



**Conference of the Parties to the Basel Convention
on the Control of Transboundary Movements of
Hazardous Wastes and Their Disposal
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**Matters related to the implementation of the Convention:
strategic issues: development of guidelines for
environmentally sound management**

Guidance to assist Parties in developing efficient strategies for achieving recycling and recovery of hazardous and other wastes

Note by the Secretariat

At its fourteenth meeting, the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, in decision BC-14/3 on developing guidelines for environmentally sound management, adopted guidance to assist Parties in developing efficient strategies for achieving recycling and recovery of hazardous and other wastes. The guidance referred to above were prepared by the expert working group on environmentally sound management, taking into account comments received from Parties and others. The text of the final version of the guidance, as adopted, is set out in the annex to the present note. The present note, including its annex, has not been formally edited.

* UNEP/CHW.14/1.

Annex

Guidance to assist Parties in developing efficient strategies for achieving environmentally sound recycling and other recovery of hazardous and other wastes

1. Introduction

1.1. Context

1. The objective of this document is to provide guidance to assist Parties in developing efficient strategies for achieving environmentally sound recycling and other recovery (including energy recovery) of hazardous and other wastes. The guidance may also be helpful to municipal and local authorities, private companies, non- organizations (NGOs), academia, among others; all of which could provide significant contributions towards developing and implementing a waste recycling and other recovery strategy.

2. The Basel Convention is the primary global legal instrument for the environmentally sound management of hazardous and other wastes and their disposal. This includes efforts towards waste prevention and minimization, and the sound management of waste that cannot be avoided. Guidance to assist parties in developing efficient strategies for achieving the prevention and minimization of the generation of hazardous and other wastes and their disposal adopted by decision BC-13/3 is provided in a separate document.¹

3. Recycling and other recovery has been also addressed in the context of the 2030 Agenda for Sustainable Development adopted by the United Nations General Assembly in Resolution 70/1 in September 2015² and Resolution 2/7 on the sound management of chemicals and waste adopted by the second session of the UNEA2.³

4. This guidance has been developed in accordance with the Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes (the ‘Cartagena Declaration’),⁴ adopted by the tenth meeting of the Conference of Parties to the Basel Convention in 2011. In the Cartagena Declaration, Parties noted that recycling and recovery, as well as prevention and minimization of hazardous wastes and other wastes, are the critical stages of the waste management hierarchy and declared a commitment to enhancing the active promotion and implementation of more efficient strategies for achieving environmentally sound recycling and other recovery of hazardous wastes and other wastes.

5. As part of the Strategic Framework for the implementation of the Basel Convention for 2012-2021,⁵ adopted by decision BC-10/2, the following guiding principle was agreed upon: “recognize the waste management hierarchy (prevention, minimization, reuse, recycling, other recovery including energy recovery, and final disposal) and, in so doing, encourage treatment options that deliver the best overall environmental outcome, taking into account life-cycle thinking”. The waste management hierarchy is a guiding principle: when implementing it technical, socio economic and environmental considerations should be taken into account.

¹ UNEP/CHW.13/INF/11/Rev.1 available at :
<http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMToolkit/Overview/tabid/5839/Default.aspx>.

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http://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf.

³ <http://web.unep.org/environmentassembly/node/41228>.

⁴ The Cartagena Declaration is available at:
<http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/cop/cop10/CartagenaDeclaration.pdf>.

⁵ The Strategic Framework is available at:
<http://basel.int/Implementation/StrategicFramework/Overview/tabid/3807/Default.aspx>.

6. By decision BC-11/1, the framework for the environmentally sound management of hazardous wastes and other wastes⁶ was adopted which highlights the importance of recycling and other recovery of hazardous wastes and other wastes for ensuring environmentally sound management.

7. In response to the abovementioned developments, by its decision BC-13/2, the thirteenth meeting of the Conference of the Parties mandated the development of the current guidance document to assist Parties in developing efficient strategies for achieving environmentally sound recycling and other recovery of hazardous and other wastes, as part of activities to implement the Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes.

8. Waste recycling and other recovery strategies may include improving material and resource efficiency, decoupling resource use from economic growth, promoting the use of secondary materials, reducing the use of harmful substances, shifting towards a circular economy⁷ and creating new business models,⁸ as well as job creation.

1.2. Objective and scope

9. The objective of this document is to provide guidance on developing strategies and instruments, both mandatory and voluntary, to promote the recycling and other recovery of hazardous wastes and other wastes where it has not been possible to prevent their generation.

10. This guidance focuses primarily on recycling and other recovery operations. It further considers elements which support the minimization of waste. It includes references to the elements comprised in other guidance documents under the Basel Convention, such as technical guidelines.

11. This guidance, together with the Guidance on developing efficient strategies for achieving the prevention and minimization of the generation of hazardous and other waste and their disposal,⁹ can be used together to provide information on the application of the waste management hierarchy recognized by decision BC-10/2.¹⁰

12. This guidance provides examples of mandatory and voluntary measures including laws and regulations, extended producer responsibility (EPR) systems and, financial systems, and the promotion of the demand for recycled materials. For in-depth information on different aspects of effective such as technology, costs, size and viability of plants and infrastructure additional guidance is available¹¹.

13. This guidance mentions the importance of evaluating the feasibility of recycling and other recovery facilities, considering factors such as the amounts of waste generated, their transport, needs and availability of energy. Feasibility studies might identify national as well as regional approaches.

14. This guidance also provides approaches towards business models, industrial symbiosis and other initiatives addressing life cycle thinking, the circular economy, sustainable development and resource efficiency.

15. This guidance addresses disposal operations included in Annex IVB¹² of the Basel Convention and hazardous wastes and other wastes as indicated in Article 1 of the Basel Convention. While the main focus is on the development of strategies for achieving environmentally sound recycling and other recovery of hazardous wastes and other wastes, most of the guidance provided in this document is of a general nature and can also be applied to other non-hazardous wastes.

⁶ The Framework for the environmentally sound management of hazardous wastes and other wastes is available at: <http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMFramework/tabid/3616/Default.aspx>.

⁷ An economy where the value of products, materials and resources is maintained for as long as possible and the generation of waste is minimized. Definition extracted from the EU Circular Economy Strategy: http://ec.europa.eu/environment/circular-economy/index_en.htm.

⁸ Policy guidance on resource efficiency. http://www.keepeek.com/Digital-Asset-Management/oced/environment/policy-guidance-on-resource-efficiency_9789264257344-en#.Wkx2hNEUncs#page8.

⁹ UNEP/CHW.13/INF/11/Rev.1 available at: <http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMToolkit/Overview/tabid/5839/Default.aspx>.

¹⁰ The elements of waste management hierarchy may slightly differ in national or regional legislation.

¹¹ Examples include: www.eippcb.jrc.ec.europa.eu/reference; www.eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf; <http://www.basel.int/Implementation/Publications/LatestTechnicalGuidelines/tabid/5875/Default.aspx>.

¹² Operations which may lead to resource recovery, recycling reclamation, direct re-use or alternative uses.

16. When using this guidance, it is important to consider linkages with other initiatives under the Basel Convention and in other frameworks, such as climate change. The appendix to this document provides information on linkages that could be considered.

1.3. Terminology

17. The terms referred to within the present guidance are to be read in a manner consistent with the terms contained in Article 2 of the Basel Convention, in the Glossary of Terms adopted by the thirteenth meeting of the Conference of the Parties by Decision BC-13/2,¹³ and in the set of practical manuals on the promotion of the environmentally sound management of wastes, in particular the practical manual on terminology adopted by decision BC-13/2.¹⁴

18. It should be recognized that a Party may have its own definitions of certain terms in its legislation.

2. General guidance on recycling and other recovery

2.1. Benefits & challenges of waste recycling and other recovery

2.1.1 Benefits

19. Recycling and other recovery of waste, as opposed to finally disposing of it, has multiple benefits, such as protection of the environment and human health, mitigating of climate change and bringing economic and social advantages.

Environment and health

20. The benefits of environmentally sound recycling and other recovery for the environment and human health relative to other waste management options lower down in the waste hierarchy are significant. When municipal or industrial solid waste is disposed of by dumping and open burning, the adverse impacts to air, soil, surface and groundwater and the coastal and marine environment, and thus on public health, can be severe. Open dumps can pollute air, soil and water resources. Disposal sites are often located near bodies of water (e.g., rivers or the sea), and therefore pose risks to aquatic and coastal environments. Poor solid waste management is one of the primary sources of marine litter. Improper disposal of waste may produce air pollution through emissions of e.g. heavy metals and persistent organic pollutants and cause health problems for people living near the disposal areas.¹⁵ Furthermore, optimizing recycling and increasing the recycled content in new products will result in less virgin material extraction with a related reduction of negative environmental impacts reducing the need to mine more ore, cut down more trees, and deplete other natural resources while also saving the land for better uses rather than landfilling.¹⁶

Climate change

21. The links between waste management and climate change are significant. Diverting waste from final disposal to recycling and other recovery means significant cuts in greenhouse gas emissions through reducing the generation of methane gas at landfills or uncontrolled dumping. Maximising recycling avoids CO₂ emissions from the burning of waste. Recycling reduces the need to use energy to produce and process primary raw materials and also in that respect curbs greenhouse gas emissions. For example, it has been estimated that plastics production and the incineration of plastic waste gives rise globally to approximately 400 million tonnes of CO₂ a year.¹⁷ Recycling one tonne of plastic saves an estimated 2 tonnes CO₂.¹⁸ Recycling 15 million tons of plastics per year by 2030 (equivalent to about half of the projected plastic waste generation) would save CO₂ emissions equivalent to taking 15 million

¹³ UNEP/CHW.13/4/Add.2.

¹⁴ UNEP/CHW.13/4/Add.1/Rev.1, available at: <http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMToolkit/Overview/tabid/5839/Default.aspx>.

¹⁵ See Global Waste Management Outlook, UNEP and ISWA (2015), <http://web.unep.org/ourplanet/september-2015/unep-publications/global-waste-management-outlook>.

¹⁶ ISRI Scrap Yearbook, p16 – www.scrap2.org/yearbook/files/assets/basic-html/page-I.html#.

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https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf.

¹⁸ http://presse.ademe.fr/wp-content/uploads/2017/05/FEDEREC_ACV-du-Recyclage-en-France-VF.pdf.

cars off the road.¹⁹ The energy saving from using other types of recycled materials instead of primary materials amounts to 95% for aluminium, 75% for copper, 60% for steel and 60% for paper.²⁰ The International Resource Panel has highlighted that a resource efficient circular economy should be an integral part of climate policy due to the synergies it creates.

Economic and social benefits

22. The economic and social benefits that come with resource efficiency, circular economy and increasing recycling are significant. For example, the Global Waste Management Outlook provides an estimate of 4.2 jobs per ton per day of material that is recycled based on a case study in five countries in the Eastern Balkans.²¹ A case study from Mauritius presented in this publication shows how it is feasible to move away from dumping to recycling.²² Another study suggests that full compliance of the Member States of the EU with EU waste legislation, including waste recycling targets, separate collection requirements and the diversion of bio waste from landfills could increase the turnover of the waste management and recycling sector by some € 42 billion per year and create over 400,000 additional jobs.²³ A study commissioned by the Institute of Scrap Recycling Industries (ISRI) shows that recycling in the United States supports more than 530,000 jobs and generates \$117 billion to the U.S. economy. In addition, case studies have shown significant cost savings from reduced health impacts and avoidance of clean-up operations.²⁴

2.1.2 Challenges

23. There are a number of challenges associated with the recycling and other recovery of waste as outlined in this section.

Market for secondary raw materials

24. The demand for secondary raw materials is a driver for recycling. High rates of collection with a limited or a non-existent market for recycled materials, may result in reduced investment in recycling infrastructure and their activities. Furthermore, high costs of recycling may encourage the waste management sector to choose a less preferable operation, such as final disposal.

Hazardous waste and waste containing hazardous materials

25. Chemicals, products and waste policies and strategies may strive for conflicting goals. Products legally put on the market containing hazardous substances when they become wastes, present a challenge to recyclers. Recycling hazardous waste and wastes containing hazardous materials, if not properly handled, may release certain substances such as POPs and mercury with the potential to cause adverse effects to humans and the environment. For example, prohibition of recycling of persistent organic pollutants (POPs) and mercury, the setting of hazardous chemical thresholds in products and so in recycled materials requires recyclers to know where the chemicals are in what waste and in what quantity. Thus, recyclers are faced with economic and technical challenges in identifying whether the quantity is above or below such thresholds. Wastes containing POPs above the set thresholds have to be irreversibly transformed or destroyed which may create an additional economic burden for recyclers.

Appropriate design for recycling and other recovery

26. Manufacturers and product designers strive to achieve maximum value from their goods but do not always incorporate appropriate design for recycling and other recovery such as using valuable recycled materials or enabling the efficient recycling and recovery of the products themselves.

Effective systems for separate collection

27. In order to achieve high quality recycled materials and good recycling yields, it is usually crucial to establish separate collection systems. Case studies show how it is possible to involve key stakeholders and develop efficient systems through increasing awareness and engaging citizens.²⁵

¹⁹ A. Rahimi, J. M. García, Chemical recycling of waste plastics for new materials production, Nat. Chem. Rev. 1, 0046, 2017. See also Global Waste Management Outlook, p. 12 etc.

²⁰ ISRI Recycling Industry Yearbook 2017, p16 – www.scrap2.org/yearbook/files/assets/basic-html/page-I.html#.

²¹ Global Waste Management Outlook p. 215 and 221.

²² Global Waste Management Outlook, p. 49.

²³ <http://ec.europa.eu/environment/waste/studies/pdf/study%2012%20FINAL%20REPORT.pdf>.

²⁴ Ibid, p. 174 etc. See also Global Waste Management Outlook p. 211-212.

²⁵ Assessment of separate collection schemes in the 28 capitals of the EU, European Commission (2015), http://ec.europa.eu/environment/waste/studies/pdf/Separate%20collection_Final%20Report.pdf.

However, establishing such systems may be complicated and require major investments in equipment and infrastructure. It also depends on the level of knowledge of the businesses and the general public.

28. Co-mingling of different waste categories should be avoided to reduce the level of cross contamination. Even if a co-mingling system for certain wastes is used, mixing certain categories of waste such as glass with paper should be avoided if mixing reduces the quality of the individual wastes. Co-mingled collection systems increase difficulties in convincing people that sorting waste at source is the better solution.

29. Collection systems may involve the informal sector. Strategies may have to address the broader socio-economic challenges of that sector.

Setting of recycling and recovery targets

30. To incentivize the level of recycling and recovery in relation to other waste management options lower down in the hierarchy, the setting of recycling and recovery targets is important. The setting targets should consider existing recycling and recovery capacity and performance, taking into account both national and global facilities. The setting of ambitious recycling targets can be a driver to boost recycling. Nevertheless, the time needed to construct and start operating new facilities should be considered when setting recycling and recovery targets. Overly ambitious targets might generate high costs as low quality high cost facilities might be encouraged.

Monitoring and collecting data on recycling targets

31. Collecting data and information to demonstrate achievement of recycling targets can be a challenging task. It is important that recyclable wastes are not double-counted, e.g., materials that scrap recyclers sell to steel mills should only be counted as being recycled once. Furthermore, it is important to collect data in such a way as to not require recyclers to provide confidential data, especially customer information.

32. In tendering for contracts, waste treatment operators will have made accurate assessments of both the positive and negative values of all the waste fractions and the costs of their subsequent processing and the revenue of their recycling, or costs of energy recovery or final disposal destinations. It is common practice to measure the tonnages of wastes collected and entering waste treatment plants. These data can be used for statistics to calculate recycling targets and assess their achievement, if existing.

33. Besides the tonnage, the composition of the waste must be known or finely estimated by contractors as these are the key factors in costing all subsequent waste recovery and recycling operations. For separately collected recyclable wastes, the values and volumes are readily calculated. For separately collected wastes the assumption that the weight collected is the weight recycled may be a sufficiently accurate indicator, not reflecting losses in further recycling steps such as sorting. For mixed wastes, recycling targets can be calculated for each of the specific materials in the mixture by taking account of the composition of the material collected. Subsequent sorting processes will separate materials different from each other to be recycled separately. Materials not passed on up a specific materials value chain still might be used for energy recovery. For wastes that may either be recycled for their material value or that may be used for energy recovery, such as contaminated plastic or paper waste, care is needed to ensure weight data is correctly allocated to either recycling or energy recovery. If a material cannot be recycled or used for energy recovery, its weight should be considered as finally disposed of. Only waste which is effectively recycled should be counted when calculating recycling targets. This may be difficult to audit, especially in globalized value chains of waste and secondary materials, such as in the case of waste plastics.

Investment planning and economic instruments

34. If investments in infrastructure for waste management are locked into the lower end of the waste hierarchy it could be difficult to achieve a high level of recycling. Comprehensive waste management planning which implements the waste hierarchy in a consistent way can help to avoid such outcomes. Economic instruments, e.g. landfill taxes and pay-as-you throw systems as well as extended producer responsibility systems can be used to create incentives for recycling over final disposal.

2.2. Approaches to strategies

35. In general, approaches aimed at promoting recycling and other recovery are both initiated at government and corporate level.

A. Government

36. To promote recycling and other recovery consistently within their respective domestic settings, governments should ensure the provision and incorporation of certain policies into their legislative and regulatory frameworks, infrastructure and institutions. At the national level, governments could take the following measures:

(a) Development of integrated policies on recycling and other recovery, including regulations and policies on separate collection of recyclable wastes and waste recycling standards, involving all key stakeholders;

(b) Development and implementation of economic instruments such as EPR, price incentives to promote and stimulate sorting at source, e.g. pay-as-you-throw (PAYT) systems, tax incentives for recycling and recovery facilities, green public procurement requirements on the use of products manufactured from recycled materials or recycled content in products and/or sending products that have become waste to recycling facilities;

(c) Organization of public and corporate education and awareness-raising campaigns on recycling and other recovery, including the importance of separate collection for quality in successful recycling;

(d) Development of guidance tools for installations concerned, in line with the best available techniques (BAT) and best environmental practice (BEP) on recycling and other recovery;

(e) Cooperation with and involvement of relevant industry, associations, research institutes and other stakeholders and the establishment of public-private partnerships on recycling and other recovery;

(f) Support for research and development in the use of recycled materials in new products.

B. Business and industry

37. In many cases the manufacturing industry generates waste streams that are relatively simple to maintain separately, and as such there are more opportunities for recycling and other recovery. It might be necessary to present opportunities or create incentives to increase recycling and other recovery in other industries.

38. Industry – including manufacturers and recyclers – will be directly affected by any strategy on recycling and other recovery. When developing a strategy, they should be closely involved and their experiences and knowledge may be a vital input in the development process,

39. Implicated at the conception and production phases of the lifecycle of products, business and industry stakeholders make decisions that determine the environmental impact of products throughout their lifespan. Design for prevention and recycling is a first requisite in order to augment the amount of waste that actually can be recycled or otherwise recovered.

40. In the manufacturing of new products, business and industry stakeholders can search for best options to include recycled materials in their production process and reduce the use of hazardous substances that can impact the recyclability of products at the waste stage, thus supporting and sustaining a market for recyclable wastes.

C. Households

41. Households produce waste in the consumption phase of the lifecycle of products, generating specific wastes, such as from food, paper, packaging (e.g. plastic and glass), batteries, electrical and electronic equipment (EEE), furniture, clothing and so on.

42. There is scope to preserve these materials for recycling and other recovery e.g. by developing or expanding initiatives and activities concerning separate collection and separation at source. This could also be done through:

(a) Raising awareness of recycling and other recovery in households through communication campaigns to disseminate information on considering the importance of maintaining recyclable wastes separated in the waste stream, and increasing the use of recycled or recyclable materials;

(b) Taking action to separately collect wastes, e.g. by implementing related policies and requirements, such as pay-as-you-throw (PAYT) systems, offering specific curb side collection, or applying a collection programme of separate waste streams and providing local collection centres (also known as: container parks, bring sites and civic amenity sites).

2.2.1 Spatial approaches: local, national, regional²⁶

43. There are several recycling and other recovery measures, instruments and initiatives that could be integrated into local, national or regional strategies. The main purpose of a recycling and other recovery strategy is to provide a broad vision and framework which seeks to build on existing initiatives and to embrace the most efficient and effective complementary measures, both binding and voluntary.
44. At the local level, a strategy might be directed to a city or town with specific characteristics, for example in the case of relatively small and isolated areas, which require different answers than those in the centre of a country and/or with a large population.
45. Local authorities might offer specific curb side collection, or apply a collection programme of separate waste streams and provide local collection centres.
46. A national strategy might consider the development of regulations, economic or other instruments to promote recycling and other recovery all over the country.
47. In some cases, the quantity of waste generated in a country is not enough to start a feasible facility. In these cases, a regional strategy, considering the coordination of nearby countries, including authorities, companies and society, might result in the interest of recycling and other recovery companies to invest in a regional facility. Also, it may not be feasible or practical to treat certain waste (e.g., special or hazardous wastes) close to its source of arising or within the state in which it is generated.
48. According Article 4, paragraph 9 of the Convention, transboundary movements of hazardous wastes and other wastes should only be allowed if the state of export does not have technical capacity and the necessary facilities, capacity or suitable disposal sites in order to dispose of the wastes in question in an environmentally sound and effect manner; or the wastes in question are required as a raw material for recycling or recovery industries in the State of import; or the transboundary movement in question is in accordance with other criteria to be decided by the Parties, provided that these criteria do not differ from other objectives of this Convention.

2.2.2 Sectoral approaches

49. A recycling and other recovery strategy may have its basis in the waste management sector, when looking for alternatives for final disposal of waste, or in the manufacturing sector, when recycling is demand-driven. Its scope, however, should comprise the whole economy, all material flows and products used in a certain sector, or exchanged between different sectors, from their collection to their disposal.
50. Strategies may cover all sectors and approach recycling and other recovery in a general manner, but some sectors may benefit from a specific approach. Sectors that are typically linked with the generation of hazardous wastes and other wastes that could benefit from specific strategies on recycling and other recovery include agriculture, manufacturing, chemical industries, hospitals, retail, transport and households. For example, recycling and other recovery of agricultural waste might reduce the demand of soil nutrients as well as the need for fossil fuels.

2.2.3 Waste stream approaches

51. It is particularly useful to address certain waste streams if they account for large proportions of the total waste generation or if they can be easily and efficiently recovered or recycled. The proportion that these wastes account for will vary to some extent based on national circumstances. Therefore, it is important to look at a breakdown of waste generation before setting priorities. Various waste streams are addressed in the sections below.

3. Developing efficient strategies for achieving environmentally sound recycling and other recovery of hazardous and other wastes

3.1. Preparation/getting started

52. There are five main factors which contribute to the success of a recycling and other recovery strategy:
- (a) A clear and concise strategic view of the multiple advantages of the recycling and other recovery of waste;

²⁶ Involving more than one country in a region.

- (b) The commitment of relevant decision makers, including those of a high-level, as well as interested and affected stakeholders to implement the strategy;
- (c) The quality of available information, including both quantitative and qualitative data;
- (d) Knowledge of feasible recycling and other recovery processes;
- (e) An understanding of the existing infrastructure for recycling and other recovery.

53. As such, the preparation of a recycling and other recovery strategy should be initiated with the establishment of general strategic view, highlighting “quick wins” and other advantages and determining medium and longer-term goals.

54. Based on this general strategic view, the following three organizational steps should be followed to prepare the strategy:

(a) Establishment of a project team: The size of the project team should be large enough to cover a broad range of views and interests, but small enough to allow discussions and integration of opinions. A team should include:

- (i) Relevant decision makers;
 - (ii) Experts to carry out the technical/socio-economic analyses, project organization and workshop moderation;
 - (iii) Stakeholders, who on the one hand represent a broad range of opinions, concerns and interests and on the other hand, are willing to identify common ground and to contribute to recycling and other recovery. It is not necessary for stakeholder experts to represent the official opinion of their organizations. However, they should be among the opinion leaders of their respective organization;
- (b) Establishment of a knowledge base on:
- (i) The historic and expected future development of material and waste flows and their environmental impacts;
 - (ii) Current recycling and other recovery processes at a national and local level and ecological/technological/economic/social barriers which inhibit improvements;
 - (iii) Instruments to overcome such barriers and their effectiveness;
- (c) Establishment of an operational plan which:
- (i) Sets timelines;
 - (ii) Budgets the respective activities;
 - (iii) Identifies and assigns roles and responsibilities to the various stakeholders

55. With the respect to the content of a strategy it is essential to follow a multi-step approach of:

- (a) Providing a vision on the scope and timeframe of the strategy;
- (b) Defining the specific objectives which should drive the waste recycling and other recovery strategy;
- (c) Setting priority areas on which the recycling and other recovery strategy should focus;
- (d) Selecting and combining measures that will bring about high recycling and other recovery targets and low environmental impacts and efficient material systems.

56. In each of the above steps, all potential efficient options should first be identified and then narrowed down to the most effective options.

57. The selected objectives and measures should allow the recycling and other recovery strategy to fulfil its task, namely to:

- (a) Motivate interested and affected stakeholders to increase recycling and other recovery and diminish final disposal;
- (b) Get interested and affected stakeholders involved and encourage them;
- (c) Enable action by interested and affected stakeholders by providing them with useful examples and other means.

3.2. Assessing the situation

58. In assessing the situation, the following steps might be considered:

(a) Initial assessment

An initial assessment of current recycling and other recovery performance, using available data on recycling and other recovery, is an important starting point. A number of available statistics can be used in charting progress on defined objectives. The following statistics are helpful in assessing the current status of recycling and other recovery and for creating baselines:

- (i) Quantities of waste produced and collected per waste stream, eventually segregated by region or municipality;
- (ii) Type and available capacity for recycling and other recovery;
- (iii) Number and location of facilities for recycling and other recovery;
- (iv) Percentage of citizens covered by collection systems, systems for separate collection or pay-as-you-throw (PAYT) systems;
- (v) Data on the national recycling rate, material recovery rate, energy recovery rate, final disposal rate;
- (vi) Products covered by producer responsibility systems;
- (vii) Collection of information. In addition to waste cycle data, information on national demographics, socio-economic characteristics (for example income levels, education levels, workforce etc.), available infrastructure, existing waste management systems and trade and what kind of manufacturing activities that are present within the relevant country/region should be collected. Such information can be quantitative or qualitative, and is important for creating a baseline and a realistic framework for the strategy;

(b) Analysis of policies

An analysis of existing policies in place at the national, regional (e.g. state or provincial) and local level is crucial in determining which policies are working and in identifying thematic areas which have not yet been addressed. The range of initiatives used and their results so far should be considered in assessing what works well locally and what should be expanded. An inventory of existing producer responsibility policies, for example, will be essential before expanding this policy area. There may be opportunities to forge partnerships between recycling and other recovery strategies operating at different administrative levels and to develop synergies between regional strategies. Trade-offs between measures, unintended consequences of existing measures, and competition for existing infrastructure and services, should also be considered here;

(c) Identification of key barriers and drivers for change

National authorities have much to gain by identifying the key barriers and drivers for progress in recycling and other recovery that are specific to their country as these will help guide the selection of measures implemented;

(d) Involvement of stakeholders: how and when

The involvement of stakeholders from the outset is essential both in gathering data and taking stock of measures already in use. Through the launch of a formal consultation, stakeholders involved in existing recycling and other recovery activities or relevant fields will be identified or will identify themselves. The participants in the consultation will be key resources in the subsequent phases of strategy development and their continuous involvement will ensure that the strategy designed will be relevant, useful and achievable.

3.3. Setting framework and priorities

59. The preliminary phase in the development of a recycling and other recovery strategy allows authorities to define their overall approach, the role of participating bodies and the goals the strategy will pursue. This is also the time to further elaborate the strategic vision of the strategy and how recycling and other recovery fit into and contribute to a sustainable society.

60. The following sections provide guidance on priorities, scope and targets when formulating a strategy.

3.3.1 Scope

61. It is necessary to determine whether the recycling and other recovery strategy will be an integrated part of a national or regional waste management plan, or a national or a regional environmental protection strategy, or other national or local strategy or plan, or if it will exist independently.
62. How the strategy will address recycling and other recovery may be determined by identifying:
- (a) Key stakeholders;
 - (b) Relevant waste streams;
 - (c) Key elements/tools.

3.3.2 Key stakeholders

63. When developing a recycling and other recovery strategy, as well as specific initiatives or measures, it is recommended to identify the key stakeholders, which include:
- (a) Consumers, or more specifically, households;
 - (b) Specific industry sectors, whereby actors in the production phase, combined with those active in the recycling industry and waste management phase, play a prominent role;
 - (c) Workers and trade unions;
 - (d) Local authorities;
 - (e) Dedicated non-governmental organisations;
 - (f) Academia;
 - (g) Other dedicated actors, such as repair centres, schools, etc.

3.3.3 Waste streams

64. When developing a recycling and other recovery strategy, as well as specific initiatives or measures, it is recommended to identify relevant waste streams, which may include the following.

3.3.3.1. Hazardous wastes

65. Hazardous waste may be generated by both industries and households. Often in developing countries and countries with economies in transition, structures for the management of hazardous waste may be lacking or inadequate. Even if Parties have these structures in place for the management of hazardous waste, strategies for recycling and other recovery, including to increase its safe collection, should be actively pursued for their relevant environmental, economic and social benefits.

3.3.3.2. E-waste

66. Electrical and electronic equipment waste or e-waste is a rapidly growing waste stream, having reached up to 42 million metric tonnes by 2014, with only part of this being recycled and recovered.²⁷ The amount of e-waste is expected to grow to 53.9 Mt in 2025, with an annual growth rate of around 3 per cent, resulting in a more than 30% increase in less than a decade.²⁸ Thirty million units of e-waste are sent to developing countries in Latin America, Asia and Africa,²⁹ which often do not have appropriate legislation and facilities to manage this waste. The generation of e-waste in developing countries is also increasing.

67. E-waste is addressed by legislative measures in developed countries, for example the European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)³⁰ which, inter alia, sets targets for the collection, other recovery, recycling and preparation for reuse³¹ of electrical and electronic equipment. Under the Basel Convention, a number of guidance documents, awareness raising

²⁷ According to United Nations University (Balde et al. 2015; UNODC 2013) and published in "Waste Crimes- Waste Risks: Gaps in Meeting the Global Waste Challenge" (UNEP, 2015).

²⁸ Statistics on the National Arisings of E-waste and the Movement of E-waste between Countries, Harokopio University (K.E. Lasaridi, E. Terzis, C. Chroni, K. Abeliotis) published May 2018.

²⁹ <http://www.nature.com/news/take-responsibility-for-electronic-waste-disposal-1.20345>.

³⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1533300415431&uri=CELEX:02012L0019-20180704>

³¹ "Regarding "preparation for re-use" see explanation in the Glossary of terms (document UNEP/CHW.13/4/Add.2).

tools and pilot projects have been developed in relation to e-waste.³² Organizations including the IETC and UNU StEP initiative have undertaken a significant body of work addressing e-waste. Further, the United States Environmental Protection Agency (USEPA) has coordinated the International E-Waste Management Network (IEMN), which has brought together environmental officials from Asia, Latin America, the Caribbean, Africa, and North America to exchange best practices on e-waste management since 2011.

3.3.3.3. *Healthcare or medical waste*

68. Certain recycling and other recovery measures may be relevant to some of the types of healthcare and medical waste, inter alia, taking into account a limited time for storage for some of the wastes.

69. Healthcare or medical waste may consist of a range of different types of waste, including non-hazardous, infectious, pathological, chemical, pharmaceutical or even radioactive waste. Estimations suggest that of the total amount of waste generated by healthcare activities, about 85% is general, non-hazardous waste comparable to domestic waste. The remaining 15% is considered hazardous that may be infectious, toxic or radioactive.³³ However in some countries, healthcare waste may not be sorted and end up being mixed which makes it entirely hazardous.

70. Major sources of healthcare waste include:

- (a) Hospitals and other health facilities;
- (b) Laboratories and research centres;
- (c) Mortuary and autopsy centres;
- (d) Animal research and testing laboratories;
- (e) Blood banks and collection services;
- (f) Nursing homes for the elderly;
- (g) Expired medicines and medical devices.

3.3.3.4. *Lead acid batteries*

71. Lead-acid batteries are the most widely used rechargeable batteries in the world. Since lead accumulators include lead and sulphuric acid, discarded lead accumulators are considered as hazardous waste because they exhibit the toxic characteristics of lead, and the corrosive characteristics of the sulphuric acid. Currently, used lead-acid battery recycling occurs in almost every city in the developing world, and even in some countries in transition. In many cases the local recycling operations are not performed in an environmentally sound manner and release lead contaminated waste into the local environment and ecosystems in critical quantities. Exposure to lead can cause serious health problems, especially in young children.

3.3.3.5. *Packaging waste*

72. Packaging refers to all materials whose purpose is the containment, protection, shipping or presentation of goods, from their natural condition to saleable form, as handled by the producer or the consumer. Packaging is often divided into three broad categories: primary packaging referring to the principal material enveloping the product, secondary packaging for grouping products together and tertiary packaging for shipping and handling. Packaging waste is generated at all levels of the supply chain, generally being more or less uniform and in large quantities in the case of secondary and tertiary packaging. Primary packaging is generated by consumers as the end user and is generally varied and in small quantities. Its separate collection, specifically per respective material (plastics, glass, metals, wood, paper), contributes considerably to the subsequent recycling of these wastes.

3.3.3.6. *Plastic waste*

73. Plastic waste is a rapidly growing waste stream because of the attractive characteristics of plastic that makes it a material of choice for and in many products. Plastic use has multiplied by 20 times from 1964 to 2014, up to 312 million metric tonnes, and it is expected to double in the next 20 years. It is estimated that only 14% of plastic is collected for recycling, which leaves up to 267 million metric

³² <http://www.basel.int/Implementation/Ewaste/Overview/tabid/4063/Default.aspx>.

³³ <http://www.who.int/mediacentre/factsheets/fs253/en/>.

tonnes which is buried, burned or dumped into the natural environment.³⁴ It is estimated that 8 million tonnes of plastic waste ends up in the oceans. Recently, a number of strategic initiatives on the subject have been taken, such as a proposal for a new plastic economy or the EU Plastic Waste Strategy published in 2017.³⁵ These initiatives are based on the concept of a circular economy.

3.3.3.7. *Biodegradable waste*

74. Biodegradable waste originates from plant or animal matter and distinguishes itself by its characteristic to be broken down by living organisms. Biodegradable waste includes food scraps and garden waste. Biodegradable wastes are generated by most societal actors and present great potential for recycling. These wastes can contribute considerably to soil enrichment when composted. Food waste can be used to produce valuable animal feed, by applying simple processes like boiling. Other options may include strategies to produce biogas through anaerobic digestion.

3.3.3.8. *Waste pneumatic tyres*

75. Management of waste tyres requires special consideration of the associated recycling costs so as to keep them out of landfills or tyre piles. There are opportunities for recycling, by shredding followed by the production of tiles, or to be used in road construction, e.g., mixed with asphalt (“rubberized asphalt”). Other opportunities include energy recovery by co-processing. Economic instruments, e.g. Extended Producer Responsibility, might be implemented to ensure recycling and other recovery.

3.3.4 Key elements/tools

76. To encourage recycling and other recovery, it is important to consider ways to facilitate recycling and other recovery. An assessment of how easy it is to get recyclable wastes to a recycling facility should be made. Some examples include how many recycling and/or collection facilities are available per a specific geographical area or population density and transportation options/costs. Another example may be the proportion of the population served curbside collection or by pay-as-you-throw (PAYT) systems. A range of elements and tools are relevant when considering options and pathways for promoting recycling and/or other recovery of wastes.

Minimizing waste destined for final disposal

77. Supporting and promoting activities designed to reduce the generation and hazard potential of hazardous and other wastes at the national level (objective 2.2 in the Strategic Framework for the implementation of the Basel Convention for 2012–2021), contribute to minimizing the quantity of waste generated within a country or a region. This will also affect the amounts of waste destined for final disposal. Waste minimization and waste prevention may thus reduce the negative impacts of final disposal through landfilling and incineration.

Separate collection

78. Collection of waste in separate bins or containers increases the level of quality of the different waste fractions. Mixing for instance food waste with other wastes such as plastic wastes will contaminate both materials and impact further processing in sorting plants and recycling facilities. Therefore, separate collection has a positive effect on recycling targets in many cases. Moreover, automated central sorting facilities represent advanced technologies in which specific categories and qualities of a waste fraction can be identified, yielding marketable recovered waste fractions.

Legal, policy and economic instruments

79. Governments may initiate measures aiming to stimulate the waste management sector. Waste strategies, objectives or other policies at both national and local level give directions for the waste sector. In addition, a legal framework, such as laws and regulations, including obligations for important stakeholders, are necessary instruments for putting into action the general policies within each country. Economic instruments are also effective for this purpose, and include taxes and fees on activities and products. Deposit systems are one example of an economic instrument promoting both collection and sound management of waste. A pay-as-you-throw system (PAYT) may also be an effective element

³⁴

https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_Pages.pdf.

³⁵ See

http://ec.europa.eu/environment/waste/plastic_waste.

within a waste management system, as final disposal costs will be related to the quantity of waste to be disposed of, motivating consumers to find possibilities for the recycling and other recovery of waste generated by them.

Measures to promote the market for recyclable materials

80. Active measures can be taken to strengthen the demand for recyclable wastes as opposed to raw materials. Such measures may e.g. be voluntary, legal and economic, and can refer to standards for the content of recycled materials in a product and requirements for the quality level of products put on the market. New requirements for producers can therefore give new opportunities for employment and business. Measures may include:

- (a) Minimum standards for recycled content in products;
- (b) Tax systems favouring recyclable contents;
- (c) Financial subsidies aimed at the recycling industry;
- (d) Requirements for recycling, both in recycling targets and the content of products.

Certification standards

81. Certification standards in the recycling industry itself are also relevant measures. Taking into account the size of the enterprise, especially the situation of SMEs, the type and amount of waste, the nature of the operation and domestic legislation, facilities may be encouraged to implement an Environmental Management System such as ISO14001; an Occupational Health and Safety Management System such as OHSAS 18001; a quality management system such as ISO 9001; or a tailor-made management system for their activities. The Framework for the environmentally sound management of hazardous wastes and other wastes includes facility requirements.³⁶

Influencing and harnessing power of consumer behaviour

82. Consumers play a key role in a country's steps towards increased resource efficiency. Specific requirements and standards for products will influence consumer behaviour and demands. Other types of measures, like campaigns, information activities, bans or restrictions can also create awareness and build trust among consumers.

3.3.5 Targets

83. In recycling and other recovery strategies, the general aim of decoupling economic growth and the environmental impact of waste generation should be taken into account. Within this framework, quantitative goals with clear deadlines are helpful in mobilizing a shift towards recycling and recovery attitudes and practices or towards more efficient management of materials, so long as targets are ambitious but achievable and incorporate incentives for those that go "above and beyond" minimum targets.

84. Targets should take into account existing trends in waste generation, as well as the existing infrastructure and services that can help public authorities and others achieve selected goals. Managing the expectations of stakeholders with respect to any potential target is also important to ensure the success of both the development and implementation of the strategy.

85. Any evaluation or assessment of the targets and their achievement should be independent and credible in order to safeguard the support and engagement of all involved stakeholders.

86. The following steps may be useful in determining the appropriate targets:

- (a) Geographical scale of targets

Targets may be helpful at national, regional and local levels. Countries with strong regional authorities may wish to operate recycling and other recovery strategies at this level. An ambitious national target accompanied by a major awareness-raising campaign can be useful in increasing the visibility of the measure and in stimulating the collection and monitoring of recycling and other recovery data;

- (b) Quantitative or qualitative targets

Quantitative targets, reductions in final disposal and increases in recycling and other recovery as well as public awareness for example, are useful targets at all geographical levels. Results might be gauged by

³⁶

<http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMFramework/tabid/3616/Default.aspx>

measuring the weight of collected, recycled or recovered waste or avoided greenhouse gas emissions, or a combination of several of the beforementioned. Qualitative targets are particularly helpful when targeting difficult waste streams;

(c) Data collection

When determining any type of target, it should be considered whether the data required to substantiate results is already available. Does this data exist at national, regional or local levels? If data is currently unavailable, would it be difficult to collect?

(d) Timeframe

The timeframes for the strategy and the initiatives should be considered. It should also be considered whether these timeframes relate to other relevant plans or initiatives. In addition, it should be considered if the timeframes are sufficient to achieve the desired results. Furthermore, it should be considered whether ambitious targets over a longer timeframe or achievable short-term targets suit the general approach and priorities of the national strategy;

(e) Voluntary or obligatory targets and instruments

Targets may be shared goals committed to through voluntary agreements, or requirements for certain sectors accompanied by penalties for non-compliance;

(f) General or focused targets

General targets may be expressed in terms of e.g. waste recycled and recovered, reductions of final disposal of waste or reductions in greenhouse gas emissions created through waste management (in million tonnes of carbon dioxide equivalent).

Sector specific targets may focus on households and businesses separately, as the waste burden produced and the channels for providing information may differ. In general, the smaller the sector of focus chosen, the more accurately results can be measured and the greater the proportion of individuals affected by the campaign.

Targets may focus on waste streams, accompanied by strategic awareness campaigns or regulatory measures. Waste paper, packaging waste, waste of electric and electronic equipment, batteries waste, end-of-life vehicles, biodegradable waste and construction and demolition waste lend themselves well to individual recycling and other recovery targets.

3.4. Identifying means of implementation

87. This phase involves a careful listing of all necessary resources required and mechanisms for mobilising them with the aim of safeguarding their supply for the longer term, as recycling and other recovery strategies will typically require a longer period of implementation.

88. Different types of recycling and other recovery strategies or measures call for different means of implementation. State-driven strategies will need careful budgeting on that level beforehand in order to safeguard the success of the strategy in the longer term. Strategies implemented by or with private stakeholders will require means of implementation that are delivered in a shared or even specifically dedicated effort.

89. It is recommended that opportunities created by new national and regional waste and chemicals initiatives are tapped into to advance the promotion of recycling and other recovery.

3.5. Developing a recycling and other recovery strategy

90. This phase involves the development of measures to ensure that the strategy is well suited to the particular circumstances of the country or region and that it will be widely accepted and engaging.

91. Stakeholder involvement is crucial to the success of the strategy and the achievement of its goals. Early involvement in the process is very important in order to secure ownership of the strategy.

92. Stakeholder involvement may be undertaken as follows:

(a) Invite key stakeholders to brainstorming sessions or workshops at the developmental stage;

(b) Identify the stakeholders involved in each sector and at each administrative level. This may include: relevant policy makers, regional and local authorities, communities, non-profit organizations, researchers, behaviour change specialists, business and industry professionals, trade organizations, and consumer groups;

(c) Determine the role for key stakeholders: Advisory committees or sector panels, involving all concerned key stakeholders, may give the best interaction between stakeholders and public authorities. However, since such committees or panels can be time consuming and costly, it is important to decide whether this type of involvement is helpful for all activities. This assessment might best be done in the phase of identifying means of implementation;

(d) Consider whether there should be a permanent or temporary role for key stakeholders;

(e) Consider which other stakeholders should be consulted during the design stage of the strategy;

(f) Consider how the general public may be involved in the development of the proposed strategy.

93. A list of practical questions that could help identify opportunities in developing a recycling and other recovery strategy from the perspective of policy integration and coherence is provided below:

(a) What are the relevant priorities in possible overarching strategies or policies, such as in the sustainable development strategy, the national environment policy and/or the waste management plan, on a national, regional and local level? For example, efforts to set up general waste and chemicals laws and regional initiatives on waste and chemicals like the one launched in Latin America and the Caribbean, coordinated by UNEP/ROLAC.³⁷

(b) Which policy areas are under revision or development (or will be under revision or development soon) and what opportunities exist for the integration of the aspects of recycling and other recovery in these areas? What bottlenecks might impede the achievement of the strategy, both now and in the future?

(c) Which institutions are in charge of the relevant policy areas? Which relevant strategies or action plans have been prepared in these areas and what are the objectives, targets and indicators defined in them that are relevant to recycling and other recovery? Are there institutions or sectors that require capacity building or skill development?

(d) How could these different policy areas contribute to the achievement of recycling and other recovery objectives and targets? What particular policies are in place in the areas in focus and what gaps and opportunities exist for integration of recycling and other recovery aspects into these policies? What technologies are relevant, available and affordable and what requires development?

(e) Are policies in place to address a particular waste stream or product group coherent? Are there policies in place which particularly hinder recycling and other recovery?

(f) What are the opportunities for creating synergies amongst the relevant policies and to improve their coherence? What are the associated trade-offs to be tackled? What is the next opportunity for the revision or amendment of the relevant policies?

(g) What relevant initiatives are in place by business, civil society or academia and which of these could be supported by governmental policies?

94. Methods for improving policy integration and coherence through recycling and other recovery strategies include:

(a) Expert groups or committees in charge of the development of recycling and other recovery strategies should schedule meetings or form sub-groups to discuss and explore opportunities for policy integration and the improvement of the coherence of policies. The ultimate objective of this dedicated work should be to design a work programme with strategic goals and mechanisms to monitor them on the issue of policy integration and the improvement of the coherence of policies (environmental, economic, social, etc.). This work programme should clearly identify policy areas in the focus of policy integration work in the short-, medium- and long-term and form the centre of recycling and other recovery strategies;

(b) One of the main tools for the integration of recycling and other recovery aspects into other policy areas is impact assessment. It is therefore recommended that relevant impact assessment guidelines and training cover recycling and other recovery issues;

(c) National sustainable development strategies are also an important vehicle of policy integration as they usually connect a large number of relevant policy areas with the ultimate aim of

³⁷ <http://web.unep.org/regions/rolac/about-uneprlac>.

achieving sustainable development. The topic of recycling and other recovery therefore should clearly be identifiable in any national sustainable development strategy.

3.6. Adopting and implementing the strategy

95. Once the draft strategy is developed, a critical analysis should be undertaken to ensure its objectives are met. A process for adoption should be pursued through the relevant channels. For example, the government might present the strategy to the parliament for adoption.

96. A process for periodic review of the strategy and its adjustment should be developed.

97. Given the general approach selected in section 3.3 above (Setting framework and priorities), authorities should determine, depending on the activities and measures included in the strategy, at which levels they should be implemented.

98. A timeframe showing the expected duration of the different stages and the expected finalization date of the strategy should be agreed. The timeframe should pay special attention to the different stages of the recycling and other recovery strategy.

3.7. Monitoring the strategy

99. Monitoring the implementation of policies to increase recycling and other recovery is essential to evaluating their effectiveness and determining whether changes need to be made to improve results. The monitoring and evaluation process involves collecting data at the national, regional, and/or local level to assess performance and track progress towards measurable goals.

100. To evaluate the achievement of a strategy, appropriate indicators should be used to evaluate progress. "Recycling Rate" and "Recovery Rate" are widely used, but there are also other types of indicators. Some volume based indicators are also relevant, such as per capita based collection amount of recyclable wastes. Depending on the objective of the strategy, appropriate indicators should be chosen. Possible monitoring approaches could include:

- (a) Self-monitoring with regular reporting;
- (b) Government monitoring and reporting;
- (c) Third-party monitoring through an accreditation or certification scheme; or
- (d) A combination of the abovementioned approaches is also possible.

101. Some indicators measure the capacity for recycling and other recovery in a given area and can inform decisions about where to locate future facilities. For example, knowing the number, location, and processing capacity of recycling and other recovery facilities with respect to urban and industrial areas provides information about where gaps in coverage may exist. Other indicators measure actual levels of recycling and other recovery activity.

3.7.1 Examples of indicators

102. This section provides background and examples of data or indicators that can be used to monitor recycling and other recovery strategies.

Quantitative data

103. Examples of some of the most common indicators include:

- (a) Generation rate – the amount of waste generated. It serves as the basis for calculating recycling and recovery targets;
- (b) Collection rate – the percentage of waste that is collected. Collection targets should be tracked by waste stream;
- (c) Recycling and recovery rate = There are many ways of calculating the recycling and recovery rate;
- (d) Final disposal rate – the percent of waste finally disposed of (operations listed in Annex IV.A of the Convention).

104. The indicators above can be used to collect data on recycling and other recovery of hazardous and non-hazardous wastes. However, to obtain information about the management of hazardous waste specifically, it is important to obtain the information from facilities that generate hazardous waste, such as:

(a) Quantity and type(s) of hazardous waste generated per period of time (e.g., annual or biennial basis);

(b) Quantity and type of hazardous waste destined for recovery (operations listed in Annex IVB of the Convention) per period of time (e.g., annual or biennial basis), including transboundary movements.

Qualitative data

105. Improving awareness of and attitudes towards recycling and other recovery can also help increase recycling and recovery targets. Information from surveys or other data collection tools that assess perceptions and behaviours towards recycling, such as perceived benefits, barriers or challenges, and overall level of acceptance towards recycling by individuals and by facilities that generate waste. Such indicators help gauge the willingness to recycle and can inform strategies to make recycling and other recovery a priority for government agencies, businesses, and households.

106. When to collect data. Before implementing a recycling and other recovery strategy, it is important to collect baseline data to have an understanding of the waste management system before changes are made, to help determine what waste management activities need improvement, and to be able to track progress. For example, a waste characterization study provides information about the quantities of different types of household waste (e.g., plastics, metals, glass, biodegradable waste) that are generated within a geographical region. Waste characterization data is collected by taking samples of waste and sorting it into material types and then weighing each type. Waste characterization information helps in planning how to reduce waste, establish recycling and other recovery programmes, and conserve resources.

107. Once baseline information has been collected, additional data to measure the progress of the recycling and other recovery strategy should be collected on a regular (e.g. annual or biennial) basis.

108. Sources of data. The recycling and other recovery and final disposal data needed to calculate recycling and recovery targets can be obtained from numerous sources, including generators, collectors, processors, and from recycling, other recovery and final disposal facilities. Data about attitudes and behaviours toward recycling and other recovery can be collected from any entity or individual that is an actual or potential stakeholder in recycling/other recovery activities.

109. Who should collect the data. Any entity can collect recycling, other recovery and final disposal information. Typically, the entity responsible for these operations takes on the data collection responsibility. However, regional or local recycling organizations, trade associations, or other government agencies can also collect the necessary data. In addition, governments can utilize data from the industry for national statistics and reporting mechanisms. The use of quantitative data is therefore wide and important at many different levels.

3.7.2 Empirical examples

Recycled Content in Products

110. Recycled content in products are used in various green procurement programmes. For example, recycled paper which is made from certain percentage of used paper can be product which may be purchased under green public procurement programme.

Cyclical Use Rate in Japan

111. In Japan, Cyclical Use Rate is one of three main indicators in the Fundamental Plan for Establishing Sound Material Cycle Society. Cyclical Use Rate is defined as amount of Cyclical Use divided by amount of Resources Consumed by the society. Cyclical Use includes recycling and reuse. Amount of Resources is derived from the natural resources consumed by society and recycled and reused amount:

$$\text{Cyclical Use Rate} = \frac{\text{Amount of Cyclical Use}}{\text{Amount of Cyclical Use} + \text{Natural Resource Input}}$$

112. This is similar to the ratio of recycled materials in a certain product. The data of amount of Cyclical Use and Natural Resource Input are estimated by Material Flow Analysis of the whole economy.

Waste Diversion Rate in the Philippines

113. In the Philippines, a waste Diversion Rate focuses on source separation of the waste generator. Waste Diversion Rate is waste diverted from final disposal by sorting waste at source and other

activities. It can be calculated using amount of recyclable waste collected by sorting collection programme divided by total collected waste. This indicator is often called recycling rate;

$$\text{Waste Diversion Rate} = \frac{\text{Amount of Waste Collected for Recycling}}{\text{Amount of Waste Disposed}}$$

114. The Ecological Solid Waste Management Act enacted in 2001 requires local government to achieve 25% Waste Diversion Rate.³⁸

Recycling and Recovery Rate in Recycling Process

115. In regulations applying Extended Producer Responsibility to end of life vehicles (ELV) and waste electrical and electronic equipment (WEEE), producers with the support of recyclers should achieve recycling and/or recovery targets. Collected ELV and WEEE are dismantled in a recycling facility to sort out recyclable materials and others. Recycling rate is calculated as the amount of waste recycled divided by the amount of waste that came into the facility.

Collection Target of WEEE in EU

116. In the EU, there is a collection target for WEEE. In the beginning, 4 kg per capita of WEEE was a national level collection target. Over time this figure was easily reached by a number of countries, partly due to high consumption of EEE. In the revised Directive on WEEE,³⁹ the ratio of collected amount to amount of EEE placed on the market, or the ratio of collected amount to amount of total WEEE generated, became the main indicators. A common calculation method on EEE placed on a market and total quantity of WEEE generated is defined by Commission Implementing Regulation (EU) 2017/699.

Total raw material input productivity in Germany

117. Other recovery contributes to minimizing the use of raw materials and hence reduces the negative ecological effects of using raw materials. In order to measure the effect in doing this, the indicator of total raw material input productivity at national level is used in Germany. This indicator is calculated by dividing the primary raw material input (encompassing both biotic and abiotic raw materials and considering imported goods not only with a view to their own weight but also their entire specific primary raw material input) by the gross domestic product to which the value of imported goods has been added, as follows:

$$\text{Total Raw Material Input Productivity} = \frac{\text{Primary Raw Material Input}}{\text{Gross Domestic Product incl. Value of Imported Goods}}$$

3.8. Adapting the recycling and other recovery strategy

118. Throughout the implementation of a recycling and other recovery strategy, it is important to revisit the goals objectives and targets and evaluate whether the programme is on track to meet its desired outcomes. The data collected provides decision-makers with information to make changes and adapt the strategy as needed. The type of data collected and/or waste streams tracked can be modified as the recycling and other recovery programme evolves.

3.9. Practical examples

119. Practical examples are available on the Basel Convention website.⁴⁰

³⁸ <https://www.ecolex.org/details/legislation/ecological-solid-waste-management-act-no-9003-of-2000-lex-faoc045260/>.

³⁹ DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE) (recast).

⁴⁰

<http://basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMToolkit/Overview/ta/bid/5839/Default.aspx>.

Appendix

Linkages

1. Strategies on recycling and other recovery may be developed by using guidance documents developed under the framework of the Basel Convention. Linking it to other policies, such as policies to mitigate climate change, may increase the effectiveness of the strategy and allow for mobilization of additional resources.

Guidance under the framework of the Basel Convention

2. Various technical guidelines⁴¹ and guidance documents⁴² as well as practical manuals on promoting the environmentally sound management of wastes⁴³ have been adopted under the framework of the Basel Convention.

3. Most of the technical guidelines and guidance documents outline the information related to the ESM of a particular waste stream, including specific aspects of recycling and/or other recovery of the waste in question whereas others address certain disposal operations.

Guidance under other frameworks

4. The sound management of chemicals and waste means detoxifying the environment: minimizing the use of hazardous substances in production and consumption, preventing or reducing the generation of hazardous wastes and other wastes, and safely managing the waste generated. Chemicals and waste management is a wide-ranging concern and as such is considered in various global frameworks, international agreements and programmes, in particular the Stockholm and Minamata Conventions.

5. The 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals were adopted by General Assembly resolution 70/1 in September 2015.⁴⁴ The 2030 Agenda provides a new opportunity for enhancing coherence in international policy and law-making at all levels.

6. Given that chemicals and waste affect many aspects of development, chemicals and waste are reflected in a number of goals and targets, including health, water, cities and human settlements, oceans, and sustainable consumption and production. The sound management of chemicals and waste is also important in areas such as education, gender equality, and climate change.⁴⁵

7. Waste prevention and minimization as well as the environmentally sound management of wastes are addressed in Goal 12 of the 2030 Agenda⁴⁶ to ensure sustainable consumption and production patterns. Achieving Goal 12 requires a strong national framework for sustainable consumption and production that is integrated into national and sectoral plans, sustainable business practices and consumer behaviour, together with adherence to international norms on the management of hazardous chemicals and waste. Furthermore, Goal 11 pays special attention to the management of municipal and other waste.⁴⁷

8. Resolution 2/7 on the sound management of chemicals and waste adopted by the second session of the United Nations Environment Assembly (UNEA2),⁴⁸ requested the Executive Director to address,

⁴¹ <http://www.basel.int/Implementation/Publications/LatestTechnicalGuidelines/tabid/5875/Default.aspx>.

⁴² <http://www.basel.int/Implementation/Publications/GuidanceManuals/tabid/2364/Default.aspx>.

⁴³

<http://www.basel.int/Implementation/CountryLedInitiative/EnvironmentallySoundManagement/ESMToolkit/Practicalmanuals/tabid/5847/Default.aspx>.

⁴⁴ The Sustainable Development Goals are available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

⁴⁵ The Sustainable Development Goals are available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

⁴⁶ See target 12.3 “By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses”; target 12.4 “By 2020, achieve the environmentally sound management of chemicals and all waste through 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”; and target 12.5 “By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse”.

⁴⁷ See target 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”.

⁴⁸ Resolution 2.7 on the sound management of chemicals and waste is available at: <http://web.unep.org/unea/list-resolutions-adopted-unea-2>.

in the 2019 update of the Global Waste Management Outlook,⁴⁹ strategies for increasing waste prevention, reduction, reuse, recycling and other recovery, including energy recovery, leading to overall reduction of final disposal.⁵⁰ Furthermore, resolution 2/11 on marine plastic litter and microplastics stressed that prevention and environmentally sound management of waste are keys to long-term success in combating marine pollution, including marine plastic debris and microplastics and called on Member States to establish and implement necessary policies, regulatory frameworks and measures consistent with the waste hierarchy.⁵¹

9. The Basel Convention and the Rotterdam, Stockholm and Minamata Conventions are four autonomous legally binding instruments that share the same objective to protect human health and the environment from the adverse effect of chemicals and waste whereby each of the Conventions has a set of specific objectives, dealing with hazardous and other wastes; pesticides and industrial chemicals; persistent organic pollutants; and mercury. Several chemicals are covered by more than one Convention (e.g. PCBs, mercury) and synergistic work amongst the Conventions supports the ESM of waste in general, facilitates the delivery of assistance to countries to manage chemicals and wastes at different stages of their life-cycles and aims to mainstream the sound management of chemicals and waste into national development plans.

10. Industry has an important role to play in promoting sustainable chemistry, innovation, the circular economy and the first two steps in the waste hierarchy (prevention and minimization).⁵² The Strategic Approach to International Chemicals Management (SAICM) is a multi-stakeholder and multi-sectoral platform⁵³ for achieving the goal of sound chemicals management. Environmental, economic and other aspects of chemical safety are reflected in SAICM quick start programme.⁵⁴

⁴⁹ <http://web.unep.org/chemicalsandwaste/what-we-do/policy-and-governance/global-chemicals-outlook>.

⁵⁰ See <http://web.unep.org/ietc/what-we-do/global-waste-management-outlook-gwmo>.

⁵¹ Resolution 2.11 on marine plastic litter and microplastics is available at: <http://web.unep.org/unea/list-resolutions-adopted-unea-2>.

⁵² <http://www.saicm.org/Meetings/FirstIntersessional/tabid/5463/language/en-US/Default.aspx>.

⁵³ <http://www.saicm.org/Home/tabid/5410/language/en-US/Default.aspx>.

⁵⁴ <http://www.saicm.org/Implementation/QuickStartProgramme/tabid/5523/language/en-US/Default.aspx>.