

# INDICATOR FACT – SHEET

## 2. “Hardware” of waste management

### *Sub-indicators*

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#### *IND 2.C Resource Recovery*

*IND 2.C.1 % of plastic waste generated that is recycled*

**DRAFT Indicator Specification**

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## Indicator Specification

<b>H2020 Indicators</b>	
<b>Thematic area</b> WASTE	<b>Date</b> <b>Author (s)</b>
<b>Policy theme</b> <b>Marine Litter and waste management interfaces</b>	
<b>Indicator</b> 2. "Hardware" of waste management <b>Sub-indicators</b> <i>IND 2.A Waste Collection</i> <i>IND 2.A.1 Waste Collection Coverage</i> <i>IND 2.A.2 Waste Captured by the formal waste sector</i> <i>IND 2.B Environmental Control</i> <i>IND 2.B.1 % of waste to uncontrolled dumpsites</i> <i>IND 2.B.2 Uncontrolled dumpsites in Coastal Areas</i> <i>IND 2.B.3 Waste going to dumpsites in Coastal Areas</i> <i>IND 2.C Resource Recovery</i> <i>IND 2.C.1 % of plastic waste generated that is recycled</i>	
<b>Additional information</b> (if applicable) The specification has been modified, comparing to the 2015 versions. This indicator substitutes the previous Indicator 2 "Collected and treated municipla waste". The reasons are explained at the rationale.	

## Rationale

Performance indicators provide a good basis for assessing the existing situation, carrying out a comparison and tracking changes or progress made over time. For indicators to be useful as a tool for decision makers and politicians, they need to simplify the potential mass of data by being selective, by focusing on the important elements rather than trying to cover all aspects. By doing so, the information the indicators present will be relatively easy to use and understand.

Unfortunately, compiling high quality data on waste and waste treatment has long been a challenge. The available estimates are diverse, not verified or reliable, and often rather outdated. Thus, transforming waste data into reliable waste statistics has proven difficult. Definitely, this situation reflects to Marine Litter Statistics too, in one or another way. Some of the major areas of concern are:

- Lack of standard definitions and classifications
- Absence of measurement and of standard methodologies for measurement
- Lack of standard reporting systems

Interest in performance indicators for solid waste management is long-standing. Researchers have examined the bias issues in the then-standard set of three benchmark indicators: waste generated per capita; proportion of waste being managed by different methods; and proportion of households with a regular collection service. They found that although solid waste planning is a multi-disciplinary field requiring information about the physical, environmental, social, and economic implications of a system, the environmental indicators in use for solid waste do not adequately inform decision-makers about these attributes. Therefore, in many cases the indicators do not facilitate a holistic approach to environmental planning and policymaking.

A notable recent attempt to develop benchmark indicators and apply them to the comparison of cities both North and South was the report prepared for UN-Habitat on the state of solid waste management in the World's cities. The evolution of this tool is described in the recent UNEP – ISWA Global Waste Management Outlook and the set of Wasteaware Indicators.

According this tool, experience suggests that, for a system to be sustainable in the long term, consideration needs to be given to:

- All the physical elements (infrastructure) of the system.
- All the stakeholders (actors) involved.
- All the strategic aspects, including the political, health, institutional, social, economic, financial, environmental and technical facets.

The concept of Integrated Sustainable Waste Management (ISWM) which explicitly brings together all three dimensions, is gradually becoming the norm in discussion of solid waste management in developing countries. In this systematic description we can refer to the “software” and the “hardware” of waste management. The “software” refers to all the governance aspects (financial sustainability, social inclusion, institutional development). The “hardware” refers to all the relevant infrastructure (collection, recycling, treatment and disposal).

## Justification for indicator selection

The “Hardware” of waste management comprises the three primary physical components (elements), each linked to one of the key drivers that are described.

### Waste collection: driven primarily by public health (Indicator 2A)

Safe management of human excreta (sanitation) and removal, treatment, and management of solid waste are two of the most vital urban environmental services. While other essential utilities and infrastructure like energy, transport and housing often get more attention (and much more budget); failing to manage the ‘back end’ of the materials cycle has direct impacts on health, length of life, and the human and natural environment. Uncollected solid waste clogs drains and causes flooding and subsequent spread of water-borne diseases.

Cities spend a substantial proportion of their available recurrent budget on solid waste management, perhaps as much as 20-50% for some smaller cities. Yet UN-HABITAT data shows waste collection rates for cities in low- and middle-income countries generally in the range of 10-90%, which means that large portions of the population receive no services at all, and much waste ends up in the environment. The data also show that rates of diarrhoea and acute respiratory infections are significantly higher for children living in households where solid waste is dumped, or burned, in the yard, compared to households in the same cities, which receive a regular waste collection service.

### Waste treatment and disposal: driven primarily by environmental protection (Indicator 2B)

Until the environmental movement emerged in the 1960s, most unwanted materials were discharged to land, as open dumping, to air, as burning or evaporation of volatile compounds, or to water by discharging solids and liquids to surface or groundwater or the ocean. There was little regard for the effects on drinking water resources and health of those living nearby, because disposal was based on the idea that wastes decomposed and returned to the environment without harming it.

Over the last 30-40 years, environmental control over has seen development of a series of steps, first phasing out uncontrolled disposal, then introducing, and gradually increasing, environmental standards, for example on water pollution and methane emissions from sanitary landfills and air pollution from incinerators. Many cities in low- and middle-income countries are still working on phasing out open dumps and establishing controlled disposal. This is a first step towards good waste management, and is designed to pave the way for a sanitary landfill, seen to be an essential part of any waste management system.

### The 3Rs – reduce, reuse, recycle: driven by the resource value of the waste (IND 2.C)

Many developing and transitional country cities still have active informal sector recycling, reuse, and repair systems, which often achieve recycling rates comparable to those in the West, at no cost to the formal waste management sector. Not only does the informal recycling sector provide livelihoods to huge numbers of the urban poor, but they also save the city 15-20% of its waste management budget, by reducing the amount of wastes that would otherwise have to be collected and disposed of by the City.

During the past 10-20 years, high-income countries have been rediscovering the value of recycling as an integral part of their waste (and resource, management systems, and have invested heavily in both physical infrastructure and communication strategies to increase recycling rates. Major priorities to improve environmental performance and conserve resources work to shift the focus of waste management. The goal of safe disposal shifts to an emphasis on valorisation, and commercialisation, of three sets of materials:

- Products which can be re-used, repaired, refurbished, or re-manufactured to have longer useful lives;
- Recyclable materials which can be extracted, recovered, and returned to industrial value chains, where they strengthen local, regional, and global production; and
- Bio-solids consisting of plant and animal wastes from kitchen, garden, and agricultural production, together with safely managed and treated human excreta, which are sources of key nutrients for the agricultural value chain, and have a major role to play in food security and sustainable development.

#### REFERENCES

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- FRENCH MINISTRY OF THE ENVIRONMENT, ENERGY AND MARINE AFFAIRS, May 2017, 10 Key Indicators for Monitoring Circular Economy
- UNEP and CSIRO (2011). *Resource Efficiency: Economics and Outlook for Asia and the Pacific* [http://apps.unep.org/publications/pmtdocuments//pdf/Resource\\_Eficiency\\_EOAP\\_web.pdf](http://apps.unep.org/publications/pmtdocuments//pdf/Resource_Eficiency_EOAP_web.pdf)
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- UNEP – ISWA, Global Waste Management Outlook, 2015, ISBN: 978-92-807-3479-9
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- Wasteaware' benchmark indicators for integrated sustainable waste management in cities, Waste Management, Volume 35, January 2015, Pages 329-342

## Indicator definition

### **IND 2.A: Waste Collection**

#### **IND 2.A.1: Waste Collection Coverage (Wcc)**

This indicator provides the % of the population of the country that is covered by a regular collection service organised either by public authorities or private companies. It is a measure of the public health protection (due to regular removal of waste) and the quality of municipal governance. The indicator includes both formal municipal and informal sector services.

$$Wcc (\%) = Ps / P$$

Where:

Ps = population of the country that is covered by a regular collection service organised either by public authorities or private companies

P = total population of the country

#### Definitions required

A 'collection service' may be 'door to door' or by deposit into a community container. 'Collection' includes collection for recycling as well as for treatment and disposal (so includes e.g. collection of recyclables by itinerant waste buyers). 'Reliable' means regular - frequency will depend on local conditions and on any pre-separation of the waste. For example, both mixed waste and organic waste are often collected daily in tropical climates for public health reasons, and generally at least weekly; source-separated dry recyclables may be collected less frequently.

Formal Waste Sector: Solid waste system, solid waste authorities, government, materials recovery facility; Solid waste management activities planned, sponsored, financed, carried out or, regulated and/or recognised by the formal local authorities or their agents, usually through contracts, licenses or concessions.

Informal Waste Sector: Waste pickers, scavengers, junkshops; Individuals or enterprises who are involved in waste activities but are not sponsored, financed, recognised or allowed by the formal solid waste authorities, or who operate in violation of or in competition with formal authorities

#### Temporal Unit

Annually

#### Units

% on total population of the country

## **IND 2.A: Waste Collection**

### **IND 2.A.2: Waste captured by the system (Ws)**

This indicator provides the % of the percentage of waste generated that is actually handled completely by the formal waste management and recycling system, thus the waste that is not lost through illegal burning, burying or dumping in unofficial areas.

Waste captured by the system represents all the waste materials shown on a Materials Flow Diagram that are delivered to an official treatment/disposal facility or to a recycling factory (MRF). This includes street sweepings, wastes collected, and waste materials collected for and delivered to recycling.

Accordingly, once again it is mentioned that waste capture does not include collected waste materials that are then dumped at an illegal ('wild') dumpsite location.

Although the positive role of the informal recyclers is recognized, there is a huge lack of relevant reliable data, so their contribution can't be measured at this stage.

$$Ws (\%) = Wf/W$$

Where:

Wf = Waste captured by the formal waste sector

W = Total Waste Generated

#### Definitions required

Formal Waste Sector: Solid waste system, solid waste authorities, government, materials recovery facility; Solid waste management activities planned, sponsored, financed, carried out or, regulated and/or recognised by the formal local authorities or their agents, usually through contracts, licenses or concessions.

MRF (Material Recover Facility: Materials recovery facility, IPC, IPF, intermediate processing centre/facility, recycling processing centre; An industrial facility of moderate scale that is designed for post-collection sorting, processing, and packing of recyclable and compostable materials. It is usually of moderate technical complexity with a combination of automated and hand-sorting. e inputs are usually commingled or mixed recyclables and not mixed waste. The outputs are industrial grade materials, usually crushed or baled and separated by type, colour, etc.

Treatment: Decontamination, processing, incineration, anaerobic digestion, biogas production, pyrolysis, composting; Labour based or mechanical methods to reduce the risk of exposure or reduce the impacts to the environment of toxic or hazardous materials associated with the waste stream and in some cases, can concurrently capture and increase the economic value of specific waste stream components value added  
Disposal-legal: Disposal of waste at a site designated by the municipal authorities

#### Temporal Unit

Annualy

#### Units

w/w % on total waste generated

**IND 2.B: Environmental Control - % of controlled treatment and disposal (We)**

This indicator provides the % of controlled treatment and safe disposal practices, the percentage of the total municipal solid waste destined for treatment or disposal in either a state-of-the-art, engineered facility or a 'controlled' treatment or disposal site. Thus, the indicator is a measure of the environmental control or protection achieved by the formal system. Waste being accepted at a facility 'counts' towards this quantitative indicator if the facility has reached at least an intermediate level of control. By definition, the calculation does not include informal recycling facilities, illegal disposal and dumpsites.

The numerator is similar to IND 2.A.2. The denominator is (Total Waste generated – Waste recycled and reused).

$$We \% = Wf / (W - Wr)$$

Where:

Wf = Waste captured by the formal waste sector

W = Total waste generated

Wr = Recycled and reused waste

Definitions required

Formal Waste Sector: Formal Waste Sector: Solid waste system, solid waste authorities, government, materials recovery facility; Solid waste management activities planned, sponsored, financed, carried out or, regulated and/or recognised by the formal local authorities or their agents, usually through contracts, licenses or concessions.

Informal Waste Sector: Waste pickers, scavengers, junkshops; Individuals or enterprises who are involved in waste activities but are not sponsored, financed, recognised or allowed by the formal solid waste authorities, or who operate in violation of or in competition with formal authorities

Dumpsite: Dump, open dump, uncontrolled waste disposal site; A designated or undesignated site where any kinds of wastes are deposited on land, or burned, or buried, without supervision and without precautions regarding human health or environment

Disposal-illegal: Dumping, wild dumping, littering; Disposal of waste at a site different from one officially designated by the municipal authorities, especially where it is specifically prohibited. May also refer to disposal at the wrong time or in the wrong quantities, even if all other aspects are correct

Temporal Unit

Annually

Units

w/w % in (Total Waste generated – Waste recycled and reused).



**IND 2.B.1: % of waste that goes to uncontrolled dumpsites (Wd)**

This indicator provides the % of the waste that goes to the dumpsites, thus it is a measure of the pressure for leakages related to ML and water pollution. In addition, it shows the maturity of the national waste management system. The calculation formula is the following:

$$\% Wd = Wu / (Wg - Wr)$$

Where:

Wu = Waste delivered to dumpsites

W = Total waste generated

Wr = Recycled and reused waste

In practice, the indicator can be calculated as follows:

$$\% Wd = 100\% - \text{IND 2.B}$$

**Definitions required**

Dumpsite: Dump, open dump, uncontrolled waste disposal site; A designated or undesignated site where any kinds of wastes are deposited on land, or burned, or buried, without supervision and without precautions regarding human health or environment

Disposal-illegal: Dumping, wild dumping, littering; Disposal of waste at a site different from one officially designated by the municipal authorities, especially where it is specifically prohibited. May also refer to disposal at the wrong time or in the wrong quantities, even if all other aspects are correct

**Temporal Unit**

Annually

**Units**

w/w %

**IND 2.B.2: Number of Dumpsites in Coastal Areas (NdC)**

This indicator provides the dispersion of potential leakages & pollution including marine litter sources in the Coastal Area, thus it is a direct measure of the pressure and the drivers for ML and water pollution. In addition, it shows the maturity of the waste management system in the Coastal Areas. The target of the regional plan was to eliminate dumpsites by 2020.

**Definitions required**

Dumpsite: Dump, open dump, uncontrolled waste disposal site; A designated or undesignated site where any kinds of wastes are deposited on land, or burned, or buried, without supervision and without precautions regarding human health or environment

Disposal-illegal: Dumping, wild dumping, littering; Disposal of waste at a site different from one officially designated by the municipal authorities, especially where it is specifically prohibited. May also refer to disposal at the wrong time or in the wrong quantities, even if all other aspects are correct

Coastal Areas: Areas within 100 km buffer zone of the coastline.

**Temporal Unit**

Annually

**Units**

Number of dumpsites in the Coastal Area

***IND 2.B.3: Waste going to dumpsites in the Coastal Areas (WdC)***

This indicator provides how much waste goes to dumpsites located in Coastal Areas. The spatial distribution of dumpsites provides a very good picture for the paths that the pollution including marine litter and combined quantity of waste dumped and it gives a clear picture of the waste disposed through dumpsites in the coastal area.

All the following indicators are calculated on the level of the Coastal Areas.

$$\% Wd = Wu / (Wg - Wr)$$

Where:

Wu = Waste delivered to dumpsites

W = Total waste generated

Wr = Recycled and reused waste

Definitions required

Dumpsite: Dump, open dump, uncontrolled waste disposal site; A designated or undesignated site where any kinds of wastes are deposited on land, or burned, or buried, without supervision and without precautions regarding human health or environment

Disposal-illegal: Dumping, wild dumping, littering; Disposal of waste at a site different from one officially designated by the municipal authorities, especially where it is specifically prohibited. May also refer to disposal at the wrong time or in the wrong quantities, even if all other aspects are correct

Coastal Areas: Areas within 100 km buffer zone of the coastline.

Temporal Unit

Annually

Units

w/w %

**IND 2.C: Resource Recovery (RR)**

The indicator shows the percentage of total municipal solid waste generated that is recycled. It includes both materials recycling and organics valorisation / recycling (composting, animal feed, anaerobic digestion).

$$RR (\%) = W_r / W$$

Where:

W = Total waste generated

W<sub>r</sub> = Recycled and reused waste

**Definitions required**

Recycling: the term represents a collection of public and private, formal and informal activities that result in diverting materials from disposal and recovering them in order to return them to productive use'. The recycling rate should include the contribution from the 'informal' recycling sector as well as formal recycling as part of the solid waste management system. Recycling is higher up the waste hierarchy, so energy recovery from e.g. thermal treatment is not considered here.

Formal Waste Sector: Formal Waste Sector: Solid waste system, solid waste authorities, government, materials recovery facility; Solid waste management activities planned, sponsored, financed, carried out or, regulated and/or recognised by the formal local authorities or their agents, usually through contracts, licenses or concessions.

Informal Waste Sector: Waste pickers, scavengers, junkshops; Individuals or enterprises who are involved in waste activities but are not sponsored, financed, recognised or allowed by the formal solid waste authorities, or who operate in violation of or in competition with formal authorities

**Temporal Unit**

Annually

**Units**

w/w %

***IND 2.C.1: % of plastic waste generated that is recycled (RRpl)***

The indicator shows the percentage of total plastic municipal solid waste generated that is recycled. It includes materials recycling only.

$$RRpl = Pr / Pw$$

Where:

Pr = plastic that is recycled or reused

Pw = Plastic waste generated

Pw can be calculated by multiplying the % of plastics in waste composition with the total waste generated.

Definitions required

Plastics: The plastic fraction includes mostly packaging wastes, such as PET, PVC, polypropylene, high and low density polyethylene (HDPE/LDPE) and polystyrene.

Temporal Unit

Annualy

Units

w/w %

## Policy Context and Targets

Marine litter (ML) is a challenge of global scale and implications. It is necessary to develop a more integrated perspective regarding ML. ML is not simply related to SWM and recycling, it is a result of a systemic failure, with the following four key-parameters:

- (I) The continuous growth in use of thousands of different forms of plastics.
- (II) Poor or absent solid waste management services and infrastructure, and insufficient monitoring & law enforcement (mainly in the Med North).
- (III) Problematic - vulnerable markets for secondary plastics.
- (IV) Lack of a systemic and in-depth understanding of:
  - The technical challenges and the restrictions of material properties and the flows of plastics.
  - The effects of social consumption patterns and littering behaviours on solid waste generation.
  - The impacts of unplanned tourist developments and of the fishing industry.

The plastic production & consumption, the lack of waste & recycling infrastructure and enforcement, (especially in coastal areas), the problematic markets for secondary materials and the touristic activities can be considered as Drivers of ML generation.

An important step forward towards dealing with the marine litter problem was adoption of Decision IG.20/10 at the 17th Meeting of the Contracting Parties of the Barcelona Convention (Paris, February 2012) entitled "Adoption of the Strategic Framework for Marine Litter management". This Strategic Framework analyses the problem and is proposing quite a number of activities that would help in approaching in a systematic way the problem of marine litter. COP 17 also adopted the ecological objective on marine litter in the framework of the ecosystem approach. Decision IG.20/10 mandated the Secretariat to prepare the Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the LBS Protocol.

Another very important step was the Regional Plan on ML in the Mediterranean. The Plan came into force on 8 July 2014 for all parties to the Land Based Sources (LBS) Protocol and it:

- provides Mediterranean countries with a framework to elaborate national policies and action plans to address impacts of marine litter
- creates momentum for addressing litter-related marine and coastal pollution in an integrated manner

Regarding waste management, the plan was aiming mainly to waste prevention, using the following goals:

1. Solid waste management - reduction at source, waste hierarchy (**2025**)
  - Reducing/ reusing/ recycling measures for plastic packaging waste (**2019**)
  - Explore and implement to the extent possible the following (**2017**):
    - Extended Producer Responsibility
    - Sustainable Procurement Policies
    - Voluntary agreements and fiscal and economic instruments to reduce plastic bags consumption
    - Deposits, Return and Restoration System (for beverage containers and expandable polystyrene boxes in the fishing sector)
    - Cooperate with industry to establish procedures and manufacturing methodologies to reduce micro-plastic
4. Close the existing illegal dump sites on land (2020)
5. Combat dumping including littering on the beach, illegal sewage disposal in the sea, the coastal zone and rivers

The Horizon 2020 Initiative, which aims to reduce the pollution of the Mediterranean Sea by 2020, recognizes the importance of waste as one of the three priority areas causing major pollution in the Mediterranean Sea. The UN Global Programme of Action for the Protection of the Marine Environment against Land-Based Activities and the Convention for the Protection of the Mediterranean Sea against Pollution have also identified waste management as a priority intervention.

In all the relevant efforts and plans, the major objective is to reduce plastic waste by shifting to circular economy, enabling re-design of materials and products, advancing reuse and recycling practices. The policies (and the proposed indicators in this document) are directly related with the SDGs as follows:

GOALS	TARGET	INDICATORS
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.	% of urban solid waste regularly collected and with adequate final discharge with regards to the total waste generated by the city
Goal 12: Ensure sustainable consumption and production patterns	12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.	Treatment of waste, generation of hazardous waste, hazardous waste management, by type of treatment
	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.	National recycling rate, tons of material recycled
Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development	14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	Index of coastal eutrophication and floating plastic debris density

The UN has established the Global Partnership on Marine Litter, with the following Goals. Goal A: Reduced levels and impacts of land-based litter and solid waste introduced into the aquatic environment. Goal B: Reduced levels and impact of sea-based sources of marine debris including solid waste, lost cargo, ALDFG, and abandoned vessels introduced into the aquatic environment. Goal C: Reduced levels and impacts of (accumulated) marine debris on shorelines, aquatic habitats, and biodiversity. It is anticipated that different stakeholders will form sub-groups to focus on specific issues, e.g. cross-cutting issues.

The shift to Circular Economy is necessary for the substantial reduction and prevention of ML. The G20 have advocated for a global roadmap for action to address the life cycle of plastics and effectively valorize plastics in the economy whilst mitigating their environmental impacts. This roadmap includes:

1. Upstream measures

2. Consumption based measures

3. Worldwide engagement in awareness of impacts and the need for social change.

4. Measures to enhance and advance waste management - the required measures involve (indicatively):

- Separate waste collection: Emphasis should be placed on moving away from landfill and energy recovery towards re-use and recycling. Separate municipal waste collection is a key element within this infrastructure, to make recycling a convenient option for citizens to deal with their waste plastics. Re- use opportunities in the plastic packaging sector, ranging from reusable B2B crates to refillable bottles for beverages and cleaning products.
- Waste management infrastructure and services: Direct investment in waste infrastructure is needed in all countries to increase the rate of recovery and reduce the leakage of plastics. Although landfilling should be the least-preferred option, investment in sanitary landfills is still desirable in countries where informal and unprotected landfills are a major source of plastic pollution.
- Export of plastic waste: In general, plastic waste should not be exported for disposal or treatment in locations with significantly lower treatment standards than the country of origin. Countries which export waste for recycling should have responsibility to assess and take into account the impacts of that trade. An estimated 15 million tonnes of plastic is traded per year as waste destined for recycling.

- Infrastructure for maritime and fisheries marine litter: Whilst terrestrial sources are the most important, an estimated 0.5 to 5.9 million tonnes of plastics enters the oceans from sea-based sources every year. Appropriate waste infrastructure at ports can reduce this flow of waste.
- Deposit refunds and extended producer responsibility (EPR): Producers should be made responsible for their products after the point of sale. Deposit refund and EPR instruments, which support the uptake, quality and economics of recycling, thus reducing marine littering, should be implemented. EPR schemes also encourage producers to design their products to be suitable for take-back and recycling.
- Clean-up and collection: Given the size of the oceans and the scale of the marine litter problem, clean-up activities are costly, largely ineffective and create an unhelpful illusion that upstream measures are not necessary. Whilst upstream measures should be preferred, clean-up may be a suitable last resort for addressing marine litter in limited zones such as urban areas, tourist beaches and ports where the litter causes severe social and economic damage.

#### **Related policy documents**

- Decision IG.20/10 at the 17th Meeting of the Contracting Parties of the Barcelona Convention (Paris, February 2012) entitled "Adoption of the Strategic Framework for Marine Litter management".
- EU Marine Strategy Framework Directive (MSFD), 2008/56/EC
- A European Strategy for Plastics in a Circular Economy, COM (28) 2018, 16-1-2018
- EU, DG for Internal Policies, EU Action to Combat Marine Litter, IP/A/ENVI/2017-02, May 2017
- G20 Insights, T20 Task Force Circular Economy: Circular economy measures to keep plastics and their value in the economy, avoid waste and reduce marine litter, 2017
- United Nations Environment Assembly of the United Nations Environment Programme, Resolution on Marine Litter and Microplastics, UNEP/EA.3/L.20, Third Session, 4-6 December 2017
- UNEP, Regional Plan for the Marine Litter Management in the Mediterranean, UNEP (DEPI)/MED WG. 379/5, 2013
- UN Global Programme of Action for the Protection of the Marine Environment against Land-Based Activities

## Methodology

### ***IND 2.A: Waste Collection***

#### ***IND 2.A.1: Waste Collection Coverage***

##### Calculations

$$Wcc (\%) = P_s / P$$

Where:

$P_s$  = population of the country that is covered by a regular collection service organised either by public authorities or private companies

$P$  = total population of the country

The national figures should be aggregated by the regional or municipal figures – obviously, the final figures should be weighed.

##### Geographical coverage

This indicator is calculated on a country level, including the total population.

##### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided

##### Data collection & availability

In general terms, data about population is usually available by state statistic authorities. However, it is not always sure that the data regarding the waste collection coverage is organized and collected on a national level. In some cases, this is done by ad-hoc committees under the ministries of Environment or the one that deals with municipalities.

##### Problems and gaps

The major problem is that in many countries the collection coverage is not measured and aggregated on a national level, and sometimes not even on a regional level. Another important problem is that the activities and the involvement of the informal sector is sometimes ignored or underestimated, although in several cities and countries informal recyclers manage up to 8-10% of the waste generated.

##### Methodological Uncertainties

Unless there is a proper national reporting system that works, it will be very difficult to assess the national collection coverage. In addition, even when such systems are in place they usually refer to the waste collection done by the municipalities or the accredited companies and they do not include the collection by informal recyclers. The quantification of the informal recyclers contribution is one of the most difficult aspects, by definition, but it is not impossible to have at least an assessment of it, as it will be explained later.



## ***IND 2.A: Waste Collection***

### ***IND 2.A.2: Waste captured by the system***

#### Calculations

$$Ws (\%) = Wf/W$$

Where:

Wf = Waste captured by the formal waste sector

W = Total Waste Generated

#### Geographical coverage

This indicator is calculated on a country level.

#### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

#### Data collection & availability

In general terms, the crucial issue is to collect and find access to the data collected at the facilities. Even if these data sets are not available in a ministry or in the statistic authorities, the waste management authorities can retrieve them and then, the national authorities have to aggregate them.

#### Problems and gaps

If the data from facilities is retrieved, then before the aggregation it is required to manage the data and provide it in a uniform way. Usual problems that emerge are the different units used (in some cases there are landfills measuring the number of vehicles instead of the tons of waste), not comparable time-series due to the different time of operations or other problems, inconsistent data sets involving different service areas monthly or even daily etc. Another important problem is that in several cases facilities do not distinguish in their records different waste streams, so there is a risk to aggregate non-municipal waste in the national figures.

#### Methodological Uncertainties

The major uncertainty regards the availability of the data on a national level. If there is not a proper reporting system in place, then the indicator can be only roughly assessed by the capacities of the official facilities.

## **IND 2.B: Environmental Control - % of controlled treatment and disposal**

### Calculations

$$\text{We \%} = \text{Wf} / (\text{W} - \text{Wr})$$

Where:

Wf = Waste captured by the formal waste sector

W = Total waste generated

Wr = Recycled and reused waste

### Geographical coverage

This indicator is calculated on a country level.

### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

### Data collection & availability

The data required can be assessed using the records of the relevant facilities. Those facilities almost always have weighbridges and measure the input waste, so their records can be used to estimate the numerator. In general terms, the crucial issue is to collect and find access to the data collected at the facilities. Even if these data sets are not available in a ministry or in the statistic authorities, the waste management authorities can retrieve them and then, the national authorities must aggregate them.

### Problems and gaps

If the data from facilities is retrieved, then before the aggregation it is required to manage the data and provide it in a uniform way. Usual problems that emerge are the different units used (in some cases there are landfills measuring the number of vehicles instead of the tons of waste), not comparable time-series due to the different time of operations or other problems, inconsistent data sets involving different service areas monthly or even daily etc. Another very important problem is that in several cases facilities do not distinguish in their records different waste streams, so there is a risk to aggregate non-municipal waste in the national figures.

### Methodological Uncertainties

The main problem again lies around landfills and when they are considered safe and protect public health and environment. The Landfill Working Group of the International Solid Waste Association<sup>1</sup> has developed a concrete evaluation system to help decision-makers on distinguishing between safe and controlled Vs uncontrolled disposal.

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<sup>1</sup> ISWA International Guidelines for Landfill Evaluation, 2011, available at <http://www.iswa.org/media/publications/knowledge-base/>

### ***IND 2.B.1: % of waste that goes to dumpsites***

#### Calculations

$$\% Wd = Wu / (Wg - Wr)$$

Where:

Wu = Waste delivered to dumpsites

W = Total waste generated

Wr = Recycled and reused waste

% Waste that goes to dumpsites = 100% - IND 2.B

#### Geographical coverage

This indicator is calculated on a country level.

#### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

#### Data collection & availability

The data required can be assessed using the records of the relevant facilities. Those facilities almost always have weighbridges and measure the input waste, so their records can be used to estimate the numerator. In general terms, the crucial issue is to collect and find access to the data collected at the facilities. Even if these data sets are not available in a ministry or in the statistic authorities, the waste management authorities can retrieve them and then, the national authorities must aggregate them.

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#### Methodological Uncertainties

The main problem again lies around landfills and when they are considered safe and protect public health and environment. The Landfill Working Group of the International Solid Waste Association<sup>2</sup> has developed a concrete evaluation system to help decision-makers on distinguishing between safe and controlled Vs uncontrolled disposal.

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<sup>2</sup> ISWA International Guidelines for Landfill Evaluation, 2011, available at <http://www.iswa.org/media/publications/knowledge-base/>

## ***IND 2.B.2: Number of dumpsites in Coastal Areas***

### Calculations

If the Coastal Area has been defined as it has been presented in the discussion for IND1.C, then the indicator can be calculated only by counting the number of dumpsites in the Coastal Area.

### Geographical coverage

100 km buffer zone from the coastline.

Alternatively: catchment/ hydrological basin at the coastal area or, if data not available, major coastal cities, in order to quantify the extent of land-based pressures that could potentially have a downstream effect on the state/impact of the sea.

### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

### Data collection & availability

The crucial issue is how to calculate the 100 kilometre coastal buffer of the land area. For that purpose, the data must be projected into an equidistant map projection appropriate for the country. The two pieces of spatial data needed to measure this indicator are gridded population and a coastal zone delineation (or mask). Some countries have already made a national inventory of their dumpsites so using a GIS system it will not be that difficult to calculate the indicator.

### Problems and gaps

The issues here are mostly related with the issues about the registration of dumpsites and the relevant data information available as well as with the clear definition of the coastal areas.

### Methodological Uncertainties

The coastal zone can be defined in different ways depending on the focus of interest and the availability of data. Typically, a combination of distance-to-coast and elevation data is used. The Millennium Ecosystem Assessment used 100 kilometres from the coast as the distance threshold and 50 meters as the elevation threshold, choosing whichever was closer to the sea. Other works use 10 meters elevation contiguous with the coast and no distance threshold; in most places this delineated an area closer than 100km from the sea, though in some areas it extended farther. In general distance- based measures are best suited for indicators used to denote coastal pressures, while elevation-based measures are best suited for indicators used to denote hazard vulnerability.

In some cases, there are no records about the dumpsites, so the relevant data can be retrieved from rough assessments or national - regional inventories.

### ***IND 2.B.3: Waste going to dumpsites in the Coastal Areas***

#### Calculations

All the following indicators are calculated on the level of the Coastal Areas.

$$\% Wd = Wu / (Wg - Wr)$$

Where:

Wu = Waste delivered to dumpsites

W = Total waste generated

Wr = Recycled and reused waste

#### Geographical coverage

100 km buffer zone from the coastline.

Alternatively: catchment/ hydrological basin at the coastal area or, if data not available, major coastal cities, in order to quantify the extent of land-based pressures that could potentially have a downstream effect on the state/impact of the sea.

#### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

#### Data collection & availability

The crucial issue is how to calculate the 100 kilometre coastal buffer of the land area. For that purpose, the data must be projected into an equidistant map projection appropriate for the country. The two pieces of spatial data needed to measure this indicator are gridded population and a coastal zone delineation (or mask). Some countries have already made a national inventory of their dumpsites so using a GIS system it will not be that difficult to calculate the indicator.

#### Problems and gaps

The issues here are mostly related with the issues about the registration of dumpsites and the relevant data information available as well as with the clear definition of the coastal areas.

#### Methodological Uncertainties

The coastal zone can be defined in different ways depending on the focus of interest and the availability of data. Typically, a combination of distance-to-coast and elevation data is used. The Millennium Ecosystem Assessment used 100 kilometres from the coast as the distance threshold and 50 meters as the elevation threshold, choosing whichever was closer to the sea. Other works use 10 meters elevation contiguous with the coast and no distance threshold; in most places this delineated an area closer than 100km from the sea, though in some areas it extended farther. In general distance- based measures are best suited for indicators used to denote coastal pressures, while elevation-based measures are best suited for indicators used to denote hazard vulnerability.

In some cases, there are no records about the dumpsites, so the relevant data can be retrieved from rough assessments or national - regional inventories.

## ***IND 2.C: Resource Recovery***

### Calculations

$$RR (\%) = W_r / W$$

Where:

W = Total waste generated

W<sub>r</sub> = Recycled and reused waste

### Geographical coverage

This indicator is calculated on a country level.

### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

### Data collection & availability

For this calculation, since IND1 has been already calculated, it is necessary to recover data from both the formal and the informal sector. The recyclables from the formal sector are always registered and usually there are invoices or other receipts for their quantities. However, the difficulty lies in quantifying the contribution of the informal recyclers. Unless there is a detailed study about them, we propose an empirical assessment as follows. The informal recyclers, finally, sell their recyclables to the same supply chains that deal with the recyclables from the formal sector. So, a survey and research for the quantities that those companies manage can provide the contribution of the informal sector. Most of those companies are willing to share information about the recyclables they buy from the informal sector and provide an order of magnitude for the contribution of the informal sector.

### Problems and gaps

In several countries, the recycling markets are not well structured and the relevant data is not systematically aggregated and reported on a national level. If the data from facilities is retrieved, then before the aggregation it is required to manage the data and provide it in a uniform way. Other problems are the relevant mentioned in IND 2.B.

### Uncertainties

The problem lies in the assessment of the contribution of the informal sector, since in many cases informal recyclers do not use the official facilities and they deliver their recyclables directly to companies dealing with recyclables. The quantification of the informal recyclers contribution is one of the most difficult aspects, by definition, but it is not impossible to have at least an assessment of it.

### ***IND 2.C.1: % of plastic waste generated that is recycled***

#### Calculations

$$RRpl = Pr / Pw$$

Where:

Pr = plastic that is recycled or reused

Pw = Plastic waste generated

Pw can be calculated by multiplying the % of plastics in waste composition with the total waste generated.

#### Geographical coverage

This indicator is calculated on a country level.

#### Temporal Coverage

It will be very useful if 10-15 years' time series can be provided.

#### Data collection & availability

For this calculation, since IND1 has been already calculated, it is necessary to recover data from both the formal and the informal sector. The recyclables from the formal sector are always registered and usually there are invoices or other receipts for their quantities. However, the difficulty lies in quantifying the contribution of the informal recyclers. Unless there is a detailed study about them, we propose an empirical assessment as follows. The informal recyclers, finally, sell their recyclables to the same supply chains that deal with the recyclables from the formal sector. So, a survey and research for the quantities that those companies manage can provide the contribution of the informal sector. Most of those companies are willing to share information about the recyclables they buy from the informal sector and provide an order of magnitude for the contribution of the informal sector.

Since plastic producers are usually aware of the recycling market, they can be helpful for a quick survey if the relevant data is not available.

#### Problems and gaps

In several countries, the recycling markets are not well structured and the relevant data is not systematically aggregated and reported on a national level. If the data from facilities is retrieved, then before the aggregation it is required to manage the data and provide it in a uniform way. Other problems are the relevant mentioned in IND 2.B.

#### Uncertainties

The problem lies in the assessment of the contribution of the informal sector, since in many cases informal recyclers do not use the official facilities and they deliver their recyclables directly to companies dealing with recyclables. The quantification of the informal recyclers contribution is one of the most difficult aspects, by definition, but it is not impossible to have at least an assessment of it.