UNIVERSITÀ CATTOLICA del Sacro Cuore
transcrime
Joint Research Centre on Transnational Crime

Transcrime Research in Brief

June 2019

05. Estimating illicit waste trafficking in Europe

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2019
ISSN: 2420-8185
ISBN: 978-88-99719-11-1

Suggested Citation:
Meneghini C., Favarin S., Joyce T. (2019), *Estimating illicit waste trafficking in Europe,*
Transcrime Research in Brief - N.5/2019, Milano (IT): Transcrime - Università Cattolica del Sacro Cuore

Graphic project: Ilaria Mastro – Transcrime

Introduction

- Increases in the world population and the consumption of goods have led to **a proliferation of produced waste**.
- Due to the scarcity of waste disposal facilities and the tightening of environmental regulations, **expenses for adequately disposing the waste have increased**.
- Waste producers have been seeking cheaper disposal alternatives in countries with less severe regulations, less expensive systems of waste disposal, and less stringent enforcement activities. As a result, waste has become a significant source of income for developing nations.
- Together with the globalization of the legal waste trade, illegal activities related to the waste cycle have become a serious issue. **Illicit waste trafficking** (IWT) has become a **major global problem**; funding criminal activity, obstructing the legal market, and causing significant damage to the environment and human beings.
- **IWT is a multi-stage crime** involving the illegal trade, shipment, and processing of waste by a wide variety of actors. Estimates indicate that on average, in the EU, annual revenues from waste trafficking of both hazardous and non-hazardous waste range between €3 billion and €12 billion (Meneghini et al. 2017).
- The disparity in the regulations governing waste management and the enforcement measures employed by different nations makes IWT a low-risk high-profit venture.

- **IWT disrupts competition**, as law-abiding businesses continue to pay the significant waste management costs that companies engaging in this illicit practice avoid. Moreover, the illegal exporting of waste diverts profits from legitimate processing channels.

- **IWT also causes significant human harms.** The unsafe processing and dismantling of waste threatens the health of recycling workers. Furthermore, the illegal dumping of hazardous waste in water or soil introduces dangerous chemicals into the natural environment, leading to an increase in illnesses. This may impact the health not only of workers and local residents, but also of future generations living in that environment.

- Unfortunately, as it is a clandestine act, **data available** on the amount of waste being illegally disposed, and henceforth on the size of the illegal market, **is limited** and not up to date (Tompson and Chainey 2011).

- **Understanding the extent of the problem**, and the magnitude of the market, **is the first step to developing effective interventions** (Sahramäki et al. 2017). To reach this goal, a methodology needs to be developed to accurately estimate the amount of waste being trafficked at European level.

- This study reviews previous IWT estimation research and available data and **proposes a new methodology** for determining the scale of the problem. It then examines the implications of the subsequent findings.

1. Definition of IWT

- IWT is a multi-stage, multi-factor process, **involving the illegal trade, shipment, and processing of hazardous and non-hazardous waste** by a wide variety of actors, from criminal individuals to legitimate businesses.

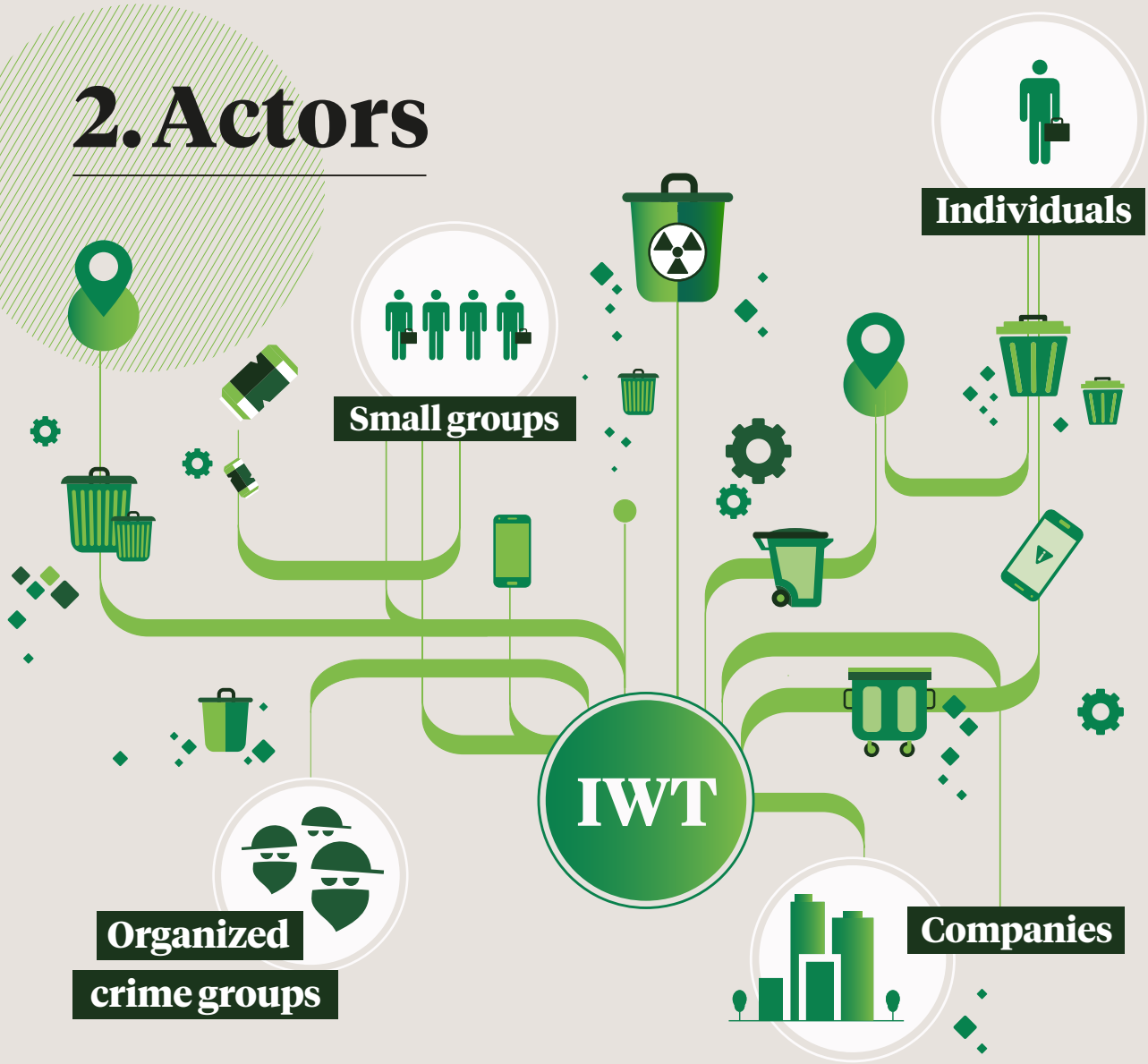
At the international level: Basel Convention definition

- Any transboundary movement of waste occurring without notification to concerned states; occurring without the consent of concerned states, or with consent obtained through falsification, misrepresentation or fraud; not conforming in a material way with the mandatory documentation, or that results in the deliberate disposal of waste in contravention of this Convention and of general principles of international law shall be deemed illegal waste traffic (UNEP 1989, Art. 9).

At the European level: Europol definition

- The trafficking of illicit waste entails the transportation, processing and disposal of waste outside the regulatory frameworks established by Member States (MSs) and the EU. All kinds of waste are trafficked, including household waste, electronic waste and other forms of hazardous waste. Depending on the type of waste, trafficking takes place within or between MSs, and to countries outside the EU (EUROPOL 2013).

2. Actors



- IWT is characterized by the interaction of a varied nexus of criminal actors: **individuals** (e.g., entrepreneurs, public officers) who can act alone or in small groups, **waste producers** (e.g., companies, municipalities), **waste management companies** (e.g., collectors, treatment facilities), and **organized crime groups** including **mafias** (Sahramäki et al. 2017).

- Individuals as well as companies behaving illicitly can **minimize the costs** related to waste management, or **maximize their profits**, by selling waste to other countries.

- They can interact with small criminal groups or organized crime groups through intermediate brokers, as well as organize themselves in small criminal groups to conduct their own trafficking operations.

- **Offending actors at work in the legal waste sector are especially problematic**, as they often have an excellent knowledge of the waste market, its complex licensing system, and how to avoid enforcement. They may also take advantage of a **double earnings effect**, being paid to take waste from producers, and after transporting it, being paid to give waste to re-users.

- The reason for the profusion of actors is twofold. First, **chances of detection are low**. Regulations are different in every country, there is limited international coordination, and insufficient resources are granted to enforcement. There is no evident victim on whom to press charges. Second, the **cost savings for non-compliance are significant**. Expensive legal treatment costs can be avoided. Waste can be bought and sold for greater profits. Informal recycling in Africa can make savings of up to 200 or 300% by disposing of illegal waste (Dorn et al. 2007).

3. Modi Operandi

- There are **five stages of IWT**: collection, storage, treatment, transport, and disposal. Each of these stages is **vulnerable to illegal activity**.
- The modus operandi **varies depending on the stage** in which actors are conducting their illegal activities. In some nations, corrupt officials allow for forged documents: concealing transported waste under the name of another good, or declassifying a specific waste from hazardous to non-hazardous.
- The falsification and misuse of licenses to prove that actors are entitled to collect, transport, treat or dispose of waste are also common.
- Criminals take advantage of illicit and licit networks to conduct waste trafficking practices.

IWT stages

Collection

Storage

Treatment

Transport

Disposal

Forgery of documents

Corrupt practices

Falsification and misuse of licences

4. Products

- Any material product of any size, from decommissioned ships, to barrels of oil, to mobile phones, can become waste.
- There are two types of waste: **hazardous**, that has the potential to significantly harm people and the environment, such as electronics, pesticides, and automotive waste, and **non-hazardous**, which if managed correctly does not pose a significant threat to people and the environment, such as glass, paper, and plastic.
- **The raw materials** that make up these products, such as plastic, wood, glass, rubber, and metals can be **recycled, reused, or disposed of safely**. In some developing countries, such as Ghana and China, waste is an important source of income, as it can be reused, recycled, or repurposed for sale.
- Profits can be earned through three mechanisms:

1. The **cost avoidance stream**, where non valuable waste such as food stuffs are shipped abroad to avoid local disposal costs;
2. The **user value stream**, where immediately useable waste such as clothes are sold as second hand products for a profit;
3. The **value transfer stream**, which involves the recycling of valuable waste, such as precious metals.

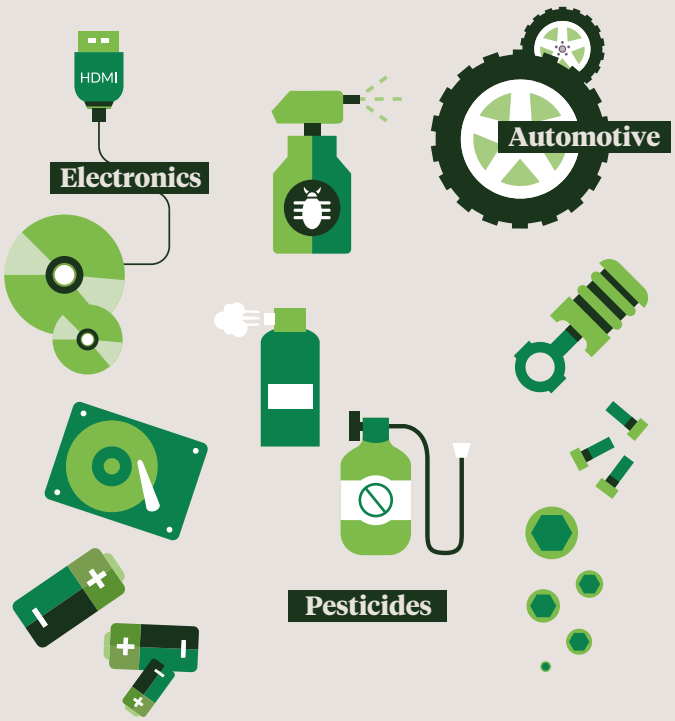
Two types of waste:

Hazardous

It has the potential to significantly harm people and the environment.

Non-hazardous

If managed correctly, it does not pose a significant threat to people and the environment.

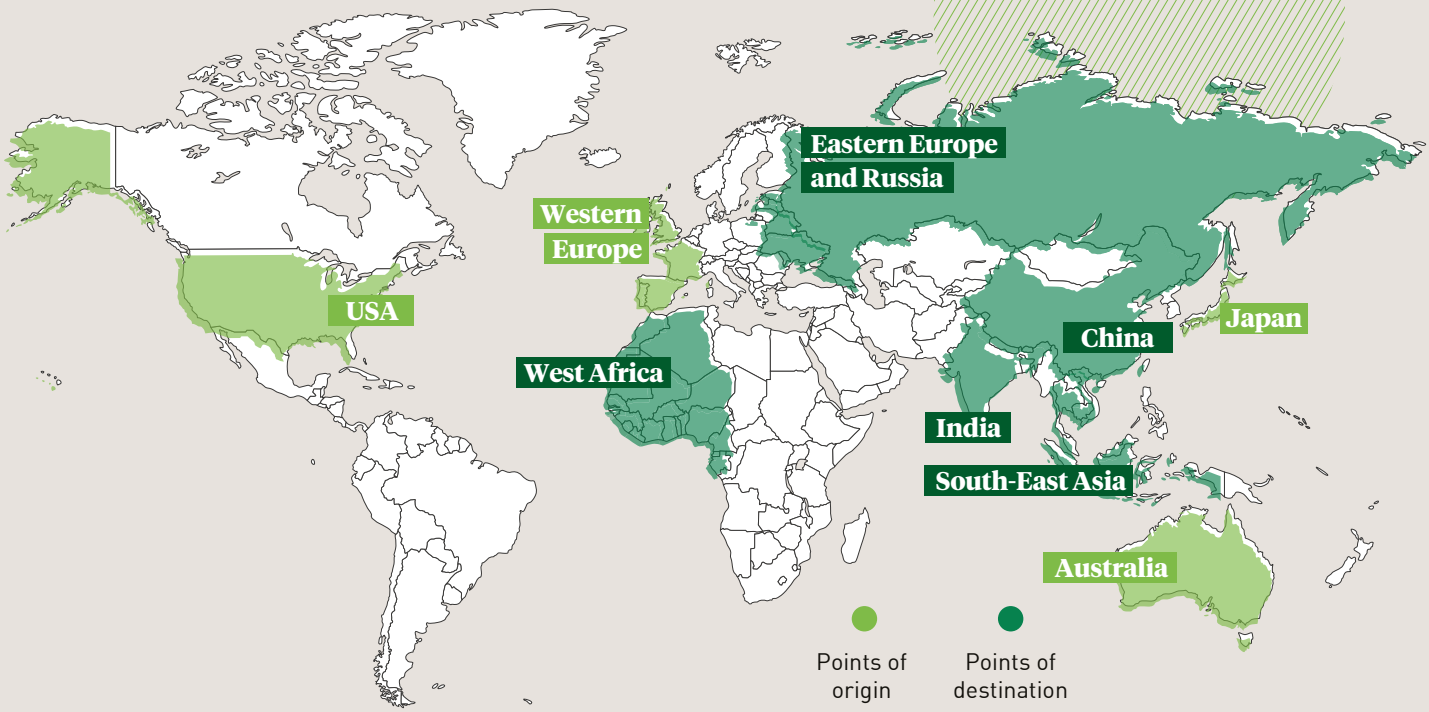


- Demand for second hand plastic as a product material in the Asian market has led to a significant **increase in the shipment of illegal plastic waste**. High demand means that plastic is priced by quantity rather than quality, leading to a reduction in the standards of shipped waste, which in some cases results in the violation of waste shipping conventions. **Similar profits are found from the IWT of paper**, as processing costs are half that of the virgin product.

- **Industrial wastes in particular may require special and expensive treatments** to be disposed of effectively. Here, the waste has a negative value, and producers pay waste processers to take the waste from them. The incentive to avoid substantial treatment costs might lead to illegal waste disposal practices.

- **E-waste is especially profitable.** E-waste may contain valuable metals and devices which make disassembly and recycling profitable. 25 tons of mobile phones yields 10 kilos of gold (UNODC 2013). However, circuit boards contain arsenic, cathode ray tubes contain lead, and cooling equipment contains chlorofluorocarbons; making these wastes hazardous to human health if dismantled without proper care.

5. Routes



Source: Elaborated from Nellemann et al. 2016

- The four main **points of origin** for illegal waste are **Western Europe**, the **United States**, **Australia**, and **Japan**. Most of the waste travels to Eastern Europe and Russia, West Africa, or East and South-East Asia. China in particular is a major destination country, importing waste from each major point of origin (Nellemann et al. 2016).

- The primary trafficking destinations from **Western Europe** are **Ghana**, **Nigeria**, and **China**, where huge quantities of waste are illegally processed, or disposed of improperly.

- **Routes depend on the type of waste**, e-waste typically being shipped to African and South-East Asian countries, used motor vehicles and associated parts to Eastern Europe and Africa, and plastics to China and other Asian countries.

Products with a high risk of waste trafficking

Plastic waste

Type of goods:

All products including plastic materials (e.g., plastic packaging, plastic waste from construction and demolition, plastic waste from automotive applications)

Main destination:

Asia

You might not know that:

In 2015, 69% of the global imports of plastic waste (including post-consumer and industrial plastic waste) were headed to China and Hong Kong (GRID-Arental 2017).

Practical case

"Plastic waste taken from European countries (e.g., Belgium, Spain, Germany) was sold to Asian countries (e.g., China, India, Indonesia). The batches of plastic contained residual hospital and wood waste, and animal remains. The contaminated waste was loaded into the containers first, and clean plastic waste was placed on top of it to conceal it. In order to obtain permission for the transport, images of these seemingly clean loads of plastic were sent to the administrative authorities. The waste was exported without a permit and with a falsified Bills of Landing. The investigation found that at least 600 illegal shipments were carried out using this method."

E-waste

Type of goods:

Electrical and electronic equipment such as computers, mobile phones, television sets, refrigerators

Main destinations:

China, Africa

You might not know that:

Recycling one million laptops saves the energy equivalent of the electricity used by more than 3,500 US homes in a single year (EPA 2019).

Practical case

"A conspiracy of Italian and African offenders (mainly Nigerian) organized the export of tons of e-waste (and, to a lesser extent, end-of-life vehicles) from Turin to Nigeria and Ivory Coast. A group of business owners transferred the e-waste for free to a group of collectors who initially stored the waste, and then arranged its transport from Turin to Genoa harbour, and then to Nigeria and Ivory Coast. Once the waste arrived in the destination countries, it was sold to unknown persons."

Old garments

Type of goods:

Old clothes, garments and accessories (e.g., bags)

Main destinations:

Africa, India

You might not know that:

50 kg of recovered clothes into second-hand fabric are equivalent to save 180 kg of non-emitted C02, 300,000 liters of water, 12 trees, 15 kg of insecticides and 30 kg of fertilizers (HUMANA people to people 2019).

Practical case

"Old rags and second-hand clothing were imported from Germany, and then illegally collected from different cities in the Campania Region, by using municipal trash bins designated to gather old garments. However, the company that legally imported the rags and clothes was a shell company for other commercial businesses. These businesses forged documents about the fake treatment of the old rags, which were falsely classified as secondary raw material. The rags were then illegally traded in Italy or exported from Naples harbour to the United Arab Emirates, India, North Africa and South America. Allegedly, the old garments were sold and reused."

Practical cases gathered from Project Blockwaste

6. How to estimate IWT

- Estimating the size of IWT is crucial to identify the areas at higher risk of illicit waste operations and to take effective decisions in allocating resources.
- Quantifying these activities is challenging because of their clandestine nature and the lack of systematized data.
- There are a few studies that report figures for the extent of IWT, relying on two main approaches:

Indirect Approach

Exploits **data on the legal waste market** and assumes that the size of illegal activities equals the amount of waste that has not been legally recorded as being treated.

Data on legal waste operations:

Waste generation

Waste treatment by type of treatment activity (incineration, landfill, recovery)

Legal imports and exports of waste

Availability:

28 EU Member States

Both types of waste: hazardous and non-hazardous

Source:

Environmental Data Centre on Waste – Eurostat

Direct Approach

Exploits **data on reported cases of illegal shipments of waste** to estimate the total amount of waste illegally shipped or trafficked between countries.

Data on illegal waste activities:

Detected illegal waste shipments (seizure cases)

Reported crimes related to illegal waste management (crime data)

Availability:

Only a few EU MSs disseminate national level statistics on waste crimes and illegal shipments (Germany, Ireland, Finland, Slovakia, Slovenia, Sweden, Italy, and the UK)

Source:

National statistics and reports

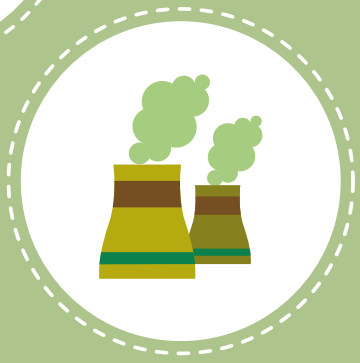
- This study aims at proposing an **innovative step-by-step methodology** to quantify different aspects of IWT, combining elements from both the indirect and the direct approach.
- The methodology is applied to estimate the illicit waste markets in the EU MSs and to quantify IWT for Germany, which was possible due to the extensive amount of data available on this country.
- The volume of IWT is estimated separately for hazardous and non-hazardous waste, as differences in the legal management price for these two types of waste creates different trafficking incentives.

7. Methodology

Difference between waste produced...

− Legal Export

+ Legal Import



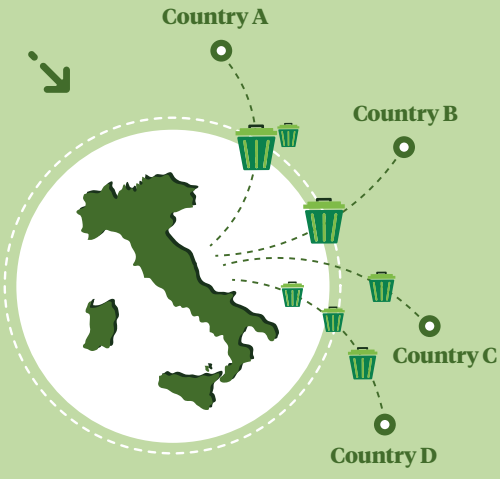
....and waste legally treated (1 2 3) generates:

Waste disappearing from the legal market

LEGAL MARKET DATA

ILLEGAL MARKET DATA

Size of illicit waste management in the country of production



Size of illicit waste trafficking (abroad)

POTENTIAL REVENUES

Having calculated the volume of waste managed or trafficked by each country, the potential revenues derived from trafficking operations can be estimated by exploiting data on prices charged for illicit waste disposal.

- Prices charged for illicit waste disposal vary according to different factors: the type of waste, whether it is hazardous, the number of actors, and the countries involved.
- Potential illicit revenues are earned both through in-country illicit disposal operations and waste trafficking abroad.
- Average potential revenues from IWT in country A can be calculated through multiplying the amount of waste trafficked by the average price charged for the illegal disposal of waste.

Volume of illicit waste in tons | **Price charged for the illegal disposal of 1 ton of waste** | **Potential revenues**

Step 1

In each country, the **gap between waste generated and waste treated** is the difference between the waste that has been produced and the waste that has been officially treated.

Step 2

This gap is adjusted by accounting for **legal waste exports**: as some countries lawfully export part of their waste to be treated or disposed of elsewhere.

Step 3

Next, this gap is adjusted by accounting for **legal waste imports**: as some countries with access to greater waste disposal facilities may lawfully import and treat waste produced abroad.

Step 4

Applying the adjustments in step 2 and 3, the gap between waste generated and waste treated represents the volume of **waste disappearing from the legal market**: generated waste for which there is no evidence of legal treatment (either within the country or abroad).

Step 5

The quantity of waste disappearing from the legal market can be divided into **two different streams**: 1) waste illegally disposed of in the country of production; 2) waste illegally trafficked abroad. The estimated amount of waste illegally trafficked abroad is computed by determining the percentage of detected waste trafficked abroad from the total amount of detected illegal waste activity, and applying this percentage to the total amount of waste disappearing from the legal market.

Step 6

Using data from **illegal waste shipments**, the amount of illegally exported waste can be estimated. When the share of illegally shipped waste from country *i* to country *k* over the total volume of detected illegal shipments is multiplied by the by size of IWT from country *i*, the result approximates the amount of illegally exported waste.

8. Results

- Applying the outlined methodology, this study estimates the volume of waste disappearing from the legal market in 21 of the EU MSs.[i]

- This is the **first substantial attempt to quantify these volumes in Europe**, given the potential biases that characterize data on generated, treated, and transported waste.

Waste disappearing from the legal market in the EU countries:

- In 21 of the EU MSs, an average of **14% of non-hazardous waste** and **37% of hazardous waste** were **not recorded as legally treated** between 2016 and 2018.

- The higher risk of illicit waste management for hazardous waste is likely due to the higher prices for its legal disposal and treatment.

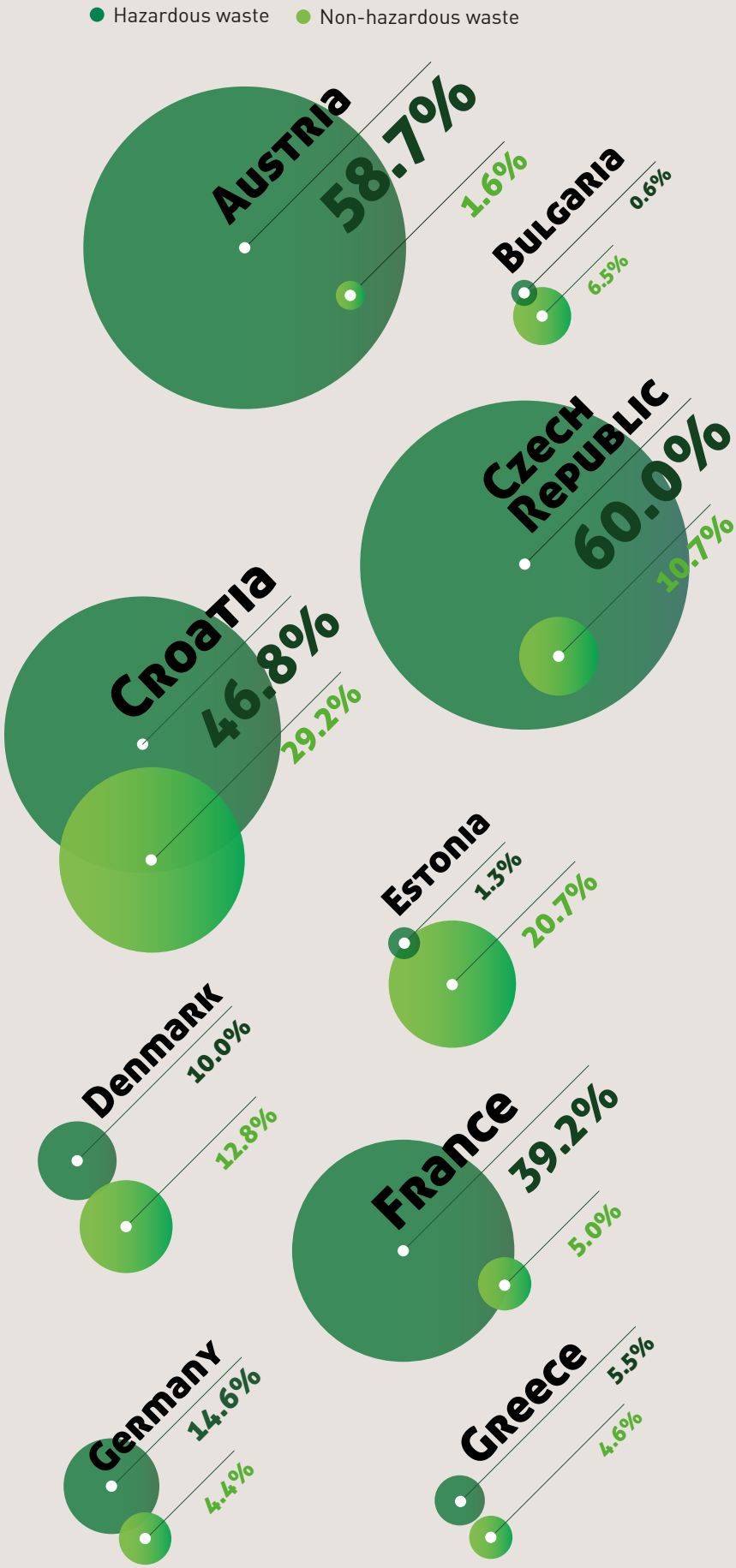
- The countries most exposed to the risk of illicit trafficking of non-hazardous waste are Portugal, Lithuania, Slovakia, and Croatia. In these countries, the share of waste disappearing between the generation and treatment phase is higher than 28%.

- Portugal, Lithuania, and Slovakia are also among the countries with the highest shares of hazardous waste disappearing, together with Austria, Czech Republic, Latvia and the UK: in these countries, more than half of the hazardous waste produced in 2016-2018 was not recorded as being legally treated.

i. 7 EU countries have been excluded from the results presented. Belgium, Cyprus, Luxembourg, Malta and Slovenia have been excludedas the information they provide on waste generated and waste treated is not applicable to the proposed methodology (in most cases, the amount of waste generated is determined on the basis of waste treatment data). Polonia and Finland have been further excluded due to partially unreliable data.

*For Austria, Bulgaria, Greece, the Netherlands, Portugal, Slovakia, and Spain, 2018 estimates are based on partially provisional data points, as reported by Eurostat.

Percentage of hazardous and non-hazardous waste disappearing from the legal market on the total produced (2016-2018)*



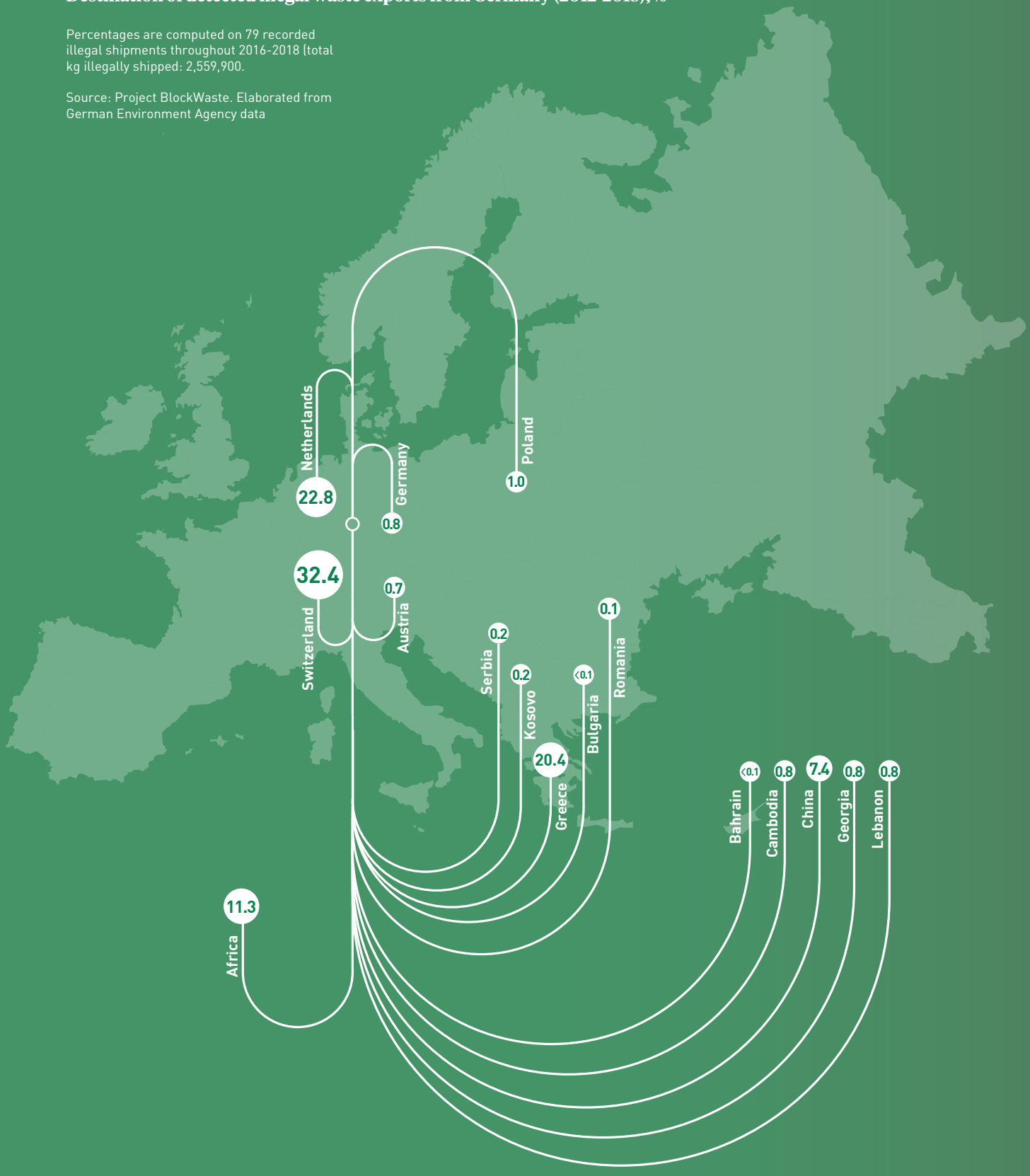

Hungary
24.5%
11.4%
Ireland
36.0%
10.2%
Latvia
61.9%
18.5%
Italy
49.9%
13.4%
Lithuania
52.4%
30.4%
The Netherlands
17.4%
3.0%
Romania
33.9%
1.2%
Portugal
52.5%
35.0%
Slovakia
59.7%
28.9%
Sweden
40.9%
5.3%
Spain
36.8%
15.0%
United Kingdom
64.3%
20.7%

Estimated illicit waste trafficking for Germany

Destination of detected illegal waste exports from Germany (2012-2015), %

Percentages are computed on 79 recorded illegal shipments throughout 2016-2018 (total kg illegally shipped: 2,559,900.

Source: Project BlockWaste. Elaborated from German Environment Agency data



- According to existing European regulations (i.e., EU Regulation No 660/2014), EU MSs should openly publish the outcome of waste shipment inspections, including any measures taken or penalties imposed.

- However, the requirement for shipment inspections was only formally adopted on the 1st of January 2017. As a result, **only a few MSs have disseminated comprehensive data on the outcome of inspections**.

- One exception is Germany, as **the German Environment Agency has been releasing information on illegal waste shipment cases** constantly starting from 2012, allowing for IWT estimates to be derived as part of this study.

- Most illegal waste exported from Germany travelled to countries in Europe, but African and China were also relevant destinations (approximately 11% and 7% of total illegal waste exports, respectively).

- By assuming that half of the waste disappearing from the German legal waste market is trafficked abroad,[ii] the **estimated volume of illegal waste exports from Germany to the rest of Europe** in one year (2016-2018 average) amounts to **almost 8 million tons**.

- Of these 8 million tons, about 4.5 million are destined to other EU countries, while 3.3 million are trafficked into Switzerland.

- Under the same scenario, IWT from Germany to African countries and China is estimated to be about 1.1 million tons and 700,000 tons respectively.

ii. In Germany, there is no available data allowing for the division of the quantity of waste disappearing from the legal market into the amount of waste illegally disposed of within the country, and the amount of waste illegally trafficked abroad. Hence, different scenarios were constructed, assuming in turn that 25%, 50% and 75% of the waste disappearing from the legal market is trafficked abroad. Results relying on the 50% threshold are presented here.

Conclusions

- The proposed methodology is an **innovative** and **exploratory attempt** to estimate IWT. The methodology combines elements from two classes of existing approaches: the direct and the indirect approach.

- The presentation of the methodology as a step-by-step approach stimulates the debate on how to improve the measurement of criminal markets and their proceeds.

- **Availability of more accurate data** will deliver more robust results. In particular, the methodology relies on the collection of precise data on waste generated, legally traded, and legally imported and exported.

- The ability to collect more information on the prices charged for the illegal disposal of waste will allow for the computation of revenues derived from the illicit waste management of different types of waste, and in different geographical areas, with greater accuracy and precision.

- Additional data on detected waste crimes will allow for more accuracy (e.g. separately for each country) in determining the share of waste illegally trafficked abroad (over the total amount of waste entering the illicit market).

- **Obtaining reliable estimates for the size of the illicit waste market** in the 28 EU MSs is an **essential starting point** that may help future studies in identifying the risk factors leading to illicit waste management. This is the first step towards improving the IWT prevention capabilities of EU agencies. Future works will have to refine the presented methodology according to renewed data availability.

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