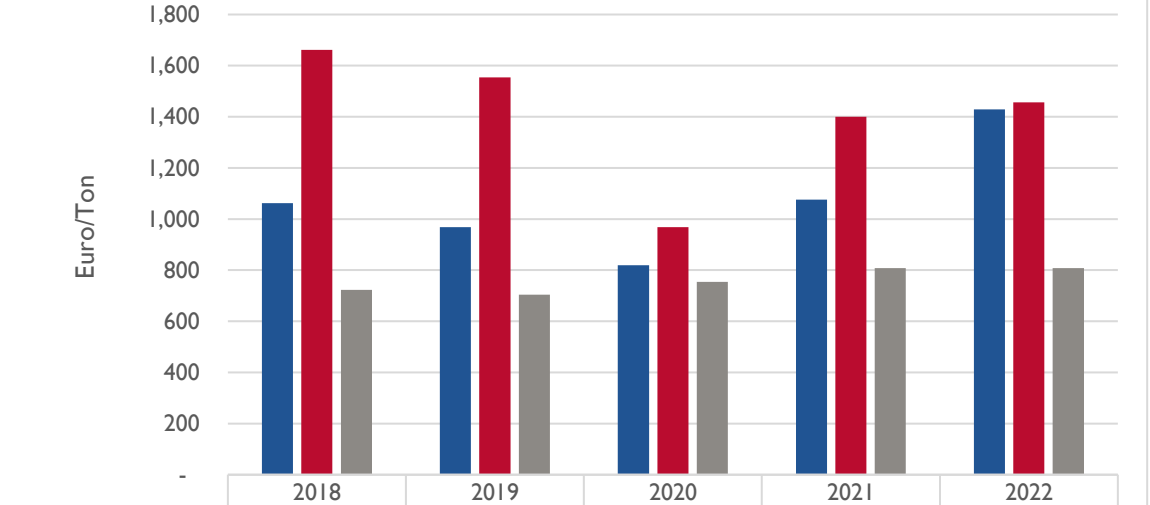


	2018	2019	2020	2021	2022
Aluminum Scrap	248,847	208,586	202,804	228,572	281,598
Lead Scrap	13,995	14,782	18,759	14,603	30,464
12V Accumulators	18,543	12,873	18,023	41,713	23,321

Source: www.trademap.org

As it was in Germany, the value per ton of imported metal waste is quite high, aluminum and lead scrap have similar values, around 1400 Euro/ton, followed by 12V accumulators around 800 Euro/ton.

Figure 25 – Values per ton of imported waste metals in the Netherlands



	2018	2019	2020	2021	2022
Aluminum Scrap	1,062	968	820	1,076	1,429
Lead Scrap	1,662	1,554	968	1,400	1,457
12V Accumulators	723	704	754	808	808

Source: www.trademap.org

The Dutch market is great destinations for waste metals as we observe significant amounts import, reliable values and quantities, that creates great business incentives for Georgian individuals and companies to explore new export opportunities.

WEEE

WEEE waste category data for the Netherlands was also available only for 2022, accordingly there were following numbers associated with WEEE:

- WEEE scrap – In 2022 The Netherlands imported nearly 6 m milllion worth of WEEE scrap, the quantity of imports exceeded 3,000 tons and average value per ton was around 1,500 Euro/ton.

Target Market 3 – Türkiye

Türkiye has been actively engaged in promoting circular economy practices to enhance sustainable resource utilization, minimize waste generation, and protect the environment. One of its significant endeavors is the development of the new National Waste Management and Action Plan[13] (NWMAP) spanning from 2023 to 2035. This plan aligns with international standards, national priorities, and the European Union regulatory framework, emphasizing the need for a comprehensive waste management strategy geared towards sustainability and integrative action.

The NWMAP aims to formulate strategies and action steps to effectively manage waste generation until 2035, in line with sustainable development goals. It emphasizes the efficient utilization of limited resources, waste reduction, reuse, recycling, and appropriate disposal methods for non-recoverable waste. Notably, the plan sets ambitious targets, including a 60% increase in the recycling rate by 2035.

The Ministry has also launched the "ZERO WASTE" website[14] dedicated to waste management initiatives, underscoring its commitment to effective waste management practices nationwide.

Türkiye's legislative and policy framework in waste management reflects its commitment to harmonizing with EU standards. Environmental Law No. 2872 forms the basis for various regulations governing different waste categories, such as municipal waste, hazardous waste, packaging waste, and electronic waste, among others. The Waste Management Regulation, informed by the Waste Framework Directive (Directive 2008/98/EC), provides the framework for waste management practices in Türkiye. Additionally, Türkiye is a signatory to the Basel Convention, which regulates the transboundary movement of hazardous waste.

Türkiye's regulation on waste import is governed by various directives and communiqués issued by relevant ministries, particularly the Ministry of Trade and the Ministry of Environment, Urbanisation, and Climate Change. These regulations aim to manage and control the importation of waste materials into the country, ensuring compliance with international standards and conventions such as the European Waste Catalogue (EWC) and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. One significant regulation is the Regulation for Product Safety and Inspection Communiqué (2021/3), which governs wastes subject to control (Annex I) or prohibition (Annex II) in alignment with the European Waste Catalogue (EWC) and the Basel Convention. The Communiqué mandates physical control and sample analysis by the Ministry of Environment, Urbanisation, and Climate Change for wastes with pre-submitted documents. Successful assessments result in a conformity document issued by the Ministry, a prerequisite for customs authority submission during the import

[13] National Strategy and Action Plan 2023.
https://webdosya.csb.gov.tr/db/cygm/haberler/ulusal_at-k_yonet-m--eylem_plan--20180328154824.pdf
[14] http://zerowaste.gov.tr/

process. Furthermore, Annex II[15] of the **Product Safety and Inspection Communiqué (2021/3) specifies prohibited imports, including the waste categories that fall in the scope of this assessment, waste oil (HS 271099) and WEEE (HS 854931, 854939, 854991, 854999).**

Two new Turkish regulations aimed at protecting the environment and citizens' health came into effect on December 26, 2022: the Regulation on the Management of Waste Electrical and Electronic Equipment (WEEE) and the Regulation on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment. The WEEE Management Regulation aims to reduce WEEE, manage it sustainably, and establish a framework for producer responsibility. It replaced the Regulation on the Control of Waste Electrical and Electronic Equipment and regulates the import of used or reconditioned EEE. The imported equipment must prove not to be waste, and any suspected WEEE will incur costs for analysis and control procedures, including storage costs, borne by producers or third parties arranging the shipment[16].

Market Trends in Türkiye

Plastics

The plastics industry plays a critical role in the Turkish economy, contributing significantly to its growth and development. Presently, the plastics sector boasts a total production surpassing 11 million tons and a turnover nearing 45 billion dollars. Direct product exports have exceeded 8 billion dollars, showing substantial international engagement. Over the past decade, the industry has consistently outpaced the Gross National Product (GNP) growth rate with an annual growth trajectory[17]. In 2022, Türkiye ranked as the second-largest country in Europe and the sixth globally, following Germany, in terms of its plastic processing capacity. Plastic goods production reached 7.9 million metric tons for the Turkish market in 2016, showcasing a growth rate of 3.7% over the last five years.

Despite holding a significant share of 2.6% of the total global plastic production and processing capacity, a significant portion of Türkiye's recycling activity focuses on imported plastic waste. Locally generated plastic waste is often of lower quality due to less effective sorting and treatment processes, making it less valuable to recyclers[18]. Over the past five years (2017-2022), the Turkish plastic products industry has witnessed a 6% annual average increase in total imports by quantity and a 9% increase in value[19].

Approximately 14,000 enterprises are active in the Turkish plastics industry, with 97% of these companies concentrated in ten provinces known for their industrial sectors. Istanbul, Izmir, Ankara, Konya, Bursa, Kocaeli, Gaziantep, Adana, Manisa, and Kayseri are the provinces hosting the highest concentration of plastic product manufacturing companies.

The plastic recycling industry in Türkiye has experienced significant growth, positioning the country as the largest importer of plastic waste in Europe. Overall, in the country, there are 751 licensed recycling plants and 566 collection and separation facilities, according to the estimates of PAGEV, Türkiye's biggest plastic manufacturers association. Adana, situated in south-central Türkiye, is a main point, receiving nearly 50% of the country's plastic waste imports, hosting around 167 licensed plastic recycling facilities[20].

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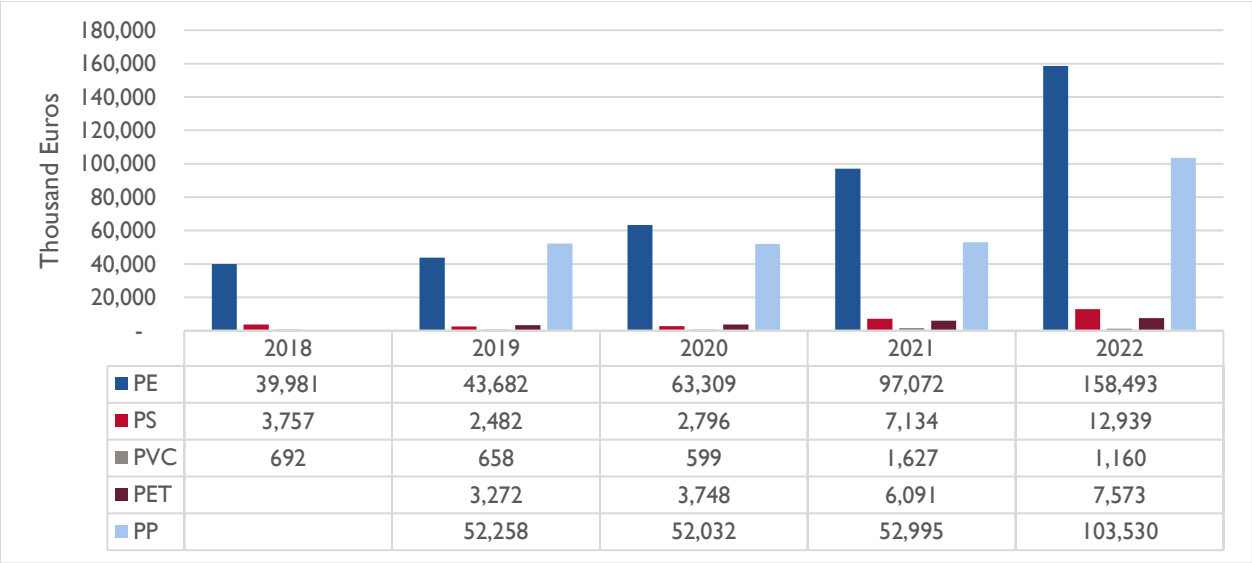
[15] https://www.resmigazete.gov.tr/eskiler/2021/12/20211231M4-2-1.pdf
[16] https://cms-lawnow.com/en/ealerts/2023/02/turkish-regulations-on-electrical-and-electronic-equipment-enters-into-force
[17] Turkish Plastics Industry Follow-Up Report, PAGEV, 2023. https://pagev.org/upload/files/Plastic%20Industry%20Follow-up%20report%202023%20-%209%20%281%29.pdf
[18] https://wwfeu.awsassets.panda.org/downloads/05062019_wwf_Türkiye_guidebook.pdf
[19] https://www.undp.org/sites/g/files/zskgke326/files/2023-06/plastics_in_turkiye-web.pdf
[20] https://ecostar.eu.com/state-of-plastics-waste-management-in-Türkiye/

Figures 26 to 28 summarize the trends over five years in Türkiye's import value, quantity, and unit value of plastic products. Across different materials, there are notable variations in these trends.

Figure 26 – Value of imported plastic waste in Turkey



	2018	2019	2020	2021	2022
PE	39,981	43,682	63,309	97,072	158,493
PS	3,757	2,482	2,796	7,134	12,939
PVC	692	658	599	1,627	1,160
PET		3,272	3,748	6,091	7,573
PP		52,258	52,032	52,995	103,530

Source: www.trademap.org

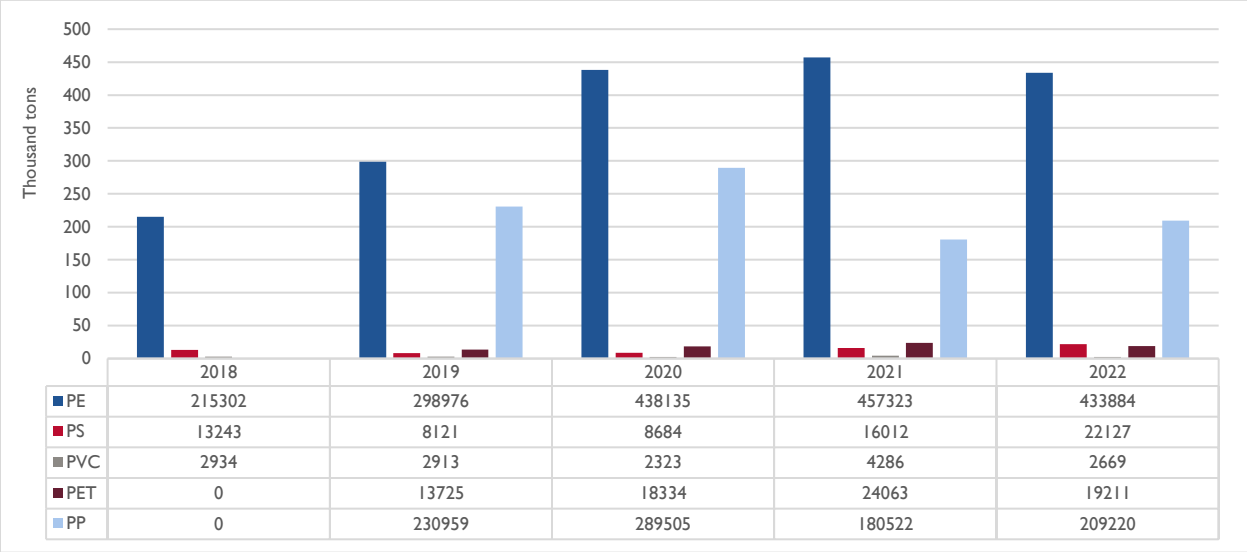
Polyethylene (PE) shows a generally increasing trend in import quantities, with a notable rise of approximately 35% from 2018 to 2021, followed by a slight decrease in 2022. Correspondingly, the import values for PE show a consistent increase over the years, experiencing significant growth of approximately 297% from 2018 to 2022. The unit values for PE also fluctuate but show an overall rising trend, especially evident from 2020 to 2022. Türkiye holds the largest share of imports for PE (HS 391510) globally, accounting for 9.62%. Notably, around 82% of Türkiye's imports originate from Europe. Among the largest exporters of PE to Türkiye within Europe are Germany, accounting for 16.7%, followed by the Netherlands (14.5%), the United Kingdom (14.4%), and Belgium (12.4%)[21].

In contrast, polystyrene (PS) shows fluctuations in import quantities, although a general upward trend has been observed. Import values for PS also display fluctuations but tend to increase over the years, with significant fluctuations in 2021 and 2022. The unit values for PS exhibit a consistent increase across the years, reflecting potential changes in market dynamics. Türkiye ranks as the sixth largest importer of PS (HS 391520), holding a share of 4.68%. Approximately 84% of Türkiye's imports originate from Europe. The primary exporters of PS to Türkiye from Europe include the United Kingdom (31.4%), Germany (30.1%), Romania (11.7%), and Spain (7.82%)[22].

Polyvinyl Chloride (PVC) import quantities fluctuate but remain relatively stable over the years. Import values for PVC also fluctuate but show a relatively stable overall trend. Unit values for PVC experience fluctuations, with a slight increasing trend observed from 2018 to 2022. Türkiye's share of world imports is relatively small, accounting for only 0.75% of the world's total imports. A significant portion, approximately 84%, of Türkiye's imports originate from Europe. The primary exporters of PE to Türkiye from Europe are the United Kingdom (31.4%), Germany (30.1%), Romania (11.7%), and Spain (7.82%)[23].

[21] www.oec.world
[22] www.oec.world
[23] www.oec.world

Figure 27 – Quantity of imported plastic waste in Turkey



	2018	2019	2020	2021	2022
PE	215302	298976	438135	457323	433884
PS	13243	8121	8684	16012	22127
PVC	2934	2913	2323	4286	2669
PET	0	13725	18334	24063	19211
PP	0	230959	289505	180522	209220

Source: www.trademap.org

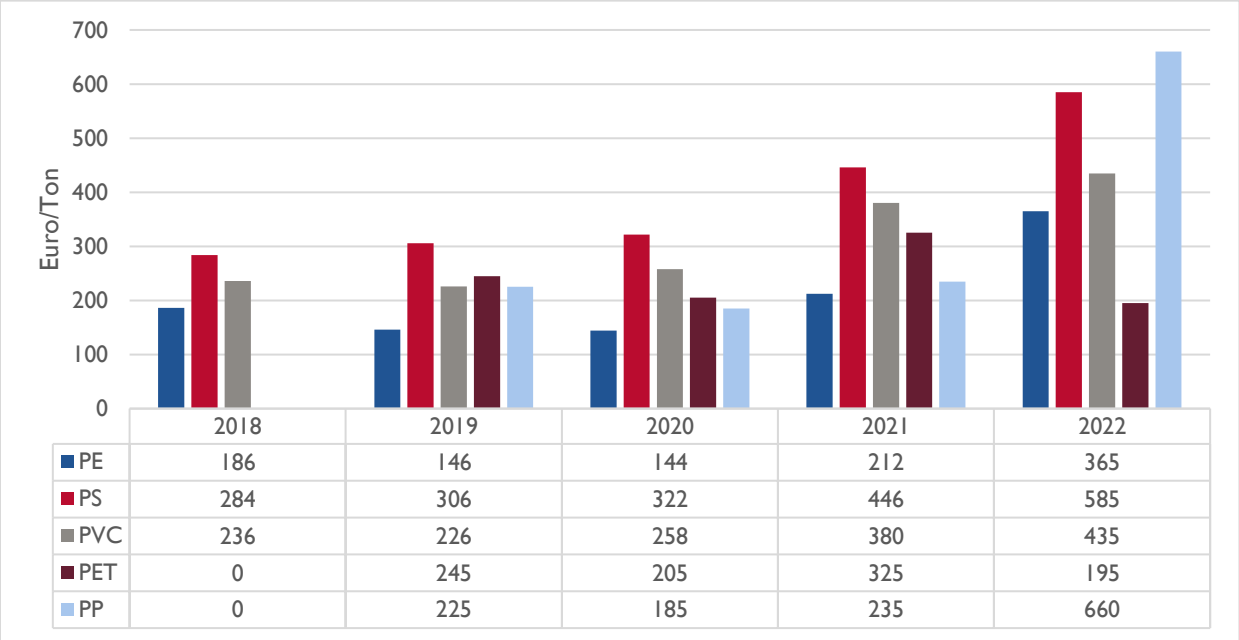
Polyethylene Terephthalate (PET) shows an increasing trend in import quantities from 2019 to 2021, followed by a slight decrease in 2022. Import values for PET generally increase over the years, with significant growth observed from 2019 to 2022. However, unit values for PET fluctuate but generally display a decreasing trend from 2019 to 2022.

Polypropylene (PP) has demonstrated a generally increasing trend in import quantities over the years. Import values for PP consistently increase, with significant growth observed from 2019 to 2022. Unit values for PP fluctuate but show a significant increase from 2021 to 2022.

Türkiye ranks as the world's fifth largest importer of Other plastics waste or scrap (HS 391590), comprising a share of 4.77% of the world's total imports in this category. The majority of Türkiye's imports originate from Yemen (25.6%), followed by Tunisia (12.1%), Germany (8.15%), and Iraq (5.8%)[24].

[24] www.oec.world

Figure 28 – Unit value of imported plastic waste in Turkey



	2018	2019	2020	2021	2022
PE	186	146	144	212	365
PS	284	306	322	446	585
PVC	236	226	258	380	435
PET	0	245	205	325	195
PP	0	225	185	235	660

Source: www.trademap.org

Aluminium

Türkiye's aluminium sector has undergone remarkable growth in the last decade, with exports to over 180 countries. With around 1,500 active companies employing over 30,000 individuals, Turkish Aluminum holds impressive global rankings across various export categories, including aluminium bars and profiles, household and kitchenware, aluminium foil, construction materials, containers, braided rope, and pipe fittings. The Turkish aluminium industry spans the entire value chain, reflecting its widespread presence and contribution to the country's industrial landscape[25]. The aluminium manufacturing market in Türkiye also anticipated substantial growth in the future, with an estimated CAGR of 5.9% between 2022 and 2027, resulting in a forecasted market size increase of USD 2,269.92 million. Several factors contribute to this growth, including the increasing demand for lightweight vehicles, urbanization, and industrialization in Türkiye, as well as rising demand for power infrastructure[26].

However, the market is characterized by a high dependency on imported recycled and primary aluminium. The significance of secondary aluminium is becoming increasingly apparent, influencing Türkiye's Aluminum Manufacturing Market growth. Secondary aluminium, derived from recycled end-of-life items, offers environmental benefits and requires 92% less energy for production than primary aluminium. This availability of secondary aluminium at a lower cost is expected to fuel the growth of Türkiye's aluminium manufacturing sector in the future, particularly in the production of aluminium castings[27].

[25] TALSAD, Turkish Aluminium Industrialists Association
[26] https://www.technavio.com/report/Türkiye-aluminum-manufacturing-market-analysis
[27] https://www.technavio.com/report/Türkiye-aluminum-manufacturing-market-analysis

Aluminum scraps imports depicted fluctuations, with a notable increase observed from 2018 to 2021 followed by a slight decrease in 2022. Import values for aluminium scraps notably rose, showing an increase of approximately 362% from 2018 to 2022. Despite fluctuations, unit values for aluminium scraps exhibited an overall rising trend, especially notable from 2018 to 2022 (Figures 29-31).

Türkiye imports 2.43% of aluminium scrap (HS 760200) of world imports. Türkiye's import sources are relatively diversified across continents. The major importers include Libya (11.9%), Netherlands (8.79%), Israel (8.61%), United States (7.17%), and Romania (6.36%)[28].

Glass

Based on data compiled by the Türkiye Statistical Institute (TSI), Türkiye has made significant progress in glass and glassware exports. The primary inputs for glass production include sand soda, dolomite, and quartz, of which Türkiye possesses abundant resources, with 98% of domestic raw materials utilized in the Turkish glass industry[29].

A recently launched recycling project called EKOMAT, initiated by two prominent glass product companies in Türkiye, GCA and Park Cam, advocates for the utilization of glass cullet in the production of glass packaging, aiming to reduce the environmental impact compared to traditional sand-based production methods[30].

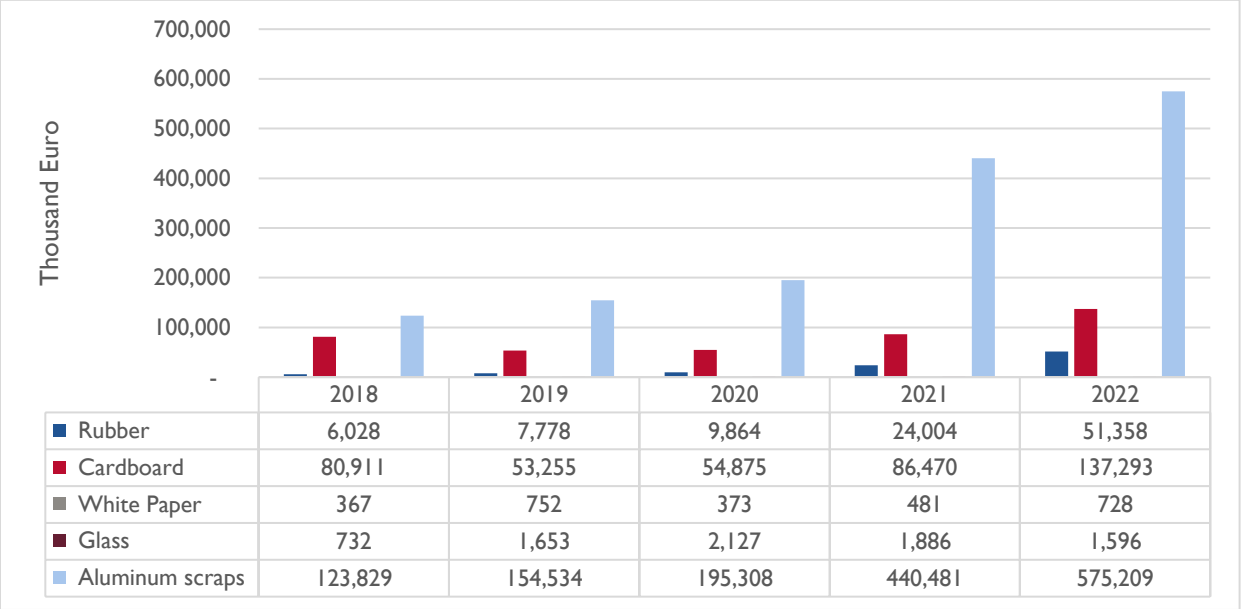
It is expected that the demand for domestically recycled and imported cullet will rise as environmental considerations become more prominent within the glass industry.

These companies stress the importance of cullet as the primary raw material for glass packaging factories, citing benefits such as decreased natural resource consumption, prolonged furnace lifespan, lower energy costs, and reduced carbon footprint, thus fulfilling environmental obligations. Although European glass manufacturers utilize cullet at a rate of 60%-70%, the usage rate in Türkiye remains below 10%[31]. Currently, 85% of glass cullet imported to Türkiye originates from Italy and Israel[32].

Glass imports experienced fluctuations, with a notable decrease observed in 2022 compared to the previous years. Import values for glass fluctuated over the years, with a slight increase observed from 2018 to 2019 followed by fluctuations. Despite these changes, unit values for glass exhibited fluctuations but displayed a relatively stable trend over the years. Türkiye imports a mere 0.45% of glass (HS 700100) globally, with the majority of its imports originating from Italy (42.1%) and Israel (42.5%).

[28] www.oec.world
[29] https://conexioconsulting.com/Türkiye-glass-and-glassware-sector/
[30] https://www.glass-international.com/news/turkish-recycling-project-collects-1-6-billion-units-of-packaging-waste
[31] https://www.glass-international.com/news/turkish-recycling-project-collects-1-6-billion-units-of-packaging-waste
[32] www.oec.world

Figure 29 – Value of imported rubber, paper, glass and aluminium waste in Turkey



	2018	2019	2020	2021	2022
Rubber	6,028	7,778	9,864	24,004	51,358
Cardboard	80,911	53,255	54,875	86,470	137,293
White Paper	367	752	373	481	728
Glass	732	1,653	2,127	1,886	1,596
Aluminum scraps	123,829	154,534	195,308	440,481	575,209

Source: www.trademap.org

Paper

Türkiye's paper production sector is not only substantial but also experiencing growth. The forecast indicates that the market size for paper manufacturing in Türkiye is set to rise by USD 476.44 million, exhibiting a CAGR of 2.72% from 2023 to 2028. The primary driver behind this growth is the increasing demand for tissue paper, a vital component in hygiene practices. Despite advancements in hygiene technology, tissue paper remains sought after due to its absorbent nature, convenience, and disposability[33]. **An interesting aspect of Türkiye's paper production is its full dependence on imported pulp. This dependency has led to increased pulp prices[34].**

In Türkiye, the tissue market features a diverse array of producers, varying in size and scale. Predominantly, large Turkish-owned companies dominate the market, often managing between two to four paper machines within their operations. The country's leading tissue paper producers have made significant investments in new machinery. Their production facilities are characterized by cutting-edge technology, positioning them as leaders in the industry. Tissue production in Türkiye is primarily concentrated in the western region, encompassing major industrial hubs such as Istanbul, Izmir, and Bursa, the country's largest city. These areas serve as focal points for production activities due to their strategic location and infrastructure[35].

Overall, it is reasonable to anticipate that Türkiye's growing dominance in the tissue paper market, coupled with its dependency on imported raw materials, will drive increased demand for recycled paper.

[33] https://www.technavio.com/report/paper-manufacturing-market-size-in-Türkiye-industry-analysis
[34] https://www.metsagroup.com/metsafibre/news-and-publications/news-and-releases/stories/2022/Türkiye-sees-steep-growth-in-pulp-demand/
[35] https://www.metsagroup.com/metsafibre/news-and-publications/news-and-releases/stories/2022/Türkiye-sees-steep-growth-in-pulp-demand/

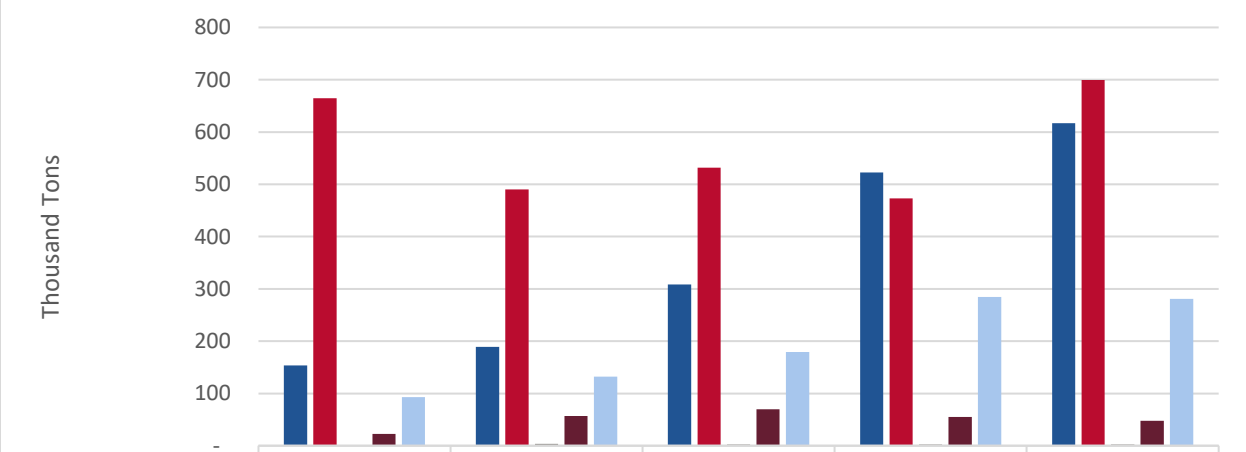
Cardboard imports fluctuated over the years, with a slight decrease observed in 2021 followed by an increase in 2022. Despite this fluctuation, import values for cardboard notably increased, showing a growth of approximately 69% from 2018 to 2022. Unit values for cardboard displayed fluctuations but exhibited an overall rising trend, especially evident from 2019 to 2022.

Türkiye ranks as the ninth largest importer of cardboard (HS 470710) globally, representing 3.76% of total imports in this category. Approximately 65% of Türkiye's imports originate from Europe. The primary importers of cardboard to Türkiye from Europe include Iraq (30.6%), United Kingdom (27%), Bulgaria (8.15%), and Netherlands (7.79%)[36].

Similarly, white paper imports showcased fluctuations, with a notable increase observed from 2018 to 2019 followed by fluctuations in subsequent years. Import values for white paper displayed fluctuations, with a significant increase observed from 2018 to 2022, marking an approximate growth of 17%. Despite these variations, unit values for white paper fluctuated but showed an overall rising trend, particularly notable from 2018 to 2022.

Türkiye's import of white paper (HS 470720) accounts for just 0.93% of world imports in this category. All of Türkiye's imports originate from Europe. The largest importers of white paper to Türkiye from Europe include the United Kingdom (30.6%), Germany (25.7%), France (15.7%), and Netherlands (9.39%)[37].

Figure 30 – Quantity of imported rubber, paper, glass and aluminium waste in Turkey



	2018	2019	2020	2021	2022
Rubber	153,747	189,192	308,362	522,890	617,045
Cardboard	664,415	490,347	532,013	473,313	699,447
White Paper	1,493	3,692	2,451	2,331	2,516
Glass	22,341	56,801	69,603	55,153	47,785
Aluminum scraps	92,913	132,029	179,590	284,384	280,601

Source: www.trademap.org

Rubber

The rubber industry is a significant sector within Turkish chemistry and manufacturing industries, contributing 1.7% to the world's total rubber exports and 1.68% to global imports in 2022. Over the

[36] www.oec.world
[37] www.oec.world

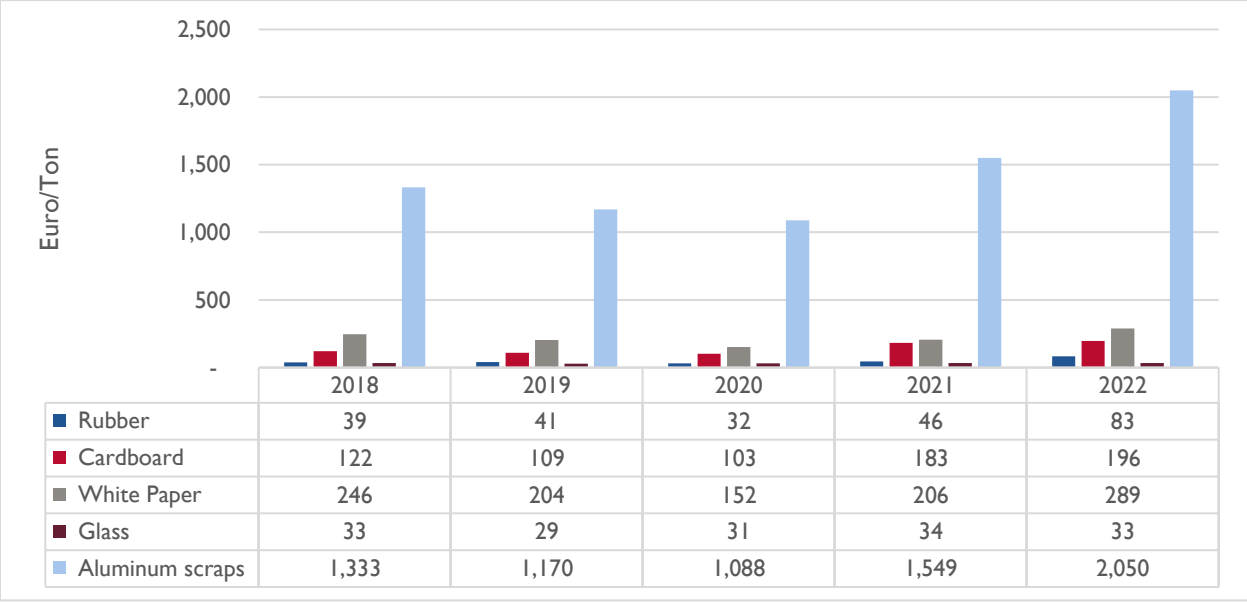
past five years (2017-2022), both exports and imports have experienced substantial growth, with exports increasing by 43% and imports by 34%[38].

Türkiye heavily relies on imports for its raw materials, although the rubber industry itself engages in direct exports. Moreover, indirect exports occur through channels primarily linked to the automotive sector. Rubber products find widespread use across various industries, including automotive, construction, aviation, health, mining, machinery, clothing, shoemaking, office supplies, furniture, and toys. Rubber serves as a fundamental material for a myriad of products such as pipes, hoses, conveyor belts, seals, vibrating dampers, and bellows in moving mechanisms[39].

Rubber imports showed a substantial increase in quantities, rising by approximately 301% from 2018 to 2022. Import values for rubber also notably rose, experiencing a growth of approximately 206% during the same period. Despite fluctuations, unit values for rubber depicted an overall increasing trend, particularly notable from 2018 to 2022.

Türkiye stands as the second largest importer of rubber (HS 400400) globally, representing 8.07% of total imports in this category. Nearly all of Türkiye's imports, approximately 99%, originate from Europe. The primary importers of rubber to Türkiye from Europe include Italy (34.8%), Netherlands (20.3%), France (16.9%), and the United Kingdom (11.6%)[40].

Figure 31 – Unit value of imported rubber, paper, glass and aluminium waste in Turkey



	2018	2019	2020	2021	2022
Rubber	39	41	32	46	83
Cardboard	122	109	103	183	196
White Paper	246	204	152	206	289
Glass	33	29	31	34	33
Aluminum scraps	1,333	1,170	1,088	1,549	2,050

Source: www.trademap.org

[38] www.oec.world
[39] https://pagev.org/upload/files/Hammadde%20Yeni%20Tebli%C4%9F%20Bilg.%203/Turkish%20Rubber%20Industry%20Follow-Up%20Report%202017.pdf
[40] www.oec.world

PET Strap Analyses

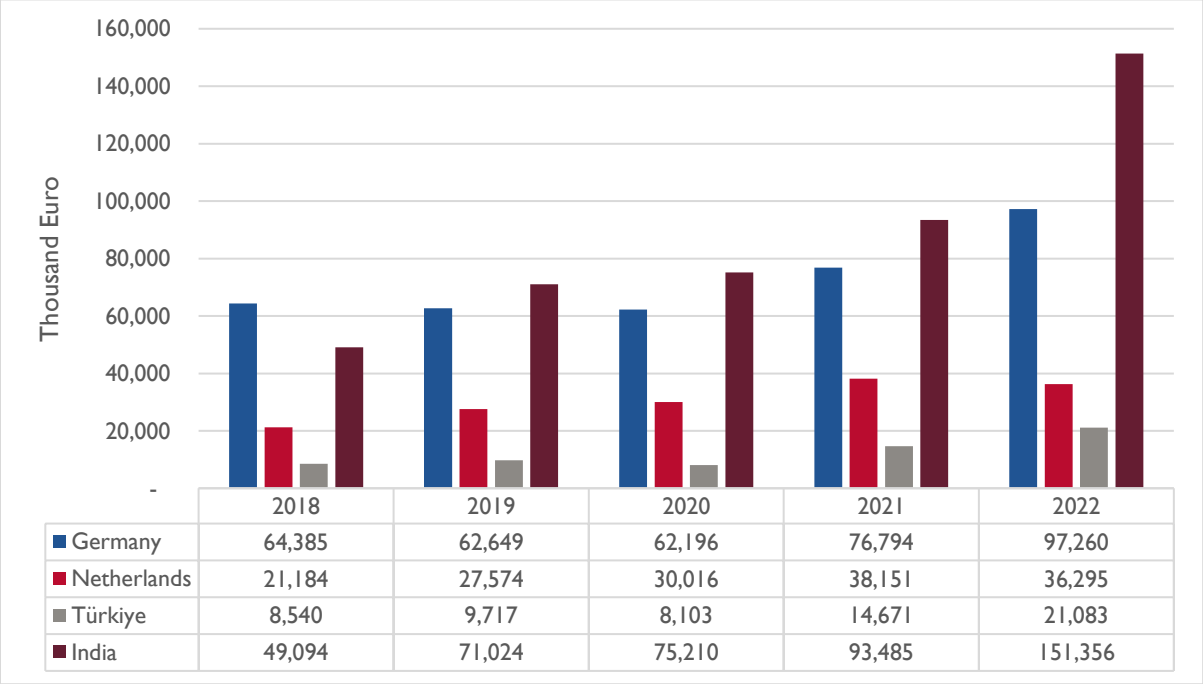
PET Strap is the product used for packing a wide variety products and materials. In Georgia the strap is produced from PET flakes from PET bottles and this product is identified as one of the potential products that can be exported to target markets. This category is analyzed separately because it is not traded as waste or as raw material, but it's the final product. Also, the export of PET Strap is not regulated by the waste shipment regulations, because it's a final product and can be exported according to a regular trade policy.

For PET strap analyses we are considering our 3 target markets and additionally India, where significant PET Strap imports are observed. PET Strap is traded under two HS codes: ***39206220*** and ***39206290***.

Market Trends

As we have mentioned for PET Strap analyses additionally to our target markets, we are considering Indian market, as India is one of the top destinations for PET strap.

Figure 32 – Value of imported PET Strap in target markets

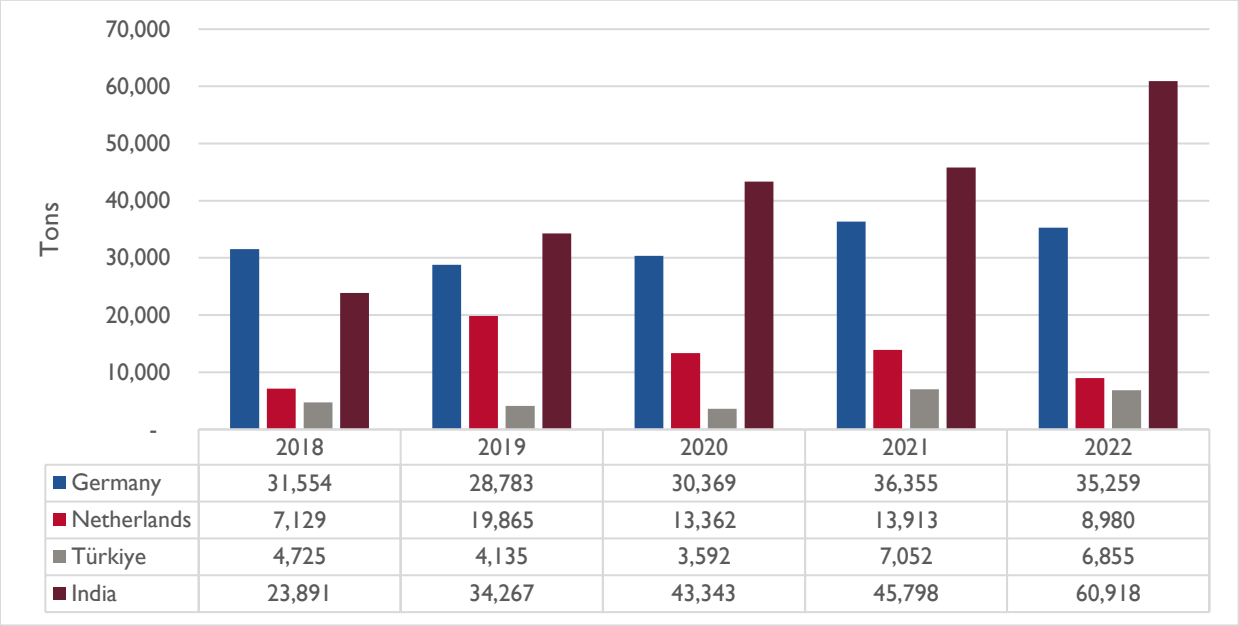


	2018	2019	2020	2021	2022
Germany	64,385	62,649	62,196	76,794	97,260
Netherlands	21,184	27,574	30,016	38,151	36,295
Türkiye	8,540	9,717	8,103	14,671	21,083
India	49,094	71,024	75,210	93,485	151,356

Source: www.trademap.org

In 2022 India imported 151 million Euro worth of PET Strap, that was 60 million Euro more than previous year. From 2018, in India imports were steadily increasing. Next market where imports PET Strap were stable and increasing is Germany, where 97 million worth of PET Strap was imported 2022. Stable imports of PET trap were also observed for the last 5 years in the Netherlands and Türkiye, in the Netherlands imports of PET Strap reached 36 million Euro, in Türkiye – 21 million.

Figure 33 – Imported quantities of PET Strap in the target markets

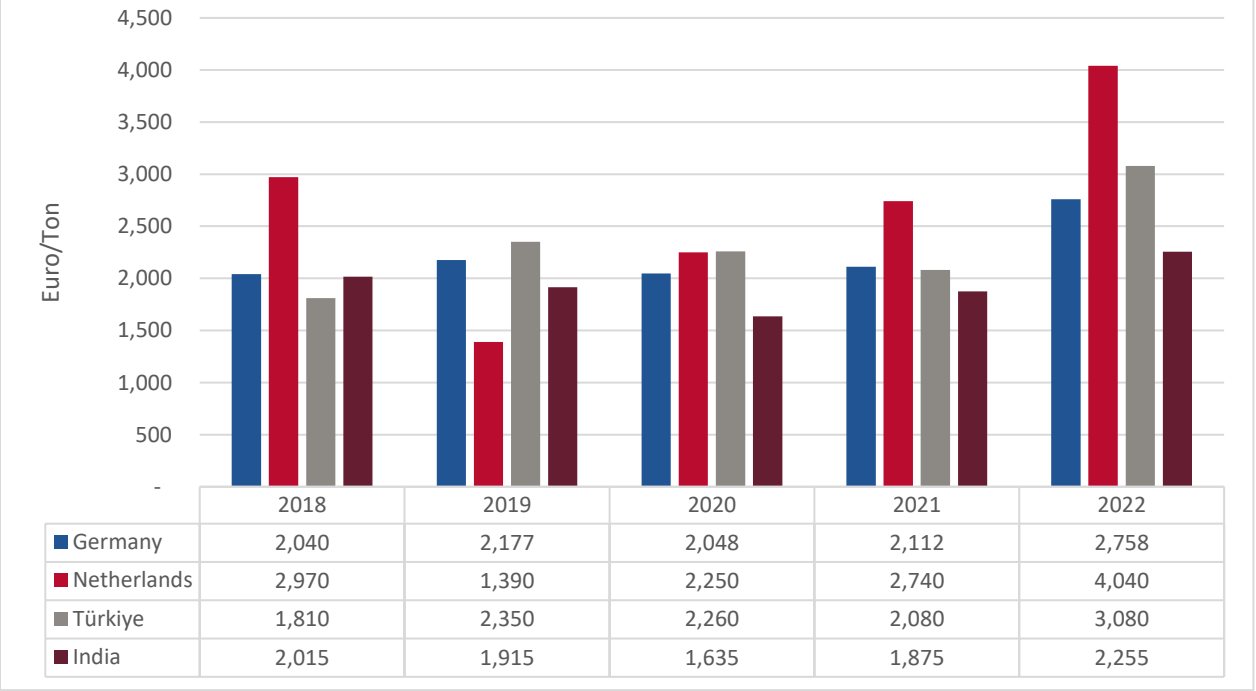


	2018	2019	2020	2021	2022
Germany	31,554	28,783	30,369	36,355	35,259
Netherlands	7,129	19,865	13,362	13,913	8,980
Türkiye	4,725	4,135	3,592	7,052	6,855
India	23,891	34,267	43,343	45,798	60,918

Source: www.trademap.org

India imports biggest amount of PET Strap (Figure 34), in 2022 India imported 60 thousand tons of PET Strap, in 2021 45 thousand and in 2020 43 thousand tons. Germany has also big quantities of PET import, in 2022 German imports exceeded 35 thousand tons. In the Netherlands and Türkiye imports of PET Strap in 2022 were 8.9 thousand and 6.8 thousand tons respectively.

Figure 34 – Unit value of imported PET Straps in target markets



	2018	2019	2020	2021	2022
Germany	2,040	2,177	2,048	2,112	2,758
Netherlands	2,970	1,390	2,250	2,740	4,040
Türkiye	1,810	2,350	2,260	2,080	3,080
India	2,015	1,915	1,635	1,875	2,255

Source: www.trademap.org

PER Strap value in target varies from 2,000 to 4,000 Euro/ton in target markets. In 2022 imports of the Netherlands had the highest value per ton among the target markets – 4,040 Euro/ton, followed by Türkiye – 3,080 Euro/ton, then Germany – 2,758 Euro/ton and lastly India 2,255 Euro/ton. The Proce of PET Strap depends on size of the product (thickness, length and wideness), but our data do not allow us to differentiate between product sizes and conduct different analyses. The data on unit value represents the average value of different size PET Straps.

Georgia has a great opportunity to increase PET waste collection inside the county and start production of new products form PET waste. PET is very valuable raw material, from which lot of useful products are made for various industries, such as packaging, construction, transportation and logistics, special potential has PET Strap. As we have seen demand for PET Strap is rapidly increasing across the world and looking for new export markets could be very profitable for Georgian companies.

Trade Relations and Logistics with Target Markets

Logistics

This chapter provides information about logistics and accessibility of target markets, particularly options for transportation, distance and approximate prices.

In Georgia logistical services, in our case cargo transportation to EU and turkey are offered by various logistic companies. The price of such services depends on time, market and other factors, also there are not many studies that will allow the research to have good price indication, especially for Georgia. To overcome this issue the research team used www.searates.com website.

All target markets can be accessed vis land and marine transport (air transport option is excluded). Transportation options discussed below are based on full load 40-inch containers.

Transportation Options for Germany:

	Container Type	Maximum Load (m3)	Means of Transport	Distance (Km)	Origin of Shipment	Destination	Duration (Days)	Price [41](USD)
Option 1	40'	50	Land	4,100	Tbilisi	Hamburg	6	3,013
Option 2	40'	60	Sea	7,500	Tbilisi	Hamburg	27	2,256

Transportation Options for The Netherlands:

	Container Type	Maximum Load (m3)	Means of Transport	Distance (Km)	Origin of Shipment	Destination	Duration (Days)	Price (USD)
Option 1	40'	50	Land	4,360	Tbilisi	Rotterdam	7	3,333
Option 2	40'	60	Sea	6,900	Tbilisi	Rotterdam	36	2,577

[41] The price is calculated on previously selected date, in our case the prices are given as of March 24, 2024

Transportation Options for The Türkiye:

	Container Type	Maximum Load (m3)	Means of Transport	Distance (Km)	Origin of Shipment	Destination	Duration (Days)	Price (USD)
Option 1	40'	50	Land	1,500	Tbilisi	Istanbul	3	1,380
Option 2	40'	60	Sea	1,300	Tbilisi	Istanbul	15	980

The most accessible market for Georgia is obviously the Türkiye, but considering the price and amount of exported materials Germany and the Netherlands are also feasible options for the shipments. Also, important factor for the shipment planning is maximum load, for Germany land transportation cost per cubic meter of cargo is 60$, for sea –42$. In case of the Netherlands land transportation cost per cubic meter of cargo is 66$, for sea – 42$. For Türkiye same parameters are for land – 27.6 and sea – 16$.

Trade relations

Georgia indeed has free trade agreements (FTAs) with both the European Union (EU) and Türkiye.

Free Trade Agreement with the European Union (EU): The free trade arrangement with the European Union is regulated by the Agreement on the Establishment of the Deep and Comprehensive Free Trade Area (DCFTA), which is the technical component of the Association Agreement signed on June 27, 2014, between the European Union, the European Atomic Energy Community, their Member States, and Georgia.

To facilitate the implementation of the aforementioned Agreement, regulations concerning rules of origin and methods of administrative cooperation are outlined in the Regional Convention on Pan-Euro-Mediterranean Preferential Rules of Origin.

To confirm the preferential origin of goods, either a Preferential Certificate of Origin known as EUR.1 (also referred to as a Movement Certificate EUR.1) or a "Declaration of Origin" is utilized.

Free Trade Agreement with Türkiye: Trade relations between Georgia and Türkiye are governed by the Free Trade Agreement established on November 21, 2007, known as the "Agreement on Free Trade between Georgia and the Republic of Turkey."

To effectively implement this agreement, regulations regarding rules of origin and methods of administrative cooperation were defined as of April 29, 2021, under the Regional Convention "On Pan-Euro-Mediterranean Preferential Rules of Origin."

For the confirmation of the preferential origin of goods, the Certificate of Preferential Origin, also referred to as EUR.1 (or Movement Certificate EUR.1), or a "Declaration of Origin" is utilized as evidence.

Exceptions to both Georgia's[42] and Türkiye's exports[43], as well as Türkiye 's import quotas[44], apply solely to the HS 01-24 product group, which includes animals and food but does not include the products considered within the scope of this study.

[42] Exclusions from the free trade regime when importing from Turkey in Georgia
[43] Exclusions from the free trade regime when importing from Georgia to Turkey
[44] Türkiye Import quotas

IV. Annexes

Annex I – The Notification Document

1. Exporter — notifier Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:	**3. Notification No:** **Notification concerning** A. (i) Individual shipment: ☐ (ii) Multiple shipments: ☐ B. (i) Disposal (1): ☐ (ii) Recovery: ☐ C. Pre-consented recovery facility (2) (3) Yes ☐ No ☐
2. Importer — consignee Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:	**4. Total intended number of shipments:** **5. Total intended quantity** (4): Tonnes (Mg): m^3: **6. Intended period of time for shipment(s)** (4): First departure: Last departure: **7. Packaging type(s)** (5): **Special handling requirements** (6): Yes ☐ No ☐
8. Intended carrier(s) Registration No: Name (7): Address: Contact person: Tel.: Fax: E-mail: Means of transport (5):	**11. Disposal/recovery operation(s)** (2) D-code/R-code (5): Technology employed (6): Reason for export (1) (6): **12. Designation and composition of the waste** (6):
9. Waste generator(s)—producer(s) (1) (7) (8) Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Site and process of generation (6)	**13. Physical characteristics** (5): **14. Waste identification** *(fill in relevant codes)* (i) Basel Annex VIII (or IX if applicable): (ii) OECD code (if different from (i)): (iii) EC list of wastes: (iv) National code in country of export: (v) National code in country of import: (vi) Other (specify): (vii) Y-code: (viii) H-code (5): (ix) UN class (5): (x) UN number: (xi) UN shipping name: (xii) Customs code(s) (HS):
10. Disposal facility (2): ☐ **or recovery facility** (2): ☐ Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Actual site of disposal/recovery:	

15. (a) Countries/States concerned, (b) code No of competent authorities where applicable, (c) specific points of exit or entry (border crossing or port)							
State of export — dispatch	State(s) of transit (entry and exit)						State of import — destination
(a)							
(b)							
(c)							

16. Customs offices of entry and/or exit and/or export (European Community):

Entry: Exit: Export:

17. Exporter's — notifier's/generator's — producer's (1) **declaration:**

I certify that the information is complete and correct to my best knowledge. I also certify that legally enforceable written contractual obligations have been entered into and that any applicable insurance or other financial guarantee is or shall be in force covering the transboundary movement.

Exporter's — notifier's name: Date: Signature:

Generator's — producer's name: Date: Signature:

18. Number of annexes attached

FOR USE BY COMPETENT AUTHORITIES

19. Acknowledgement from the relevant competent authority of countries of import — destination/transit (1)**/export — dispatch** (9)**:**

Country:

Notification received on:

Acknowledgement sent on:

Name of competent authority:

Stamp and/or signature:

20. Written consent (1) (8) **to the movement provided by the competent authority of** (country):

Consent given on:

Consent valid from: until:

Specific conditions: No: ☐ If Yes, see block 21 (6): ☐

Name of competent authority:

Stamp and/or signature:

21. Specific conditions on consenting to the movement or reasons for objecting

(1) Required by the Basel Convention.
(2) In the case of an R12/R13 or D13-D15 operation, also attach corresponding information on any subsequent R12/R13 or D13-D15 facilities and on the subsequent R1-R11 or D1-D12 facility(ies) when required.
(3) To be completed for movements within the OECD area and only if B(ii) applies.
(4) Attach detailed list if multiple shipments.
(5) See list of abbreviations and codes on the next page.
(6) Attach details if necessary.
(7) Attach list if more than one.
(8) If required by national legislation.
(9) If applicable under the OECD Decision.

Annex 2 – The Movement Document

1. Corresponding to notification No:		**2. Serial/total number of shipments:**
3. Exporter — notifier Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:		**4. Importer — consignee** Registration No: Name: Address: Contact person: Tel.: Fax: E-mail:
5. Actual quantity: tonnes (Mg): m^3:		**6. Actual date of shipment:**
7. Packaging Type(s) (1): Number of packages: **Special handling requirements:** (2) Yes: ☐ No: ☐		
8.(a) First carrier (3): Registration No: Name: Address: Tel.: Fax: E-mail:	**8.(b) Second Carrier** (3): Registration No: Name: Address: Tel.: Fax: E-mail:	**8.(c) Last carrier** (3): Registration No: Name: Address: Tel.: Fax: E-mail:
- - - - - - - To be completed by carrier's representative - - - - - - -		*More than three carriers (2)* ☐
Means of transport (1): Date of transfer: Signature:	Means of transport (1): Date of transfer: Signature:	Means of transport (1): Date of transfer: Signature:
9. Waste generator(s) — producer(s) (4) (5) (6): Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Site of generation (2):		**12. Designation and composition of the waste** (2): **13. Physical characteristics** (1): **14. Waste identification** *(fill in relevant codes)* (i) Basel Annex VIII (or IX if applicable): (ii) OECD code (if different from (i)): (iii) EC list of wastes: (iv) National code in country of export (v) National code in country of import: (vi) Other (specify): (vii) Y-code: (viii) H-code (1): (ix) UN class (1): (x) UN number: (xi) UN shipping name: (xii) Customs code(s) (HS):
10. Disposal facility ☐ **or recovery facility** ☐ Registration No: Name: Address: Contact person: Tel.: Fax: E-mail: Actual site of disposal/recovery (2)		
11. Disposal/recovery operation(s) D-code/R-code (1):		

15. Exporter's — notifier's/generator's — producer's ([4]) declaration:

I certify that the above information is complete and correct to my best knowledge. I also certify that legally enforceable written contractual obligations have been entered into, that any applicable insurance or other financial guarantee is in force covering the transboundary movement and that all necessary consents have been received from the competent authorities of the countries concerned.

Name: Signature:

Date:

16. For use by any person involved in the transboundary movement in case additional information is required

17. Shipment received by importer — consignee (if not facility):

Name: Signature:

Date:

TO BE COMPLETED BY DISPOSAL/RECOVERY FACILITY

18. Shipment received at disposal facility ☐ **or recovery facility** ☐

Date of reception: Accepted: ☐ Rejected (*): ☐

Quantity received: Tonnes (Mg): m^3:

(*) immediately contact competent authorities

Approximate date of disposal/recovery:

Disposal/recovery operation ([1]):

Name:

Date:

Signature:

19. I certify that the disposal/recovery of the waste described above has been completed

Name:

Date:

Signature and stamp:

([1]) See list of abbreviations and codes on the next page.
([2]) Attach details if necessary.
([3]) If more than three carriers, attach information as required in blocks 8 (a,b,c).
([4]) Required by the Basel Convention.
([5]) Attach list if more than one.
([6]) If required by national legislation.

Annex 3 – List of Companies

Company	Waste material and products	Country	Address	Website	Telephone number	Annual Report	Email
Umicore	Batteries, Lithium Batteries	Belgium	Hoboken	https://csm.umicore.com/en/battery-recycling/	32 3 821 7235	https://www.umicore.com/en/industries/	ghislain.vanDamme@umicore.com
Eucobat	Lithium Batteries	Belgium	Zaventem	https://www.eucobat.eu/	32 2 720 40 80	_	info@eucobat.eu
EBRA	Lithium Batteries	Belgium	Reyerslaan 80 1030 Brussels	https://www.ebra-recycling.org/	32 492 97 23 30	https://www.ebra-recycling.org/recycling-batteries	info@ebra-recycling.org
Eramet	Lithium Batteries	France	Le Palais su Vienne	http://www.eramet.com	33 1 45 38 42 00	https://www.eramet.com/en/activities/relieve-battery-recycling/	bertrand.schutz@erametgroup.com
SNAM	Lithium Batteries	France	Viviez	http://www.snam.com	33 (0)5 65 43 77 30	https://www.snam.com/recyclage/	communication@snam.com
SAFT	Lithium Batteries	Sweden	Okskarsham	http://www.saft.fr		https://saft.com/media-resources/our-stories/reduce-recycle-reuse-%E2%80%93-making-batteries-sweden	Lars-eric.Johansson@saft.alcatel.se
Accurec	Lithium Batteries	Germany	Müheim an der Ruhr	http://www.accurec.de	49,208,781, 173	https://accurec.de/lithium?lang=en	info@accurec.de

Company	Waste material and products	Country	Address	Website	Telephone Number	Annual Report	Email
ACA Industies	Weee	Belgium	Deinze	https://acaindustry.com/	32 (0) 9 282 09 55	https://acaindustry.com/electronic-waste/	info@ecoproject.be
Ailit	Weee	Lithuenia	Vilnius	https://ailit.lt/en/	37,065,859,335	https://ailit.lt/en/electronic-scrap/	ailit.lietuva@gmail.com
MTB Recycling	Weee	France	38890 Saint-Chef	https://www.mtb-recycling.fr/en/	33,474,928,768	https://www.mtb-recycling.fr/en/equipements-de-recyclage/weee/	info@mtb.fr
Environmental Computer Recycling	Weee - computer recycling	UK	Birmingham	https://www.computer-recycling-and-removals.co.uk/	1,215,728,422	https://www.computer-recycling-and-removals.co.uk/computer-recycling/	_
Stena Recycling	Wee	Sweden	Fiskhamnsgatan 8 B, SE-414 58 Göteborg	https://www.stenametall.com/	46 10 445 00 00	https://www.stenametall.com/what-we-do/our-businesses/stena-recycling/	info@stenametall.se

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Bage plastics GmbH	PS, PP	Austria	Eisenstrasse 1 4502 St. Marien	https://bage-plastics.com/	43 7227-22210	https://bage-plastics.com/products/bage-ps/	office@bage-plastics.com
Campine	PP	Belgium	Nijverheidsstraat 2 2340 Beerse	https://www.campine.com/en/	32 (0)14 60 15 11	https://www.campine.com/en/specialty-chemicals/recycled-polypropylene/	info@campine.com
Coolrec Plastics	PS	Nederlands	Van Hilststraat 7, NL-5145 RK Waalwijk	-	31416347373	https://www.coolrec.com/en/plastics	sales-plastics@coolrec.com
Ecoplast	PP	Austria	Untere Aue 21 8410 Wildon	https://www.ecoplast.com/	4,331,823,355	https://www.ecoplast.com/en/recycling/our-recycling-processes/	info@ecoplast.com
RaffPlastics	PS, PP	Belgium	MELANEDREEF 16B, B-8650 HOUTHULST	https://www.raffplastics.be/en	32 51 61 05 00	https://www.raffplastics.be/en/range-of-plastics	INFO@RAFFPLASTICS.BE

Company	Waste material and products	Country	Address	Website	Telephone number	Annual Report	Email
Der Grüne Punkt Holding GmbH & Co. KG	Packaging - glass, plastic.	Germany	Edmund-Rumpler-Straße 7 51149 Cologne	https://www.gruener-punkt.de/en/	492,203,937,557	Yes, 2016-2017 annual report	anfrage@gruener-punkt.de
REMONDIS SE & Co. KG	Packaging - glass, plastic.	Germany	Brunnenstraße 138 44536 Lünen	https://www.remondis.de/en/home/	4,923,061,060	https://www.remondis.com/en/about-us	https://www.remondis.de/en/home/
SUEZ Deutschland GmbH	Packaging - glass, plastic.	Germany	Oberholzweg 1, 56299 Ochtendung	https://www.suez.com/en/		yes	
Veolia Umweltservice GmbH	Packaging waste	Germany	Hammerbrookstr. 69 20097 Hamburg	https://www.veolia.de/	49 (0) 40 - 78101-0	https://www.veolia.com/en/veolia-group/profile	
Good Plastic Things	Packaging - plastic.	Netherlands	Keersluisweg 7, Hal 1, 1332 EE Almere, Netherlands	https://thegoodplasticcompany.com/good-plastic-things/	31 (0)20 399 1260	https://thegoodplasticcompany.com/case-studies/	hello@thegoodplasticcompany.com

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Genan Gmbh	Tire - Rubber Granules, Rubber Powder	Denmark, Germany, US	Daimler-Str. 34 D-46282 Dorsten	https://www.genan.de/ueber-genan/die-genan-geschichte/	49,236,295,270	Yes	info-de@genan.com
Eldan Group/ELDAN RECYCLING TÜRKİYE	Tire, Batteries, weee	Denmark, Turkey	Esenyalı Mh. Yanyol Cd. VARYAP PLAZA Sitesi No.61/163, 34943 Pendik / Istanbul / Türkiye	https://www.eldan-recycling.com/	905,322,818,694	https://www.eldan-recycling.com/product-sheets/	eo@eldan-recycling.com
B.V. Autobandrecycling.nl	Car tires	Netherlands	Voltaweg 1, 9503 GR Stadskanaal, Nederland	https://autobandrecycling.nl/	31(0)85-2736759		info@autobandrecycling.nl
Becker Reifen	Car tires	Germany	Dr. Wolff Straße 2 Business Center Limburg Germany	https://www.reifen-becker.net/index.html	4,957,172,407		verkauf@reifen-becker.net
coreenerji	Tires - Rubber	Turkey	World Trade Center H Blok K:7 D:105 Bahçelievler Yenibosna / İSTANBUL	http://www.coreenerji.com/	0 850 2738888		bilgi@coreenerji.com

Company	Waste material and products	Country	Address	Website	Telephone number	Annual Report	Email
AVISTA OIL AG	Waste oil	Germany	Bahnhofstraße 82 D-31311 Uetze	https://www.avista-oil.de/en/	49,517,785,128	https://www.northdata.com/AVISTA+OIL+AG,+Uetze/Amtsgericht+Hildesheim+HRB+200914	personal@avista-oil.de
Zeller+Gmelin GmbH & Co. KG	Waste oil	Germany	Schlossstrasse 20 73054 Eislingen	https://zeller-gmelin.de/en/	49 30 206 21 66 0	https://zeller-gmelin.de/en/unternehmen/news-presse/	bewerbung@zeller-gmelin.de
Tayras	Oil waste	Turkey	Ayazağa, Vadi İstanbul Bulvarı, Azerbaycan Cd. No: 48 D:2A Ofis, 6. Kat, 34396 Sarıyer/İstanbul	https://www.https://www.tayras.com/en/corporate/about-us.com/en/corporate/about-us	90 444 87 78	https://www.tayras.com/en/corporate/refinery-in-figures	info@tayras.com
Orüsan Kimya	Oil waste	Turkey	Aydınlı - Kosb Mah. Tuzla Kimya Sanayicileri O.S.B. Melek Aras Bulvarı Analitik Caddesi No: 86 Tuzla - İstanbul	https://www.orusankimya.com.tr/en/index.html	0(216) 593 1773	N/A	info@orusankimya.com.tr
ALBA Group	Oil waste	Germany, also across Europe and Asia	Knesebeckstraße 56-58, Berlin, Germany	https://www.alba.info/en/our-company/about-us/	4,930,351,823,260	Yes, in German	info@albagroup.de

Company	Waste material and products	Country	Address	Website	Telephone number	Annual Report	Email
ALBA Group	weee waste management	Germany, also across Europe and Asia	Knesebeckstraße 56-58, Berlin, Germany	https://www.alba.info/en/our-company/about-us/	4,930,351,823,260	Yes, in German	info@albagroup.de
Eldan Group/ELDAN RECYCLING TÜRKiYE	weee	Denmark, Turkey	Esenyalı Mh. Yanyol Cd. VARYAP PLAZA Sitesi No.61/163, 34943 Pendik / Istanbul / Türkiye	https://www.eldan-recycling.com/	905,322,818,694	https://www.eldan-recycling.com/product-sheets/	eo@eldan-recycling.com
Berger Recycling BV	weee	Netherlands Postbus 21, 9600 AA Hoogezand		https://www.bergerrecycling.nl/	310,598,361,040		info@bergerrecycling.nl
Computer HERGEBRUIK	weee (computers, monitors, phones)	Netherlands	Cesar Domelastraat 45 3059 PM Rotterdam	https://www.computerhergebruik.nl/	010-8115595		nfo@computerhergebruik.nl
TSR Recycling GmbH & Co. KG	weee - Metal Scrap	Germany	Brunnenstraße 138 44536 Lünen	https://www.tsr.eu/en/home/	49 2306 106-3800	https://www.tsr.eu/en/about-us/	info@tsr.eu

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Accurec Recycling GmbH	batteries and accumulators	Germany	Bataverstr. 21 47809 Krefeld	https://accurec.de/	492,151,652,980	https://accurec.de/publications-downloads?lang=en	info@accurec.de
GCL RECYCLING & REFINING	batteries and accumulators	Turkey	Kavakli Mahallesi, Kıble Sokak No: 8, 34596 Silivri / Istanbul TURKEY	https://www.gclcevre.com/en/e-waste-recycling/waste-battery-recycling	90 (212) 723 45 45	https://www.gclcevre.com/en/who-we-are	info@gclcevre.com
Aküsan Akü Sanayi ve Ticaret A.Ş.	batteries and accumulators	Turkey	Yavuz Selim Mah. Sivas Cad. No:364 - Kocasinan/Kayseri / TURKEY	https://www.akusan.com/En	90 (352) 241 07 70	https://www.akusan.com/En/About	akusan@akusan.com
Primobius GmbH	batteries and accumulators	Germany	Wiesenstraße 30 57271 Hilchenbach Germany	https://www.primobius.com/	492,733,293,998	https://www.primobius.com/about-us/the-company	info@primobius.com
Refurb Battery	batteries	Netherlands	Treeport 3 4891 PZ Rijsbergen	https://refurbbattery.eu/	852,464,999	https://refurbbattery.eu/making-impact	hello@refurbbattery.eu