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# Global trade in plastics: insights from the first life-cycle trade database

**Diana  
Barrowclough**

Senior Economist  
Division on  
Globalisation and  
Development  
Strategies, UNCTAD  
diana.barrowclough@unctad.org

**Carolyn Deere  
Birkbeck**

Senior Researcher  
Global Governance  
Centre,  
Graduate Institute  
carolyn.deere@graduateinstitute.ch

**Julien Christen**

Research Associate  
Graduate Institute  
julien.christen@graduateinstitute.ch

## Abstract

This paper presents the first attempt to quantify and map global trade flows across the entire life cycle of plastics – from raw inputs to final plastic products as well as waste. It draws on a new prototype database created by UNCTAD and the Graduate Institute, which draws on a granular examination of official trade classifications and compiles data on a far broader set of plastics-related inputs and products than those commonly used. This paper finds that trade is immense, with exports of primary, intermediate and final forms of plastics summing up to more than US\$1 trillion in 2018 or 5% of the total value of global trade – almost 40% higher than previous estimates. This paper also finds that plastics trade is multifaceted and complex. While some key countries dominate trade across the plastics value chain, a wide diversity of countries are active as both importers of plastic products and exporters, using plastic as a means to participate in global value chains and to add value to exports.

At the same time, while this original database captures a range of neglected trade flows across the plastics life cycle, it is a prototype and still provides an incomplete picture, in part due to the methodological challenges of quantifying the value and volume of plastics ‘hidden’ in millions of products traded internationally (e.g., plastics embedded in products or used in pre-packaged products). The paper makes an original contribution to understanding of the dynamics of the global plastics economy, through the lens of trade. The findings can help governments and stakeholders to reduce plastics pollution and CO<sub>2</sub> emissions through more effective use of trade policy in addition to other policy levers.

**Key words:** Plastic, Trade, Development, Green Economy.



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## Acknowledgements

The analysis presented in this paper draws on a prototype database that is a work in progress and will be released online as a free and open resource by UNCTAD later in 2021. This paper aims to stimulate debate that will help to refine the database and contribute to wider efforts to reduce plastics pollution.

Diana Barrowclough is Senior Economist at UNCTAD and a founding member of the Transforming the Global Plastics Economy project; Carolyn Deere Birkbeck is Senior Researcher, Global Governance Centre, Graduate Institute, and leader of the Transforming the Global Plastics Economy project; Julien Christen is research associate for the Plastics Project at the Graduate Institute. The authors are grateful for input and guidance from UNCTAD colleagues including Steve MacFeely, Head of Statistics and Information; Benny Salo, Statistics Assistant; Anton Sudzik, Statistics Assistant; David Vivas-Eugui, Legal Officer; and Mahesh Sugathan, an independent trade consultant and research associate at the Graduate Institute. This paper was supported by a research grant from the Swiss Network of International Studies.

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## Introduction

This paper presents the first attempt to quantify and map global trade flows across the life-cycle of plastics – from raw inputs and subsequent plastic products to its final stage as waste. It draws on a new original prototype database currently under development by UNCTAD and the Graduate Institute. Derived from granular examination of official trade classifications and UN Comtrade statistics to identify the breadth of plastics-related inputs and products traded internationally, this new database reveals trade flows commonly neglected in efforts to capture the scale of plastics trade.<sup>1</sup> By drawing attention to the trade flows partly or completely hidden in conventional estimates of plastics trade, this original approach enables a better estimation of the extraordinary scale, breath and complexity of trade flows across the life-cycle of plastics.

The first finding from this new approach is that the scale of global trade in plastics is immense, with exports of primary, intermediate and final forms of plastics summing to more than US\$1 trillion in just one year alone – around 5% of total global trade in 2018.<sup>2</sup> This figure is almost double previous estimates that did not capture the entire plastic life-cycle nor the breadth of plastics products traded internationally (WTO 2020). Even then, this higher valuation still significantly under-estimates the total value of plastics traded internationally due to the challenges of estimating the value and volume of ‘hidden’ plastics embedded in millions of products traded internationally or used in associated packaging.

Second, the data shows that international trade occurs at every step of the plastics life-cycle – from feedstocks, to primary plastics in resin pellet and fibre forms, through to intermediate plastic goods, final manufactured plastic goods and plastic waste. Trade is also broad in terms of geographic spread – virtually all countries are importers of plastic in one form or another, and many are exporters as well. This trade is multifaceted and complex, with different countries being involved in different points of the life-cycle depending on their endowments of plastics feedstocks (fossil fuels) or infrastructure (refining capacities; position in global manufacturing chains), or the nature of their economies (agricultural or industrial). Developing countries are involved alongside advanced ones; for some, plastics trade has been part of a wider strategy of economic diversification. For example, plastic packaging has been central to efforts of some countries to add value to their agricultural exports. At the same time, some of the countries most heavily impacted by plastic pollution contribute least to plastic production, consumption and trade, especially Small Island Developing States (SIDs).

Third, the data shows that trade is significant across the life-cycle of plastics. For some plastics – such as synthetic textiles and rubber tyres, as much as 60% of the total volume of global production is traded internationally. For other categories of plastics, trade is less significant, with a larger share produced and consumed domestically. However, even where the total volumes of trade as a proportion of production are not significant, their environmental impacts can still be important. For countries that lack capacity to manage plastic waste, import of single use plastic products, empty plastic packaging and pre-packaged imported products can significantly exacerbate their existing environmental burden.

The analysis in this paper aims to contribute to a better understanding of the plastics industry and plastics life-cycle, through the lens of trade, and to inform analysis of the range of policy levers and tools that could potentially help reduce plastics pollution. Recent efforts to regulate environmentally unsustainable trade in plastic waste have already highlighted the trade policy has a vital role to play as part of the solution to plastic pollution (Khan 2019). Our findings widen the focus beyond waste; they suggest that a logical next step will be

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<sup>1</sup> The UNCTAD ComTrade database is accessible at <https://comtrade.un.org>. The UNCTAD dataset on plastics will be published online in early 2021; it will be free and open to all (as all UNCTADstat is published under CC IGO 3.0) with the goal of providing a high value global public good.

<sup>2</sup> The WTO estimated that world merchandise exports totalled US\$19.48 trillion in 2018 (WTO 2019).

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to explore the potential role of trade policy to support efforts to reduce plastics pollution across the life cycle and to transform national and global production systems toward greater environmental sustainability (Deere Birkbeck & Sugathan 2021). This is important because, in addition to widely publicized challenges of marine plastic pollution, the plastics sector contributes significantly to greenhouse gas emissions and to an array of environmental and health challenges on land and in the air across the life cycle of plastics (Pew and Systemiq 2020), many of which disproportionately impact economically disadvantaged communities (Azoulay et al, 2019). On the international policy front, our analysis of trade flows across the life-cycle of plastics can also support and inform emerging policy dialogue on the relevance of international trade policy to plastics pollution at the WTO (Deere Birkbeck 2020; WTO 2020b) and in the context of calls for a new UN treaty on plastics pollution (Raubenheimer & Urho 2020).

### **Background to the development of the prototype database**

This prototype database emerged from, and is nested within, broader efforts by UNCTAD, the Graduate Institute and others to address the gap in attention to the global political economy of the plastics sector, including the economics and politics of international trade in plastics. Together, a project on Transforming the Global Plastics Economy was launched in early 2019 with the support of the Swiss Network of International Studies (SNIS) (see [www.plasticpolitics.solutions](http://www.plasticpolitics.solutions)). To date, most literature and public attention to plastics pollution has focused ‘downstream’ on plastic waste – arising mostly from concerns about pollution of waterways and the ocean – including international trade flows in plastic waste (Brook et al 2018; Lavendar Law et al 2020).

However, there has been surprisingly little attention to the production or ‘upstream’ side of the plastic life cycle, i.e., plastics production and consumption before it becomes waste. In the policy arena, interest in a more circular economy for plastics is shedding some light on the links between upstream production and downstream pollution, but the upstream dynamics of the plastics and petrochemical sectors and their relevance to plastic pollution across the life cycle are only just starting to attract the scholarly analysis it deserves (Nielsen et al 2019). Similarly, although this study of trade flows underscores that the plastics economy is global, there has been surprisingly little systematic academic focus on the global political economy of the global plastics sector – underpinned by international trade and investment – and how this impacts efforts to reduce plastics pollution (Barrowclough & Deere Birkbeck 2020).

Moreover, beyond looking at trade in plastic waste, there has been no systematic scholarly attention to other international trade flows across the life cycle of plastics and the relevance of trade and trade policy to efforts to curb plastic pollution. And yet, a significant portion of key plastic products is traded internationally. Tens of millions of tonnes of plastic packaging are associated with thousands of pre-packaged products traded internationally each year, from electronic goods to bottled water and chocolate bars, and millions of additional tonnes are associated with the international transportation and distribution of products. Plastic is also embodied in countless products traded and consumed across the world – from cars to household appliances, toys, construction equipment, rubber tyres, and paints. Further, one of the most valuable components of plastics trade is in fact plastic in its rawest forms – resin pellets and fibres – which are then transformed into a vast array of intermediate and final plastic products within importing countries. Improved understanding of all of these trends in trade will help policymakers to identify strategic entry points for regulations or other measures to reduce excessive use of plastics and plastic pollution.

Plastic trade flows are relevant to plastic pollution for three reasons: 1) trade in plastics products, products containing plastics, and products packaged in plastic adds to the waste management burden that importing countries face and is a conveyor belt for the spread of products responsible for microplastics pollution; 2) trade flows in plastic waste to countries with inadequate waste management capacity can exacerbate leakage of plastics into the environment, and 3) the plastics sector and the fossil fuel and chemical inputs from which

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it stems contribute significantly to greenhouse gas emissions and environmental and health challenges. Indeed, the plastics issue can be seen as a concrete, sectoral example of how a more sustainable global economy requires structural transformation – an agenda sometimes described as a Green New Deal (UNCTAD 2019).

Shifting the plastics sector toward greater environmental sustainability, including a lower contribution to greenhouse gas emissions, will require a judicious blend of government and industry policies to ensure that weaning the world off excessive use of plastic occurs through a transition process that is just – which in turn is vital to ensuring the transformation is sustained. The information that our prototype database draws together will support this process of transformation and just transition by enabling policymakers and experts to identify key trends, significant actors and pivot points across the life-cycle of plastics where policy levers and support mechanisms are needed, and could potentially be applied.

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## Structure of the paper

Section 1 sets out the basic issues at stake. It briefly introduces the key phases of the plastics life cycle, focusing upstream on the production end of the cycle and the trade flows to be explored. Section 2 introduces the prototype database and data sources for trade flows at different stages of the plastics value chain, highlighting the new insights revealed. Section 3 introduces the main findings, Section 4 shows findings by industry sectors and Section 5 shows bilateral trade trends and discusses their implications for plastics production and trade. Section 6 concludes with ideas for further research.

# 1. Plastics pollution and trade: issues at stake

Plastic pollution has fueled the environmental debate since the 1950s. It is only in the last decade, however, that scholarly interest in plastic pollution really start to grow, as reflected by growing numbers of papers and reports into this area. Most of this literature has focused on understanding and measuring the leakage of plastic materials into the oceans and its environmental impacts. Recent papers have focused, for instance, on the public health implications of plastics pollution that disrupts ecosystems and contaminates food chains.

In general, the existing scholarly and policy literature has been oriented toward the downstream side of plastic pollution, leaving largely unexplored the source of pollution in the first place and the potential for policies to curb pollution by focusing attention ‘upstream’ on production and consumption. In this paper, we aim to contribute to growing efforts to bridge the gap by analyzing trade relations across the global plastics industry and the life cycle of plastics.<sup>3</sup>

## Plastics as an industry – the plastics life-cycle

The plastic life cycle begins when oil and gas are extracted and then refined, usually by petrochemical companies. Fossil fuel feedstocks for plastic production are outputs of the oil and gas refining process and are the key inputs for virgin plastic polymers. These polymers are usually produced in the form of resin pellets or fibres and there are about 30 main different types of primary plastic polymers in this first stage of the plastics life cycle. These primary forms of plastics are purchased by producers and suppliers of plastics materials, both nationally and on the international market. The buyers convert the pellets and fibres into value-added plastics products (intermediate or final) that are also tradable internationally.

The list of plastic products traded internationally is enormous, including plastic packaging; synthetic textiles and finished clothes; construction materials and industrial machinery; electrical and electronic goods; beauty and household consumer products; paints, coatings and markings; automobile parts. These are produced and used in myriad ways, including by vertically and horizontally integrated companies with subsidiaries and partners across the world as well as by small and medium enterprises. Plastic packaging, for instance, is both produced and shipped across the world; either traded ‘empty’, as a product in its own right, to be combined with the products in the purchasing country, or as wrapping of underlying products and as part of packaging used in distribution.<sup>4</sup> The final stage in the plastics life cycle examined in this paper is plastic waste. In the past several years, there has been growing recognition that trade in plastic waste from developed to developing countries has greatly exacerbated problems of marine plastic pollution (GRID-Arendal 2019; Jambeck 2017).

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<sup>3</sup> For two recent reviews of the global political economy of the plastics industry, see Barrowclough and Deere Birkbeck (2020), and CIEL (2017).

<sup>4</sup> See for example UN Environment (2018b), Jambeck and Low (2017), and Barrowclough and Deere Birkbeck (2020) among others.

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Although purportedly shipped for management through landfill, incineration or recycling, the evidence reveals that most waste shipped to developing countries has been openly discarded on land or leaks into river systems and the sea (UNEP 2018a, b). This reality has spurred a number of countries to restrict or ban imports of certain plastic wastes as well as international agreement on a set of 'plastic amendments' to the Basel Convention on the Transboundary Movement of Hazardous Wastes that aim to better regulate trade in plastic waste (BRS, 2019).

The lifecycle of plastics thus engages a broad set of commercial stakeholders – starting with the fossil fuel feedstocks sold by major global companies (fossil fuel and petrochemical); moving through major global value chains in the construction, clothing and foods industries; to transporters at all points across the value chain; to small domestic enterprises and eventually to waste management companies, plastics waste traders and informal workers in the waste-sorting and scrap industries. In some cases, the cycle starts up again with new products generated from waste that is re-cycled, downcycled or up-cycled or used in waste-to-energy applications.

In contrast to most of the literature, which has focused attention on trade in plastic waste, this paper highlights the fact that international trade plays a central role in global supply chains across the whole plastic life cycle (see Box 1).

### **Box 1. International trade in plastics – points of trade entry in the plastics life-cycle**

Trade flows are key to global markets & supply chains for:

- fossil fuel feedstocks and chemical precursors for plastics
- additives used in plastics
- primary plastics (resin pellets and fibres)
- multiple plastic end-products (including synthetic textiles and plastic packaging)
- products with a high share of embedded plastic
- products wrapped in plastic
- plastic waste,
- recycled plastic
- secondary waste products.

## **2. Creation of the Plastics Life-Cycle Trade dataset**

### **Limitations of existing classifications and measures**

Most data on the production of plastics comes from industry and is compiled by market analysis firms responding to the detailed product specific needs and interests of manufacturers, retailers and other businesses producing or using plastics directly in their business processes or to package final products. This literature offers useful insights on the importance of the plastics market, the key sectors using plastics, key companies, key trading partners, and which countries are driving demand for and producing specific plastic products across the life cycle. For example, according to PlasticsEurope, one of the leading plastics trade associations, the plastics industry employed 1.6 million people in 60,000 companies across Europe in 2018, generating 360 billion euros of sales and ranking seventh in industrial value-added contribution (Plastics Europe 2018, 2019). While usually behind a significant paywall, such data and analysis offer an important insight into the commercial value of the plastics sector in terms of its total sales, employment and value-added, and also

provides some information on international prices for specific products and trade flows among leading trade partners.<sup>5</sup>

For a fuller and publicly accessible picture of trade flows, the United Nations International Trade Statistics Database, known as UN Comtrade, is the main source of international trade data based on official national sources. This database provides information on global trade data, reported at the bilateral level, going back to 1962. UN Comtrade's repository of international statistics relies on self-reporting by more than 170 countries of their trade transactions, detailed by trading partner and commodity. Individual goods are classified according to the Harmonized Commodity Description and Coding System (HS), which is administered by the World Customs Organization (WCO). The data are reported and are available monthly or annually in value (US Dollars) and quantity. In the HS, commodities are described in a hierarchy of codes of 2, 4 or 6 digits where longer codes provide more detail.

The most obvious group of plastic products are those listed with the 2-digit code (Chapter) 39 *Plastics and articles thereof*. In the 2017 revision of the HS system, commodities included in Chapter 39 are disaggregated into 26 codes at the 4-digit level and 126 codes at the 6-digit level, covering products ranging from plastics in their primary forms to plastic office and school supplies and tableware. (Some countries even go to 8, 10 or 12 digits to capture a more detailed picture of trade but there is no international standard for these more detailed digit levels used nationally.)<sup>6</sup> Notably, analysts citing statistics on trade in plastics generally refer only to those aspects of plastics trade that are included in Chapter 39 (see, for instance, WTO 2020a: 41-42).

However, while the list of plastic products covered under Chapter 39 is long and seems exhaustive, in fact it captures only a sub-set of the actual trade in plastics and plastic inputs. (In addition, some products included in Chapter 39 as 'plastics' are not entirely plastics but are combined with other materials). The HS system is not primarily designed for the identification of products according to the material composition, meaning that considerable additional effort is needed to extract the full value and volume of all plastic that crosses international borders.

Importantly, a number of other predominantly or entirely plastic products that are readily identifiable in the HS are included under chapters other than Chapter 39. This includes synthetic rubber products and textiles as well as items such as nappies and sanitary towels, which are almost entirely plastic, and fishing nets, which are also plastics. Further, not all plastic in primary forms (polymers) in pellet and fibre form, such as synthetic textile fibres and synthetic rubber polymers, are included in Chapter 39.

In addition, there is also a vast quantity of plastic that is embedded or associated with products and their international transportation that is not readily identifiable using the HS classifications. Even if we know certain highly traded items, such as cars and electronic goods, which are not evidently 'plastics' have a high proportion of plastics embedded in them, official trade statistics give us no way to know the share of the product that is plastic or the total volume of plastic embedded in such products traded internationally.

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<sup>5</sup> Key firms providing analysis of the petrochemical and plastics sector are the International Commodity Information Service and Grandview Research, along with industry publications such as Chemistry World and Chemical and Engineering News, as well as periodic and annual publications of industry associations such as PlasticsEurope and the Plastics Industry Associations. Across the life cycle of plastics, an array of industry specific publications exists, targeting business involves in conversion and manufacturing of plastics as well as specific sectors such as the packaging sector.

<sup>6</sup> <https://unstats.un.org/unsd/tradekb/Knowledgebase/50018/Harmonized-Commodity-Description-and-Coding-Systems-HS>.

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Beyond HS categories that cover empty plastic packaging traded as a product in its own right, a vast quantity of additional plastic packaging crosses international borders but is “hidden” in the sense that neither its volume or value can be easily quantified using the HS. Importantly, when working to identify trade flows relevant to plastics, and especially packaging, the WCO’s General Rules of Interpretation (GIRs) (a set of legal principles that govern the tariff classification of merchandise under the HS) are relevant.<sup>7</sup> The General Rules underline that various types of packaging, cases and containers are usually classified with the goods they are associated with.<sup>8</sup> In the case of pre-packaged meals and confectionary included in HS Chapters 16-21 focused on food, for instance, neither the official classifications nor statistics are designed to reveal the volume or value of ‘hidden’ plastics trade associated with the plastic packaging of those food products.

Notably, existing HS classifications for plastics differentiate between some but not all different kinds of primary plastics polymers. A handful of conventional plastics in primary forms are distinctly specified under their own subheading, but others are grouped under the general category “Other”. Although there is an HS code for PLA (an alternative type of ‘bio-based’ primary plastic), there is no separate HS code for other types of non-conventional primary plastics, such as biodegradable and compostable plastics. In addition, there is little differentiation of the diversity of intermediate and manufactured plastics products by polymer type, with some exceptions such as for certain plastic sheets, tubes, pipes and hoses. Beyond primary flows, trade flows of intermediate and final goods plastic goods made of PLA are not distinguishable from other trade flows.

Similarly, although HS codes differentiate some types of plastic waste by polymer type, they do not differentiate kinds of plastic waste (hazardous, contaminated, mixed, recyclable) or secondary materials (e.g., recycled plastic pellets). For instance, Note 7 of the official Section Notes for HS Chapter 39 (which provide guidance on the scope of items covered under the Chapter) states that Heading 39.15 (waste pairings and scrap of plastic) does not apply to waste pairings and scrap of a single thermoplastic material, transformed into primary forms. Such transformed plastics (presumably through recycling) are classified under headings 39.01 to 39.14 but are not specifically identified as being recycled primary forms of plastics.<sup>9</sup> The plastic wastes included in Chapter 39 sub-headings do also not include all kinds of plastic waste. Some rubber waste and scrap, for instance, is included in HS 401700.<sup>10</sup>

A further consideration is that, despite the existence of the harmonized system of classifications, importers and exporters may register the same product under different HS codes, as may customs officials who process products at the border. The fact that the HS is not used consistently around the world means that official trade statistics are not necessarily reliable. The United Kingdom’s advice to importers and exporters on how to

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<sup>7</sup> Kawazoe, T. (2019). What is “General Rules of Interpretation (GIRs)”. <https://www.customslegaloffice.com/global/what-is-general-rules-of-interpretation-gris/>.

<sup>8</sup> Principle 5 (a) of the GIRs for HS 2017, for instance, states that “ (a) Camera cases, musical instrument cases, gun cases, drawing instrument cases, necklace cases and similar containers, specially shaped or fitted to contain a specific article or set of articles, suitable for long-term use and presented with the articles for which they are intended, shall be classified with such articles when of a kind normally sold therewith. This Rule does not, however, apply to containers which give the whole its essential character”. Article 5 (b) further adds that “Subject to the provisions of Rule 5 (a) above, packing materials and packing containers presented with the goods therein shall be classified with the goods if they are of a kind normally used for packing such goods. However, this provision is not binding when such packing materials or packing containers are clearly suitable for repetitive use.” For further information see: <http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2017-edition/hs-nomenclature-2017-edition.aspx>.

<sup>9</sup> See the World Customs Organization. HS Nomenclature 2017 edition.

<http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2017-edition.aspx>.

<sup>10</sup> The description for HS 4018000 is: Rubber; ebonite and other hard rubbers in all forms, including waste and scrap, and articles of hard rubber.

classify their transactions, for instance, explains that the important criterion is whether the “defining characteristic” of the product is its plastic content or something else. Hence, goods with a high plastics content are only classified under the Plastics Chapter if they are not specifically referred to elsewhere in the HS and the UK tariff schedule<sup>11</sup>. As can be imagined, such a complex and somewhat subjective system may not be the best way to fully capture the true, underlying extent of trade in plastics at all diverse levels of the life-cycle. It also reflects the fact that the HS codes are primarily designed to classify goods for customs purposes (such as the administration of tariffs and quotas at the border) rather than for purposes related to tackling the environmental implications of trade.

## The new approach

In 2020, UNCTAD has worked to develop a Plastics Trade dataset that captures the breadth of trade across the life cycle of plastics as well as inputs into plastics, and that is based on official sources.

The new approach we propose in this paper combines four kinds of trade flows in the life cycle of plastics:

- Input flows – flows in feedstocks, precursors and additives used in production of primary plastics);
- non-hidden flows -- those included in HS Chapter 39 Plastics and articles thereof, as described above;
- semi-hidden flows -- those plastic products that can be readily identified under other chapters of the HS, such as synthetic textiles and rubber;
- hidden flows — products with embedded or associated plastics where the volume and value of plastics is not readily identifiable or traceable). Such hidden trade flows include packaging associated with specific products (pre-packaged food and beverages) (e.g., not empty packaging); packaging used in the distribution and transportation of products; and the massive volume of plastic embedded in household and consumer goods (as with the spectacles or toys examples above) (Paruta et al forthcoming). Estimates of these hidden flows are not yet included in the prototype database as they require the development of a distinct methodological approach but will be added in the course of 2021.

In order to capture all non-hidden and semi-hidden flows, in addition to the readily visible Chapter 39 plastics, an essential first step involved scientists with expertise in chemical industry, plastics and the HS. With their help, we identified the various categories of feedstocks, precursors and additives that are the ‘raw’ inputs into the plastics value chain. This granular process involved detailed micro-analysis, HS code by HS code, of all traded products to identify those traded inputs used in plastics production.

One advantage of the UN Comtrade data is that they are ‘raw’ in the sense that no additional estimation or imputation of any kind is applied to the data reported by countries. However, at the same time, countries who

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<sup>11</sup> There is a multitude of goods made from plastics like this, including textiles, textile products (clothes) and toys, all of which are covered in other chapters and hence not recorded in Chapter 39 on plastics. British importers and exporters are advised that, as a general rule of thumb, if the defining characteristic is that a product is made of plastic, it will be recorded in Chapter 39. For example, a plastic bottle or floorcovering is classified under this chapter. However, spectacle frames which happen to be made of plastic are classified elsewhere, as the fact they are spectacle frames is the defining factor, not their construction from plastic (Gov. UK accessible at <https://www.gov.uk/guidance/classifying-plastics>).

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do not self-report their data do not appear in the database, which has been the case in recent years for a few countries of global economic importance. This study uses data from 2018.<sup>12</sup>

The findings from the UN Comtrade database were also compared with UNCTAD's Merchandise Trade Matrix, which reports trade data at a higher level of product aggregation and uses a different classification – the Standard International Trade Classification (SITC) revision 3.<sup>13</sup> Correspondence tables exist to enable matching between information from both classifications. This database offers a larger country coverage than UN Comtrade, thanks to estimation and correction methodologies used to impute plastics data pertaining to missing countries,<sup>14</sup> but it only reports value estimates (in US Dollars). A third comparison was made with the Base pour l'Analyse du Commerce International, known as BACI database, constructed by the French think tank Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). BACI uses raw data from the UN Comtrade Database and the same HS classifications. Although only updated annually (whereas Comtrade is continuously updated), it goes a step further by providing reconciled information on annual bilateral trade flows disaggregated at product level.<sup>15</sup> All three databases provide broadly consistent information on the plastics data, which is perhaps not surprising given their common roots.

Once all of those HS codes that explicitly cover plastic inputs and products along the life cycle were identified, the codes were sub-divided into six categories that roughly approximate important phases of the plastics life cycle, as shown in Box 1. The full list of HS subheadings included in the database are reproduced in Annex 1, broken down according to their place in the life-cycle, along with explanatory notes. The authors hope publication of this paper will stimulate researchers to help improve the categorizations and dataset). As noted above, in addition to non-hidden and semi-hidden trade in plastics along the life cycle, to present a fuller picture of trade across the whole value chain and life cycle of plastics, we also included input categories that cover trade flows in feedstocks and related chemical precursors that are used in the production of primary plastics, as well as additives used in plastics. The reason for doing this is that they are integral to the production of plastics, and are also associated with many problems of pollution, so could also potentially be important places for attention of trade policymakers.

Data is presented for 2018, the most recent year available, by importer, exporter and country-pairs. Attention is focused on the top-20 exporters and importers and the top-50 trade relations, for each stage of production. In addition, to complement our analysis of plastics trade according to the life cycle categories noted in Box 1, we also zoomed in on several illustrative sub-categories of plastics trade – such as plastic packaging and fishing nets (which are sub-categories of final manufactured plastic goods), as well as trade in synthetic textiles (where we analysed trade across the entire life cycle for synthetic textiles – from primary synthetic fibres through to final manufactured goods). It also did not examine trade in secondary plastic waste products – such as recycled primary plastics or other recycled plastic products – as HS classifications do not currently differentiate trade at this level of detail. Notably, our analysis did not investigate the trade in plastic-related services, such as waste transportation services, plastic distribution services, and waste management services. While some data on trade in waste management services is available, this is not broken down to plastic-specific waste management services.

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<sup>12</sup> The availability of data can be checked on <https://comtrade.un.org/data/da>.

<sup>13</sup> The UNCTAD Merchandise Trade Matrix is available here: <https://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>.

<sup>14</sup> Missing data is imputed from partner countries reporting trade with that country.

<sup>15</sup> The BACI database can be consulted here: [http://www.cepii.fr/cepii/en/bdd\\_modele/presentation.asp?id=37](http://www.cepii.fr/cepii/en/bdd_modele/presentation.asp?id=37).

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## 3. Findings: Trends in Global Plastics Trade

### 3.1 Plastics trade was at least 40% higher than previous estimations by value, and at least 25% higher by volume in 2018

Once the previously “semi-hidden” plastics are included, the new data shows the massive extent to which plastics inputs and products are traded at every stage of the production chain, from raw material to manufactured goods placed on shelves in retail stores. Table 1a shows that total trade in plastic inputs and products, not including the basis precursors, was worth at least US\$1,008 trillion – accounting for around 5% of total world trade in 2018. It was also almost 40% higher than the value of the sub-set of plastics trade accounted for by HS Chapter 39, which in 2018 was US\$631 billion (WTO 2020). The new approach therefore appears to have been successful in revealing aspects of plastics trade otherwise neglected in estimates.

One concern for us that a simple addition of volume and value of trade across different stages of the plastic life cycle may over-state plastic quantities because a proportion of the intermediate and final plastic products will already have crossed borders at different stages of the plastics life cycle for value addition. The figures nonetheless provide a useful guide to the volume and value of plastics trade by stage of production and overall.

The new dataset shows that when semi-hidden plastics (i.e., HS codes that include plastics but that are not in Chapter 39) are included, the volume of plastics traded in 2018 rises to around 336 million metric tonnes (MT), as compared to 257 million metric tonnes (MT) when using only Chapter 39 codes – that is almost 25% higher.<sup>16</sup> As noted above, the UNCTAD data suggest that semi-hidden trade is dominated by rubber (57 MT) then synthetic textiles (20 MT). Tables 1b and 1c provide the volume traded by stage of plastics production.

Critically, these findings are still an underestimation of the volume of plastics trade because a vast diversity of products containing ‘embedded’ plastics are not included (television sets, computers, car components, etc). Further, these findings do not include the vast quantity of plastics packaging associated with products traded internationally. Such ‘hidden flows’ of plastics trade are still under examination and preliminary results of a first methodology for tracing these will be published in early 2021 (see Paruta et al forthcoming).

The total value of trade related to the plastics sector would also be significantly higher if we included trade flows in inputs to plastics products, namely fossil fuel-based feedstocks and chemical additives. A first estimation of the value and volume of trade flows in feedstocks and chemical additives known to be used in plastics is included in Table 1c. However, as noted in Part 4, the products covered by the HS codes included in each category may not be used entirely for plastics production but may also be used in other industrial sectors (i.e., it was beyond the scope of this paper to determine what proportion of the trade flows for each HS code was for plastic-specific purposes).

Even without these lacking elements and caveats, plastics trade figures dwarf those for other sectors that are somewhat similar in their use or purposes. To give a sense of the relative scale, global cotton fabrics exports were just US\$12.9 billion in 2017; paper exports amounted to US\$170.5bn in 2019; glass and glassware US\$76.5 billion; and pharmaceutical products amounted to US\$392.9bn in 2019.

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<sup>16</sup> All data reported here is from the prototype UNCTAD Plastics database, as of October 2020.

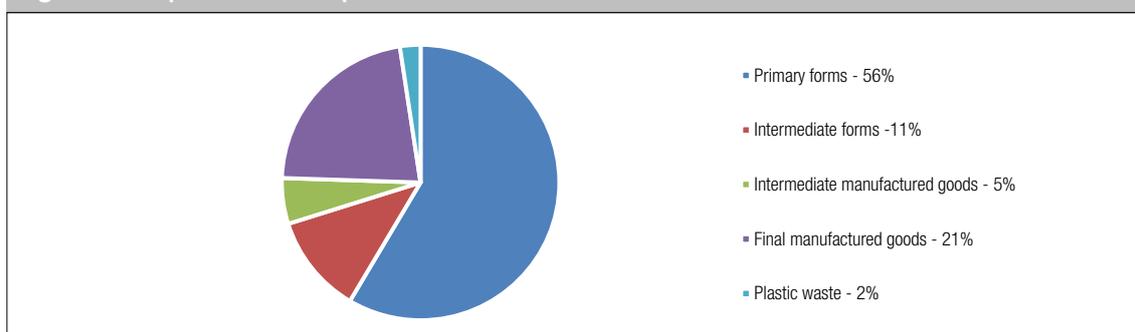
For some countries, the scale of markets for plastics are an encouraging sign of the potential market for plastics substitutes and alternatives (UNCTAD 2020; Barrowclough and Vivas 2020).

**Table 1a. Snapshot 2018 - Summary international trade in selected plastics, by phase in the plastics life-cycle (exports, 2018, \$US billions).**

Plastic Products	\$US billions
Primary forms of plastics	348
Intermediate forms of plastics	158
Manufactured plastic goods - intermediate	83
Manufactured plastic goods - final	416
Plastic waste	3
<b>Total</b>	<b>1008</b>

Source: UNCTAD plastics trade database prototype as of October 2020. See Annex for a detailed list of HS codes included in each category and explanatory notes. Note that these figures do not reflect a simple addition of values for each category or a calculation of value-added across the production process.

**Figure 1. Proportion of total plastics trade in volume**



Source: Authors' compilation, using UNCTAD Plastics prototype database as of October 2020. Note that the data on volumes should not be interpreted as the total volume of plastics traded internationally; instead, they represent a simple addition of volumes traded under different HS codes selected. In reality, the same underlying quantity of primary plastics is traded between countries at different stages of the plastics life cycle for value addition and eventually disposal.

**Table 1b. Snapshot 2018 - Summary international trade in selected plastics, by phase in the plastics life-cycle (exports, 2018, million metric tonnes).**

Products	Million metric tonnes (MT)
Primary forms of plastics	196
Intermediate forms of plastics	39
Manufactured goods - intermediate	18
Manufactured goods - final	74
Plastic waste	8

Source: UNCTAD plastics trade database prototype as of October 2020. See Annex 1 for a detailed list of HS codes included in each category and explanatory notes.

**Table 1c. Snapshot 2018 - Summary international trade in selected plastics-related products, by phase in the plastics life-cycle (exports, 2018, \$US billions and million metric tonnes).**

Products	\$US billions	Million metric tonnes (MT)
Feedstocks and precursors	94	100
Additives	81	55

Source: UNCTAD plastics trade database prototype as of October 2020. See Annex 1 for a detailed list of HS codes included in each category and explanatory notes.

### 3.2 Trade is a significant part of total production

Trade flows in plastic are not a proxy for production in plastics. A country may, for instance, be a major producer in a certain category but not a major exporter of that product. The product may be used domestically for further manufacturing or processing and then shipped internationally. Alternatively, it may simply be produced directly for domestic consumption. That said, an important new finding from the whole of life database is that trade is significant as a proportion of the total production of many plastic products and at key points along the life cycle of plastics.

Notably, calculating trade as a proportion of production is a difficult exercise due to the inconsistency in coding between trade and production data. One approach to overcoming this difficulty is to match HS codes with codes from International Standard Industrial Classification (ISIC) (UNDESA 2008). In the ISIC codes, the only production statistics available are for what is referred as 'plastics and rubber'. According to ISIC data, global production in this category in 2018 was 359 MT (Statista 2020).<sup>17</sup> Measured against our figure of 196 MT of primary plastics and rubber traded in the same year, trade represented an estimated equivalent of 54% of the volume of production for this stage of production in 2018. An alternative commonly-cited estimate is that global annual plastic production, including plastic pellets, synthetic rubber and textile synthetic fibres, reached 415 million tonnes in 2016. Using this estimate as a proxy, trade as a share of global primary plastic production reaches a smaller but still significant 36%. (A 2018 production estimate using this methodology is not yet available but we note that overall production is widely recognized to have further increased by the 2018 reference year for our trade data. (Billard & Boucher 2019).

Using a similar methodology, the data suggests that total exports of synthetic textiles reached 60% of the total volume of global production. Even exports of 'empty' plastic packaging (i.e., shipping containers full of plastic packaging) alone account for around 5% of plastic packaging produced annually.<sup>18</sup> A critical finding from our study is that official statistics on plastics packaging trade fail to capture a vast proportion of plastic packaging

<sup>17</sup> For further research, a primary source for more detailed data on plastics production is the UN Industrial Development Organization (UNIDO).

<sup>18</sup> As shown in Annex 1, HS codes used to derive these figures for plastic packaging were HS Codes: 392310 (plastics; boxes, cases, crates and similar articles for the conveyance or packing of goods 392321 (ethylene polymers; sacks and bags (including cones), for the conveyance or packing of goods; 392329 (plastics; sacks and bags (including cones for the conveyance or packing of goods, of plastics other than ethylene polymers); 39330 (plastics; carboys, bottles, flasks and similar articles, for the conveyance or packing of goods; 392340 (plastics; spools, cops, bobbins and similar supports, for the conveyance or packing of goods; 392350 (plastics; stoppers, lids, caps and other closures, for the conveyance or packing of goods; and 392390 (plastics; articles for the conveyance or packing of goods n.e.c. in heading no. 3923.

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known to be traded internationally and thus prevent a very partial view. It is well recognized that millions of tonnes of plastics packaging cross borders through consumer and household products that are pre-packaged, through business-to-business packaging (B2B), and through additional packaging used for transportation and distribution. All of this 'hidden' packaging is not, however, identified in official trade statistics and is thus not easily traced. These findings suggest that trade policy could be a significant tool, among the other policy instruments used to reduce plastics and promote substitutes.

Tables 1 a-c and Figure 1 show the respective contribution of each category to total plastics trade. As noted above, our analysis suggests that respective size of trade in primary plastics (resin pellets and fibres), is large – accounting for at least 36% by value of total world plastics trade. For advocates wishing to reduce plastics trade, this could potentially be one place to look for regulatory levers, especially in consideration of the fact that these are direct by-products of the fossil-fuel industry, which is in many countries the recipient of large-scale government subsidies. While plastics packaging flows do not represent such a high share of overall production, the analysis above highlights that official statistics underestimate the total volume of trade in plastics packaging. Moreover, plastics packaging is the area where consumer willingness to change is perhaps greatest, and also where a number of countries are already actively seeking to produce and export alternatives to plastic. Further, for countries that are struggling to manage plastics waste within their borders, the imports of plastics packaging – either empty or associated with other products – can add considerably to this burden. This is particularly the case, for instance, for Small Island Developing States that have limited capacity for waste management and recycling and few possibilities to change the direction or trend in trade (Barrowclough and Vivas 2020).

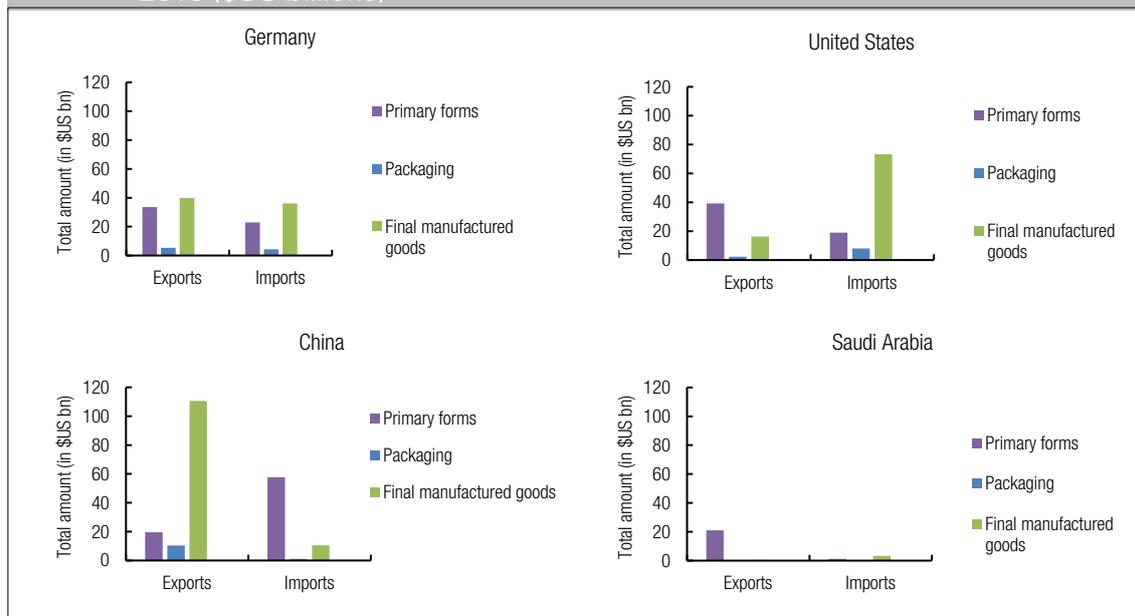
### 3.3 Trade is multi-faceted and multi-directional

Another important finding from analysis of the life-cycle plastics database is that many countries play dual roles in the plastics sector. Some of the world's largest exporters of plastics products and inputs are at the same time among the world's largest importers, indicating that plastics trade is multi-faceted and multi-directional. The oil-producer Saudi Arabia is one of the world's largest exporters of plastics inputs, in the primary forms of pellets and nurdles and does not figure much as an importer. China is a major importer of primary plastics and exporter of derivative products. The United States and Germany, with significant interests in oil and gas production and the chemical industry as well as manufacturing more generally, feature heavily in both importing and exporting of plastics across the life cycle (Figure 2).

Tables 2 and 3 below highlights how the role of selected countries in trade varies across the stages in the life cycle of plastics in 2018. Notably, some countries rank among the top 10 exporters across all parts of the plastics value chain – such as the United States and several EU countries –while others are prominent in certain sectors only (such as Indonesia as an exporter of intermediate manufactured products and of synthetic textiles). Some of the world's largest exporters of plastics products and inputs are at the same time among the world's largest importers, indicating that plastics trade is multi-faceted and multi-directional. The oil-producer Saudi Arabia is one of the world's largest exporters of primary plastics and does not figure much as an importer of plastics. China is a major importer of primary plastics and a significant exporter of most derivative plastic products. The United States and Germany, with significant interests in oil production and the chemical industry as well as manufacturing more generally, feature heavily as both importers and exporters.

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Figure 2. Key players snapshot – plastics trade is multi-faceted and multi-directional, 2018 (\$US billions)



Source: Author's compilation, drawing on prototype UNCTAD Plastics Database, October 2020.

Table 2. Top ten exporters by volume and category (Rank 1-10, 2018)

Rank	Feedstocks	Additives	Primary Plastics	Intermediate Forms of Plastic	Intermediate Manufactured Products	Final Manufactured Products	Plastic Waste	Packaging	Synthetic Textiles
1	Rep. of Korea	Saudi Arabia	USA	China	China	China	Germany	China	China
2	Japan	USA	Saudi Arabia	Germany	Rep. of Korea	Germany	USA	Germany	Rep. of Korea
3	USA	Rep. of Korea	Rep. of Korea	Italy	Chinese Taipei	Thailand	Japan	France	India
4	Netherlands	Belgium	Germany	USA	India	Poland	United Kingdom	Vietnam	Chinese Taipei
5	Germany	Indonesia	Belgium	Rep. of Korea	Indonesia	USA	Belgium	Poland	Vietnam
6	Saudi Arabia	China	China	India	Thailand	Belgium	France	Netherlands	Indonesia
7	India	Chinese Taipei	Chinese Taipei	Chinese Taipei	USA	Japan	Netherlands	Italy	USA
8	Chinese Taipei	Malaysia	Netherlands	Turkey	Germany	France	Hong Kong	Belgium	Thailand
9	Belgium	Germany	Thailand	Belgium	Vietnam	Italy	Mexico	Turkey	Germany
10	Singapore	Canada	Singapore	Poland	Turkey	Rep of Korea	Italy	Thailand	Belgium

Source: Authors' calculations, drawing on prototype UNCTAD Plastics Database, October 2020.

**Table 3. Top ten importers by volume and category (Rank 1-10, 2018)**

Rank	Feedstocks	Additives	Primary Plastics	Intermediate Forms of Plastic	Intermediate Manufactured Products	Final Manufactured Products	Plastic Waste	Packaging	Synthetic Textiles
1	China	China	China	USA	Vietnam	USA	Malaysia	USA	USA
2	Belgium	India	Germany	Germany	USA	Germany	Thailand	Germany	Vietnam
3	Netherlands	USA	USA	France	China	United Kingdom	Hong Kong	Japan	Germany
4	USA	Germany	Italy	China	Indonesia	France	Germany	United Kingdom	Turkey
5	Germany	Netherlands	India	United Kingdom	Turkey	Netherlands	Vietnam	France	China
6	Chinese Taipei	Belgium	Belgium	Belgium	Germany	Japan	Netherlands	Netherlands	Indonesia
7	Rep. of Korea	Rep. of Korea	Turkey	Italy	Bangladesh	Belgium	USA	Belgium	Brazil
8	India	Spain	Vietnam	Turkey	Mexico	Canada	Chinese Taipei	Spain	United Kingdom
9	Mexico	Italy	France	Vietnam	India	Spain	Turkey	Poland	Mexico
10	France	Indonesia	Mexico	Poland	Brazil	Italy	Indonesia	Italy	Japan

Source: Authors' calculations, drawing on prototype UNCTAD Plastics Database, October 2020.

## 4. Findings: Plastics trade by phases of the plastics life-cycle, by country and region

The following pages highlight some initial findings on plastics trade according to the various phases of the plastics life-cycle, starting at inception and ending with waste, by country and region.<sup>19</sup> We show both volume, a measure that is of particular interest in terms of pollution, and also value, a measure that indicates the economic weight of the category. Figures for each phase are shown in full in Annex 2, and some are also highlighted in the text below. We also zoom in further in on a few interesting sub-groups of products, notably plastic packaging, synthetic textiles and fishing nets. Finally, a full list of the HS codes that were used to extract data relevant to each sub-heading can be found in Annex 1, along with explanatory notes.

### 4.1. Feedstocks and precursors used in plastics

Fossil-fuel feedstocks and related precursors for plastics production, consisting mostly of petroleum products from crude oil and hydrocarbons found in natural gas, are at the earliest stage of the plastics value chain and are the basis for a sequence of further transformations that result in final plastic products. Although the value of the trade in this category reached US\$94 billion in 2018, this is comparatively small compared to the value of trade across the life cycle of plastics, the importance of this category was highlighted by the large share of feedstocks and precursors traded internationally in terms of volume, reaching 100 million metric tonnes. In terms of volume, fossil fuel feedstocks and precursors represent the second largest category of trade in the plastics value chain. However, while the items included in the database for this category represent a sub-group of fossil fuels and precursors specifically identified as inputs for plastics production, they may also be inputs for other sectors; the data does not allow us to determine what portion of the value and volume of these that were specifically devoted to plastics. Notably, this category is also a significant category in terms of contribution

<sup>19</sup> Note: In the charts and aggregations that follow, the United States includes Puerto Rico and United States Virgin Islands; Belgium includes Luxembourg; France includes Monaco; Chinese Taipei is reported as "Other Asia, not elsewhere specified"; Switzerland includes Liechtenstein; Rest of World is the sum of all other countries.

to pollution, including CO<sup>2</sup> emissions as well as through oil, gas and chemical mishaps and leakages during international transportation.

Leading oil and gas producers made up the top-20 exporters of feedstocks and chemical precursors used in plastics in 2018, including the United States, Saudi Arabia, Canada, Kuwait and Russia, as one would expect (Annex 2 Figures 1a - d). However non-oil exporting countries with refining capacities were also significant players including, in particular the Republic of Korea (with 15 million tonnes) and Japan (with 10 million tonnes). China does not enter the top exporters because China uses its domestic fossil fuel production locally and imports fulfill outstanding needs, thus ranking first by far in terms of imports.

## 4.2. Additives used in plastics

Chemical additives are an essential component of plastics. Although not consisting of plastics themselves, these chemical additives are critical ingredients for the scale and diversity of plastics on the global market, enabling the multitude of colours, textures, characteristics, properties and features that have made plastics such as useful material. More importantly, they have been pointed at due to the suspected danger they represent for health<sup>20</sup>. The product codes included in this category are listed in the Annex and may warrant further review for future studies. The additives listed may not be used exclusively for plastics, and further research is required as to how these should most correctly be included in the database. At its present definition, trade in additives potentially used in plastics was worth US\$81 billion in 2018, corresponding to 55 million metric tonnes.

The United States lead exports in additives used in plastics in terms of value, exporting almost US\$9 billions of such additives in 2018, before China with around US\$7 billion. Saudi Arabia was ranked 3rd with US\$6 billion but ranked first in trade by volume, which might reflect a specialization in heavier additives compared to other countries (Annex 2 Figures 2a-d). In terms of imports, countries which were the large plastics producers (China, Germany, United States) were unsurprisingly the largest buyers as additives are an essential component for the production of final goods. China imported US\$14 billion of additives used in plastics, corresponding to 18% of the total imports in additives in 2018, more than twice the value of imports from Germany.

## 4.3. Primary forms of plastics

Primary forms of plastic are a very important category of plastics trade as they enter the production of the immense range of all final products that contain plastic. In 2018, trade in primary forms of plastic (including resin pellets, synthetic fibres and synthetic rubber in primary forms) reached some US\$348 billion, corresponding to almost 200 million metric tonnes.

As shown below, and in the Annex as Figures 3a-d, the United States was the top exporter of primary forms of plastics with approximately US\$37bn of exports in 2018, while Germany and the Republic of Korea followed with respectively around US\$31 and US\$27 billion each, before Belgium and Saudi Arabia, with the latter ranked second in terms of volume. In this context, Saudi Arabia, as one of the most important oil producers,

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<sup>20</sup> One of the best known additives is Bisphenol A, commonly known as BPA, which is an endocrine disrupter. While widely banned for use in baby bottles, it continues to be widely used in many food and beverage storage containers.

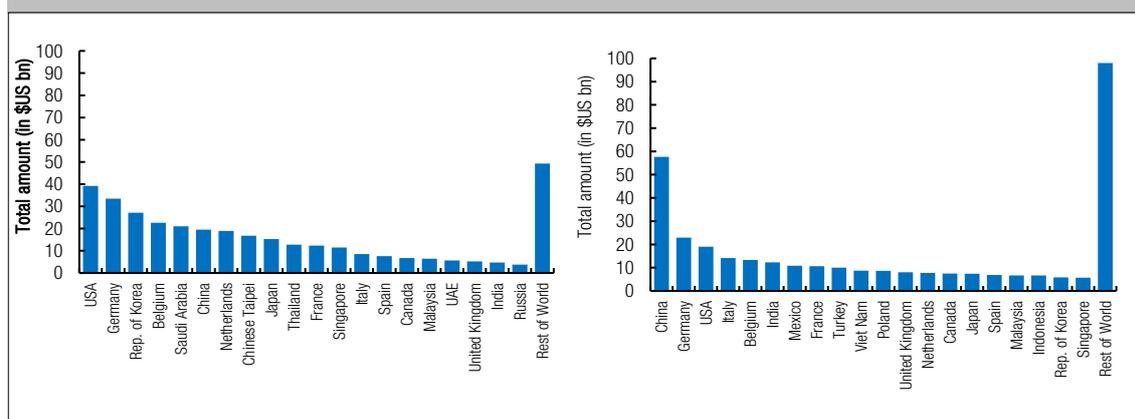
has all the necessary resources and knowledge required to supply such an industry. Actors are relatively concentrated in few geographical locations, between Europe, Asia, Middle East and North America.<sup>21</sup>

In terms of total exports in primary forms of plastic in 2018, the United States and Germany each represented approximately one tenth of the global trade market, while the subsequent four countries each represented approximately 6-8% of global trade in primary plastics.

Some of the world's largest exporters of plastic products are also importers of an array of inputs to plastic production. A number of developing countries make a significant contribution to converting, manufacturing and trade of intermediate or finished goods, including India, Mexico, Turkey and Vietnam (Annex 2 Figures 3 a-d). China, while ranking 6th in terms of exports of plastic raw material was by far the largest importer of primary forms of plastic, importing 17% of the total market, an amount which was almost three times as much as Germany (which although in 2nd position can also count on domestic production of plastic raw materials). A core explanation for this is the scale of China's domestic market for plastics and the scale of its manufacturing output for global markets, generating huge demand for inputs. If one could incorporate the full plastics value chain, to include all the plastic embedded in final manufactured products, the scale of China's exports would be even larger.

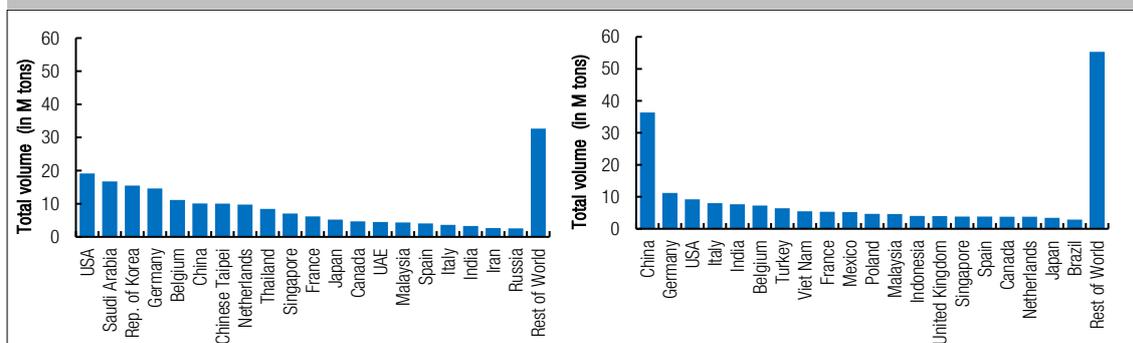
Notably, production of primary plastics generally requires both reliable access to fossil fuels as well as chemical industrial knowledge and infrastructure. Most of the top producers of primary plastics, but not all, have both of these assets. Germany, for instance, relies on the strength of its chemical industry for competitive advantage, while others like Saudi Arabia has rapidly build petrochemical capacity to leverage its oil wealth.

**Figure 3. Value exports (left) and imports (right) in primary forms of plastics – 2018**



Source: Authors' compilation, drawing on prototype UNCTAD Plastics Database, October 2020. USA includes Puerto Rico and United States Virgin Islands; Belgium includes Luxemburg; France includes Monaco; Chinese Taipei is reported as "Other Asia, not elsewhere specified" in the BACI Database; Switzerland includes Liechtenstein; Rest of World is the sum of all other countries.

<sup>21</sup> This national level trade data reinforces industry data on the world's top producers of virgin primary plastics. Countries and firms ranked in descending order the United States (Exxon Mobile, Chevron Phillips and Dow chemicals); Germany (BASF and Lanxess); Italy (Eni); Saudi Arabia (SABIC); United Kingdom (Ineos); Korea (LG Chem) and Netherlands (Lyondell Bassell). See Barrowclough and Deere (2020).

**Figure 4. Volume exports (left) and imports (right) in primary forms of plastics – 2018**

Source: See Figure 3.

#### 4.4. Intermediate forms of plastics

Intermediate forms of plastic products include products that are still at an early stage in the plastics value chain. They consist of primary plastics that have already been processed and assembled into larger elements – such as sheets, films, plates and yarns – that will then be further molded, shaped, manufactured, assembled to produce intermediate and final manufactured products. Intermediate forms of plastics represented a large share of trade in plastic products, at US\$158 billion and 39 million metric tonnes in 2018.

With only a few exceptions, the same countries enter the rankings both as largest exporters and importers of intermediate forms of plastics. While large manufacturing countries unsurprisingly led the rankings in terms both of exports and imports of plastics in intermediate forms (e.g., China accounted for exports worth US\$22 billion and imports worth US\$12 billion; the United States for \$14 billion exports and US\$13 billion imports, and Germany US\$21 billion in export and US\$11 billion imports, as shown in Annex 2 Figures 4 a-d), several large oil producers that export plastic feedstocks or primary plastics did not appear in the list of top exporters of intermediate plastics. Saudi Arabia, for example, was ranked 5th in terms of exports of primary forms of plastic (2nd in terms of volume) but was outside the top 20 for the subsequent phases of the lifecycle of plastic. This reflects the fact that the plastics conversion and manufacturing business requires important industrial capacity.

#### 4.5. Manufactured plastic goods - Intermediate

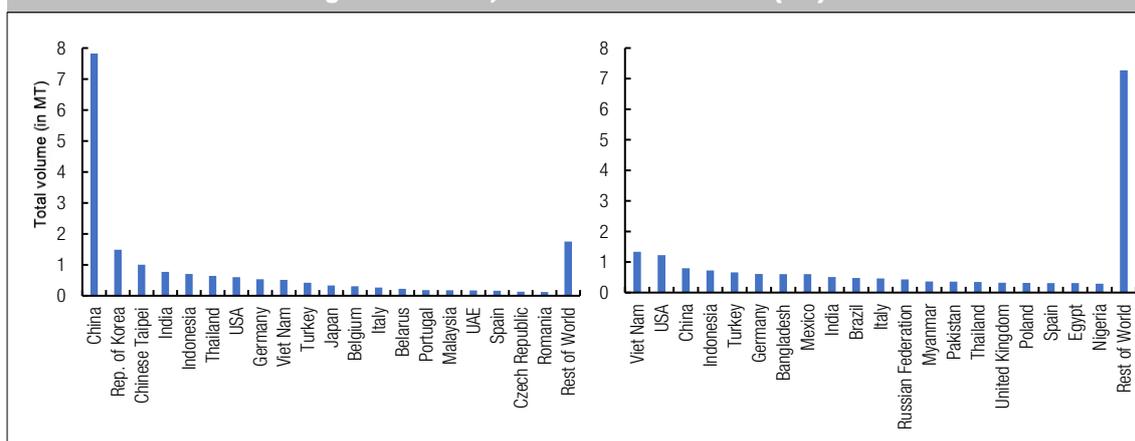
In order to refine the analysis, we further split our analysis of manufactured goods into two categories – intermediate and final manufactured goods. The total value of exports in the former category – intermediate manufactured plastic goods – summed up to US\$83 billion and 18 million metric tonnes in 2018. A number of intermediate manufactured plastic products are then further manufactured into final plastic products (e.g., woven synthetic textiles are manufactured into clothing) or used as inputs into other final manufactured products or by other sectors (e.g., plastic parts for the automobile industry and construction, household appliances, and fishing equipment). The explanatory notes in Annex 1 provide a detailed explanation of what we have included in this category.

In 2018, exports of intermediate manufactured plastic goods were dominated by Asian economies (Annex 2 Figure 5a), with China capturing 40% of the total exports in this category in terms of value (US\$33 billion), followed by the Republic of Korea (US\$6 billion and 7%), Chinese Taipei (US\$5 billion and 5%) and then the United States and Germany (each with US\$4 billion and 4% of total exports). When looking at volumes, the importance of Asia in exports is even more salient, with Asian countries making up the top-6 exports by volume,

including India, Indonesia and Thailand, and 68% of total exports in this category by volume. The importance of the Asian region in exports category of intermediate manufactured plastic products can be explained by the large share of intermediate synthetic textile products in this category.

Asian economies also play a major role in imports of intermediate manufactured plastics (Figure 5). Vietnam, for example, a well-known exporter of final manufactured synthetic clothing, needs intermediate synthetic textile products as inputs to production. In 2018, Vietnam imported US\$9 billion of intermediate plastic goods, accounting for 11% of the global total. Other Asian countries known for exporting final manufactured clothes, namely Bangladesh and Indonesia, were also among the top-5 importers by value of intermediate plastic goods (alongside the United States, China and Mexico).

**Figure 5. Volume exports (left) and imports (right) in intermediate manufactured goods – 2018, million metric tonnes (MT)**



Source: See Figure 3.

#### 4.6. Total intermediate plastic products

Focusing in on trade in intermediate plastic products – including both intermediate forms and intermediate manufactured plastic — provides a clear picture of the importance of trade at this stage of the plastics life cycle and of the key players located in the middle of the value chain of plastics. In 2018, the combined value of exports in intermediate plastic products was US\$241 billion and 57 million metric tonnes.

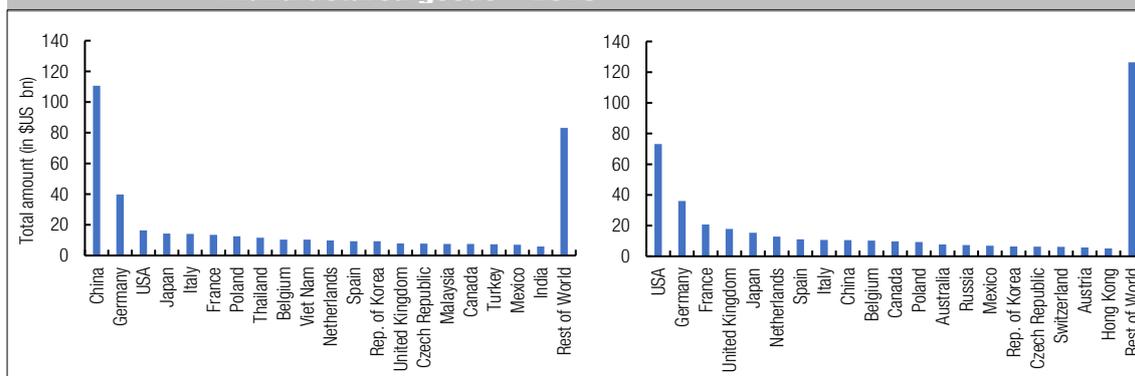
China (capturing 23% of trade by value) led the ranking of exporters of all intermediate plastic products combined, exporting more than twice the value as Germany in second position (with 10%). The products traded in this category are likely to be transformed and reexported further but necessitate the capacity to process early forms of plastics domestically. In this context, very few developing countries enter the top-20 exporters. For imports on the other hand, Vietnam, a well-known producer of manufactured clothes, ranks 4th by value due to its reliance on synthetic textile fabrics. Notably, the highest share of the total value of imports in this category is just 7%, held by equally by the United States and China, followed by German (6%) and Vietnam (5%). The remaining share of imports by volume and value is spread relatively evenly across a much larger group of countries than for other categories; the remaining top-20 importers each imported 2-3% of the total value and volume, as did numerous countries outside the top-20.

## 4.7. Final manufactured plastic goods

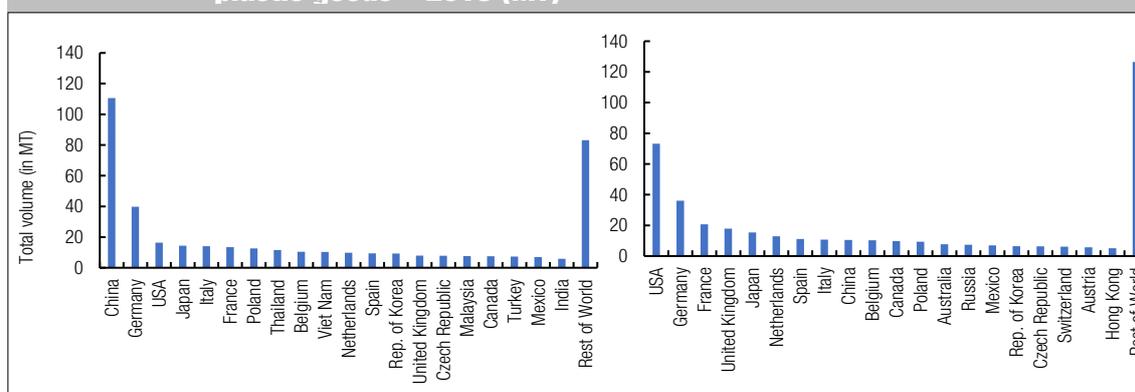
The picture for trade in final manufactured goods differs slightly to intermediate manufactured goods due to high demand for imports of final goods from advanced economies with large domestic markets. While final manufactured goods made up 21% of total plastics trade in terms of volume in 2018, thus ranking third behind feedstocks and primary forms, they were the highest value category of plastics trade along the life cycle – representing 41% in terms of value – thus illustrating the importance of value addition in final manufactured plastic goods.

In terms of the value of exports, China led exports by far (with 27% of the total), exporting almost three times as much as Germany in second (with 10% of the total) and more than six times as much as countries like the United States, Japan, Italy or France in 2018 (below and Annex 2 Fig 6a). When looking at imports, countries with large domestic markets led the rankings, notably the United States and European countries (accounting for over 50% of the total). Interestingly, China only ranked 9th in terms of value of imports in final manufactured goods, probably because it relies on its own domestic production to fulfil demand rather than importing from other countries (below and Annex 2 Fig 6b).

**Figure 6a, 6b. Value exports (left) and imports (right) in final manufactured goods – 2018**



**Figure 6c, 6d. Volume exports (left) and imports (right) in final manufactured plastic goods – 2018 (MT)**



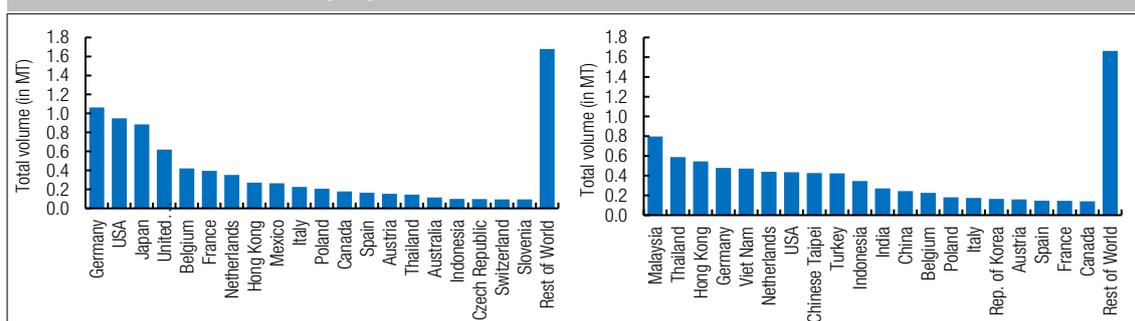
Source: As Figure 3.

## 4.8. Plastic waste

At the end of the plastics life-cycle comes waste. This category covers all types of wastes produced along the value chain. In addition, such flows have been subject to an increase of international interest in recent years since the Chinese import ban on plastic waste, an action which was then followed by many countries in South East Asia. However, although this category is the one that attracts most interest in the media, as it is the most directly linked to pollution, the total amount of trade is actually small. In 2018, it was smaller by a factor of almost 100 compared to the categories discussed above, amounting for around US\$3.3 billion and 8 million metric tonnes for exports and imports, respectively (although its multiplier values may be significantly higher when taking into account the employment effects of the many people involved in waste processing).

Most of the top-20 waste exporting countries are high-income economies as defined by the World Bank, with the exception of Mexico, Thailand, China, Indonesia and the Philippines (below and Annex 2 Fig 7a). Somewhat unexpectedly, leading the imports of plastic waste are some of the largest economies in the world including United States and Germany. This is surprising because these countries lack sufficient national recycling capacity and the option of exporting waste has been frequently viewed as cheaper and more economically efficient (GRID-Arendal 2019). Limitations of the data mean that it is not clear whether these countries re-export the waste or whether they dispose of it domestically (Jambeck et al 2018), so this remains a somewhat puzzling element for further research. In the meantime, it is worth noting evidence that most waste shipped abroad has not in fact been recycled and that enormous environmental and health consequences have been associated with sending waste off-shore to countries that do not have capacity to manage waste in an environmentally sound manner. It is notable that despite the high-profile bans of importing waste in recent years many South East Asian countries were still among the top-20 importers in 2018 (below and Annex 2 Fig 7 b). More importantly, this ranking included Malaysia, China, Vietnam, Thailand, Indonesia and the United States, which are countries that are also among the top 20 in terms of contribution to plastic waste mismanagement (Lavendar Law et al 2020).

**Figure 7. Volume exports (left) and imports (right) in plastic waste – 2018, million metric tonnes (MT)**



Source: As Figure 3.

As noted in the introduction, after key importing countries, starting with China in mid-2018, introduced restrictions on imports of certain plastics waste, the global market for plastic waste evolved considerably, and further changes are expected with the implementation by countries from early 2021 of the plastics amendments to the Basel Convention, which aim to better regulate plastic waste trade (BRS 2019). Further study of the shift in trade flows in plastic waste before and after 2018 will be of considerable value to policymakers.

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## 4.9. Zooming in on illustrative sub-categories

### (a) Synthetic textiles

A large proportion of the world's clothing is now made of synthetic fibers, which are cheaper than natural products such as wool or cotton. In consequence, the textile sector is a major consumer and producer of plastic products. According to Geyer et al. (2017), the textile sector was the fourth major industrial sector in terms of production of primary plastic with 47 million metric tonnes produced in 2015, accounting for about 14% of total global plastics production, compared to the largest category, the packaging sector (over 35% of the total and around 146 million metric tonnes) and the building and construction sector (16% of the total and some 65 million metric tonnes). Trade flows of synthetic textiles are also found to be of primary importance in our prototype database, as reported in Figures 8a and b below, which display the top-20 exporters and importers of synthetic textiles both in value and volume. (Note that synthetic textile is broadly defined here as including all stages of synthetic textile production, from man-made filaments to manufactured clothes.)

In 2018, China dominated the ranking by far (Annex 2 Fig 8a) exporting the equivalent of 40% of the US\$209 billion of total exports of synthetic textiles. Germany, the Republic of Korea, and Vietnam followed with respectively 5%, 4%, 4% of the total value of exports, followed by a long list of countries exporting between 1% and 3% of the global total.

Turning to the importers' side (Annex 2 Fig 8b), the ranking in 2018 was led by the United States, which imported the equivalent of US\$27 billion of synthetic textiles, corresponding to 13% of total imports that year. Vietnam and Germany were second and third respectively, importing slightly more than they export. As mentioned above, countries like Vietnam and Indonesia import intermediate manufactured plastic products (woven fabrics) to be assembled into final manufactured products; they also export considerable volumes of both intermediate and final manufactured products made from synthetic textiles.

Annex 2 Figures 8 c and d report the top-20 exporters in synthetic textile by volume. Again, China led the ranking by far with almost 50%, followed by five major Asian economies typically known as important textile exporters: the Republic of Korea, India, Chinese Taipei, Vietnam and Indonesia. The difference in ranking between value and volume figures could reflect the fact some economies might be specialized in exporting higher-value products, as is the case here for Germany which only ranked 9th in volume but 2nd in value. A more careful analysis of bilateral trade relations might shed light on these differences.

### (b) Plastic packaging

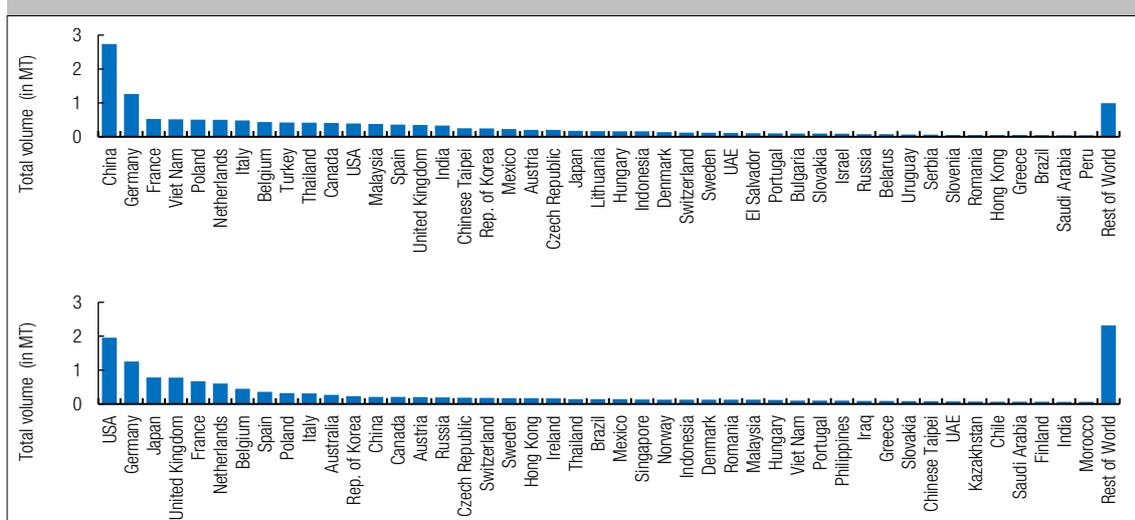
The greatest component of plastic pollution in the world's oceans is the result of mismanaged plastic packaging waste. Most packaging is single-use and few countries have adequate waste collection, management and recycling facilities to stop such waste entering the environment. Much plastic packaging waste is also technically difficult to recycle because it is contaminated, combined with non-recyclable materials or contains toxic materials that present health and environmental hazards when recycled. To fight against such pollution, many countries have implemented national bans against single-use plastic and there are numerous company initiatives to reduce unnecessary use of plastic packaging and other single use products in their stores and products.

Our dataset suggests the major economies are also the biggest exporters in plastic packaging by value, with China exporting 19% of the total \$US53 billion exported in 2018, while Germany exported 10%. France, the United States and Italy follow, with exports from 5% to 4% of the total. Regarding imports, United States accounted for 15% of total imports in 2018, while Germany accounted for 8%.

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In terms of volume, the extent of trade taking place in plastic packaging – 14 million tonnes in 2018 – is much smaller than the other categories discussed above. However, such products are typically used one single time before ending up in bins (see Figure 9).

**Figure 9. Volume exports (above) and imports (below) in plastic packaging – 2018 MT**



Source: As Figure 3.

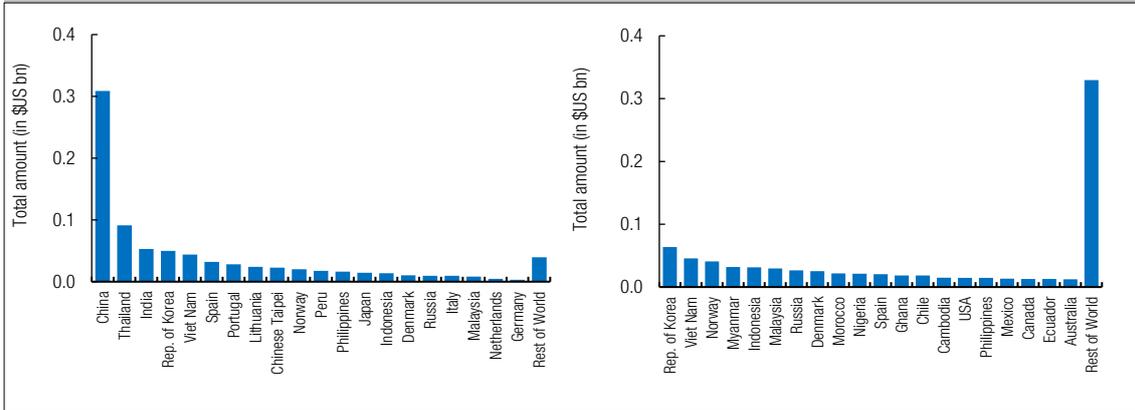
Notably, as discussed above, this data on plastic packaging flows, also shown in Annex 2 Figs 9 a-d, underestimate both the value and volume of packaging that is trade internationally because the data reported only include plastic packaging products which cross borders to be sold as such. They do not include domestic production or packaging directly wrapped around products or packaging used to protect goods in transportation (in this sense, some packaging may be traded twice – once as ‘empty’ packaging and later as packaging used in boxes to protect goods in transportation). In consequence, figures presented here largely underestimate the extent of the packaging trade flows.

### (c) Plastic fishing nets

While fishing nets do not appear in Chapter 39 of the HS, the majority of fishing lines and nets are plastic. Although much smaller than the categories discussed above in terms of trade, amounting only \$0.82 billion and 0.16 million tonnes in total, trade in ‘made-up fishing nets’ provides an important example of the breadth of plastic products traded internationally and are also worthy of consideration due to the pollution they create when discarded in the ocean. The following data on trade in fishing nets refers only items covered by HS 560811 ‘made-up fishing nets’; additional HS codes related to fishing lines and nets were not included here

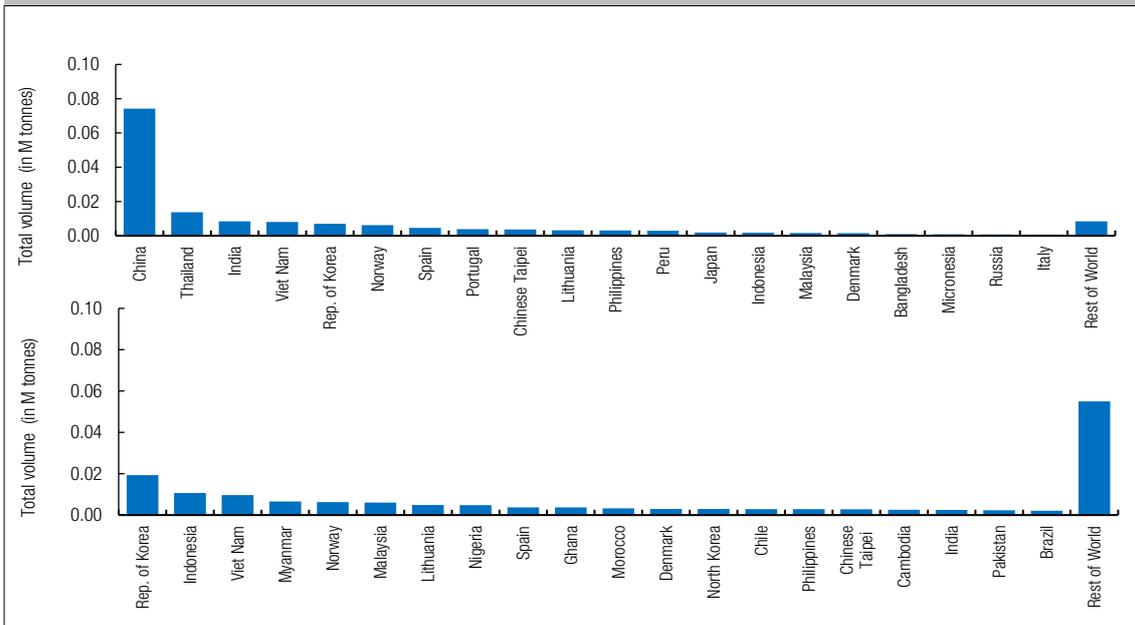
As shown below and in Annex 2 Figs 10 a-d, countries with important fishing industries appear in the top-20 importers and exporters of ‘made-up fishing nets’, often for the first time in the plastics life-cycle. More importantly, the Asian countries that were important traders of fishing nets both in terms of imports and exports were also those that identified as key entry points for marine litter into the ocean. Notably, this sub-category of plastics trade is the first one in this study where African countries have appeared among the top-20 importers by value, with Nigeria and Ghana, both countries for which the fishing industry is an important part of the GDP, ranking respectively 10<sup>th</sup> and 12<sup>th</sup> for the import of fishing nets.

**Figure 10a,b. Value exports (left) and imports (right) in plastic fishing nets – 2018,**



Source: As Figure 3.

**Figure 10c,d. Volume exports (above) and imports (below) in plastic fishing nets –**

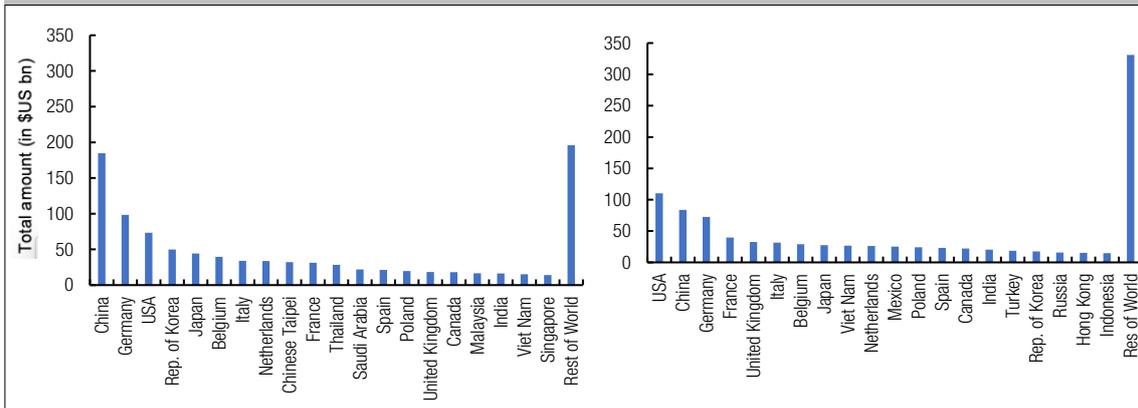


Source: As above.

#### 4.10. Total plastic products

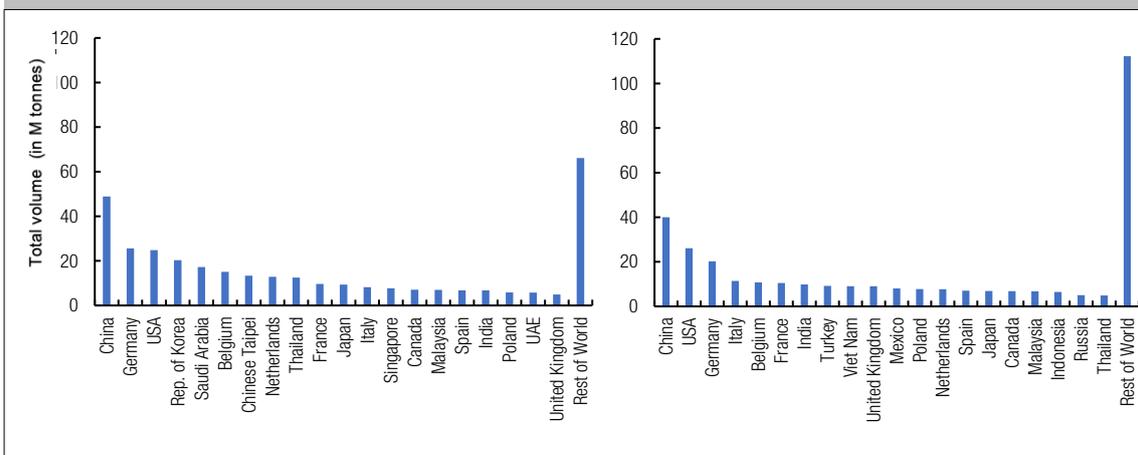
Total trade in plastic products (excluding feedstocks and additives) reached the value of US\$1008 billion in 2018. As shown below and in Annex 2 Figs 11 a-d. most trade was concentrated in Europe and in Asia, with China and Germany being the largest exporters in both volume and value terms, and China being notable as the world’s largest importer and also exporter of plastics by volume; although the United States was an important player too.

**Figure 11a,b. Value exports (left) and imports (right) in total plastic products – 2018, \$US bn**



Source: As Figure 3.

**Figure 11c,d. Volume exports (left) and imports (right) in total plastic products –**



Source: As Figure 3.

## 5. Bilateral trade flows

Now that we have identified the main actors in each category of products, it is interesting to map the main bilateral trade relations taking place annually. One striking feature is that almost all trade in plastics, regardless of the stage of the production life cycle, appears to occur horizontally between Asia, Europe and North America. The trend of north-south or south-north trade prevalent in other products, or south-south trade patterns of recent years, do not occur. Further, Africa and Latin America (with the exception of Mexico) account only marginally for trade in this industry. The figures below show the top-50 bilateral flows. The circles indicate whether the country is a net exporter or a net importer in the sample: white circles indicate more outgoing, while blue circles indicate more incoming.

## 5.1. Feedstocks and precursors

Beginning with pre-primary inputs to plastics, consisting of feedstocks and precursors, China was clearly the biggest importer, importing mostly from the Republic of Korea, Japan, Taiwan and Saudi Arabia (Annex 2 Fig 12). Another interesting feature was the relatively small importance of Europe in terms of bilateral trade, with only two relations in the top-50 linking Europe with countries outside the continent, namely the US and Saudi Arabia.

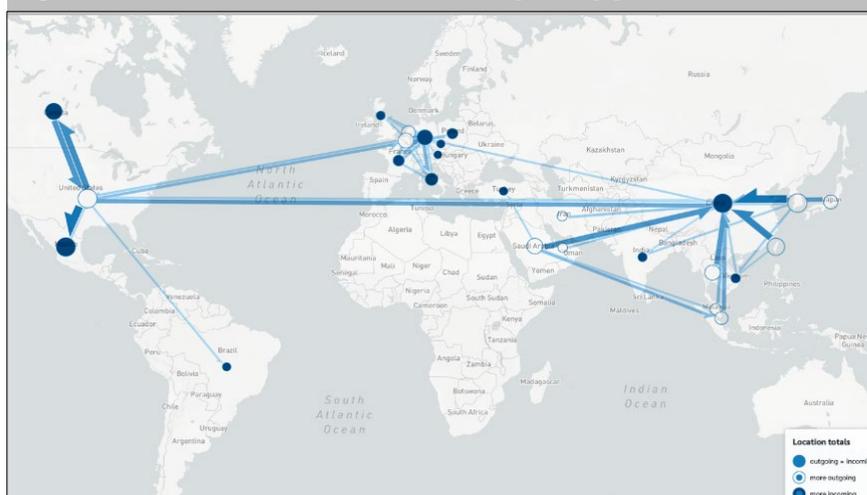
## 5.2. Additives

While major bilateral trade relations for feedstocks and precursors focused primarily at the regional level, with a lot of activity taking place within Asia and around China in particular, the top-50 rankings for trade in additives that can be used in plastics feature much more distant trading partners (Annex 2 Fig 13). Most of these net importers are major producers of intermediate and manufactured plastic products for which additives are a key input. The largest relation links Saudi Arabia and China, which traded almost twice as much by value as the second largest trade relation, which links Chinese Taipei and China. As in the case of feedstocks and precursors in Annex 2 Figure 12, Europe as a whole has a relatively small share of overall global trade in additives that can be used in plastics.

## 5.3. Primary Forms of Plastic

As noted above, the United States, Germany and the Republic of Korea were the top-3 exporters in this category in terms of value, with China, Germany and the United States as the top-3 importers. Consequently, the main bilateral links are between these countries, and there seems to be a trend of trade between close as opposed to distant neighbors (see Figure 14). The United States, for example, exported primary forms of plastics worth US\$8.4 billions to Mexico in 2018. Similarly, China imported US\$8.33 billions of such products from the Republic of Korea.

**Figure 14. Value of bilateral trade flows in primary plastics – 2018**



## 5.4. Intermediate forms of plastics

Bilateral trade flows in intermediate forms of plastics reflect the path of many global value chains in manufacturing production and trade (see Figure 15). Figure 15 illustrates the complexities of the plastics

ecosystem, whereby many developing countries have charted a path to economic diversification and trade through being part of these chains, which involve many countries and companies, ranging from major international corporations at the headquarters level to small and medium enterprises comprising the factory floor.

**Figure 15. Value of bilateral trade flows in intermediate forms of plastics – 2018**



### 5.5. Manufactured plastic goods - intermediate

Compared to intermediate forms of plastics shown above, trade in intermediate manufactured goods looks quite different. The striking feature was that almost all of the top-50 bilateral trade relations in 2018 involved exports from China to all regions of the world, with almost all other countries being net importers from China (See Figure 16). Another striking feature is that we see for the first-time trade flowing to Africa entering the largest bilateral trade relations, with Nigeria, Kenya, Morocco and Egypt importing non-negligible amounts from China.

**Figure 16. Value of bilateral trade flows in intermediate manufactured goods – 2018**



### 5.6. Total intermediate plastic products

Total intermediate plastic products, which combine intermediate forms of plastics and intermediate manufactured products, appear to be even more globally oriented than total plastic products when we focus on the top-50 bilateral trade relations. At least two countries on the African continent, namely Egypt and Nigeria, imported intermediate plastic products from China to a significant extent (see Figure 17). In addition, and similar to the case of intermediate manufactured goods discussed above, China was a net exporter to almost all regions of the world, while all other countries that appear on the map tend to have the largest trade relations with their regional neighbors.

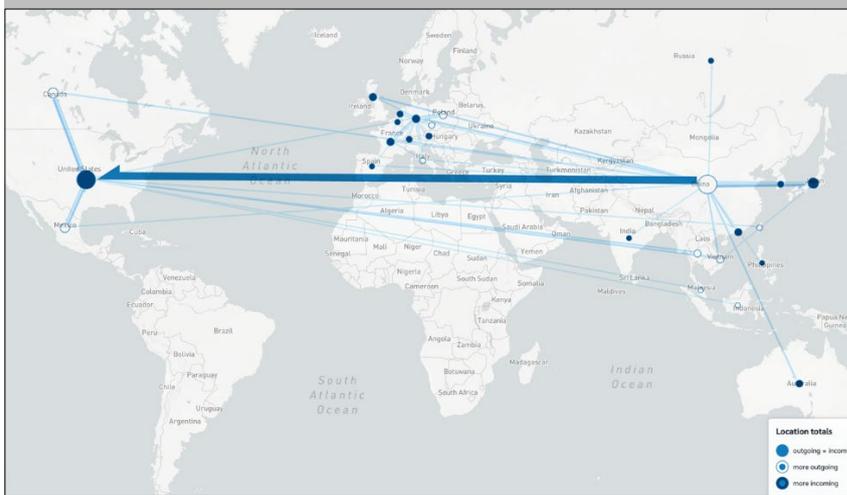
**Figure 17. Value of bilateral trade flows in total intermediate plastic products – 2018**



## 5.7. Manufactured plastic goods - final

For final manufactured plastic goods, China remained a key player, with many exports as one would expect given China's role in global manufacturing. The United States imported a significant share final manufactured plastics goods, mostly from Asia, which might also reflect the outsourcing strategy of many US firms relocating their production in countries with lower cost of labor (see Figure 18).

**Figure 18. Value of bilateral trade flows in final manufactured goods – 2018**



## 5.8. Plastic waste

When focusing on plastic waste, a striking feature is that the dominant direction of export flows was toward China and South East Asia in 2018 (Figure 19 below). However, as this data is based on the year 2018, it does not capture the impact of a number of plastic waste import bans implemented in this region in the middle of that year, and notably by China. As a number of these bans became effective only late in the year or in 2019, Asia was still strongly represented as the destination for plastic waste exports in the dataset (Brooks et al 2018; GRID-Arendal 2019).

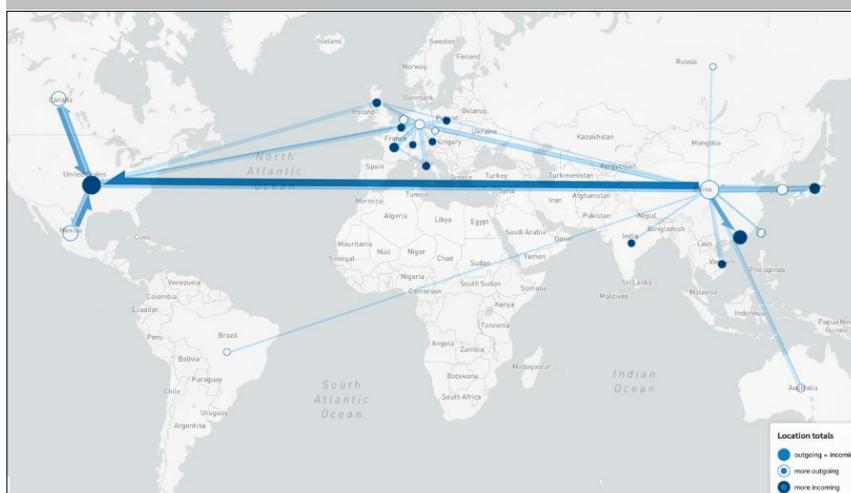
**Figure 19. Value of bilateral trade flows in waste – 2018**



## 5.9. Total plastic products

Given the ever-present nature of plastic in seemingly all goods today, even when “hidden plastics” are not yet accounted for, it is not surprising that the largest global traders are also major actors in plastic products. China, the US and Europe were hubs of trade in these products, with the highest share of the value of goods flowing from China to the US (see Figure 20). Overall, the US was a net importer of total plastic products in 2018, while China was a net exporter.

**Figure 20. Value of bilateral trade flows in total plastic products – 2018**



## 5.10. Synthetic textiles

In the case of synthetic textiles, trade is centered around Asia, and China in particular. Here, the data reflected below include synthetic textiles across the value chain – from primary forms of synthetic fibres to intermediary yarns to intermediate manufactured fabrics and a vast array of final manufactured synthetic textiles (ranging from clothes and clothing accessories to ropes and synthetic sacks as well as fishing nets).

The value chain for these final products involves a diverse array of countries playing different roles. Figure 21 highlights that the average distance of the main trade flows was longer than for many other types of plastic and that most of the combined flows leave from China. The main trade flows consisted of exports from China to the United States, from China to Vietnam, from China to Japan, and from Vietnam to the United States, amounting US\$13.1, US\$6.8, US\$4.5 and US\$2.76 billion respectively. This last flow, as well as flows from Indonesia to the United States, illustrates the specialization of Vietnam and Indonesia in the production of manufactured clothes for sale in the United States. Notably, the data also reveal that countries such as Bangladesh, Brazil, the Philippines, Egypt, Indonesia and Pakistan feature as importers of intermediate forms of synthetic, which are manufactured into final products by companies strategically located where the cost of labour is comparatively low.

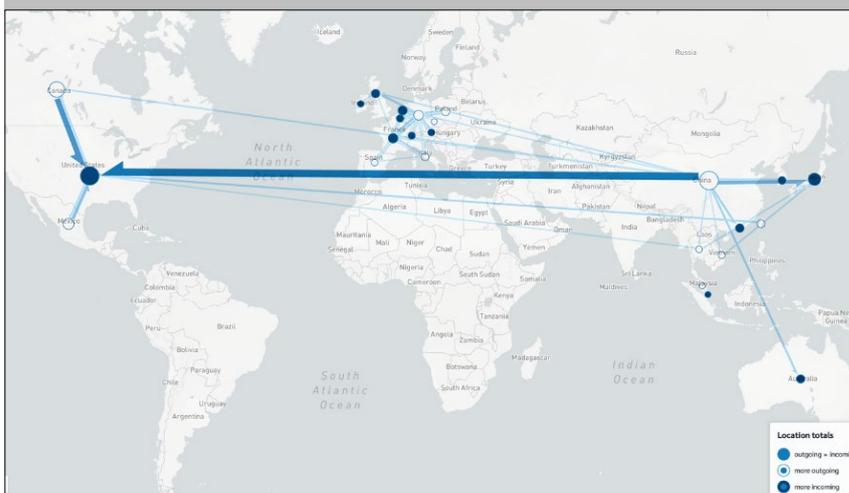
**Figure 21. Value of bilateral trade flows in synthetic textiles – 2018**



### 5.11. Plastic packaging

Similar to primary forms of plastic, trade in plastic packaging happens mostly within regions, except for the main flow of exports from China to the United States (amounting to US\$2.6 billion). As underscored above, Figure 22 only shows flows in plastic packaging per se (i.e., empty plastic packaging) but not goods pre-packaged or transported in plastics. As such, the flows illustrated considerably under-state the total volume and value of plastic packaging that flows across borders; nor does it provide the full picture of the direction of packaging trade either.

**Figure 22. Value of bilateral trade flows in plastic packaging – 2018**



## 5.12. Fishing nets

Of the plastic products analysed here in detail, fishing nets offer the most global picture in terms of bilateral trade relation. As noted in Part 4, many African and South American countries as well as small Pacific Islands appear in Figure 23 as among the top 20 importers of plastic fishing nets, reflecting the importance of fishing in their economies, whether for export or for subsistence.

**Figure 23. Value of bilateral trade flows in fishing nets – 2018**



## 6. Conclusion and further research

This paper has offered new evidence and insights about trade flows along the plastics value chain as a contribution to the wider goal of identifying policy levers and instruments that can help reduce the world's excessive use of plastic.

Based on a granular review of official international trade statistics and their classifications as reported by governments of importing and exporting countries, the data and analysis in this paper has gone considerably beyond the limited view of plastics trade revealed by an analysis of trade data covered by the “the plastics chapter” (Chapter 39) of the Harmonised System classifications. By identifying previously “semi-hidden” plastics components as well as the “known” plastics components, as well as trade in critical inputs to plastics production, this paper provides a clearer understanding of trade across the entire life-cycle of plastics.

Using a unique prototype dataset, the paper finds that value of global trade in plastics is at least 40% larger than previously envisaged, and greater still if trade in ‘hidden’ plastics were also to be included. Importantly, this dataset also highlights trade in inputs to plastics production – fossil fuel feedstocks and precursors to polymerization as well as additives. Trade is also found to be extremely broad, multi-directional and multi-faceted with many countries acting as both importers and exporters at different phases of the life-cycle and sometimes even at the same phase.

The new dataset's findings also give us a first indication of how the global plastic value chain is geographically organized at different points along the plastics life cycle. We have identified key actors at different stages of the production chain, with some countries consistently ranked among top importers and exporters. Such countries have high stakes in this industry and will therefore be important actors to bring to the discussion to help find ways to better regulate and eventually reduce the excessive use of plastic. Some countries and companies are already contributing to this effort, but much more can be done and it is hoped this first-cut empirical study will help.

In addition to identifying important individual countries in the plastics value chain, and highlighting bilateral trade flows between them, the paper importantly underscores the fact that the plastics economy is extremely global. In addition to globally distributed raw inputs into the plastics process, starting from fossil fuel producers but opening rapidly across the globe through the export of polymer resins, markets for subsequent plastic products and eventually plastic waste are global. International trade is thus deeply relevant to efforts to address plastic pollution.

At the same time, the analysis presented in this paper remains preliminary and, as with any new approach, it is hoped there will be future iterations and improvements to come. One obvious limitation, as described in section 2 above, is that much needs to be done at the national and international level to ensure that truly systematic, standardized and timely reporting of trade statistics is the norm. Further, it will be important to get a better grip on the extent of trade flows in what we have called "hidden plastics" alongside the non-hidden and semi-hidden flows. Even within the limitation of existing classifications and measures, we need to examine trade across a wider cross-section of countries and to examine trends over time. Notably, the prototype database under development will provide data back to 2002. In addition, further research may lead to recommendations to update the range of codes included in our database and their categorization. We encourage such research and suggested improvements. One specific area for further research is on the extent to which those feedstocks, precursors and additives used in plastics are indeed traded specifically for use as inputs into plastics among other potential uses. In addition, more detailed research on the share of plastics that are traded internationally – both at different points along the life cycle and in relation to specific kinds of plastic products – will improve understanding of the role of trade and its potential effectiveness as a policy lever. Finally, there are long-standing gaps in analysis of national waste management capacities for plastics mapped against their consumption of plastics – both through domestically-produced plastics and imported plastics.

Improving data collection and dissemination on these dimensions of plastics trade will be an important step towards greater understanding of the challenges that are involved in transforming the plastics economy. It will help clarify the international interlinkages and interdependencies on the production side of the plastic industry and the role of trade at different stages of the production chain. It would offer rich insights on the relationship between production, consumption and trade.<sup>22</sup> It will also help to uncover more of the "hidden" plastics trade that remains a mystery (although vigorous efforts are under way to better understand this, including by this project team). To build up on these elements, we need to learn more about the market structure of the plastic sector, namely employment, prices, revenues, costs, value-added, investment and capacity utilization. It is the hope of the authors that the trade database will help support future researchers in these areas.

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<sup>22</sup> In the interest of encouraging on-going research, UNCTAD's Statistics Division notes that while this data is not available at a disaggregated level, one could do a macro analysis using WIOD or TIVA. This difficult task would require merging chemical and economic/statistical expertise to devise appropriate ratios for each economic sector.

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One way in which the database is already supporting new policy-related research is through its identification of potential market opportunities for countries that can provide products that offer some of the benefits of plastics, without the negatives. The database is highlighting trade in some points during the life-cycle where non-plastic substitutes and alternatives can already be found. This includes synthetic textiles, for which alternatives include textiles made from cotton, wool, and vegetable fibres, and packaging, where many substitutes and alternatives are already entering markets, based on plant cellulose or milk-based wrappings, among others (Barrowclough and Vivas 2020). At the earliest stage of the plastic production cycle, there are also bio-based alternatives to fossil fuel-based virgin plastic feedstocks, although the overall environmental credentials of such 'bio-plastics' are a matter of considerable debate (Robbins 2020).

The paper has also underlined the need for further research on potential amendments to HS classifications that could help policymakers better track trends in plastics trade and address their sustainability implications (Deere Birkbeck and Sugathan 2021). Although amendments to the HS are a lengthy and complex process of negotiations that occur through 5-year review cycles, deeper understanding of the limitations and gaps in current classifications would simultaneously strengthen the knowledge base for ongoing discussion of plastics trade and its sustainability implications.

While much remains to be done, the main message from this paper is that international trade plays an important role across the life cycle of plastics. Both the volume and value of trade are higher than commonly estimated and efforts to properly capture such trade face a number of methodological challenges. We hope that the prototype basis will provide a useful foundation for further research on the role of international trade in the plastics sector and on the potential for trade policies to support efforts to reduce plastic pollution.

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## Annex 1: Inputs to the UNCTAD plastics database (prototype, as of October 2020)

### Feedstocks and precursors used in plastics Harmonized Commodity Description and Coding Systems (HS) - Revision 2017

Code	Description
270710	Oils and products of the distillation of high temperature coal tar; benzol (benzene)
270720	Oils and products of the distillation of high temperature coal tar; toluol (toluene)
270730	Oils and products of the distillation of high temperature coal tar; xylol (xylenes)
270740	Oils and products of the distillation of high temperature coal tar; naphthalene
271091	Waste oils; of petroleum or obtained from bituminous minerals, not crude; and preparations n.e.c., weight 70% or preparations of the same, containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs)
271114	Petroleum gases and other gaseous hydrocarbons; liquefied, ethylene, propylene, butylene and butadiene
280610	Hydrogen chloride (hydrochloric acid)
290121	Acyclic hydrocarbons; unsaturated, ethylene
290122	Acyclic hydrocarbons; unsaturated, propene (propylene)
290123	Acyclic hydrocarbons; unsaturated, butene (butylene) and isomers thereof
290124	Acyclic hydrocarbons; unsaturated, buta-1,3-diene and isoprene
290129	Acyclic hydrocarbons; unsaturated, n.e.c. in heading no. 2901
290211	Cyclic hydrocarbons; cyclohexane
290220	Cyclic hydrocarbons; benzene
290230	Cyclic hydrocarbons; toluene
290241	Cyclic hydrocarbons; o-xylene
290242	Cyclic hydrocarbons; m-xylene
290243	Cyclic hydrocarbons; p-xylene
290244	Cyclic hydrocarbons; mixed xylene isomers
290250	Cyclic hydrocarbons; styrene
290260	Cyclic hydrocarbons; ethylbenzene
290315	Saturated chlorinated derivatives of acyclic hydrocarbons; ethylene dichloride (ISO) (1,2-dichloroethane)
290321	Unsaturated chlorinated derivatives of acyclic hydrocarbons; vinyl chloride (chloroethylene)
290322	Unsaturated chlorinated derivatives of acyclic hydrocarbons; trichloroethylene
290323	Unsaturated chlorinated derivatives of acyclic hydrocarbons; tetrachloroethylene (perchloroethylene)
290329	Unsaturated chlorinated derivatives of acyclic hydrocarbons; n.e.c. in item no. 2903.2
290941	Ether-alcohols and their halogenated, sulphonated, nitrated or nitrosated derivatives; 2,2-oxydiethanol (diethylene glycol, digol)
290943	Ether-alcohols and their halogenated, sulphonated, nitrated or nitrosated derivatives; monobutyl ethers of ethylene glycol or of diethylene glycol
290944	Ether-alcohols and their halogenated, sulphonated, nitrated or nitrosated derivatives; monoalkylethers of ethylene glycol or of diethylene glycol n.e.c. in heading no. 2909
291010	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives; oxirane (ethylene oxide)
291020	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives, methyloxirane (propylene oxide)
291030	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives, 1-chloro-2,3-epoxypropane (epichlorohydrin)
291040	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives, dieldrin (ISO, INN)
291050	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives, endrin (ISO)
291090	Epoxides, epoxyalcohols, epoxyphenols and epoxyethers; with a three-membered ring and their halogenated, sulphonated, nitrated or nitrosated derivatives, n.e.c. in heading no. 2910
291211	Aldehydes; acyclic, without other oxygen function, methanal (formaldehyde)
291260	Paraformaldehyde

Note: The HS sub-headings in this category reflect a selection of key feedstocks and precursors readily identifiable as commonly used in plastics production. Importantly, not all trade in such products enters into the plastics life cycle; many products in this category may also have other end-uses. No attempt is made in this study to determine the share of traded products included under each classification that are destined specifically for plastics production. Recommendations on further HS classifications that cover further feedstocks and chemicals used in plastics production are welcome.

Additives Used in Plastics	
Harmonized Commodity Description and Coding Systems (HS) - Revision 2017	
Code	Description
282410	Lead; lead monoxide (litharge, massicot)
282490	Lead oxides; n.e.c. in heading no. 2824
282510	Hydrazine and hydroxylamine and their inorganic salts
290371	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; chlorodifluoromethane
290372	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; dichlorotrifluoroethane
290373	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; dichlorofluoroethanes
290375	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; dichloropentafluoropropanes
290376	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; bromochlorodifluoromethane, bromotrifluoromethane, and dibromotetrafluoroethanes
290377	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; n.e.c. in headings 290371 to 290376, perhalogenated only with fluorine and chlorine
290378	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; perhalogenated derivatives, other than those only with fluorine and chlorine, n.e.c. in item no. 2903.71 to 2903.76
290379	Halogenated derivatives of acyclic hydrocarbons containing two or more different halogens; n.e.c. in item no. 2903.7
290381	Halogenated derivatives of cyclanic, cyclenic or cycloterpenic hydrocarbons; 1,2,3,4,5,6-Hexachlorocyclohexane (HCH (ISO)), including lindane (ISO, INN)
290382	Halogenated derivatives of cyclanic, cyclenic or cycloterpenic hydrocarbons; aldrin (ISO), chlordane (ISO), and heptachlor (ISO)
290383	Halogenated derivatives of cyclanic, cyclenic or cycloterpenic hydrocarbons; mirex (ISO)
290389	Halogenated derivatives of cyclanic, cyclenic or cycloterpenic hydrocarbons; n.e.c. in item no. 2903.8
290391	Halogenated derivatives of aromatic hydrocarbons; chlorobenzene, o-dichlorobenzene, and p-dichlorobenzene
290392	Halogenated derivatives of aromatic hydrocarbons; hexachlorobenzene (ISO) and DDT (ISO) (clofenotane (INN), and 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane)
290393	Halogenated derivatives of aromatic hydrocarbons; pentachlorobenzene (ISO)
290394	Halogenated derivatives of aromatic hydrocarbons; hexabromobiphenyls
290399	Halogenated derivatives of aromatic hydrocarbons; n.e.c. in item no. 2903.91, 2903.92, 2903.93 and 2903.94
290513	Alcohols; saturated monohydric, butan-1-ol (n-butyl alcohol)
290531	Alcohols; acyclic, diols; ethylene glycol (ethanediol)
290532	Alcohols; acyclic, diols; propylene glycol (propane-1, 2-diol)
290621	Alcohols; aromatic alcohols and derivatives, benzyl alcohol
290711	Monophenols; phenol (hydroxybenzene) and its salts
290713	Monophenols; octylphenol, nonylphenol and their isomers, salts thereof
290722	Polyphenols; hydroquinone (quinol) and its salts
290723	Polyphenols; 4,4'-isopropylidenediphenol (bisphenol A, diphenylpropane) and its salts
290911	Ethers; acyclic, and their halogenated, sulphonated, nitrated or nitrosated derivatives, diethyl ether
291413	Ketones; acyclic, without other oxygen function, 4-methylpentan-2-one (methyl isobutyl ketone)
291533	Acids; saturated acyclic monocarboxylic acids; n-butyl acetate
291570	Acids; saturated acyclic monocarboxylic acids; palmitic acid, stearic acid, their salts and esters
291732	Acids; aromatic polycarboxylic acids; dioctyl orthophthalates
291733	Acids; aromatic polycarboxylic acids; dinonyl or didecyl orthophthalates
291735	Acids; aromatic polycarboxylic acids; phthalic anhydride
291736	Acids; aromatic polycarboxylic acids; terephthalic acid and its salts
291737	Acids; aromatic polycarboxylic acids; dimethyl terephthalate
291910	Esters; phosphoric, and their salts, including lactophosphates, their halogenated, sulphonated, nitrated or nitrosated derivatives; tris(2,3-dibromopropyl) phosphate
291990	Esters; phosphoric, and their salts, including lactophosphates, their halogenated, sulphonated, nitrated or nitrosated derivatives; other than tris(2,3-dibromopropyl) phosphate
292113	Amine-function compounds; acyclic monoamines and their derivatives, and salts thereof, 2-(N,N-Diethylamino)ethylchloride hydrochloride
292121	Amine-function compounds; acyclic polyamines and their derivatives, ethylenediamine and its salts
292122	Amine-function compounds; acyclic polyamines and their derivatives, hexamethylenediamine and its salts
292141	Amine-function compounds; aromatic monoamines and their derivatives, aniline and its salts
292142	Amine-function-compounds; aromatic monoamines and their derivatives, aniline derivatives and their salts
292143	Amine-function compounds; aromatic monoamines and their derivatives, toluidines and their derivatives; salts thereof
292151	Amine-function compounds; aromatic amines and their derivatives; o-, m-, p-phenylenediamine, diaminotoluenes and their derivatives; salts thereof
292800	Organic derivatives of hydrazine or of hydroxylamine
293060	Organo-sulphur compounds; 2-(N,N-Diethylamino)ethanethiol
293110	Organo-inorganic compounds; tetramethyl lead and tetraethyl lead

293120	Organo-inorganic compounds; tributyltin compounds
293133	Organo-inorganic compounds; organo-phosphorus derivatives, diethyl ethylphosphonate
293135	Organo-inorganic compounds; organo-phosphorus derivatives, 2,4,6-tripropyl-1,3,5,2,4,6-trioxatriphosphinane 2,4,6-trioxide
320420	Dyes; synthetic organic products of a kind used as fluorescent brightening agents
320490	Dyes; synthetic organic products n.e.c. in heading no. 3204 (e.g. of a kind used as luminophores), whether or not chemically defined
320611	Colouring matter; pigments and preparations based on titanium dioxide, containing 80% or more by weight of titanium dioxide calculated on the dry matter
320620	Colouring matter; pigments and preparations based on chromium compounds
320641	Colouring matter; ultramarine and preparations based thereon
320642	Colouring matter; lithopone and other pigments and preparations based on zinc sulphide
381111	Anti-knock preparations; based on lead compounds
381121	Lubricating oil additives; containing petroleum oils or oils obtained from bituminous minerals
381129	Lubricating oil additives; not containing petroleum oils or oils obtained from bituminous minerals
381190	Oxidation and gum inhibitors, viscosity improvers, anti-corrosive preparations, other prepared additives for mineral oils or liquids used as mineral oils (including gasoline), n.e.c. in heading no. 3811
381220	Plasticisers, compound; for rubber or plastics
381231	Anti-oxidising preparations and other compound stabilisers; for rubber or plastics, mixtures of oligomers of 2,2,4-trimethyl-1,2-dihydroquinoline (TMQ)
381239	Anti-oxidising preparations and other compound stabilisers; for rubber or plastics, other than mixtures of oligomers of 2,2,4-trimethyl-1,2-dihydroquinoline (TMQ)
382312	Industrial monocarboxylic fatty acids, acid oils from refining; oleic acid
382313	Industrial monocarboxylic fatty acids, acid oils from refining; tall oil fatty acids
382319	Industrial monocarboxylic fatty acids; acid oils from refining; (other than stearic acid, oleic acid or tall oil fatty acids)
382370	Industrial fatty alcohols
382481	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing oxirane (ethylene oxide)
382482	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs)
382483	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing tris(2,3-dibromopropyl) phosphate
382484	Chemical products, mixtures and preparations; containing aldrin, camphechlor (toxaphene), chlordane, chlordecone, DDT (chlorfenotane, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane), dieldrin, endosulfan, endrin, heptachlor or mirex
382485	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing 1,2,3,4,5,6-hexachlorocyclohexane (HCH (ISO)), including lindane (ISO, INN)
382486	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing pentachlorobenzene (ISO), or hexachlorobenzene (ISO)
382487	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing perfluorooctane sulphonic acid, its salts, perfluorooctane sulphonamides, or perfluorooctane sulphonyl fluoride
382488	Chemical products, mixtures and preparations; containing goods specified in Subheading Note 3 to this Chapter; containing tetra-, penta-, hexa-, hepta- or octabromodiphenyl ethers
382491	Chemical products, mixtures and preparations; consisting mainly of (5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl methylphosphonate and bis[(5-ethyl-2-methyl-2-oxido-1,3,2-dioxaphosphinan-5-yl)methyl] methylphosphonate
810720	Cadmium; unwrought, powders
810790	Cadmium; other than unwrought, n.e.c. in heading no. 8107

Note: The HS sub-headings in this category reflect a selection of key additives readily identifiable as commonly used in plastics production. Importantly, not all trade in such products enter into the plastics life cycle; many products in this category also have other end-uses. No attempt is made in this study to determine the share of traded products included under each classification that are destined specifically for plastics production. Recommendations on further HS classifications that cover further additives used in plastics production are welcome.

#### Plastics in Primary Forms Harmonized Commodity Description and Coding Systems (HS) - Revision 2017

Code	Description
390110	Ethylene polymers; in primary forms, polyethylene having a specific gravity of less than 0.94
390120	Ethylene polymers; in primary forms, polyethylene having a specific gravity of 0.94 or more
390130	Ethylene polymers; in primary forms, ethylene-vinyl acetate copolymers
390140	Ethylene polymers; in primary forms, ethylene-alpha-olefin copolymers, having a specific gravity of less than 0.94
390190	Ethylene polymers; in primary forms, n.e.c. in heading no. 3901
390210	Propylene, other olefin polymers; polypropylene in primary forms

390220	Propylene, other olefin polymers; polyisobutylene in primary forms
390230	Propylene, other olefin polymers; propylene copolymers in primary forms
390290	Propylene, other olefin polymers; n.e.c. in heading no. 3902, in primary forms
390311	Styrene polymers; expansible polystyrene, in primary forms
390319	Styrene polymers; (other than expansible polystyrene), in primary forms
390320	Styrene polymers; styrene-acrylonitrile (SAN) copolymers, in primary forms
390330	Styrene polymers; acrylonitrile-butadiene-styrene (ABS) copolymers, in primary forms
390390	Styrene polymers; in primary forms, n.e.c. in heading no. 3903
390410	Vinyl chloride, other halogenated olefin polymers; poly(vinyl chloride), not mixed with any other substances, in primary forms
390421	Vinyl chloride, other halogenated olefin polymers; non-plasticised poly(vinyl chloride), in primary forms, mixed with other substances
390422	Vinyl chloride, other halogenated olefin polymers; plasticised poly(vinyl chloride), in primary forms, mixed with other substances
390430	Vinyl chloride, other halogenated olefin polymers; vinyl chloride-vinyl acetate copolymers, in primary forms
390440	Vinyl chloride, other halogenated olefin polymers; vinyl chloride copolymers, in primary forms n.e.c. in heading no. 3904
390450	Vinyl chloride, other halogenated olefin polymers; vinylidene chloride polymers, in primary forms
390461	Halogenated olefin polymers; fluoro-polymers, polytetrafluoroethylene, in primary forms
390469	Halogenated olefin polymers; fluoro-polymers (other than polytetrafluoroethylene), in primary forms
390490	Vinyl chloride, other halogenated olefin polymers; n.e.c. in heading no. 3904
390512	Poly(vinyl acetate); in aqueous dispersion, in primary forms
390519	Poly(vinyl acetate); (other than in aqueous dispersion), in primary forms
390521	Vinyl acetate copolymers; in aqueous dispersion, in primary forms
390529	Vinyl acetate copolymers; (other than in aqueous dispersion), in primary forms
390530	Poly(vinyl alcohol); whether or not containing unhydrolysed acetate groups
390591	Vinyl acetate, vinyl ester polymers, vinyl polymers; n.e.c. in heading no. 3905, in primary forms, copolymers
390599	Vinyl acetate, vinyl ester polymers, vinyl polymers; n.e.c. in heading no. 3905, in primary forms, other than copolymers
390610	Acrylic polymers; poly(methyl methacrylate), in primary forms
390690	Acrylic polymers; (other than polymethyl methacrylate), in primary forms
390710	Polyacetals; in primary forms
390720	Polyethers; in primary forms, excluding polyacetals
390730	Epoxide resins; in primary forms
390740	Polycarbonates; in primary forms
390750	Alkyd resins; in primary forms
390761	Poly(ethylene terephthalate); in primary forms, having a viscosity of 78ml/g or higher
390769	Poly(ethylene terephthalate); in primary forms, having a viscosity of less than 78ml/g
390770	Poly(lactic acid); in primary forms
390791	Polyesters; n.e.c. in heading no. 3907, unsaturated, in primary forms
390799	Polyesters; n.e.c. in heading no. 3907, saturated, in primary forms
390810	Polyamides; polyamide-6, -11, -12, -6,6, -6,9, -6,10 or -6,12, in primary forms
390890	Polyamides; n.e.c. in heading no. 3908, in primary forms
390910	Amino-resins; urea and thiourea resins, in primary forms
390920	Amino-resins; melamine resins, in primary forms
390931	Amino-resins; n.e.c. in heading no. 3909, in primary forms, poly(methylene phenyl isocyanate) (Crude MDI, polymeric MDI)
390939	Amino-resins; n.e.c. in heading no. 3909, in primary forms, other than poly(methylene phenyl isocyanate) (Crude MDI, polymeric MDI)
390940	Phenolic resins; in primary forms
390950	Polyurethanes; in primary forms
391000	Silicones; in primary forms
391110	Petroleum resins, coumarone, indene or coumarone-indene resins and polyterpenes; in primary forms
391190	Polysulphides, polysulphones and similar products of chemical synthesis n.e.c. in chapter 39; in primary forms
391211	Cellulose acetates; non-plasticised, in primary forms
391212	Cellulose acetates; plasticised, in primary forms
391220	Cellulose nitrates (including collodions); in primary forms
391231	Cellulose ethers; carboxymethylcellulose and its salts, in primary forms
391239	Cellulose ethers; (other than carboxymethylcellulose and its salts), in primary forms
391290	Cellulose and its chemical derivatives; n.e.c. in item no. 3912, in primary forms
391310	Polymers, natural; alginic acid, its salts and esters, in primary forms
391390	Polymers, natural and modified natural; in primary forms (excluding alginic acid, its salts and esters)
391400	Ion-exchangers; based on polymers of heading no. 3901 to 3913, in primary forms
400211	Rubber; synthetic, styrene-butadiene rubber (SBR) and carboxylated styrene-butadiene rubber (XSBR) latex, in primary forms or in plates, sheets or strip
400219	Rubber; synthetic, styrene-butadiene rubber (SBR) and carboxylated styrene-butadiene rubber (XSBR), (other than latex), in primary forms or in plates, sheets or strip
400220	Rubber; synthetic, butadiene rubber (BR), in primary forms or in plates, sheets or strip

400231	Rubber; synthetic, isobutene-isoprene (butyl) rubber (IIR), in primary forms or in plates, sheets or strip
400239	Rubber; synthetic, halo-isobutene-isoprene rubber (CIIR or BIIR), in primary forms or in plates, sheets or strip
400241	Rubber; synthetic, chloroprene (chlorobutadiene) rubber (CR), latex, in primary forms or in plates, sheets or strip
400249	Rubber; synthetic, chloroprene (chlorobutadiene) rubber (CR), (other than latex), in primary forms or in plates, sheets or strip
400251	Rubber; synthetic, acrylonitrile-butadiene rubber (NBR), latex, in primary forms or in plates, sheets or strip
400259	Rubber; synthetic, acrylonitrile-butadiene rubber (NBR), (other than latex), in primary forms or in plates, sheets or strip
400260	Rubber; synthetic, isoprene rubber (IR), in primary forms or in plates, sheets or strip
400270	Rubber; synthetic, ethylene-propylene-non-conjugated diene rubber (EPDM), in primary forms or in plates, sheets or strip
400280	Rubber; mixtures of natural and synthetic rubbers of heading no. 4001 and 4002, in primary forms or in plates, sheets or strip
400291	Rubber; synthetic, n.e.c. in heading 4002, latex, in primary forms or in plates, sheets or strip
400299	Rubber; synthetic, n.e.c. in heading 4002, (other than latex), in primary forms or in plates, sheets or strip

Note: This category focuses on plastics in primary forms. For several sub-headings, however, the classification includes both plastic in primary forms as well as plastics already in 'intermediate forms' (such as plates, sheets or strip) (e.g., HS codes 400211 to 400299 related to synthetic rubber). While we have a separate category for such 'intermediate forms,' those HS codes with both are included in the primary forms category. Further research could determine the extent to which the main volumes traded in this category are indeed in primary or intermediate forms, and thus which categorization makes most sense. Finally, although it can be debated whether subheadings such as HS 391211 'Cellulose acetates; non-plasticised, in primary forms' and related cellulose related classifications (e.g., HS 391212, 391220, 391231, 391231, 391239, 391290) are plastics as commonly defined, we have taken the view that as these are included in the HS 39 Chapter on 'Plastics and articles thereof' they should also be included them in our database.

#### Intermediate Forms of Plastic Harmonized Commodity Description and Coding Systems (HS) - Revision 2017

Code	Description
391610	Ethylene polymers; monofilament, of which any cross-sectional dimension exceeds 1mm, rods, sticks and profile shapes, whether or not surface-worked but not otherwise worked
391620	Vinyl chloride polymers; monofilament, of which any cross-sectional dimension exceeds 1mm, rods, sticks and profile shapes, whether or not surface-worked but not otherwise worked
391690	Plastics; monofilament, of plastics n.e.c. in heading no. 3916, cross-sectional dimension exceeds 1mm, rods, sticks and profile shapes, whether or not surface-worked but not otherwise worked
391721	Plastics; tubes, pipes and hoses thereof, rigid, of polymers of ethylene
391722	Plastics; tubes, pipes and hoses thereof, rigid, of polymers of propylene
391723	Plastics; tubes, pipes and hoses thereof, rigid, of polymers of vinyl chloride
391729	Plastics; tubes, pipes and hoses thereof, rigid, of plastics n.e.c. in heading no. 3917
391731	Plastics; tubes, pipes and hoses thereof, flexible, having a minimum burst pressure of 27.6MPa
391732	Plastics; tubes, pipes and hoses thereof, other than those of item no. 3917.31, not reinforced or otherwise combined with other materials, without fittings
391733	Plastics; tubes, pipes and hoses thereof, other than those of item no. 3917.31, not reinforced or otherwise combined with other materials, with fittings
391739	Plastics; tubes, pipes and hoses thereof, n.e.c. in item no. 3917.30
391740	Plastics; tube, pipe and hose fittings (e.g. joints, elbows, flanges)
391910	Plastics; plates, sheets, film, foil, tape, strip, other flat shapes thereof, self-adhesive, in rolls of a width not exceeding 20cm
391990	Plastics; plates, sheets, film, foil, tape, strip, other flat shapes thereof, self-adhesive, other than in rolls of a width not exceeding 20cm
392010	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of polymers of ethylene, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392020	Plastics; of polymers of propylene, plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392030	Plastics; of polymers of styrene, plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392043	Plastics; polymers of vinyl chloride, containing by weight not less than 6% of plasticisers; plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392049	Plastics; polymers of vinyl chloride, containing by weight, less than 6% of plasticisers; plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392051	Plastics; of acrylic polymers, polymethyl methacrylate, plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392059	Plastics; of acrylic polymers (excluding polymethyl methacrylate), plates, sheets, film, foil and strip (not self-adhesive), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392061	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of polycarbonates, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392062	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of poly(ethylene terephthalate), non-cellular and not reinforced, laminated, supported or similarly combined with other materials

392063	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of unsaturated polyesters, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392069	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of polyesters n.e.c. in heading no. 3920, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392071	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of regenerated cellulose; non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392073	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of cellulose acetate, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392079	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of cellulose derivatives n.e.c. in heading no. 3920, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392091	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of poly(vinyl butyral), non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392092	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of polyamides, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392093	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of amino-resins, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392094	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of phenolic resins, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392099	Plastics; plates, sheets, film, foil and strip (not self-adhesive), of plastics n.e.c. in heading no. 3920, non-cellular and not reinforced, laminated, supported or similarly combined with other materials
392111	Plastics; plates, sheets, film, foil and strip, of polymers of styrene, cellular
392112	Plastics; plates, sheets, film, foil and strip, of polymers of vinyl chloride, cellular
392113	Plastics; plates, sheets, film, foil and strip, of polyurethanes, cellular
392114	Plastics; plates, sheets, film, foil and strip, of regenerated cellulose, cellular
392119	Plastics; plates, sheets, film, foil and strip, of plastics n.e.c. in heading no. 3921, cellular
392190	Plastics; plates, sheets, film, foil and strip, other than cellular
540110	Sewing thread; of synthetic filaments, whether or not put up for retail sale
540211	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity yarn of nylon or other polyamides, textured or not; of aramids, not for retail sale, not sewing thread
540219	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity nylon or other polyamides, textured or not; other than aramids, not for retail sale, not sewing thread
540220	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity yarn of polyesters, whether or not textured, not for retail sale, not sewing thread
540231	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of nylon or other polyamides, measuring per single yarn not more than 50 decitex, not for retail sale, not sewing thread
540232	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of nylon or other polyamides, measuring per single yarn more than 50 decitex, not for retail sale, not sewing thread
540233	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of polyesters, not for retail sale, not sewing thread
540234	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of polypropylene, not for retail sale, not sewing thread
540239	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, other than of nylon or other polyamides, polyesters, or polypropylene, not for retail sale, not sewing thread
540244	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, elastomeric, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540245	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540246	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), partially oriented, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540247	Yarn, synthetic; filament, monofilament (less than 67 decitex), polyesters (not high tenacity or textured), not partially oriented, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540248	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene (not high tenacity or textured), single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540249	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, single, untwisted or twisted 50 turns or less per metre, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540251	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540252	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540253	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540259	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, single, twisted more than 50 turns per metre, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540261	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), multiple (folded) or cabled, not for retail sale, not sewing thread

540262	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), multiple (folded) or cabled, not for retail sale, not sewing thread
540263	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene, other than high tenacity or textured yarn, multiple (folded) or cabled, not for retail sale, not sewing thread
540269	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, multiple (folded) or cabled, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540411	Elastomeric monofilament; of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm
540412	Monofilament of polypropylene; of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm
540419	Monofilament n.e.c. in heading no 5404; of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm
540490	Filament, synthetic; strip and the like (e.g. artificial straw), of synthetic textile materials of an apparent width not exceeding 5mm
540500	Monofilament, synthetic; of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm, strip and the like (e.g. artificial straw), of synthetic textile materials with width not over 5mm

Note: The category 'intermediate forms' includes plastics that have been transformed or converted from primary forms into inputs – such as sheets, filaments, yarns, plates, sheets, film, foil and strip, sticks and shapes as well as synthetic yarns and filaments that are –used either: a) further manufactured into intermediate manufactured or final manufactured plastic goods; or b) used directly as inputs for construction. We welcome feedback on whether HS codes referring to tubes, pipes and hoses, such as HS 391271, 391722, 391723, 391729, 391731, 391732, 391733, 391739, and 391740, should be categorised instead under intermediate manufactured or final manufactured plastic goods.

#### Intermediate manufactured plastic goods Harmonized Commodity Description and Coding Systems (HS) - Revision 2017

Code	Description
540710	Fabrics, woven; from high tenacity yarn, of nylon, other polyamides or of polyesters
540720	Fabrics, woven; from strip or the like, of synthetic textile materials
540730	Fabrics, woven; from synthetic filament yarn, adhesive or thermal bonded
540741	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, unbleached or bleached
540742	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, dyed
540743	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, of yarns of different colours
540744	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, printed
540751	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, unbleached or bleached
540752	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, dyed
540753	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, of yarns of different colours
540754	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, printed
540761	Fabrics, woven; containing 85% or more by weight of non-textured polyester filaments
540769	Fabrics, woven; containing 85 % or more by weight of polyester filaments; Other
540771	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), unbleached or bleached
540772	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), dyed
540773	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), of yarns of different colours
540774	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), printed
540781	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, un-bleached or bleached
540782	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, dyed
540783	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, of yarns of different colours
540784	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, printed
550110	Fibres; synthetic filament tow, of nylon or other polyamides
550120	Fibres; synthetic filament tow, of polyesters
550130	Fibres; synthetic filament tow, acrylic or modacrylic
550140	Fibres; synthetic filament tow, of polypropylene
550190	Fibres; synthetic filament tow, of synthetic materials n.e.c. in heading no. 5501
590210	Textile fabrics; tyre cord of high tenacity yarn of nylon or other polyamides
590220	Textile fabrics; tyre cord of high tenacity yarn of polyester
590310	Textile fabrics; impregnated, coated, covered or laminated with poly vinyl chloride
590320	Textile fabrics; impregnated, coated, covered or laminated with polyurethane

590390	Textile fabrics; impregnated, coated, covered or laminated with plastics, (excluding polyvinyl chloride, polyurethane and those of heading no. 5902)
550311	Fibres; synthetic staple fibres, of aramids, not carded, combed or otherwise processed for spinning
550319	Fibres; synthetic staple fibres, of nylon or other polyamides other than aramids, not carded, combed or otherwise processed for spinning
550320	Fibres; synthetic staple fibres, of polyesters, not carded, combed or otherwise processed for spinning
550330	Fibres; synthetic staple fibres, acrylic or modacrylic, not carded, combed or otherwise processed for spinning
550340	Fibres; synthetic staple fibres, of polypropylene, not carded, combed or otherwise processed for spinning
550390	Fibres; synthetic staple fibres, of synthetic materials n.e.c. in heading no. 5503, not carded, combed or otherwise processed for spinning
550510	Fibres; waste (including noils, yarn waste and garnetted stock), of synthetic fibres
550610	Fibres; synthetic staple fibres, of nylon or other polyamides, carded, combed or otherwise processed for spinning
550620	Fibres; synthetic staple fibres, of polyesters, carded, combed or otherwise processed for spinning
550630	Fibres; synthetic staple fibres, acrylic or modacrylic, carded, combed or otherwise processed for spinning
550640	Fibres; synthetic staple fibres, of polypropylene, carded, combed or otherwise processed for spinning
550690	Fibres; synthetic staple fibres, n.e.c. in heading no. 5506, carded, combed or otherwise processed for spinning
550810	Sewing thread; of synthetic staple fibres, whether or not put up for retail sale
550911	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of nylon or other polyamides, not put up for retail sale
550912	Yarn; (not sewing thread), multiple (folded) or cabled yarn, of synthetic staple fibres, containing 85% or more by weight of nylon or other polyamides, not put up for retail sale
550921	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of polyester, not put up for retail sale
550922	Yarn; (not sewing thread), multiple (folded) or cabled yarn, of synthetic staple fibres, containing 85% or more by weight of polyester, not put up for retail sale
550931	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic, not put up for retail sale
550932	Yarn; (not sewing thread), multiple (folded) or cabled, of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic, not put up for retail sale
550941	Yarn; (not sewing thread), single, containing 85% or more by weight of synthetic staple fibres, n.e.c. in heading no. 5509, not put up for retail sale
550942	Yarn; (not sewing thread), multiple (folded) or cabled yarn, containing 85% or more by weight of synthetic staple fibres, n.e.c. in heading no. 5509, not put up for retail sale
550951	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with artificial staple fibres, not put up for retail sale
550952	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with wool or fine animal hair, not put up for retail sale
550953	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with cotton, not put up for retail sale
550959	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with fibres n.e.c. in item no. 5509.5, not put up for retail sale
550961	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with wool or fine animal hair, not put up for retail sale
550962	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with cotton, not put up for retail sale
550969	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with fibres n.e.c. in item no. 5509.6, not put up for retail sale
550991	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with wool or fine animal hair, n.e.c. in heading no. 5509, not put up for retail sale
550992	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with cotton, n.e.c. in heading no. 5509, not put up for retail sale
550999	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with fibres (other than wool, fine animal hair or cotton), n.e.c. in heading no. 5509, not put up for retail sale
551110	Yarn; (not sewing thread), of synthetic staple fibres, containing 85% or more by weight of synthetic staple fibres, put up for retail sale
551120	Yarn; Of synthetic staple fibres, containing less than 85 % by weight of such fibres
551211	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of polyester staple fibres, unbleached or bleached
551219	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of polyester staple fibres, other than unbleached or bleached
551221	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic staple fibres, unbleached or bleached

551229	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic staple fibres, other than unbleached or bleached
551291	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of such fibres n.e.c. in heading no. 5512, unbleached or bleached
551299	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of such fibres n.e.c. in heading no. 5512, other than unbleached or bleached
551311	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;Of polyester staple fibres, plain weave
551312	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551313	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other woven fabrics of polyester staple fibres
551319	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other woven fabrics
551321	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Of polyester staple fibres, plain weave
551323	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics of polyester staple fibres
551329	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics
551331	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Of yarns of different colours;Of polyester staple fibres, plain weave
551339	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Of yarns of different colours;Other woven fabrics
551341	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Printed;Of polyester staple fibres, plain weave
551349	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Printed ;Other woven fabrics
551411	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;Of polyester staple fibres, plain weave
551412	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551419	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other
551421	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Of polyester staple fibres, plain weave
551422	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; 3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551423	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed;Other woven fabrics of polyester staple fibres
551429	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics
551430	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Of yarns of different colours
551441	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Of polyester staple fibres, plain weave
551442	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; 3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551443	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Other woven fabrics of polyester staple fibres
551449	Fabrics,woven; of synthetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Other woven fabrics
551511	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with viscose rayon staple fibres
551512	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551513	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with wool or fine animal hair
551519	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in item no. 5515.1
551521	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551522	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with wool or fine animal hair
551529	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in item no. 5515.2
551591	Fabrics, woven; of synthetic staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551599	Fabrics, woven; of synthetic staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in heading no. 5515

560741	Twine; binder or baler twine, of polyethylene or polypropylene
560749	Twine, cordage, ropes, cables; of polyethylene or polypropylene (excluding binder or baler twine), whether or not plaited, braided or rubber or plastic impregnated, coated, covered or sheathed
560750	Twine, cordage, ropes, cables; of synthetic fibres other than polyethylene or polypropylene, whether or not plaited, braided or impregnated, coated, covered or sheathed with rubber or plastics
600330	Fabrics; knitted or crocheted fabrics, other than those of heading 60.01 and 60.02, of a width not exceeding 30 cm, of synthetic fibres
600535	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres specified in Subheading Note 1 to this Chapter
600536	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, bleached or unbleached
600537	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, dyed
600538	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, yarns of different colours
600539	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, printed
600631	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, unbleached or bleached
600632	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, dyed
600633	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, of yarns of different colours
600634	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, printed

Note: The category 'intermediate manufactured plastic goods' includes plastics that have been manufactured from intermediate forms and that are then further manufactured into final manufactured plastic goods. This category currently consists entirely of textiles.

Notably, we have included here HS codes that cover products having 85% or more by weight of synthetic textiles as well as HS codes having less than 85% by weight. The category does not include a number of additional HS codes that include products described as containing synthetic textiles, but for which the proportion of synthetic textile in the products is listed as 'less than 5%' or in a broad range, such as '5% or more' (e.g., HS 600240 refers to 'knitted or crocheted fabrics of a width not exceeding 30 cm; containing by weight 5 % or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001', and HS 600410 refers to 'knitted or crocheted fabrics of a width exceeding 30 cm, containing by weight 5 % or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001'). While it is possible that some such categories represent significant additional volumes of plastics, significant further methodological work would be required to determine if the average proportion of plastic in the products included in these sub-headings means that the relevant HS code should be included in this category.

It could be argued that the problem of determining the share of synthetic material in products equally applies to HS sub-headings currently included that refer to having 'less than 85% by weight' of synthetic materials. In this instance, we made a judgement call that such products were more likely to contain a high proportion of plastics than those deemed to have 5% or more. As such we have included mixed woven fabrics classified under HS sub-headings 540781, 540782, 540783 and 540784, which refer to woven fabrics with 'less than 85% by weight of synthetic material, mixed mainly or solely with' different kinds of cotton, as well as 551120, 'yarn; of synthetic staple fibres, containing less than 85% by weight of such fibres.' Similarly, 23 separate HS subchapters (i.e., HS 551441, 551442, 551443, 551449, 551311, 551312, 551313, 551319, 551321, 551323, 551329, 551331, 551339, 551341, 551349, 551411, 551412, 551419, 551421, 551422, 551423, 551429, and 551430) may represent significant additional volumes of plastics but further methodological work would be required to determine if the average proportion of plastic included in these products means that each of the sub-headings should remain in this list or if the volumes of plastics covered by those codes should be analysed using a methodology to estimate volumes of hidden plastics trade. This issue of selection is ripe for further research and feedback is welcome. In the meantime, from the perspective of monitoring trade that has implications for plastics pollution – and given the volume and value of trade in these products – these HS subheadings have been included.

As noted in the main text of this paper, there are thousands of additional intermediate manufactured products that contain embedded plastics traded internationally – ranging from construction materials to car parts and components for electrical appliances – that are then incorporated into final manufactured products. At this prototype stage, the authors have clustered also such products excluded from the list above for further study rubric of 'hidden' plastic products. Feedback on whether some of those excluded codes noted above can be considered predominantly plastics and thus relevant for inclusion in the database is welcome.

Notably, we did not include in this category a number of additional HS codes related to manufactured products where the HS description specifically refers to plastics, but where the plastic component is relatively small. These include, for instance, a number of HS codes related to construction materials: HS 721070 'flat-rolled products of iron or non-alloy steel, of a width of 600 mm or more, clad, plated or coated; other-painted, varnished or coated with plastics'; 721240 'flat-rolled products of iron or non-alloy steel, of a width of less than 600 mm; painted, varnished or coated with plastics'; and 731442 'cloth (including endless bands), grill, netting and fencing, of iron or steel wire; expanded metal of iron or steel; coated with plastics'; as well as HS 5910.00 'transmission or conveyor belts or belting, of textile material, whether or not impregnated, coated, covered or laminated with plastics, or reinforced with metal or other material.' In each case, an unknown volume and value of plastics crosses borders as a share of the main product.

Final manufactured plastics goods Harmonized Commodity Description and Coding Systems (HS) - Revision 2017	
Code	Description
320810	Paints and varnishes; based on polyesters, dispersed or dissolved in a non-aqueous medium
320820	Paints and varnishes; based on acrylic or vinyl polymers, dispersed or dissolved in a non-aqueous medium
320910	Paints and varnishes; based on acrylic or vinyl polymers, dispersed or dissolved in an aqueous medium
391810	Floor, wall or ceiling coverings; of polymers of vinyl chloride, whether or not self-adhesive, in rolls or in the form of tiles
391890	Floor, wall or ceiling coverings; of plastics (excluding polymers of vinyl chloride), whether or not self-adhesive, in rolls or in the form of tiles
392210	Plastics; baths, shower-baths, sinks and wash-basins
392220	Plastics; lavatory seats and covers
392290	Plastics; bidets, lavatory pans, flushing cisterns and similar sanitary ware n.e.c. in heading no. 3922
392310	Plastics; boxes, cases, crates and similar articles for the conveyance or packing of goods
392321	Ethylene polymers; sacks and bags (including cones), for the conveyance or packing of goods
392329	Plastics; sacks and bags (including cones), for the conveyance or packing of goods, of plastics other than ethylene polymers
392330	Plastics; carboys, bottles, flasks and similar articles, for the conveyance or packing of goods
392340	Plastics; spools, cops, bobbins and similar supports, for the conveyance or packing of goods
392350	Plastics; stoppers, lids, caps and other closures, for the conveyance or packing of goods
392390	Plastics; articles for the conveyance or packing of goods n.e.c. in heading no. 3923
392410	Plastics; tableware and kitchenware
392490	Plastics; household articles and hygienic or toilet articles
392510	Plastics; builders' ware, reservoirs, tanks, vats and similar containers of a capacity exceeding 300 litres
392520	Plastics; builders' ware, doors, windows and their frames and thresholds for doors
392530	Plastics; builders' ware, shutters, blinds (including venetian blinds) and similar articles and parts thereof
392590	Plastics; builders' ware, n.e.c. or included in heading no. 3925
392610	Plastics; office or school supplies
392620	Plastics; articles of apparel and clothing accessories (including gloves, mittens and mitts)
392630	Plastics; fittings for furniture, coachwork or the like
392640	Plastics; statuettes and other ornamental articles
392690	Plastics; other articles n.e.c. in chapter 39
401110	Rubber; new pneumatic tyres, of a kind used on motor cars (including station wagons and racing cars)
401120	Rubber; new pneumatic tyres, of a kind used on buses or lorries
401130	Rubber; new pneumatic tyres, of a kind used on aircraft
401140	Rubber; new pneumatic tyres, of a kind used on motorcycles
401150	Rubber; new pneumatic tyres, of a kind used on bicycles
401170	Rubber; new pneumatic tyres, of a kind used on agricultural or forestry vehicles and machines
401180	Rubber; new pneumatic tyres, of a kind used on construction, mining or industrial handling vehicles and machines
401190	Rubber; new pneumatic tyres, of a kind used on light commercial vehicles
401211	Retreaded tyres; of a kind used on motor cars (including station wagons and racing cars)
401212	Retreaded tyres; of a kind used on motor buses or lorries
401213	Retreaded tyres; of a kind used on aircraft
401219	Retreaded tyres; other than of a kind used on motor cars (including station wagons and racing cars), buses and lorries and aircraft
401220	Rubber; used pneumatic tyres
401290	Rubber; tyres n.e.c. in heading no. 4012
401310	Rubber; inner tubes, of a kind used on motorcars (including station wagons and racing cars), buses and lorries
401320	Rubber; inner tubes, of a kind used on bicycles
401390	Rubber; inner tubes, n.e.c. in heading no. 4013
401410	Rubber; vulcanised (other than hard rubber), sheath contraceptives
401490	Rubber; vulcanised (other than hard rubber), hygienic or pharmaceutical articles (excluding sheath contraceptives), with or without fittings of hard rubber
401511	Rubber; vulcanised (other than hard rubber), surgical gloves
401519	Rubber; vulcanised (other than hard rubber), gloves, mittens and mitts other than surgical gloves
401590	Rubber; vulcanised (other than hard rubber), articles of apparel and clothing accessories (other than gloves, mittens and mitts)
401610	Rubber; vulcanised (other than hard rubber), moulded rubber mats and mats of non-rectangular shape made by cutting from the piece, of cellular rubber
401691	Rubber; vulcanised (other than hard rubber), floor coverings and mats, of non-cellular rubber
401692	Rubber; vulcanised (other than hard rubber), erasers, of non-cellular rubber
401693	Rubber; vulcanised (other than hard rubber), gaskets, washers and other seals, of non-cellular rubber
401694	Rubber; vulcanised (other than hard rubber), boat or dock fenders, whether or not inflatable, of non-cellular rubber
401695	Rubber; vulcanised (other than hard rubber), inflatable articles (other than boat or dock fenders), of non-cellular rubber

401699	Rubber; vulcanised (other than hard rubber), articles n.e.c. in heading no. 4016, of non-cellular rubber
401700	Rubber; ebonite and other hard rubbers in all forms, including waste and scrap, and articles of hard rubber
430400	Fur, artificial; articles thereof
560811	Made-up fishing nets
570320	Carpets and other textile floor coverings; tufted, of nylon or other polyamides, whether or not made up
610323	Ensembles; men's or boys', of synthetic fibres, knitted or crocheted
610333	Jackets and blazers; men's or boys', of synthetic fibres, knitted or crocheted
610343	Trousers, bib and brace overalls, breeches and shorts; men's or boys', of synthetic fibres, knitted or crocheted
610413	Suits; women's or girls', of synthetic fibres, knitted or crocheted
610423	Ensembles; women's or girls', of synthetic fibres, knitted or crocheted
610433	Jackets; women's or girls', of synthetic fibres, knitted or crocheted
610443	Dresses; women's or girls', of synthetic fibres, knitted or crocheted
610453	Skirts and divided skirts; women's or girls', of synthetic fibres, knitted or crocheted
610463	Trousers, bib and brace overalls, breeches and shorts; women's or girls', of synthetic fibres, knitted or crocheted
611130	Garments and clothing accessories; babies', of synthetic fibres, knitted or crocheted
611212	Track suits; of synthetic fibres, knitted or crocheted
611231	Swimwear; men's or boys', of synthetic fibres, knitted or crocheted
611241	Swimwear; women's or girls', of synthetic fibres, knitted or crocheted
611521	Hosiery; panty hose and tights (other than graduated compression hosiery), of synthetic fibres, measuring per single yarn less than 67 decitex, knitted or crocheted
611522	Hosiery; panty hose and tights (other than graduated compression hosiery), of synthetic fibres, measuring per single yarn 67 decitex or more, knitted or crocheted
611596	Hosiery and footwear; without applied soles, of synthetic fibres, knitted or crocheted (excluding graduated compression hosiery, panty hose, tights, full or knee-length hosiery measuring per single yarn less than 67 decitex)
611693	Gloves, mittens and mitts; of synthetic fibres, knitted or crocheted, (other than impregnated, coated or covered with plastics or rubber)
620312	Suits; men's or boys', of synthetic fibres (not knitted or crocheted)
620323	Ensembles; men's or boys', of synthetic fibres (not knitted or crocheted)
620333	Jackets and blazers; men's or boys', of synthetic fibres (not knitted or crocheted)
620343	Trousers, bib and brace overalls, breeches and shorts; men's or boys', of synthetic fibres (not knitted or crocheted)
620413	Suits; women's or girls', of synthetic fibres (not knitted or crocheted)
620423	Ensembles; women's or girls', of synthetic fibres (not knitted or crocheted)
620433	Jackets and blazers; women's or girls', of synthetic fibres (not knitted or crocheted)
620443	Dresses; women's or girls', of synthetic fibres (not knitted or crocheted)
620453	Skirts and divided skirts; women's or girls', of synthetic fibres (not knitted or crocheted)
620463	Trousers, bib and brace overalls, breeches and shorts; women's or girls', of synthetic fibres (not knitted or crocheted)
620930	Garments and clothing accessories; babies', of synthetic fibres (not knitted or crocheted)
621430	Shawls, scarves, mufflers, mantillas, veils and the like; of synthetic fibres (not knitted or crocheted)
630140	Blankets (other than electric blankets) and travelling rugs; of synthetic fibres
630312	Curtains (including drapes) and interior blinds; curtain or bed valances, knitted or crocheted, of synthetic fibres
630392	Curtains (including drapes) and interior blinds, curtain or bed valances; of synthetic fibres, not knitted or crocheted
630493	Furnishing articles; of synthetic fibres, not knitted or crocheted (excluding bedspreads and articles of heading no. 9404)
630533	Sacks and bags; of a kind used for the packing of goods, of man-made textile materials, of polyethylene or polypropylene strip or the like, not flexible intermediate bulk containers
630612	Tarpaulins, awnings and sunblinds; of synthetic fibres
630622	Tents; of synthetic fibres
670210	Flowers, foliage and fruit, artificial, and parts thereof; articles made of artificial flowers, foliage or fruit, of plastics
670411	Wigs; complete, of synthetic textile materials
670419	False beards, eyebrows and eyelashes, switches and the like; of synthetic textile materials
854720	Insulating fittings; of plastics, for electrical machines, of insulating material only (except minor assembly parts), excluding those of heading no. 8546
900311	Frames and mountings; for spectacles, goggles or the like, of plastics
940370	Furniture; plastic
940592	Lamps and light fittings; parts thereof, of plastics
950632	Golf balls
960621	Buttons; of plastics, not covered with textile material
960860	Refills for ballpoint pens, comprising the ball point and ink-reservoir
961511	Combs, hair-slides and the like; Of hard rubber or plastics
961900	Sanitary towels (pads) and tampons, napkins and napkin liners for babies and similar articles, of any material

Note: There are many millions of additional final manufactured goods that are either entirely plastic or contain a high proportion of plastic that are included in codes under other HS Chapters and sub-headings. For the purposes of this study, we have included only those most clearly identifiable as items made entirely or mostly plastics. We erred on the side of caution for many items. For instance, there are many final manufactured goods such as

clothing and apparel that are comprised almost entirely from synthetic textiles and plastics but that are not included here. Examples of relevant codes include HS 420212 'trunks, suit-cases and vanity cases and various types of bags: with outer surface of plastics or of textile materials'; HS 420222, 'handbags, whether or not with shoulder strap, including those without handle; with outer surface of sheeting of plastics or of textile materials,' HS 420232, 'articles of a kind normally carried in the pocket or in the handbag; with outer surface of sheeting of plastics or of textile materials,' and HS 420292, which includes 'other trunks, bags and containers; with outer surface of sheeting of plastics or of textile materials'. This list also excludes HS subheadings for footwear and safety headgear that contain different kinds of plastics, but for which the value and volume of that content was impossible for the authors to estimate. For instance, leather shoes with synthetic rubber soles can not simply be classified as plastic products although many sport shoes are almost entirely made of synthetic textiles and rubber.

As such, at this prototype stage, the authors have clustered also such products excluded from the list above for further study rubric of 'hidden' plastic products. Feedback on whether some of those excluded codes noted above can be considered predominantly plastics and thus relevant for inclusion in the database is welcome.

Synthetic Textiles	
Code	Description
391810	Floor, wall or ceiling coverings; of polymers of vinyl chloride, whether or not self-adhesive, in rolls or in the form of tiles
391890	Floor, wall or ceiling coverings; of plastics (excluding polymers of vinyl chloride), whether or not self-adhesive, in rolls or in the form of tiles
430400	Fur, artificial; articles thereof
540110	Sewing thread; of synthetic filaments, whether or not put up for retail sale
540211	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity yarn of nylon or other polyamides, textured or not; of aramids, not for retail sale, not sewing thread
540219	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity nylon or other polyamides, textured or not; other than aramids, not for retail sale, not sewing thread
540220	Yarn, synthetic; filament, monofilament (less than 67 decitex), of high tenacity yarn of polyesters, whether or not textured, not for retail sale, not sewing thread
540231	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of nylon or other polyamides, measuring per single yarn not more than 50 decitex, not for retail sale, not sewing thread
540232	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of nylon or other polyamides, measuring per single yarn more than 50 decitex, not for retail sale, not sewing thread
540233	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of polyesters, not for retail sale, not sewing thread
540234	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, of polypropylene, not for retail sale, not sewing thread
540239	Yarn, synthetic; filament, monofilament (less than 67 decitex), textured, other than of nylon or other polyamides, polyesters, or polypropylene, not for retail sale, not sewing thread
540244	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, elastomeric, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540245	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540246	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), partially oriented, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540247	Yarn, synthetic; filament, monofilament (less than 67 decitex), polyesters (not high tenacity or textured), not partially oriented, single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540248	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene (not high tenacity or textured), single, untwisted or twisted 50 turns or less per metre, not for retail sale, not sewing thread
540249	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, single, untwisted or twisted 50 turns or less per metre, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540251	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540252	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540253	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene (not high tenacity or textured), single, twisted more than 50 turns per metre, not for retail sale, not sewing thread
540259	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, single, twisted more than 50 turns per metre, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540261	Yarn, synthetic; filament, monofilament (less than 67 decitex), of nylon or other polyamides (not high tenacity or textured), multiple (folded) or cabled, not for retail sale, not sewing thread
540262	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), multiple (folded) or cabled, not for retail sale, not sewing thread
540263	Yarn, synthetic; filament, monofilament (less than 67 decitex), of polypropylene, other than high tenacity or textured yarn, multiple (folded) or cabled, not for retail sale, not sewing thread
540269	Yarn, synthetic; filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, multiple (folded) or cabled, n.e.c. in heading no. 5402, not for retail sale, not sewing thread
540411	Elastomeric monofilament; of 67 decitex or more and of which no cross-sectional dimension exceeds 1mm

540412	Monofilament of polypropylene; of 67 decitex or more and of which no cross-sectional dimension exceeds 1 mm
540419	Monofilament n.e.c. in heading no 5404; of 67 decitex or more and of which no cross-sectional dimension exceeds 1 mm
540490	Filament, synthetic; strip and the like (e.g.. artificial straw), of synthetic textile materials of an apparent width not exceeding 5mm
540500	Monofilament, synthetic; of 67 decitex or more and of which no cross-sectional dimension exceeds 1 mm, strip and the like (e.g. artificial straw), of synthetic textile materials with width not over 5mm
540710	Fabrics, woven; from high tenacity yarn, of nylon, other polyamides or of polyesters
540720	Fabrics, woven; from strip or the like, of synthetic textile materials
540730	Fabrics, woven; from synthetic filament yarn, adhesive or thermal bonded
540741	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, unbleached or bleached
540742	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, dyed
540743	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, of yarns of different colours
540744	Fabrics, woven; containing 85% or more by weight of filaments of nylon or other polyamides, printed
540751	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, unbleached or bleached
540752	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, dyed
540753	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, of yarns of different colours
540754	Fabrics, woven; containing 85% or more by weight of textured polyester filaments, printed
540761	Fabrics, woven; containing 85% or more by weight of non-textured polyester filaments
540769	Fabrics, woven; containing less than 85% by weight of non-textured polyester filaments
540771	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), unbleached or bleached
540772	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), dyed
540773	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), of yarns of different colours
540774	Fabrics, woven; containing 85% or more by weight of synthetic filaments (excluding nylon or other polyamides and polyesters), printed
540781	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, un-bleached or bleached
540782	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, dyed
540783	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, of yarns of different colours
540784	Fabrics, woven; containing less than 85 % by weight of synthetic filaments, mixed mainly or solely with cotton, printed
550110	Fibres; synthetic filament tow, of nylon or other polyamides
550120	Fibres; synthetic filament tow, of polyesters
550130	Fibres; synthetic filament tow, acrylic or modacrylic
550140	Fibres; synthetic filament tow, of polypropylene
550190	Fibres; synthetic filament tow, of synthetic materials n.e.c. in heading no. 5501
550311	Fibres; synthetic staple fibres, of aramids, not carded, combed or otherwise processed for spinning
550319	Fibres; synthetic staple fibres, of nylon or other polyamides other than aramids, not carded, combed or otherwise processed for spinning
550320	Fibres; synthetic staple fibres, of polyesters, not carded, combed or otherwise processed for spinning
550330	Fibres; synthetic staple fibres, acrylic or modacrylic, not carded, combed or otherwise processed for spinning
550340	Fibres; synthetic staple fibres, of polypropylene, not carded, combed or otherwise processed for spinning
550390	Fibres; synthetic staple fibres, of synthetic materials n.e.c. in heading no. 5503, not carded, combed or otherwise processed for spinning
550510	Fibres; waste (including noils, yarn waste and garnetted stock), of synthetic fibres
550610	Fibres; synthetic staple fibres, of nylon or other polyamides, carded, combed or otherwise processed for spinning
550620	Fibres; synthetic staple fibres, of polyesters, carded, combed or otherwise processed for spinning
550630	Fibres; synthetic staple fibres, acrylic or modacrylic, carded, combed or otherwise processed for spinning
550640	Fibres; synthetic staple fibres, of polypropylene, carded, combed or otherwise processed for spinning
550690	Fibres; synthetic staple fibres, n.e.c. in heading no. 5506, carded, combed or otherwise processed for spinning
550810	Sewing thread; of synthetic staple fibres, whether or not put up for retail sale
550911	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of nylon or other polyamides, not put up for retail sale
550912	Yarn; (not sewing thread), multiple (folded) or cabled yarn, of synthetic staple fibres, containing 85% or more by weight of nylon or other polyamides, not put up for retail sale
550921	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of polyester, not put up for retail sale
550922	Yarn; (not sewing thread), multiple (folded) or cabled yarn, of synthetic staple fibres, containing 85% or more by weight of polyester, not put up for retail sale
550931	Yarn; (not sewing thread), single, of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic, not put up for retail sale
550932	Yarn; (not sewing thread), multiple (folded) or cabled, of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic, not put up for retail sale

550941	Yarn; (not sewing thread), single, containing 85% or more by weight of synthetic staple fibres, n.e.c. in heading no. 5509, not put up for retail sale
550942	Yarn; (not sewing thread), multiple (folded) or cabled yarn, containing 85% or more by weight of synthetic staple fibres, n.e.c. in heading no. 5509, not put up for retail sale
550951	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with artificial staple fibres, not put up for retail sale
550952	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with wool or fine animal hair, not put up for retail sale
550953	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with cotton, not put up for retail sale
550959	Yarn; (not sewing thread), of polyester staple fibres, mixed mainly or solely with fibres n.e.c. in item no. 5509.5, not put up for retail sale
550961	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with wool or fine animal hair, not put up for retail sale
550962	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with cotton, not put up for retail sale
550969	Yarn; (not sewing thread), of acrylic or modacrylic staple fibres, mixed mainly or solely with fibres n.e.c. in item no. 5509.6, not put up for retail sale
550991	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with wool or fine animal hair, n.e.c. in heading no. 5509, not put up for retail sale
550992	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with cotton, n.e.c. in heading no. 5509, not put up for retail sale
550999	Yarn; (not sewing thread), of synthetic staple fibres, mixed mainly or solely with fibres (other than wool, fine animal hair or cotton), n.e.c. in heading no. 5509, not put up for retail sale
551110	Yarn; (not sewing thread), of synthetic staple fibres, containing 85% or more by weight of synthetic staple fibres, put up for retail sale
551120	Yarn; Of synthetic staple fibres, containing less than 85 % by weight of such fibres
551211	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of polyester staple fibres, unbleached or bleached
551219	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of polyester staple fibres, other than unbleached or bleached
551221	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic staple fibres, unbleached or bleached
551229	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of acrylic or modacrylic staple fibres, other than unbleached or bleached
551291	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of such fibres n.e.c. in heading no. 5512, unbleached or bleached
551299	Fabrics, woven; of synthetic staple fibres, containing 85% or more by weight of such fibres n.e.c. in heading no. 5512, other than unbleached or bleached
551311	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;Of polyester staple fibres, plain weave
551312	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551313	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other woven fabrics of polyster staple fibres
551319	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other woven fabrics
551321	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Of polyester staple fibres, plain weave
551323	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics of polyster staple fibres
551329	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics
551331	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Of yarns of different colours;Of polyester staple fibres, plain weave
551339	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Of yarns of different colours;Other woven fabrics
551341	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Printed;Of polyester staple fibres, plain weave
551349	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight not exceeding 170 g/m <sup>2</sup> ; Printed ;Other woven fabrics
551411	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;Of polyester staple fibres, plain weave
551412	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached;3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551419	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; unbleached or bleached; Other

551421	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Of polyester staple fibres, plain weave
551422	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; 3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551423	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed;Other woven fabrics of polyester staple fibres
551429	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Other woven fabrics
551430	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; dyed; Of yarns of different colours
551441	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Of polyester staple fibres, plain weave
551442	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; 3-thread or 4-thread twill, including cross twill, of polyester staple fibres
551443	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres,mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Other woven fabrics of polyester staple fibres
551449	Fabrics,woven; of sythetic staple fibres, containing less than 85 % by weight of such fibres, mixed mainly or solely with cotton, of a weight exceeding 170 g/m <sup>2</sup> ; printed; Other woven fabrics
551511	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with viscose rayon staple fibres
551512	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551513	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with wool or fine animal hair
551519	Fabrics, woven; of polyester staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in item no. 5515.1
551521	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551522	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with wool or fine animal hair
551529	Fabrics, woven; of acrylic or modacrylic staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in item no. 5515.2
551591	Fabrics, woven; of synthetic staple fibres n.e.c. in chapter 55, mixed mainly or solely with man-made filaments
551599	Fabrics, woven; of synthetic staple fibres n.e.c. in chapter 55, mixed mainly or solely with fibres n.e.c. in heading no. 5515
560741	Twine; binder or baler twine, of polyethylene or polypropylene
560749	Twine, cordage, ropes, cables; of polyethylene or polypropylene (excluding binder or baler twine), whether or not plaited, braided or rubber or plastic impregnated, coated, covered or sheathed
560750	Twine, cordage, ropes, cables; of synthetic fibres other than polyethylene or polypropylene, whether or not plaited, braided or impregnated, coated, covered or sheathed with rubber or plastics
560811	Made-up fishing nets
570320	Carpets and other textile floor coverings; tufted, of nylon or other polyamides, whether or not made up
590210	Textile fabrics; tyreCORD of high tenacity yarn of nylon or other polyamides
590220	Textile fabrics; tyreCORD of high tenacity yarn of polyester
590290	Textile fabrics; tyreCORD of high tenacity yarn of viscose rayon
590310	Textile fabrics; impregnated, coated, covered or laminated with poly(vinyl chloride)
590320	Textile fabrics; impregnated, coated, covered or laminated with polyurethane
590390	Textile fabrics; impregnated, coated, covered or laminated with plastics, (excluding polyvinyl chloride, polyurethane and those of heading no. 5902)
600240	Knitted or crocheted fabrics of a width not exceeding 30 cm;Containing by weight 5 % or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001
600330	Fabrics; knitted or crocheted fabrics, other than those of heading 60.01 and 60.02, of a width not exceeding 30 cm, of synthetic fibres
600410	Knitted or crocheted fabrics of a width exceeding 30 cm,Containing by weight 5 % or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001
600535	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres specified in Subheading Note 1 to this Chapter
600536	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, bleached or unbleached
600537	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, dyed
600538	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, yarns of different colours
600539	Fabrics; warp knit (including those made on galloon knitting machines), other than those of headings 60.01 to 60.04, of synthetic fibres, printed
600631	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, unbleached or bleached
600632	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, dyed
600633	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, of yarns of different colours
600634	Fabrics; knitted or crocheted fabrics, other than those of headings 60.01 to 60.04, of synthetic fibres, printed

610323	Ensembles; men's or boys', of synthetic fibres, knitted or crocheted
610333	Jackets and blazers; men's or boys', of synthetic fibres, knitted or crocheted
610343	Trousers, bib and brace overalls, breeches and shorts; men's or boys', of synthetic fibres, knitted or crocheted
610413	Suits; women's or girls', of synthetic fibres, knitted or crocheted
610423	Ensembles; women's or girls', of synthetic fibres, knitted or crocheted
610433	Jackets; women's or girls', of synthetic fibres, knitted or crocheted
610443	Dresses; women's or girls', of synthetic fibres, knitted or crocheted
610453	Skirts and divided skirts; women's or girls', of synthetic fibres, knitted or crocheted
610463	Trousers, bib and brace overalls, breeches and shorts; women's or girls', of synthetic fibres, knitted or crocheted
611130	Garments and clothing accessories; babies', of synthetic fibres, knitted or crocheted
611212	Track suits; of synthetic fibres, knitted or crocheted
611231	Swimwear; men's or boys', of synthetic fibres, knitted or crocheted
611241	Swimwear; women's or girls', of synthetic fibres, knitted or crocheted
611521	Hosiery; panty hose and tights (other than graduated compression hosiery), of synthetic fibres, measuring per single yarn less than 67 decitex, knitted or crocheted
611522	Hosiery; panty hose and tights (other than graduated compression hosiery), of synthetic fibres, measuring per single yarn 67 decitex or more, knitted or crocheted
611596	Hosiery and footwear; without applied soles, of synthetic fibres, knitted or crocheted (excluding graduated compression hosiery, panty hose, tights, full or knee-length hosiery measuring per single yarn less than 67 decitex)
611693	Gloves, mittens and mitts; of synthetic fibres, knitted or crocheted, (other than impregnated, coated or covered with plastics or rubber)
620312	Suits; men's or boys', of synthetic fibres (not knitted or crocheted)
620323	Ensembles; men's or boys', of synthetic fibres (not knitted or crocheted)
620333	Jackets and blazers; men's or boys', of synthetic fibres (not knitted or crocheted)
620343	Trousers, bib and brace overalls, breeches and shorts; men's or boys', of synthetic fibres (not knitted or crocheted)
620413	Suits; women's or girls', of synthetic fibres (not knitted or crocheted)
620423	Ensembles; women's or girls', of synthetic fibres (not knitted or crocheted)
620433	Jackets and blazers; women's or girls', of synthetic fibres (not knitted or crocheted)
620443	Dresses; women's or girls', of synthetic fibres (not knitted or crocheted)
620453	Skirts and divided skirts; women's or girls', of synthetic fibres (not knitted or crocheted)
620463	Trousers, bib and brace overalls, breeches and shorts; women's or girls', of synthetic fibres (not knitted or crocheted)
620930	Garments and clothing accessories; babies', of synthetic fibres (not knitted or crocheted)
621430	Shawls, scarves, mufflers, mantillas, veils and the like; of synthetic fibres (not knitted or crocheted)
630140	Blankets (other than electric blankets) and travelling rugs; of synthetic fibres
630312	Curtains (including drapes) and interior blinds; curtain or bed valances, knitted or crocheted, of synthetic fibres
630392	Curtains (including drapes) and interior blinds, curtain or bed valances; of synthetic fibres, not knitted or crocheted
630493	Furnishing articles; of synthetic fibres, not knitted or crocheted (excluding bedspreads and articles of heading no. 9404)
630533	Sacks and bags; of a kind used for the packing of goods, of man-made textile materials, of polyethylene or polypropylene strip or the like, not flexible intermediate bulk containers
630612	Tarpaulins, awnings and sunblinds; of synthetic fibres
630622	Tents; of synthetic fibres
670210	Flowers, foliage and fruit, artificial, and parts thereof; articles made of artificial flowers, foliage or fruit, of plastics
670411	Wigs; complete, of synthetic textile materials
670419	False beards, eyebrows and eyelashes, switches and the like; of synthetic textile materials

Note: Notably, we have included here HS codes that cover products having 85% or more by weight of synthetic textiles as well as HS codes having less than 85% by weight. The category does not include a number of additional HS codes that include products described as containing synthetic textiles, but for which the proportion of synthetic textile in the products is listed as 'less than 5%' or in a broad range, such as '5% or more' (e.g., HS 600240 refers to 'knitted or crocheted fabrics of a width not exceeding 30 cm; containing by weight 5% or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001', and HS 600410 refers to 'knitted or crocheted fabrics of a width exceeding 30 cm, containing by weight 5% or more of elastomeric yarn, but not containing rubber thread; other than those of heading 6001'). While it is possible that some such categories represent significant additional volumes of plastics, significant further methodological work would be required to determine if the average proportion of plastic in the products included in these sub-headings means that the relevant HS code should be included in this category.

It could be argued that the problem of determining the share of synthetic material in products equally applies to HS sub-headings currently included that refer to having 'less than 85% by weight' of synthetic materials. In this instance, we made a judgement call that such products were more likely to contain a high proportion of plastics than those deemed to have 5% or more. As such we have included mixed woven fabrics classified under HS sub-headings 540781, 540782, 540783 and 540784, which refer to woven fabrics with 'less than 85% by weight of synthetic material, mixed mainly or solely with' different kinds of cotton, as well as 551120, 'yarn; of synthetic staple fibres, containing less than 85% by weight of such fibres.' Similarly, 23 separate HS subchapters (i.e., HS 551441, 551442, 551443, 551449, 551311, 551312, 551313, 551319, 551321, 551323, 551329, 551331, 551339, 551341, 551349, 551411, 551412, 551419, 551421, 551422, 551423, 551429, and 551430). Some of these HS codes may represent significant additional volumes of plastics but further methodological work would be required to determine if the average proportion of plastic included in these products means that each of the sub-headings should remain in this list or if the volumes of plastics covered by those codes should be analysed using a methodology to estimate volumes of hidden plastics trade. This issue of selection is ripe for further research and feedback is welcome. In the

meantime, from the perspective of monitoring trade that has implications for plastics pollution – and given the volume and value of trade in these products – these HS subheadings have been included.

This list also does not include a number of final manufactured products that are described in the HS as containing plastic, such as HS 420212 'trunks, suit-cases and vanity cases and various types of bags: with outer surface of plastics or of textile materials'; HS 420222, 'handbags, whether or not with shoulder strap, including those without handle; with outer surface of sheeting of plastics or of textile materials', HS 420232, 'articles of a kind normally carried in the pocket or in the handbag; with outer surface of sheeting of plastics or of textile materials' and HS 420292, which includes 'other trunks, bags and containers; with outer surface of sheeting of plastics or of textile materials.'

This list also excludes HS subheadings for footwear that contains different kinds of plastics, but where the value and volume of that content was impossible for the authors to estimate. For instance, leather shoes with synthetic rubber soles, cannot simply be classified as plastic products although many sport shoes may indeed be entirely of synthetic textile and rubber.

As such, at this prototype stage, the authors have clustered also such products excluded from the list above for further study under the rubric of 'hidden' plastic products. Feedback on whether some of those excluded codes noted above can be considered predominantly plastics and thus relevant for inclusion in the database is welcome.

Notably, we have not included any HS subheadings for artificial fibres, such as viscose rayon and cellulose acetate, glass or metallic fibres. We also note that HS 961900 'sanitary towels (pads) and tampons, napkins and napkin liners for babies and similar articles, of any material' is included in our list of final manufactured products and should likely also be included in this list of synthetic textiles, which will be amended in the online version of our database.

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**Plastic waste**

Code	Description
391510	Ethylene polymers; waste, parings and scrap
391520	Styrene polymers; waste, parings and scrap
391530	Vinyl chloride polymers; waste, parings and scrap
391590	Plastics n.e.c. in heading no. 3915; waste, parings and scrap

Note: This category does not currently include rubber waste and scrap referred to in HS 401700 (Rubber; ebonite and other hard rubbers in all forms, including waste and scrap, and articles of hard rubber) because it was not possible to determine the share of waste among other products included in this category. It also does not include HS 550510 'Waste (including noils, yarn waste and garnetted stock) of synthetic fibres. However, this sub-heading is included under synthetic textiles above.

**Fishing nets****Harmonized Commodity Description and Coding Systems (HS) - Revision 2017**

Code	Description
560811	Made-up fishing nets

Note: HS Chapter 56 includes a number of other sub-headings for fishing-related products that are likely to be largely made of plastics – such as fishing buoys and fishing line, as well as small fishing vessels. Further study may clarify the proportion of plastics embedded in products included in other fisheries-related HS codes such that some of these may properly be included in this database. At this prototype stage, the authors have included such products on the list of 'hidden' plastic products for further investigation.

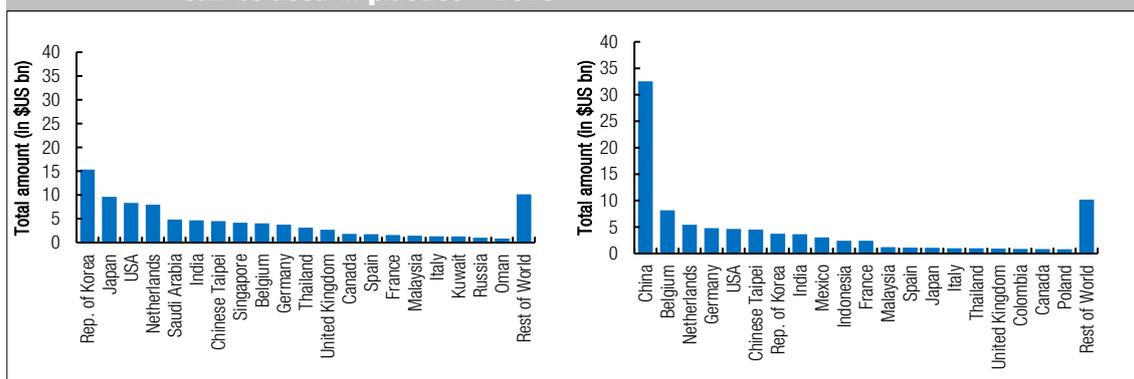
**Plastic packaging****Harmonized Commodity Description and Coding Systems (HS) - Revision 2017**

Code	Description
392310	Plastics; boxes, cases, crates and similar articles for the conveyance or packing of goods
392321	Ethylene polymers; sacks and bags (including cones), for the conveyance or packing of goods
392329	Plastics; sacks and bags (including cones), for the conveyance or packing of goods, of plastics other than ethylene polymers
392330	Plastics; carboys, bottles, flasks and similar articles, for the conveyance or packing of goods
392340	Plastics; spools, cops, bobbins and similar supports, for the conveyance or packing of goods
392350	Plastics; stoppers, lids, caps and other closures, for the conveyance or packing of goods
392390	Plastics; articles for the conveyance or packing of goods n.e.c. in heading no. 3923
630533	Sacks and bags; of a kind used for the packing of goods, of man-made textile materials, of polyethylene or polypropylene strip or the like, not flexible intermediate bulk containers

Note: This category – and the HS system – includes only on 'empty' plastic packaging traded as a product in its own right. It does not include the considerable volume of plastic packaging associated with pre-packaged goods, such as processed food products, or that accompanies household goods, personal electronic devices) and is used by international transporters and distributors of goods that cross international borders. See also discussion on page 10 of this paper.

## Annex 2: Supplementary figures on plastic trade flows

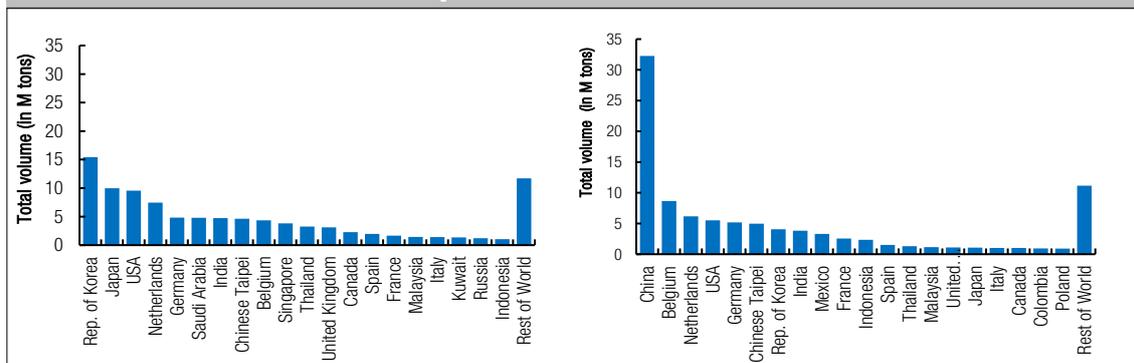
**Figure 1a, b. Value of exports (left) and imports (right) in feedstocks & precursors that can be used in plastics – 2018**



Source: All computations are based on the UNCTAD Plastics database prototype, as of October 2020.

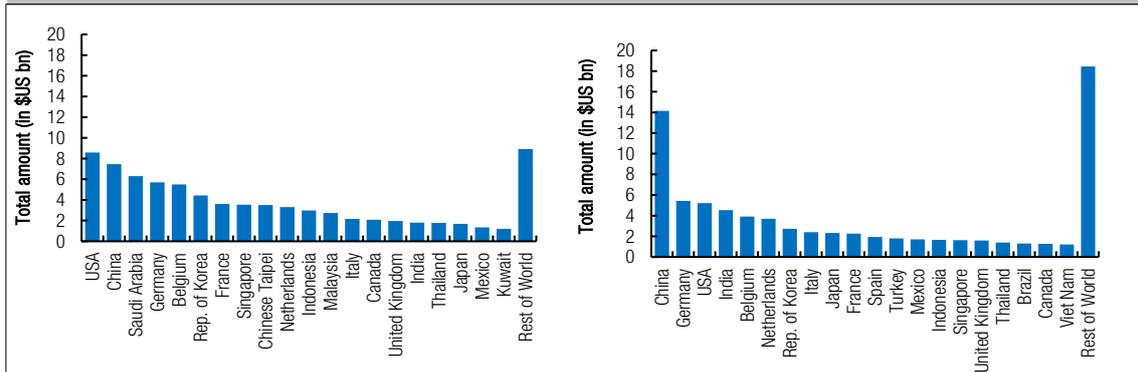
Notes: In all computations, USA includes Puerto Rico and United States Virgin Islands; Belgium includes Luxemburg; France includes Monaco; Chinese Taipei is reported as "Other Asia, not elsewhere specified; Rest of World is the sum of all other countries.

**Figure 1c, 1d. Volume of exports (left) and imports (right) in feedstocks & precursors that can be used in plastics – 2018**



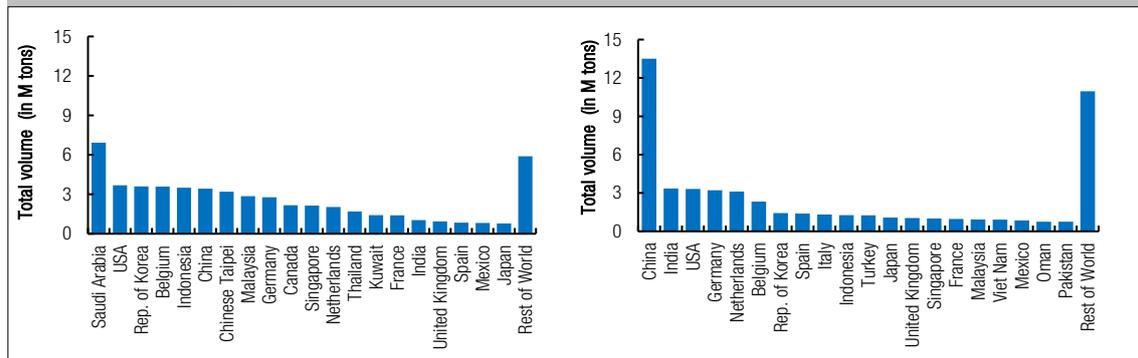
Source: As Fig 1 a,b.

**Figure 2a, 2b. Value of exports (left) and imports (right) in additives that can be used in plastics – 2018**



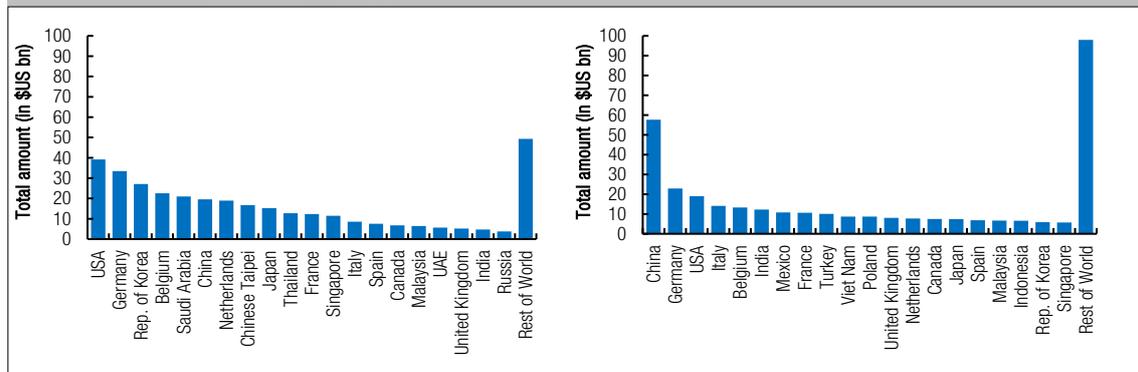
Source: As Fig 1 a,b.

**Figure 2c, 2d. Volume of exports (left) and imports (right) in additives that can be used in plastics – 2018**



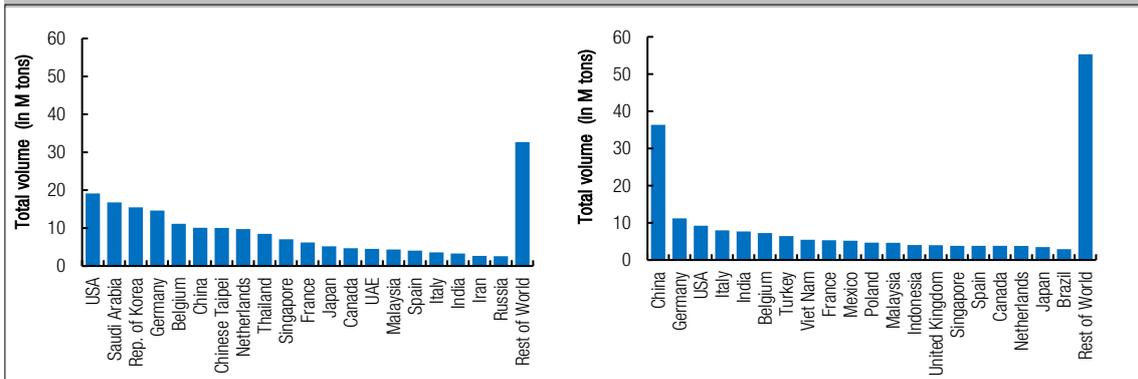
Source: As Fig 1 a,b.

**Figure 3a, 3b. Value of exports (left) and imports (right) in primary forms of plastics – 2018**



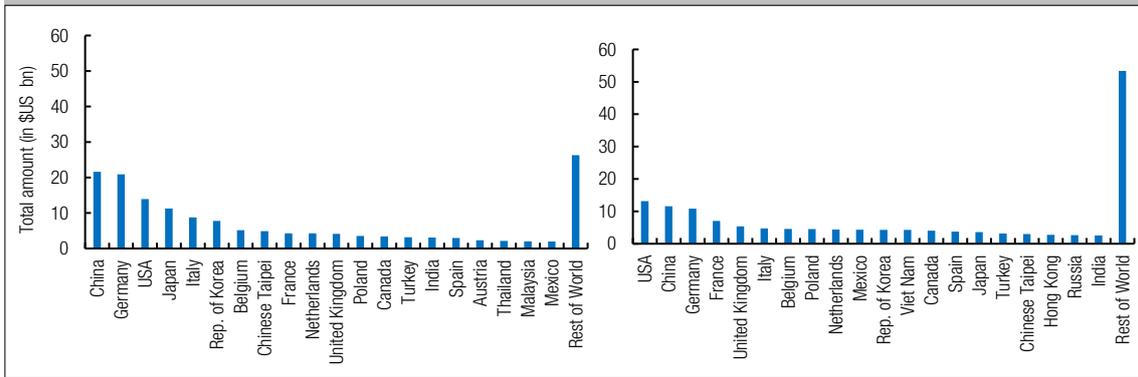
Source: As Fig 1 a,b.

**Figure 3c, 3d. Volume of exports (left) and imports (right) in primary forms of plastics – 2018**



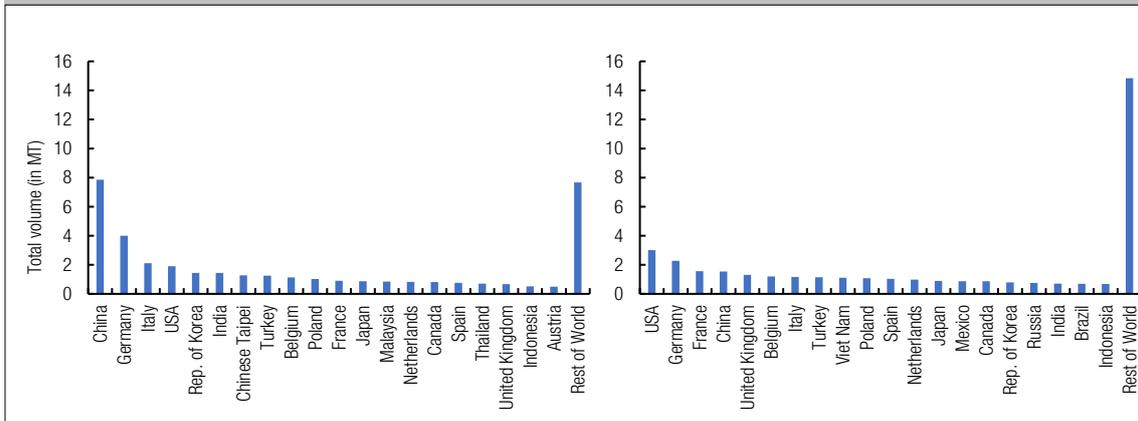
Source: As Fig 1 a,b.

**Figure 4a, 4b. Value of exports (left) and imports (right) in intermediate forms of plastics – 2018**



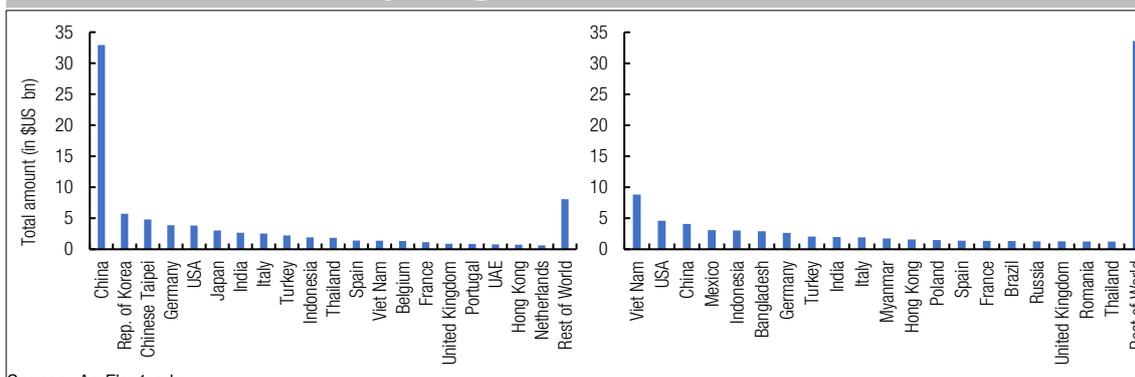
Source: As Fig 1 a,b.

**Figure 4c, 4d. Volume of exports (left) and imports (right) in intermediate forms of plastics – 2018, million metric tonnes (MT)**



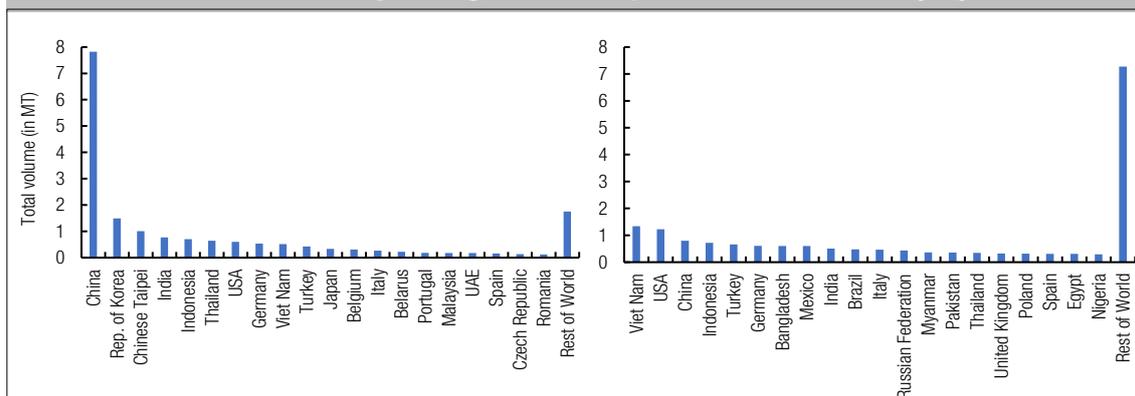
Source: As Fig 1 a,b.

**Figure 5a, 5b. Value of exports (left) and imports (right) in intermediate manufactured plastic goods – 2018**



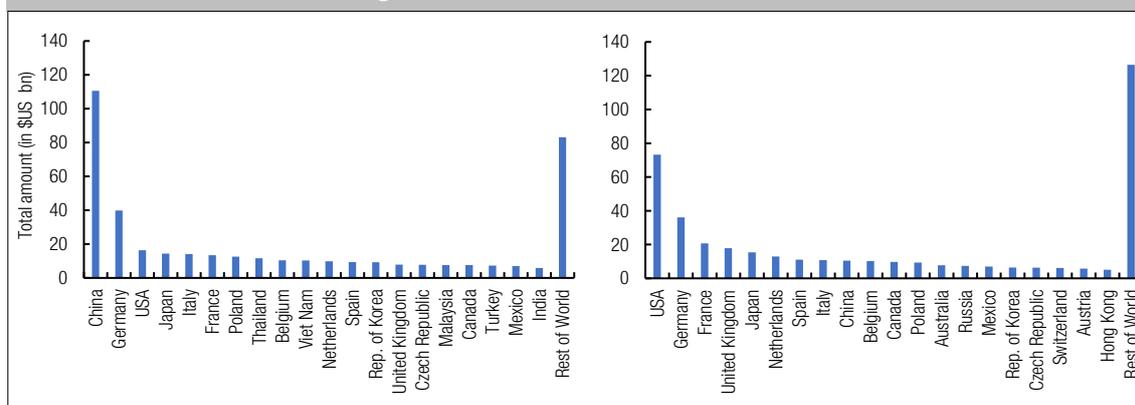
Source: As Fig 1 a,b.

**Figure 5c, 5d. Volume of exports (left) and imports (right) in intermediate manufactured plastic goods – 2018, million metric tonnes (MT)**



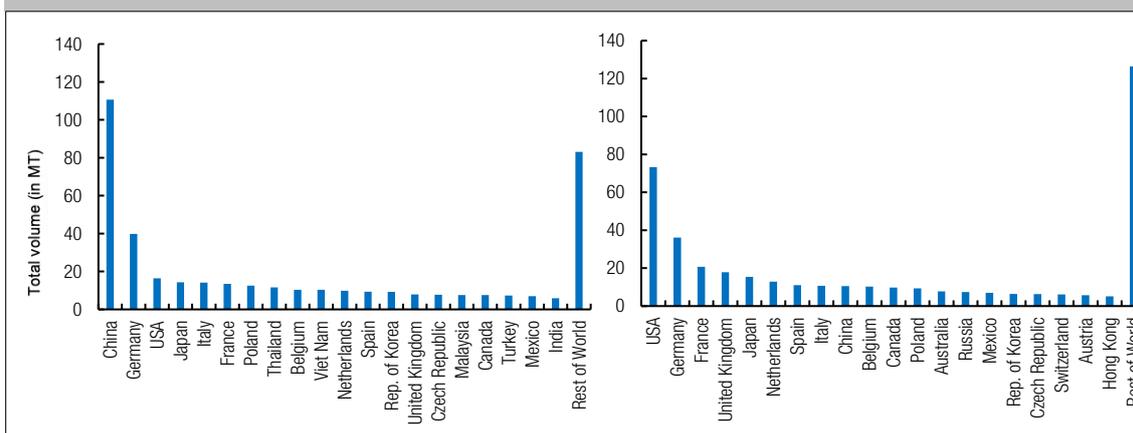
Source: As Fig 1 a,b.

**Figure 6a, 6b. Value exports (left) and imports (right) in final manufactured goods – 2018**



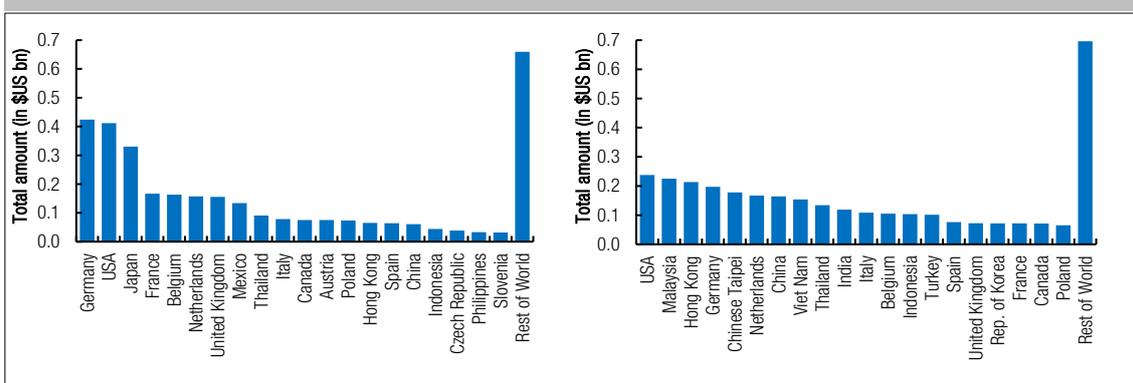
Source: As Fig 1 a,b.

**Figure 6c, 6d. Volume exports (left) and imports (right) in final manufactured plastic goods – 2018 (MT)**



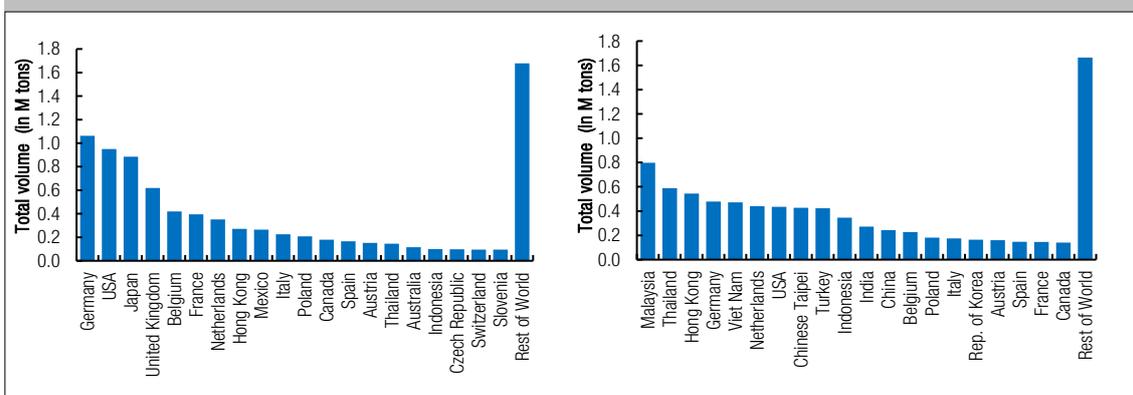
Source: As Fig 1 a,b.

**Figure 7a, 7b. Value exports (left) and imports (right) in plastic waste – 2018**



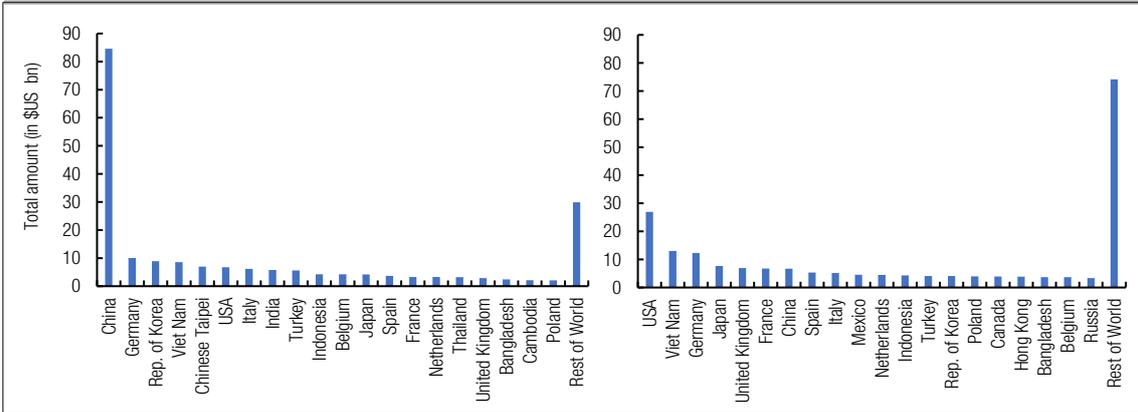
Source: As Fig 1 a,b.

**Figure 7c, 7d. Volume exports (left) and imports (right) in plastic waste – 2018**



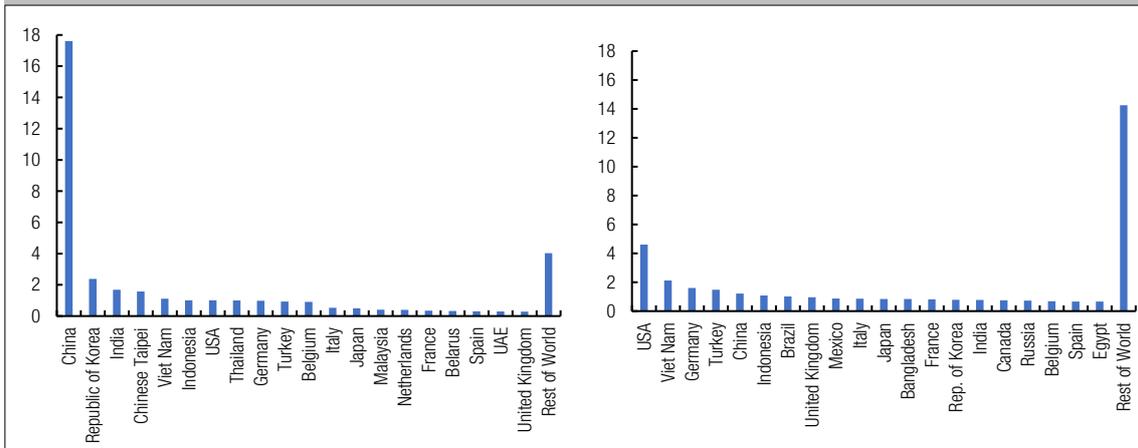
Source: As Fig 1 a,b.

**Figure 8a, 8b. Value exports (left) and imports (right) in synthetic textiles – 2018**



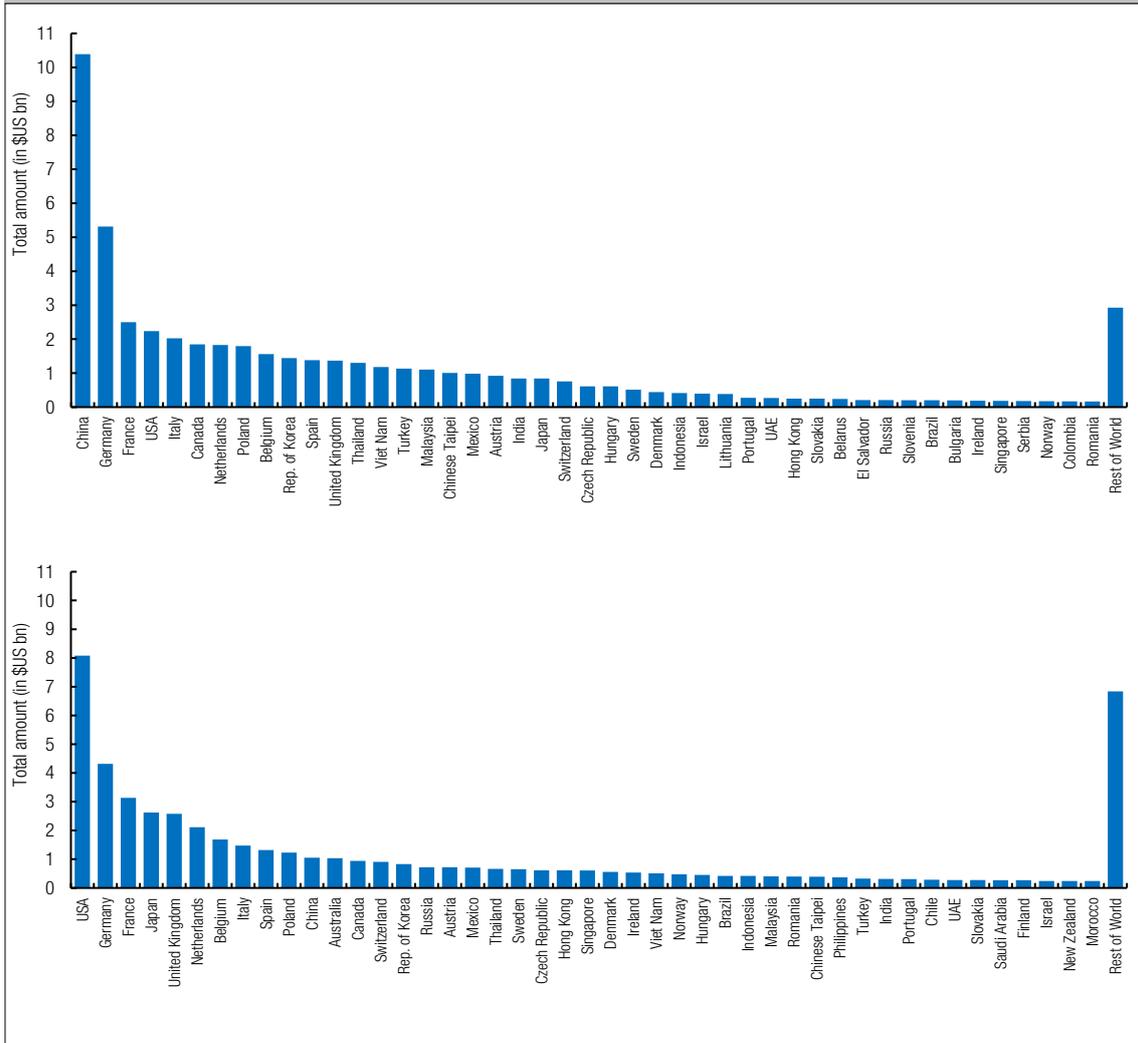
Source: As Fig 1 a,b.

**Figure 8c, 8d. Volume exports (left) and imports (right) in synthetic textiles – 2018**



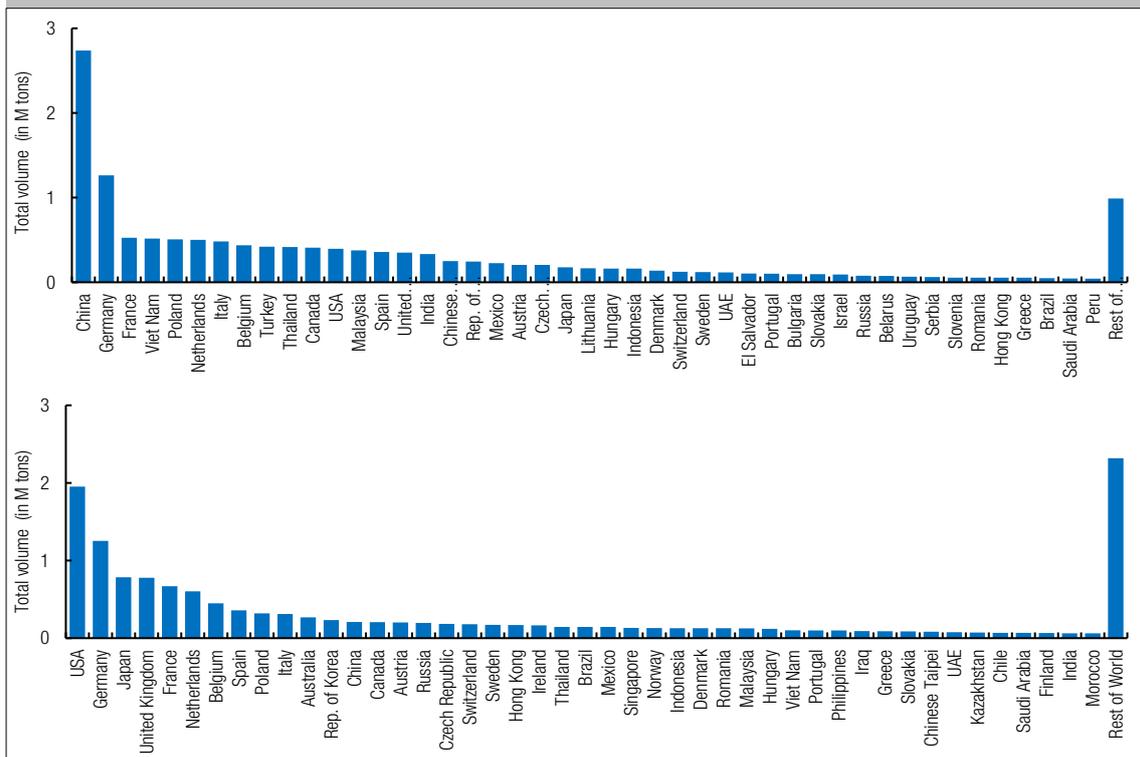
Source: As Fig 1 a.

**Figure 9a, 9b. Value exports (top) and imports (bottom) in plastic packaging – 2018**



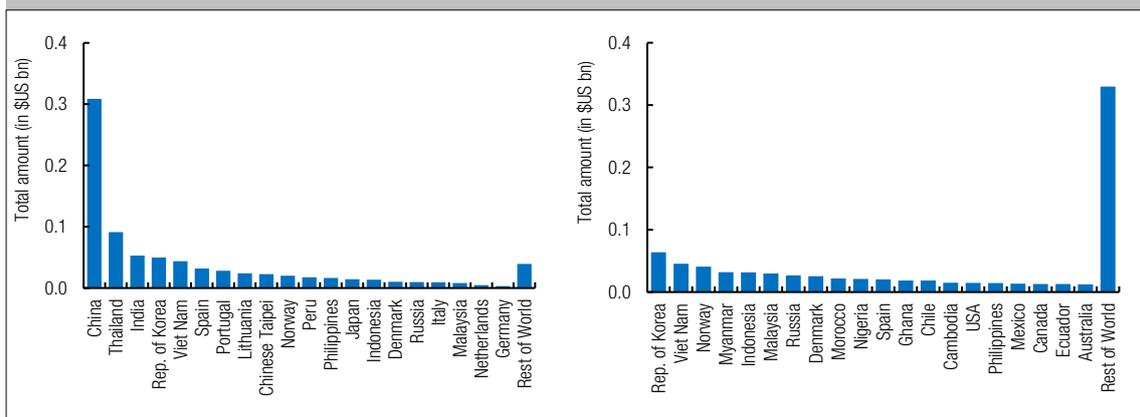
Source: As Fig 1 a,b.

Figure 9c, 9d. Volume exports (top) and imports (bottom) in plastic packaging – 2018



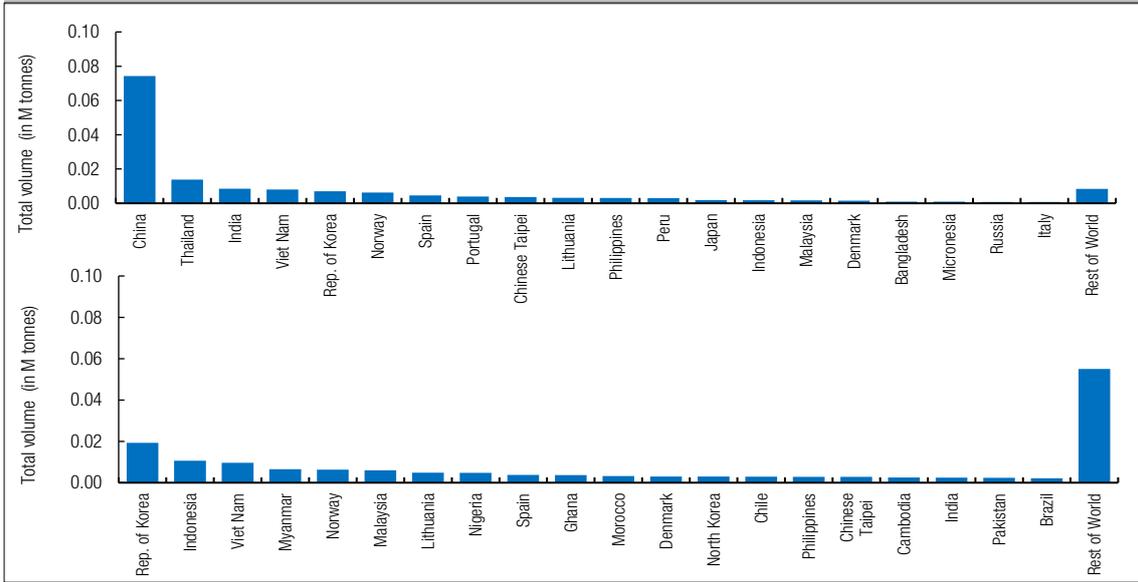
Source: As Fig 1 a,b.

Figure 10a, 10b. Value exports (left) and imports (right) in fishing nets – 2018



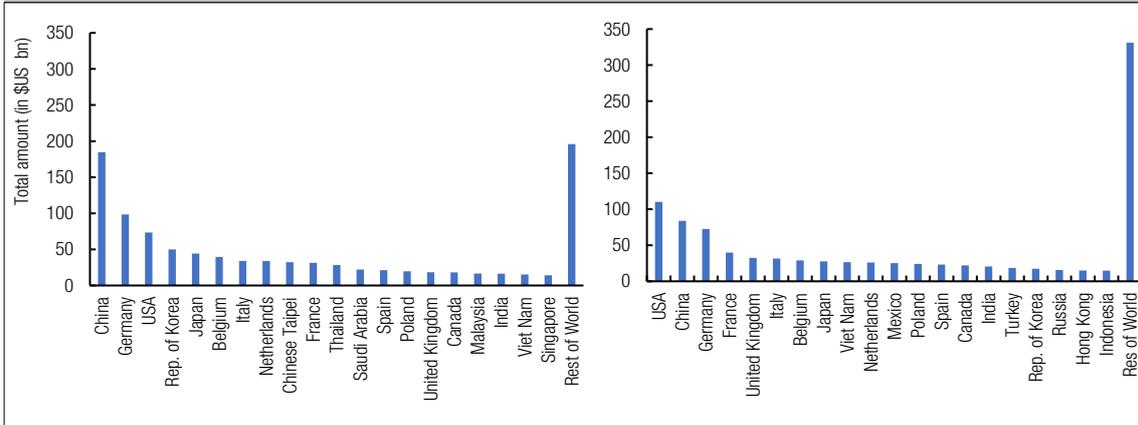
Source: As Fig 1 a,b.

**Figure 10c, 10d. Volume exports (left) and imports (right) in fishing nets – 2018**



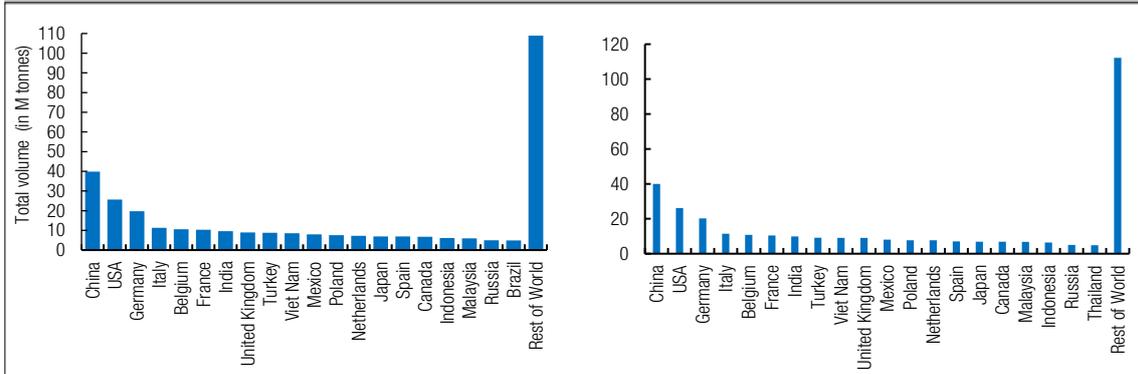
Source: As Fig 1 a,b.

**Figure 11a,b. Value exports (left) and imports (right) in total plastic products – 2018, \$US bn**



Source: As Fig 1 a,b.

**Figure 11c,d. Volume exports (left) and imports (right) in total plastic products –**



Source: As Fig 1 a,b.

**Figure 12. Bilateral trade flows – feedstocks and precursors**



Source: As Fig 1 a,b.

**Figure 13. Bilateral trade flows – additives**



Source: As Fig 1 a,b.