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FOCUS

SOLID WASTE MANAGEMENT

UNDERSTANDING FOR BETTER ACTION

#WorldInCommon

Cover photo credit: A child transporting waste through the Happyland slum, Tondo district, Philippines.
Credit: Ezra Acayan / AFD.

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Publication date: April 2022

Graphic design: Luciole

Commissioned by AFD Group and managed by the Urban Development, Town Planning and Housing Division (VIL).

Implementation of the landfill project with energy recovery at the Mare Chicose Landfill, Mauritius.
Credit: Fabien Dubessay/AFD

Contents

LIST OF ACRONYMS

ADEME: French Environment and Energy Management Agency

AFD: Agence Française de Développement

COD: Chemical Oxygen Demand

COVED: Collectes Valorisation Énergie Déchets SA

DAC: Development Assistance Committee

DAGL: Greater Lomé Autonomous District

DCs: Developing countries

EPP: Extended Producer Responsibility

ExPLOI: Indian Ocean Plastic Expedition

FEXTE: Fund for Technical Expertise and Experience Transfers

FNADE: French association for waste management and environmental services companies

GDP: Gross Domestic Product

GHG: Greenhouse gas

HAW: Household and assimilated waste

HCW: Healthcare waste or medical waste

HSW: Household solid waste

HWRI: Healthcare waste with risk of infection

IPCC: Intergovernmental Panel on Climate Change

IUCN: International Union for Conservation of Nature

LDCs: Least Developed Countries

LMICs: Lower- and Middle-Income Countries

NDCs: Nationally Determined Contributions

OECD: Organisation for Economic Co-operation and Development

OECS: Organization of Eastern Caribbean States

PE: Polyethylene

PET: Polyethylene terephthalate

POS: Strategic Orientation Plan

PVC: Polyvinyl chloride

SDGs: Sustainable Development Goals

SICTOM: Inter-municipal union for the collection and treatment of household waste

SPREP: South Pacific Regional Environment Program

SRF: Solid Recovered Fuels

SWM: Solid waste management

TeqCO$_2$: Ton of equivalent CO$_2$

UNEP: National Union of Landscape Contractors

UNEP: United Nations Environment Programme

VDP: Voluntary drop-off point

VIL: Urban Development, Town Planning and Housing Division

WEA: Waste from economic activities

WEEE: Waste electrical and electronic equipment

WWF: World Wide Fund for Nature

WHY THIS GUIDE?

Humankind generates **over two billion tons of urban solid waste every year. At least a third of it is not properly treated.**[1] This poorly managed waste has a **direct impact on health, the climate, biodiversity and the environment:** it increases the proliferation of diseases, its poor combustion creates smoke which causes many respiratory problems, it heightens flood risks by blocking drains, its degradation causes greenhouse gas (GHG) emissions which add to global warming, it pollutes oceans and terrestrial ecosystems, it holds back the economic development of the countries in question. The most vulnerable populations are the most affected by poor waste management. They generally live in precarious neighborhoods where there are no essential services, and sometimes near illegal dumps and uncontrolled landfills. **In contrast, an appropriate management of solid waste is a major vehicle for mitigating impacts in many respects:** protecting the environment and maintaining ecosystem services, reducing GHG emissions, improving hygiene conditions in a territory and therefore its attractiveness – cleanliness is also a key factor in developing tourism activities –, and creating direct and indirect jobs.

Waste management is one of the main sectors that generate methane. This gas accounts for a total of almost 20% of global GHG emissions. During COP26, methane was for the first time subject to an agreement signed by 97 countries. This commitment aims to reduce methane emissions by at least 30% by implementing concrete solutions in the sectors of agriculture, energy and also waste management.

Agence Française de Développement (AFD) has been operating in the solid waste management sector since the early 2000s. Between 2010 and 2020, AFD supported over 60 projects for a total amount of some €500 million. It has been stepping up its operations in the sector for the last five years in response to growing global awareness of the need to take action in the waste sector. The increase in demands is mainly related to urgent social situations and the determination to control the impacts of waste on the cleanliness of cities, health and the environment.

Waste management figures prominently in the Sustainable Development Goals (SDGs), as it is included in five of them (SDGs 5, 8, 11, 12 and 14). In addition, waste is **directly or indirectly mentioned in the NDCs presented by each country in the context of the 2015 Paris Climate Agreement.**

In view of the great diversity of operational contexts and complexity of the issues, AFD seeks to promote a differentiated and adapted approach. It thereby supports the structuring of sectors, from the production of waste to its final treatment, while improving health, social and environmental conditions. The technical assistance offered to local authorities, the actions to build their capacities and the technologies used must be defined based on the needs and context.

This operational guide has been designed with the objectives of highlighting the main issues related to solid waste management, stressing the importance of an effective and sustainable integrated waste management sector and presenting the principles and modalities of AFD's operations in this field.

The objective is also to provide a guide for local authorities and municipalities seeking to adapt their essential waste management services and measure AFD's potential in terms of supporting their projects.

[1] World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050".

A resident waste recycling waste at the Happyland slum, Tondo district, Philippines.
Credit: Ezra Acayan.

Operational context

STRATEGY

AFD's operations in the Solid Waste Management (SWM) sector are part of an overall strategy driven by the commitment to developing activities that are 100% Paris Agreement and 100% Social Link. Furthermore, AFD's waste activities support territorial and ecological transitions in the countries it assists.

THE FIVE COMMITMENTS OF AFD'S STRATEGIC ORIENTATION PLAN (POS)

1. **Become the first "100% Paris Agreement" development institution,** with 100% of its financing contributing to low-carbon and resilient development trajectories.
2. **Ensure that its activity is "100% Social Link"** with actions that contribute to the fight against inequality and strengthen the social link.
3. **Promote "3D" development thinking:** strengthening coordination between actors in diplomacy, defense and development in the context of crisis and fragile areas, particularly the Sahel and the Levant, provides more effective support for peacebuilding.
4. **"Non-sovereign first":** give priority to non-sovereign financial solutions and allow the involvement of local non-State and private sector actors working closely on the ground.
5. **"Partnership by design":** Adopt a partnership-based approach to bring about innovative solutions, pool human and financial resources and increase the influence of France and Europe.

Under its Strategic Orientation Plan, AFD aims to support six major transitions through its operations:

- Demographic and social
- Energy
- Territorial and ecological
- Digital and technological
- Economic and financial
- Political and civic.

AFD's climate ambition is to be a development bank 100% compatible with the Paris Agreement.

AFD'S STRATEGY FOR THE TERRITORIAL AND ECOLOGICAL TRANSITION

The "territory" as the relevant level for analysis and operations

AFD's strategy to support the territorial and ecological transition is based on an understanding of territories as being not only geographical entities, but also political, economic and cultural entities. Supporting the "transition" of territories means analyzing the strengths and weaknesses of a territory on a case-by-case basis in order to:

- Improve living conditions for all and promote social cohesion: equal access to essential services and "quality of cities"
- Promote the connectivity and attractiveness of territories: secondary cities, transport infrastructure and structuring of agriculture and agri-food sectors
- Promote resilience: sustainable agricultural production methods, fight against the degradation of ecosystems and promote biodiversity, reduction of the ecological footprint of cities.

€543 M committed for SWM in developing countries

31 countries of operation and **4** French overseas departments

18 projects and studies completed **32** ongoing, **12** under preparation

€10.5 M the average amount of sovereign loans

Average duration of waste projects: **5 years**

KEY FIGURES

PROJECT FINANCING

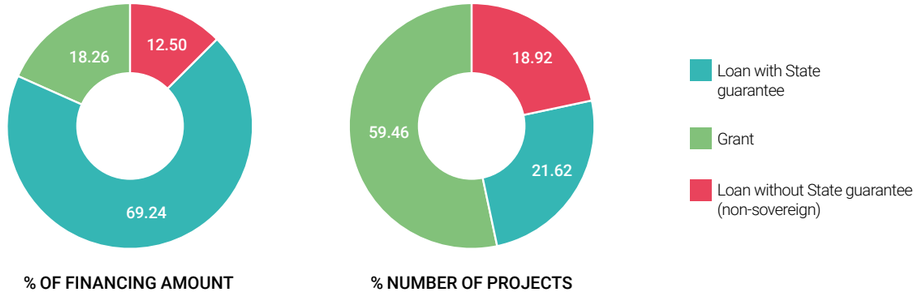


Figure 1: Breakdown of the type of AFD financing allocated to waste projects. Source: AFD, 2021

AFD mobilizes various financing tools for the preparation and implementation of SWM projects.

Various facilities can finance project feasibility studies and technical assistance depending on the type of project and geographical area: the Project Start-up, Preparation and Monitoring Facility (FAPS), the Study and Capacity Building Fund (FERC), the CICLIA Fund (Cities and Climate in Sub-Saharan Africa), UPFI (Urban Projects Finance Initiative), LAIF-CAF (Latin America Investment Facility-Corporación Andina de Fomento), and CDIA (Cities Development Initiative for Asia), and Fund for Technical Expertise and Experience Transfers (FEXTE) are all instruments that can sometimes support project appraisals.

The project itself can be financed by a sovereign loan (State guarantee), non-sovereign loan (without a State guarantee) or a grant (cooperation fund, delegated fund, etc.).

For more information about AFD's project financing tools, please visit AFD's website, "Finance Projects" section (https://www.afd.fr/en/finance-projects).

Figure 2: Exponential increase in projects for waste management. Source: AFD, 2021

KEY FIGURES

PROJECT ACTIVITIES

The project components are adapted to the geographical area of operation, the local context and the financing allocated. The activities AFD supports include:

ORGANIZATION OF THE SECTOR		
Pre-collection Mobilization of NGOs to support the informal sector's activities	**Collection** Work with municipalities on the issue of routes	**Equipment** Purchase of trucks, bins…

DESIGN, IMPROVEMENT AND CONSTRUCTION OF INFRASTRUCTURE			
Voluntary drop-off points	**Creation or expansion of landfills**	**Securing and rehabilitation of dumps**	**Recycling unit**
Transfer stations		**Sorting unit**	**Composting unit**

CAPACITY BUILDING	
Vocational training given by AFD or external organizations to ensure the sustainability of projects	**Social support** for informal operators to safeguard their incomes and for their transition towards formalized jobs
Technical assistance provided by consultants during and after the project	
Awareness-raising based on the importance of waste sorting and reducing waste at source	**Financing model** by developing appropriate, achievable and sustainable financial and tax plans

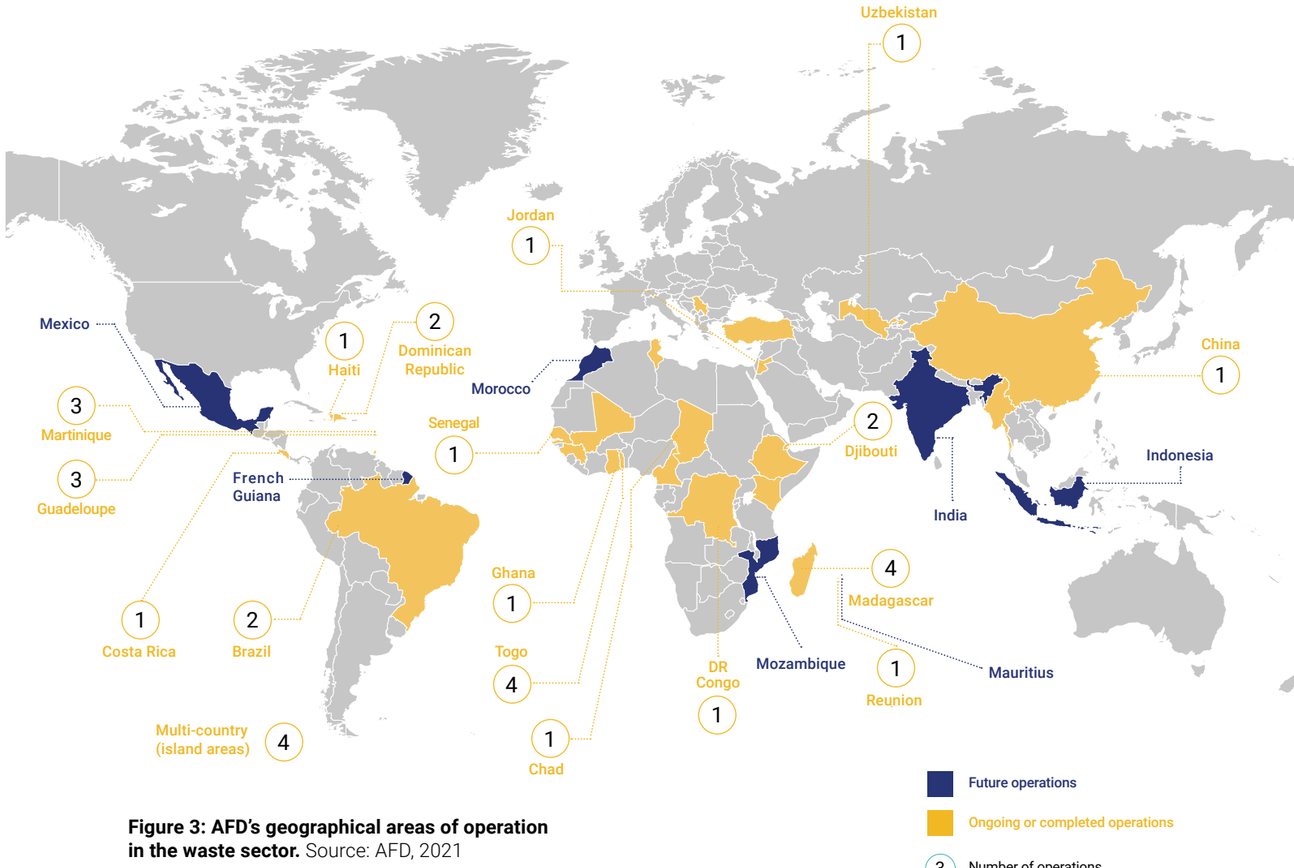


Figure 3: AFD's geographical areas of operation in the waste sector. Source: AFD, 2021

PROJECTED IMPACTS

21 million
people with an improved quality of life through a reduction in disturbances, including **11 million** through improved access to waste management services

10,000 informal workers
whose income-generating activities have been supported

310 structures
benefiting from capacity building

480 beneficiaries
of vocational and technical training

at least
790,000
$TeqCO_2$ avoided
each year

[2] Unit to compare the global warming potential of various GHGs and aggregate the emissions. It has been developed by the IPCC.

Exponential increase in waste tonnage around the world

During the 20th century, the quantities of solid waste generated around the world multiplied by a thousand and the current production is projected to increase by a further 70% by 2050. Proportionally, low-income countries produce less waste than high-income countries (0.2-0.4 kilograms per person per day, against 0.8-1.6 kilograms). Yet the growth of the middle class and adoption of new consumption patterns, combined with strong population growth, particularly in Sub-Saharan Africa and South Asia, explain why the **total quantity of waste produced in countries with a low gross domestic product (GDP) is expected to increase by more than three times by 2050**. Access to solid waste management services remains very limited in many countries where less than half of the waste produced is collected[3] and 93% is not treated in suitable facilities.[4]

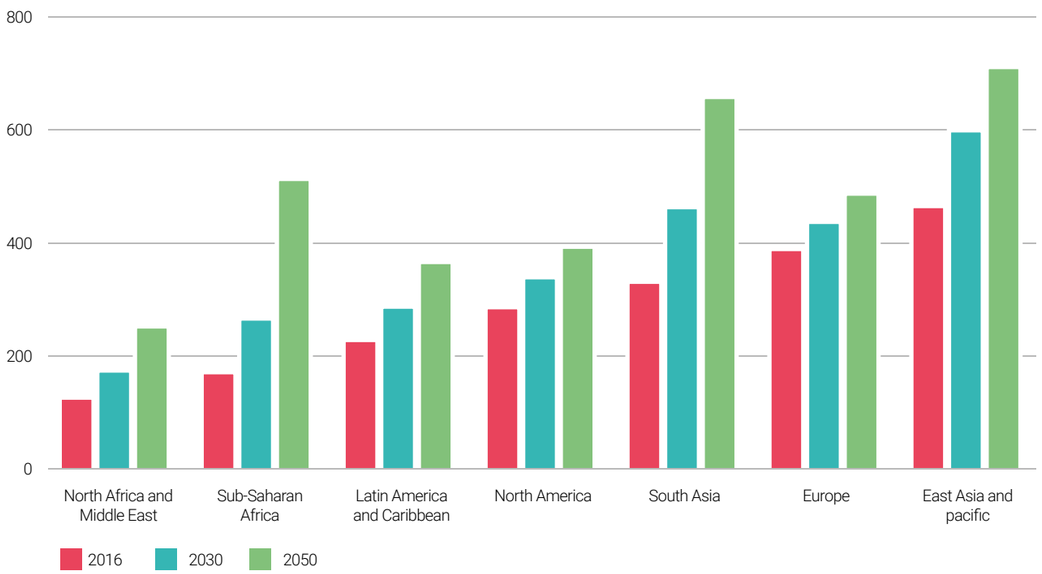


Figure 4: Projected global waste production, in millions of tons/year.
Source: World Bank, 2018

By 2050, waste production will triple in AFD's countries of operation

93%
of waste there is not treated appropriately

[3] 39% in Least Developed Countries (LDCs), 51% in Lower Middle-Income Countries (LMICs). World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050" (the "current" data refer to data evaluated in 2016).
[4] World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050" (the "current" data refer to data evaluated in 2016).

Adapting operations to the level of structuring of the sector and means available

The treatment methods between developed countries and developing countries are often different. Each territory must design its own model. Indeed, **there are many waste management routes** and just as many associated treatment methods. Rather than seeking a single one-size-fits-all solution, the best solution is to put together several complementary outlets.[5] The choice depends on the local context, the technical and financial capacity and the interest shown by the local and central political authorities. But this choice must also be based on technical aspects and particularly an **extensive and representative characterization of the sources of waste produced and to manage**.

It is essential to **know the type of waste produced, its flows and quantity at a given moment and anticipated over a certain period, as well as where it is produced, in order to define the most appropriate treatment methods and the scale of the equipment depending on the objectives set**. Generally speaking, countries where people have a low purchasing power will produce more organic waste from the food or agriculture sector. In middle-income, emerging and developed countries, where per capita income is increasing, food consumption is becoming more processed with more packaging. The share of the budget devoted to food will decrease and go towards hygiene products, equipment and non-essential goods, which are also a source of non-organic waste. In addition, higher GDP in a country means a lower share of food in the household budget and the production of more non-organic waste.

The financial capacity of municipalities also has an impact on the **amounts allocated to the operation and maintenance of treatment centers and facilities**. This needs to be taken into account when the sector is designed. While AFD assists with the implementation of facilities and treatment, local authorities must be able to finance their operation and maintenance commensurate with the needs, otherwise the facilities would not be sustainable.

To assess the performance of cities in terms of the management of their solid waste, municipalities can use the "Waste Wise Cities" tool developed by UN-Habitat in 2020. Further information is available on its website (https://unhabitat.org/waste-wise-cities).

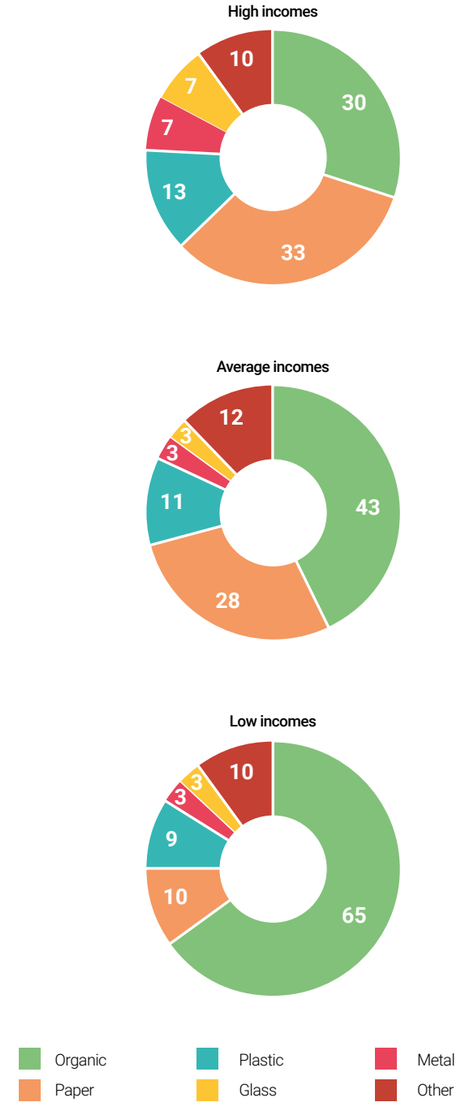


Figure 5: Average composition of household solid waste generated depending on the level of household income.
Source: UNEP, 2011

[5] Technical Reports n° 54. AFD (June 2019), "Diverting Solid Waste Socio-technical Innovations in Cities of the Global South".

Lộc Thủy waste treatment center. Lăng Cô, Vietnam.
Credit: Laurent Weyl/Collectif Argos

PART 1

Overall organization of the **solid waste management** sector

The notion of Household and Assimilated Waste (HAW)

There are many waste management routes and their adaptability varies depending on the types of waste (hazardous or non-hazardous, organic, inert, etc.), its origin (households, shops and industries) and the local situation (technical, financial and institutional capacity). Each territory must design their own model. AFD focuses its operations on household and assimilated solid waste, whose management requires moderate technical skills which have major positive impacts on the environment, climate and quality of life.

The notion of Household and Assimilated Waste[6] (HAW) includes household waste and "assimilated" waste generated by small traders, shops and administrations and collected under the same conditions as household waste. The public service is responsible for the management of HAW (municipality, inter-municipality or State), in contrast to other waste from economic activities (industrial, agricultural, from construction, etc.) whose management generally remains the responsibility of its producer.

The term HAW is commonly used in Western societies to refer to the **public management sector which is organized in municipalities**. However, it is important to develop a sector adapted to the local context, without seeking to simply reproduce a solid waste management model set up in a country in the North.

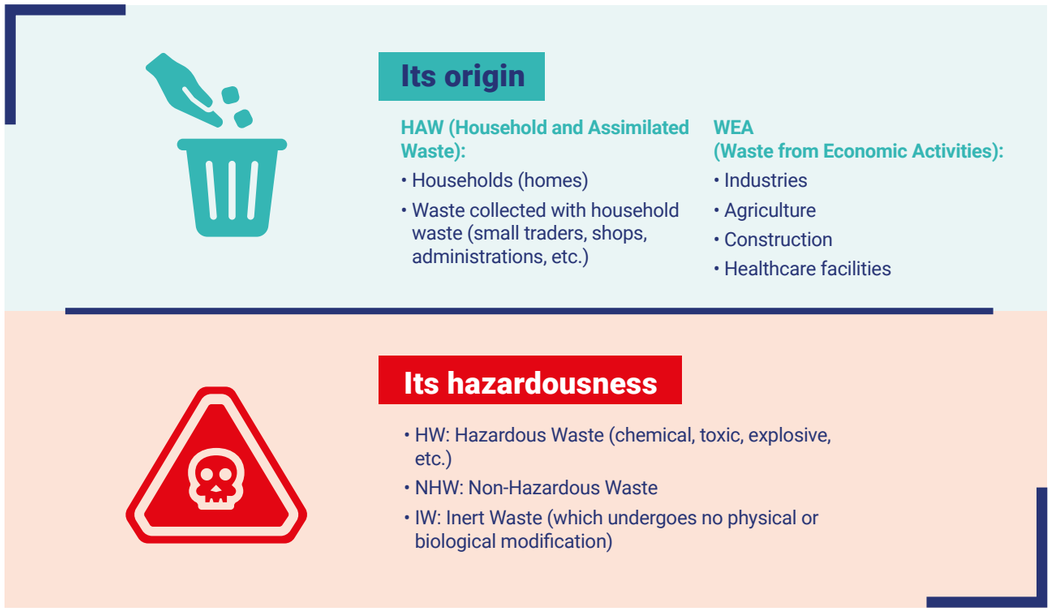


Figure 6: The different waste classifications.
Source: AFD, 2021

[6] Throughout the document, the use of the term "waste" refers to Household and Assimilated Waste (HAW) unless otherwise mentioned.

ZOOM ON…

Reducing waste at source in developing countries

The objective of reducing waste at source is to reduce the quantity of waste generated and its toxicity for health and the environment, before it is even created. It is the preliminary stage in all waste treatment systems and is becoming a necessity in order to address issues such as the increase in the tonnage of waste generated, the toxic discharges it causes and the growing scarcity of natural resources. Preventing the creation of waste means **reducing the costs and negative externalities** related to the collection, transport and treatment and preserving resources to limit their disposal after use.

Programs to reduce waste at source include the following components:

- A **change in consumption patterns/production/transformation** of waste producers (households, traders and industries) encouraged by awareness-raising and communication actions related to the prevention of waste production
- The existence of tough regulations to promote a reduction in waste production and bring about changes in production/consumption (*e.g.*: ban on the use of single-use plastics)
- The introduction of public policies which aim to reduce the volume of waste produced, such as Extended Producer Responsibility (EPR),[7] can also have an impact on the quantity of waste and diversity of materials produced.

The scenarios describe an unprecedented growth in waste in developing countries in the coming decades, at a time when a number of municipalities are unable to manage the current tonnage. **Reduction and prevention are therefore major issues** in these countries and in the long term will reduce the environmental, social and climate impact of waste. In the medium term, they will also considerably reduce the expenditure charged to essential waste management services.

To address urgent situations, decision-makers in developing countries often **focus on short-term solutions**, when the benefits of programs for waste reduction at source and prevention, which incur immediate financing, can begin to emerge in the medium/long term. The integration of policies to reduce waste at source, the first link in the chain, is a major issue in terms of ultimately properly managing the quantities of waste in a territory.

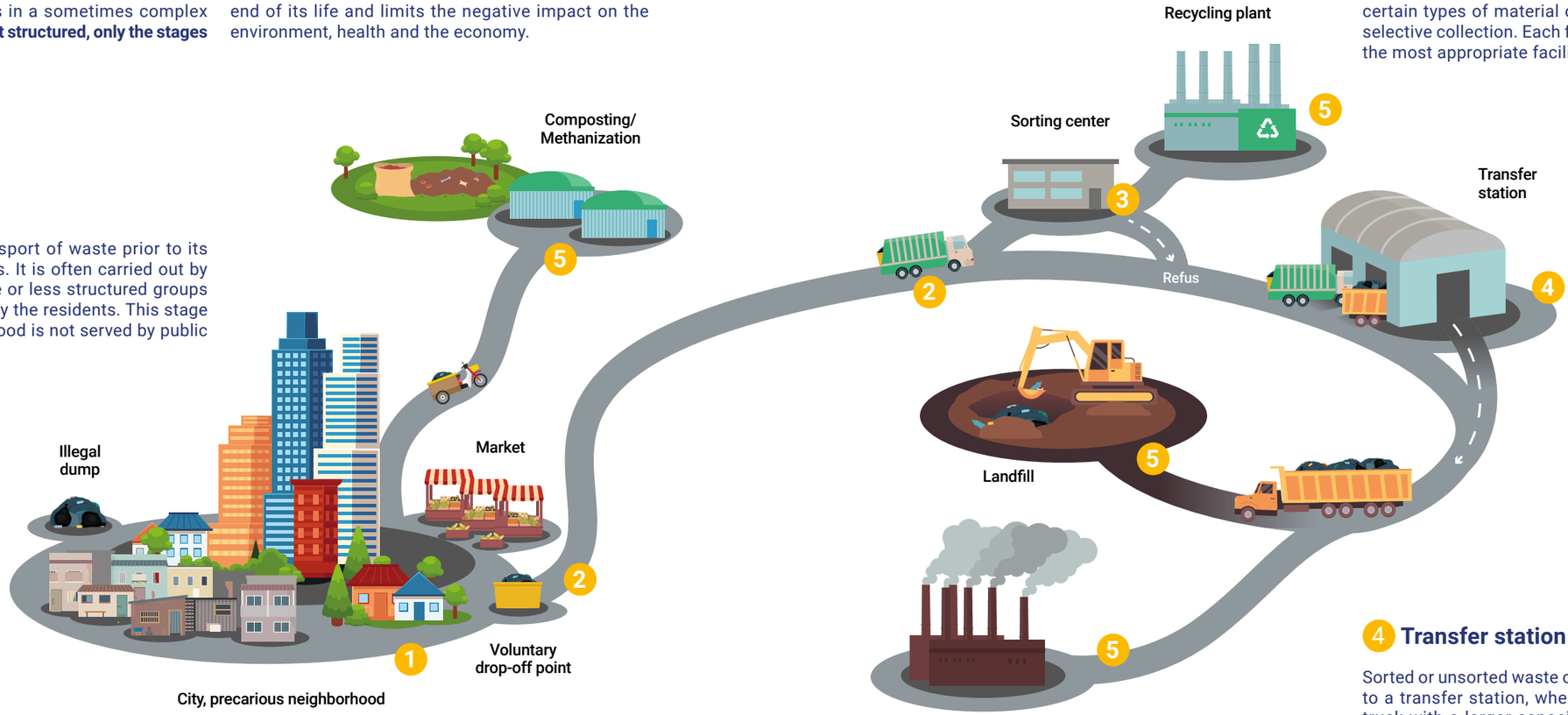
Figure 7: Garbage put on the street in Hyderabad. Andhra Pradesh, India. Credit: Didier Gentilhomme/AFD

[7] Extended Producer Responsibility is based on the polluter-pays principle. It is a system organized by sector, recognizing that the producer of a good is responsible for it, from its marketing to its transition to the status of waste and its disposal. They must collectively organize and finance the management of their end-of-life waste.

ZOOM ON…

Scheme of a structured solid waste management sector

In AFD's countries of operation, an optimized solid waste management structure is made up of several stages, from the handling of waste to its processing or disposal: pre-collection, collection, pretreatment, transfer and treatment are all links in a sometimes complex chain. **When the sector is not structured, only the stages for pre-collection, collection and the transport to a landfill are handled.** When there is no end outlet, illegal dumps proliferate, often in and around cities. An efficient waste management service handles waste until the end of its life and limits the negative impact on the environment, health and the economy.



1 Pre-collection

It corresponds to the transport of waste prior to its handling by public services. It is often carried out by informal operators in more or less structured groups and remunerated directly by the residents. This stage exists when the neighborhood is not served by public waste collection services.

2 Collection

It starts when refuse is collected by public services, generally door-to-door or in voluntary drop-off centers. A selective collection to separate the different types of recyclable waste can be set up, door-to-door or in voluntary drop-off centers.

3 Pretreatment

This stage takes place when there are one or several recycling or recovery routes. A sorting center separates certain types of material or sorts the flows from the selective collection. Each flow will subsequently go to the most appropriate facility for its treatment.

4 Transfer station

Sorted or unsorted waste can be taken by small trucks to a transfer station, where it will be emptied into a truck with a larger capacity. This truck will take the waste to a final treatment outlet, while optimizing its transport.

5 Treatment

The objective is to dispose of the waste. The material is transformed and recovered through recycling or composting. Landfill or incineration dispose of the material in a controlled way. A number of waste-to-energy technologies are now available, but the facilities are costly and require specialized technical skills.

Figure 8: Summary of waste sector logistics. Source: AFD, 2021

1

Pre-collection: a vehicle for recycling and social integration

Figure 9: Pre-collectors carrying waste to the voluntary drop-off point, Djibouti.
Credit: Yonas Tadesse/AFD

In many cities in the South, the population has limited access to a public waste management service. Pre-collection provides a parallel, alternative and generally informal service which makes it possible to adapt to the uncontrolled development of cities and especially meets the needs of poor people.

Pre-collection covers the first part of operations to take waste from the place where it is produced to the place where it is handled, which can be a consolidation point or a transfer station.

This is a particularly important stage in developing countries where municipal services collect a large part of the waste at formal or spontaneous consolidation points and not door-to-door. These places consolidate the waste in a neighborhood or street. Most often it is the communities themselves which continue to spontaneously transport the waste to these sites: households, vulnerable residents in the neighborhood who find a means of livelihood from it and are part of the informal network, local microenterprises or residents' associations.

This mode of operation is particularly suitable for neighborhoods that are not easy to access for dump trucks and generally optimizes manual sorting. The pre-collectors sell some waste which has added value. These practices are conducive to a circular economy system and are a major vehicle for social integration between communities and operators in the sector.

20 million people around the world made their livelihoods from informal recycling in 2018

2

Transport of waste: collection, a link that depends on the type of territory

Collection is an essential link in the waste management process. **Collection is defined as any operation to pick up and consolidate waste in order to transport it to a treatment facility**. Upstream it is conditioned by the spatial organization of municipalities and downstream by the treatment method.

Collection methods can be organized in many ways. Several parameters can vary: frequency of collection, choice of containers, modes of transport (compactor trucks, animal-drawn carts or handcarts…) and the collection process. These parameters are conditioned by the local characteristics: production rate, density and composition of the waste to be collected, dispersal of production sites, practicability of the modes of transport (quality of roads, availability of mechanical skills…), distance from the treatment sites, local technical, financial and institutional capacity.

There can be several types of collection. Solid waste can be collected "loose" (just collection without separating the material) or "selectively" (waste separated based on its type and final destination). Selective collection is carried out directly by households and is then subject to differentiated collection. It makes it possible to separate the waste depending on its potential as organic or non-organic recyclable material and obtain sorted waste with a higher resale value. It can subsequently qualify for recycling, energy recovery or specific treatment through the appropriate treatment channel. Selective collection is the first stage in rational waste management, which makes it easier to direct the waste towards recycling channels.

In most developing countries, selective collection is poorly developed as the associated costs are often higher than the costs of the collection in place and there are no recycling channels.

Figure 10: Refuse collection in Colombo, Sri Lanka.
Credit: Didier Gentilhomme/AFD

3

Pretreatment: What place for recycling?

With the increased recycling targets, pretreatment involves maximizing the separation of recoverable and recyclable material. It allows a second sorting that would be too complicated at source: separate different types of plastic, separate colored and clear glass, dismantle the various materials of certain electronic components…[8]

THE PLACE OF SORTING IN THE WASTE MANAGEMENT SECTOR

Recycling has several advantages:

- It promotes the **direct reintroduction of materials into the production cycle** they come from, fully or partially replacing a new raw material
- It enables a **different treatment of organic waste**, which decomposes rapidly and the material obtained can be recovered as an amendment
- It **reduces the quantity of final waste** that needs to be disposed of, which optimizes waste transport and extends the life of storage centers.

The sorting can be carried out at various levels in the chain. Households can sort their waste themselves to separate the recoverable fractions which will be collected door-to-door, or take it to voluntary drop-off points. The sorting centers can then also carry out sorting prior to the collection. It generally involves manual or mechanized sorting units which have been installed. The sorted waste is then transported to the outlets the most suited to its type. This process reduces the tonnage that needs to be transported and treated. It also increases the recovery rate for recyclable or reusable materials, as the materials leaving the center are cleaner and of better quality. In this case, it is no longer referred to as a transfer station but as a sorting center.

Figure 11: Cycléa manual sorting center, Réunion.
Credit: Pierre Marchal/Anakaopress

[8] ADEME (2018), "Pretreatment, Often Essential for Waste Recovery".

RECYCLING: DIFFICULT TO CLOSE THE LOOP

While recycling appears to be very much a win-win solution in terms of extending the lifespan of materials and reducing waste, it remains difficult to implement in areas where sorting at the source and upstream collection are not well structured. In terms of sorting at the source, raising the awareness of the population is a determining factor. There needs to be an entity able to recycle the materials. They are often industries that directly reuse raw materials. There must also be a sufficient tonnage of recyclable waste so that these industries make the effort to develop recycling processes, which are often costly and energy-intensive.

Setting up a recycling platform requires **substantial investments and operating/maintenance costs, specific technical skills and there is no guarantee it will be profitable**. It is for these reasons that recycling processes are generally preferred in areas of operation where the waste sector is already well established.

4%

Average rate of recycled or composted solid waste in low-income countries

In low-income countries, the rate of recycled or composted solid waste hardly reaches 4% of the mass produced, against over a third in high-income countries. **A large number of informal workers are involved in the recovery and resale of recyclable material** (PET, PVC and PE plastics, ferrous and non-ferrous metals, carboard and glass) and are the main operators in recycling.[9] This sector is often structured as an informal resale chain, but it does contribute to improving waste management in a territory. It also avoids sending a substantial volume of recoverable waste to landfill.

ZOOM ON…

Waste prevention a priority

"The best waste is the waste we don't produce!"

All waste management policies should draw on this saying. **The primary objective must be to prevent and reduce the production and harmfulness of waste**, in particular by taking action on the design, manufacturing and distribution of substances and products and promoting their reuse. Waste prevention, which reduces the use of resources, is a major focus of the circular economy.

After prevention, a "hierarchy of waste treatment methods" directive at the European and national level aims to promote the transition towards a circular economy, *i.e.*:

- The preparation of waste for its reuse
- The recycling and recovery of organic waste by returning it to the soil
- Any other recovery, in particular energy recovery
- Disposal (landfill or incineration without energy recovery).

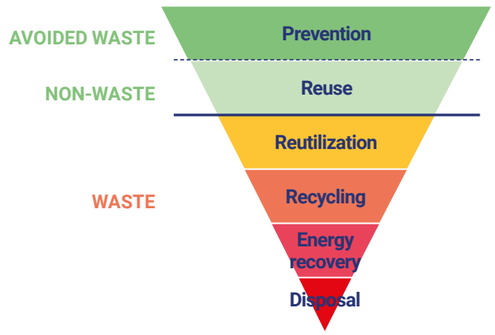


Figure 12: The hierarchy of waste treatment methods. Source: Zero Waste France

[9] World Bank (2018), "What a Waste 2.0" (the "current" data refer to data evaluated in 2016).

Figure 13: Recycling point in the Aracapé neighborhood. Fortaleza, Brazil. Credit: Jorge Cardoso/AFD

ZOOM ON…

The circular economy

ADEME defines the circular economy as "An economic system of trade and production which, at all stages of the life cycle of products (goods and services), aims to **increase the efficiency of resource use and reduce environmental impact while enhancing the well-being of individuals**."[10]

The objective of the circular economy is to save resources as much as possible by delaying the moment when the waste will be generated as much as possible and, when this happens, ensure that this waste is recycled. In opposition to the linear economic model – "produce, consume, throw away" –, the circular economy aims to establish a logic of cycles similar to a natural environment. The model is based on three areas of action and seven pillars (see Figure 14).

A recent European Commission report finds that the circular transition will be a source of economic growth in Africa (+ 2.2% by 2030 compared to the growth projection still based on the current model) through the creation of new markets and jobs (11 million new jobs), and the diversification of the activity. **The increase in GDP will also drive a reduction in GHG emissions** through R&D (Research & Development) and new technologies, while fueling the economies of countries and reducing their dependence on imports.[11]

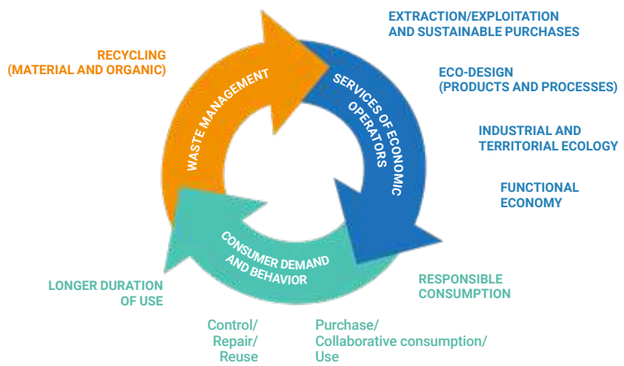


Figure 14: The pillars of the circular economy. Credit: ADEME

[10] ADEME (2013), Technical Sheet "Circular Economy: Notions".
[11] European Commission (2021) "Circular Economy in the Africa-EU Cooperation, Continental Report".

4 Logistics of transfer stations

Depending on local contexts, the transfer to treatment centers may be made directly by dump trucks responsible for refuse collection. But in a number of cases, the transfer is made indirectly due to transport costs. Indeed, the treatment center is generally far from the waste production areas and the collection vehicles are not suitable for transporting waste over long distances.

Transfer stations are sometimes installed close to cities in order to optimize waste transport and reduce transport costs. The waste transits through them for a variable duration which must not exceed a maximum of 12 to 24 hours to limit issues of odors from the fermentation of the collected waste. It is a transition stage between the collection and final disposal of waste which optimizes the transport with the use of fully loaded heavy goods vehicles.

Some **"sorting and transfer stations"** are designed to carry out upstream sorting. The waste is often sorted based on its source (households, traders, restaurants, administrations…). It is dumped into separate bins or manual sorting units installed at the entrance of the center, which facilitates its transfer to the treatment site.

Upstream separation **reduces the mass of waste** transported to the final treatment site. This **reduces the cost of waste transport and extends the life of storage facilities**. However, it is necessary to check the consistency between the sorting activities and the presence of a material recycling market nearby.

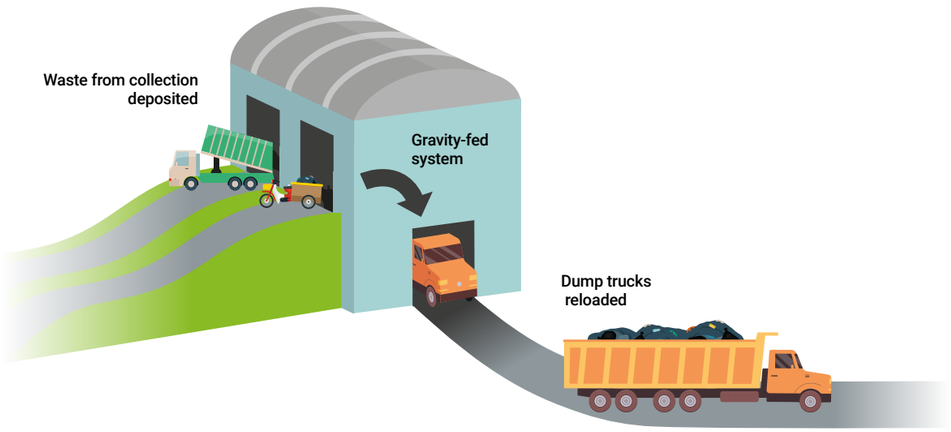


Figure 15: Logistics of transfer stations
Source: AFD, 2021

5

Waste treatment often used

LANDFILLS AS AN EMERGENCY RESPONSE

According to data provided by the World Bank, a third of waste in the world is dumped in open-air landfills. **Waste storage in dumps is the most common solid waste "treatment" method in developing countries.** However, when the dumps are not controlled, they have harmful effects and cause problems in terms of hygiene and major harm to environmental and social well-being.

Solid waste treatment through landfills, with or without prior recovery of the material, is often **the preferred option before a subsequent development towards more complex and industrialized treatment methods**.

Landfills are designed to **store non-recyclable final waste in optimal safety, environmental, social, climate and biodiversity protection conditions**. The different equipment at the landfills protects and preserves the soil and groundwater. Indeed, a landfill comprises impermeable cells which prevent leachate infiltration[12] (residual liquid from the percolation of rainwater through waste) in the soil and collection systems to recover and treat this leachate. The management of operations at a landfill must aim to reduce the contact between the waste and rainwater or surface water. It must also control the type of incoming waste, prevent light materials from being blown away around the sites, treat the odors from the degradation of organic waste and reduce the risk of spontaneous combustion (or explosion) from the mixture of methane and oxygen inside the waste mass. **The control and capture of biogas are two of the major aspects of an appropriate management of landfilled waste**. Biogas can be a source of energy by being recovered in the form of electricity, heat and biofuel. It should be noted that the potential for recovery is still largely untapped in developing countries due to the complexity of the facilities required and the associated costs. Biogas capture reduces odor nuisance and its treatment through burning or recovery has an effect on controlling GHGs.

1/3 of waste in the world is dumped in dumps with little or no control

The treatment method through landfill storage provides a waste management system from the collection to the disposal. Despite the performance of the sorting/recycling facilities, there will inevitably be final waste that cannot be recycled: certain plastics, industrial waste, incineration residue and construction waste do not qualify for recycling and must be disposed of. Landfills therefore provide local authorities with a single treatment method that removes waste from living areas while respecting strict environmental standards.

ZOOM ON…

Biogas

Biogas is a **combustible gas, a mixture of carbon dioxide and methane**, which is produced by the anaerobic degradation of organic, plant or animal matter. It is a carbonaceous gas, with 45-60% composed of methane (which, according to the IPCC, is about 28 times more warming than carbon dioxide) and 25-45% of carbon dioxide.

Its destruction by flaring reduces GHG emissions into the atmosphere caused by biogas by up to nearly 95%. As it has a high calorific value, **it is often interesting to be able to convert this gas into electrical or thermal energy** or into biofuel.

[12] Leachate: liquids produced under the combined action of rainwater and the fermentation of landfilled waste, or from the release, under certain conditions of compaction and degradation, of the wet portion that certain types of waste are naturally composed of. Its precise composition is directly dependent on the quality of the waste and storage conditions (humidity...). It does however contain pollutants from nitrogen (ammoniac, NH4), carbon (organic waste, COD (chemical oxygen demand)) and heavy metals.

Figure 16: Installation of the waterproof tarpaulin on the new cell at the Lộc Thủy landfill. Lăng Cô, Vietnam.
Credit: Laurent Weyl/Collectif Argos

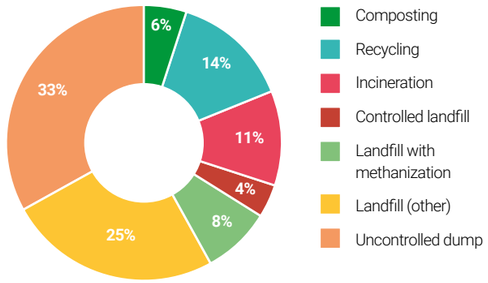


Figure 17: What happens to the waste collected in the world?
Source: World Bank, 2018

AFD'S ACTIONS

Landfill design

The procedures related to the design of a landfill, from the political decision to create it to the opening of the site, require a number of mandatory procedures. They include technical, environmental and social studies, obtaining the building and operating permits and the procedures for public procurement and the selection of service providers (studies, construction and operation). **It takes an average of four to seven years to open a new landfill.** For example, AFD has financed improvements to the waste management system in the center and south areas of the Gaza Strip. The project, which was allocated in 2013, was subject to major constraints. It was only able to start in 2016 and was commissioned in 2019.

Designing a landfill that meets acceptable environmental standards requires:

- Defining the perimeter of the region concerned by the project
- Assessing the quality and quantity of the waste to manage throughout the life of the site
- Ensuring that the site selected is suited to this type of infrastructure:
  - Technically: an available surface area sufficient to ensure a lifetime of ten to twenty years at the minimum; a compatible geology and hydrology – soft ground with low permeability, site above the level of the highest groundwater or surface water, away from any fault zone; a suitable morphology with natural gentle slopes; away from any airport catchment area;
  - Environmentally: away from any listed or protected area, or site of special interest for biodiversity;
  - Socially: minimum distance respected in terms of homes, schools and hospitals, social impacts controlled;
  - Access: presence of an access road suitable for heavy vehicles;
  - Land ownership: ensure the availability and ownership of the site, which must be easy to access from the main urban center of waste production.

In the context of financing this type of infrastructure, AFD must **ensure that it is suited to the type and quantity of waste which will be stored there throughout the total expected lifetime**, and that the land is available and accessible. It must also ensure **the institutional and financial capacity of the partner entity responsible for solid waste in the territory concerned**.

Figure 18: Operation of the Aképé landfill, Togo. Credit: Isabelle Gasquet/AFD

RECOVERY OF BIOWASTE

A landfill waste treatment facility can be completed with other types of infrastructure, in order to treat certain fractions of waste in a more virtuous manner. This is the case with facilities for the treatment and recovery of organic waste through composting or methanization.

Composting, as with recycling, makes it possible to reintroduce material into the production cycle by creating organic amendments, which can be used on farms and urban green spaces. It also reduces the tonnage that needs to be transported then landfilled. It is low-tech and avoids a significant amount of methane emissions.

The main objective of waste treatment through methanization is to recover the biogas produced via the degradation of organic matter by micro-organisms under controlled conditions and in the absence of oxygen. **The biogas is used to produce energy, heat and biofuels.** Methanization may be relevant in areas of operation where the tonnage of organic matter is very high and there are not sufficient outlets on the market for material from composting. This type of infrastructure requires more investments and technology than composting units.

However, **both processes require sorting at the source** which requires a number of facilities for the collection of green waste, as well as awareness-raising actions.

Waste composting and methanization can be applied to all sorted naturally fermenting organic matter:

- Green waste and household garden waste (dead leaves, grass clippings, hedge and bush trimmings, pruning residues, etc.)
- Sludge produced in urban wastewater treatment plants
- Residual household waste following a mechanical-biological sorting which can only be recovered through composting
- Household biowaste and organic waste
- Livestock manure.

Figure 19: Explaining the timetable for the composting and control operations. Gabès, Tunisia.
Credit: Pol Guillard/AFD

ZOOM ON…

Composting

Composting is a biological process which, through bacterial action under aerobic conditions (in the presence of oxygen), allows the accelerated degradation of organic waste (food waste, green waste) to produce a stable amendment rich in humic compounds: compost. This treatment does not generate methane, reduces the use of chemical fertilizer through inputs of organic amendments for agricultural soils and reduces the quantities of waste to transport and dispose of.

This method can be integrated into a multi-scalar approach (housing, neighborhood and city) in order to collect different sources involving multiple stakeholders.[13]

A separate collection of waste from markets or catering and/or farming activities can also be considered.

It is necessary to ensure that there is a quality supply of organic waste (sorting at the source vs. sorting of mixed waste), a constant and sufficient supply of structuring materials (dry materials) and a sufficient area for maturation and storing the finished product.

From an economic perspective, it is important to ensure that there are sufficient outlets near the composting facility.

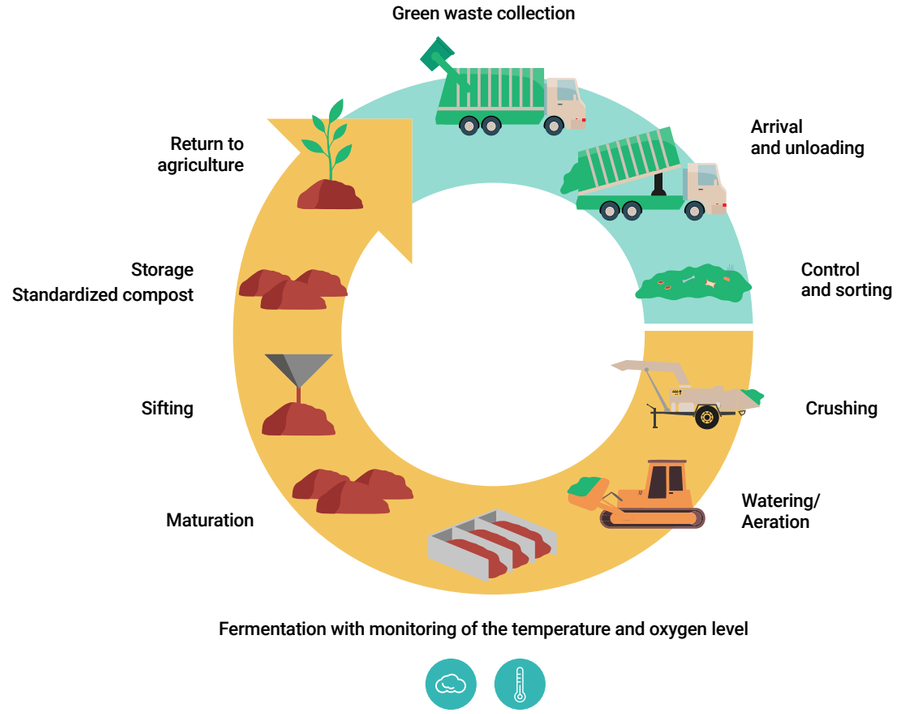


Figure 20: The composting platform. Source: Inter-municipal union for the collection and treatment of household waste (SICTOM)

[13] AFD (2018). "From Waste to the Resource – Recycling of Waste in Cities in the South".

ZOOM ON...

Methanization

Methanization is an anaerobic recovery solution (without the presence of oxygen) that accelerates the natural process for the decomposition of putrescible materials by micro-organisms under controlled conditions (in particular the temperature). It generates partially stabilized organic matter, called digestate, which can be added to the soil directly or after a composting phase. Methanization is also combined with the production of methane-rich biogas which is recovered for energy. Once it has been purified, the biogas can replace natural gas for all its current uses (production of electricity, heat and fuel for vehicles).

Methanization is a process that receives organic waste from selective collection. The process is relatively complex to implement and, like composting, is dependent on the quality of the sorting of the incoming organic waste and the existence of outlets nearby. This process is especially difficult to control because the heterogeneity of the incoming waste is important. It also requires physical infrastructure able to transport the energy produced – biogas and/or electricity – to the beneficiaries.

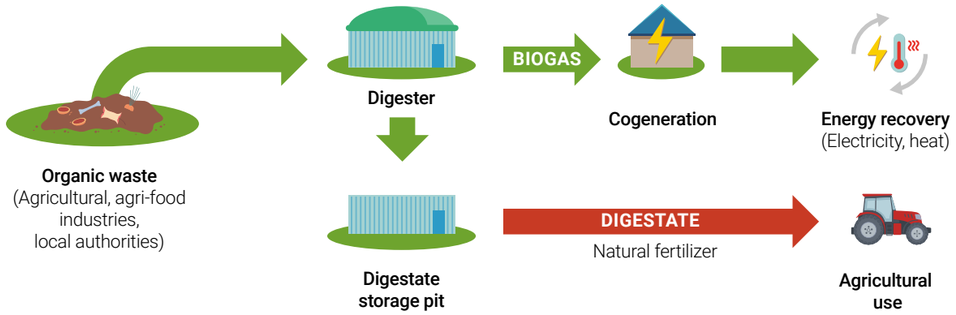


Figure 21: Methanization. Source: AFD, 2021

THERMAL TREATMENT OF SOLID WASTE

The thermal treatment of solid waste, which includes the various types of incineration, is not a priority in solid waste treatment methods as it results in **a loss of reusable or recyclable materials, as well as potential negative externalities on the environment**. Consequently, the incineration facilities depend on the quality and type of waste produced at the source. If they do not have an efficient smoke treatment system, they emit GHGs[14] and often consume a lot of energy for their own operation. However, if this treatment method is completed with a link integrating energy and/or thermal recovery, it has the advantage of **replacing the use of high carbon fossil fuels** with the generation of heat or electricity and considerably reducing the volume of waste to treat.

These techniques, which require high-level expertise, considerable monitoring and appropriate treatment facilities, particularly for smoke, are **extensively used by developed countries but very few exist in low-income countries**. They require a waste combustion with a high calorific potential[15] and a low level of humidity. They are therefore dependent on the quality of the stocks of incoming waste and the quality of the waste produced at the source. Processes that are costly in terms of investment, as well as operation and maintenance, are implemented more in countries in the North than in developing countries. Incineration is suitable for urban megacities in higher income countries where there is strong land pressure. It is estimated that in 2017, 26% of household waste in the European Union was treated by incineration.[16]

[14] GHGs: CO and CO_2, mineral dust, oxides of nitrogen and sulfur (NOx and SOx), heavy metals, dioxins and furans.
[15] Quantity of energy produced by a material during its combustion.
[16] Inter-Environnement Wallonie, Analysis of the Circular Economy (2017): https://www.iew.be/dechets-il-y-a-valorisation-et-valorisation/

ZOOM ON...

Incineration with energy or thermal recovery

Incineration with energy or thermal recovery uses the heat produced during the combustion of waste to generate steam. This steam will then turn an alternator which produces electricity. This energy will be redistributed on the grid. This type of facility has clear benefits in terms of land consumption (smaller footprint than a storage site) and efficiency in waste disposal.

However, the process is highly controversial because of the air emissions it generates and its impact on air quality and the health of people living nearby. The profitability of a waste incineration plant depends on the quantity of energy produced and therefore on the quantity and quality of combustible waste with high calorific value, which results in the incineration of a larger quantity of material. It is not conducive to recycling or the implementation of regulations for the conservation of resources. Incineration requires very strict smoke treatment due to its dangerousness. It also creates residues, either ash (treatment residues from the smoke from the household waste incineration) or bottom ash and slag which are sometimes toxic. They require downstream treatment through landfill, in cement plants or road subbases, depending on their quality.

They are costly facilities in terms of investment and operation. Consequently, incinerator projects must respect a number of important conditions, in particular in terms of the maturity of the sector in the country, the environmental and energy performance of the equipment and the financial and technical capacities of the contracting authority. In France, there are 127 household waste incineration plants.[17]

Pyrolysis

Pyrolysis consists of a thermal treatment by which the waste is heated at a very high temperature through an external heat supply, with little or no oxygen, in an airtight and high-pressure tank. The waste is converted into solid, liquid or gaseous fuels which can be burned to produce energy.

However, the process is quite complex and costly, and is dependent on the quality of the incoming waste and the outlets for the energy produced. This process can be considered as a recovery method, especially for dry waste with high calorific value (in particular plastics).

Figure 22: Energy recovery facility for agro-industrial waste through the pyrolysis process under the Agrovalor project, Côte d'Ivoire.
Credit: Pablo Ramos Roncal/AFD

Waste conversion into solid recovered fuel (SRF)

Solid recovered fuel is fuel prepared using non-hazardous and non-recyclable waste with a low moisture content. The waste is shredded then compressed and subsequently forms pellets, SRF, which have a very high calorific value. SRF is energy-rich, transportable and storable. It is mostly used to fire the kilns of cement plants or other dedicated energy production units, thereby replacing fossil fuels.[18] This is an appropriate solution when waste recycling is not viable as there is no market for the conversion and/or reuse of recycled products and/or there are major energy production needs. The barrier to the development of SRF is economic, as it is necessary to ensure that there is a quality and stable quantity of the supply.

[17] French association for waste management and environmental services companies (FNADE), Waste-to energy.
[18] FNADE (2015). Development of the SRF sector in France, FNADE's position.

Ragpickers collecting scraps of fabric at the Koshe Reppi landfill, Ethiopia.
Credit: Didier Gentilhomme/AFD

PART 2

Development issues related to waste management

An effective sector to ensure the prosperity of inhabitants and economic development

THE IMPACT OF WASTE ON THE HEALTH SITUATION OF LOCAL AUTHORITIES

It is estimated that there are 12.6 million annual global deaths linked to unhealthy environments.[19] **A poor management of waste and wastewater directly contributes to the deterioration of the living environment of citizens.**

The accumulation of waste and its presence in cities can block drains and sewers. This phenomenon disrupts wastewater treatment systems, exacerbates flood risks and provides breeding grounds for mosquitos, which increases the proliferation of diseases such as malaria and lymphatic filariasis. For example, UNEP (United Nations Environment Programme) has defined a correlation between the reproduction of the Aedes aegypti mosquito in South America, which carries the Zika virus, and the presence of artificial habitats created by tyres, boxes and plastic containers.[20]

12.6 million annual global deaths are linked to unhealthy environments

Figure 23: To combat the proliferation of mosquitos in plastic, it is burned every day. Kampong Cham, Cambodia. Credit: Greg Mo/AFD

In the longer term, there are enormous chronic health risks, particularly among children. **Combustible waste, burned in the open air, releases dioxins and particles which increase respiratory and neurological diseases, as well as cancer risks.** Leachate leakage[21] pollutes the soil and groundwater and has a direct impact on the health of neighboring populations who consume its water.

The presence of plastic particles also poses a threat to the health of local populations. As their biodegradability is particularly slow, they affect all the links in the food chain up to humans. There is still little known about the impact on living beings of the dissemination and storage of these particles, but it is likely that there are effects such as the weakening of the immune system, respiratory problems, endocrine disruption, reduced fertility and increased cancer risks.[22]

Sharp objects and syringes also cause **cuts and serious injuries which can transmit fatal diseases such as tetanus.** The ragpickers who go around dumps to collect waste with no protection, as well as children, are the main victims.

[19] WHO (2006, then revised in 2016), "Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks".
[20] UNEP (2016), "Emerging issues of environmental concern".
[21] Leachate: liquids produced under the combined action of rainwater and the fermentation of landfilled waste. Its precise composition is directly dependent on the quality of the waste and storage conditions (humidity...). It does however contain pollutants from nitrogen (ammoniac, NH4), carbon (organic waste, COD) and heavy metals.
[22] Anzivino-Viricel, L., N. Falette, J. Carretier, L. Montestrucq, O. Guye, T. Philip, B. Fervers (2012), "Gestion des déchets ménagers et assimilés : bilan des connaissances et évaluation des effets sanitaires en population générale et au travail".

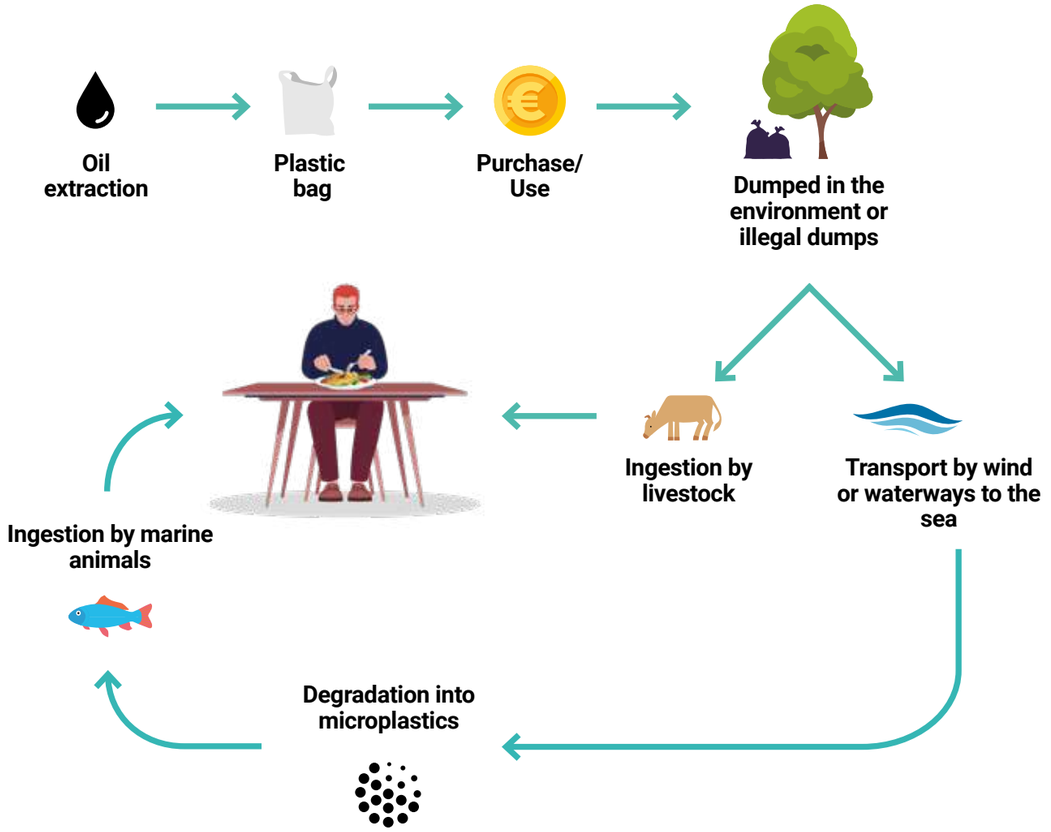


Figure 24: Plastic which integrates the food chain. Source: AFD 2021 (VIL Division)

AFD'S ACTIONS

The cost of not managing waste

Not managing or poorly managing solid waste has direct and indirect consequences on health, the climate and the environment. Various studies and analyses of data collected around the world show that it is sometimes possible to estimate the monetary cost of a total absence of waste management in certain geographical areas or cities.

For example, these costs are based on **the possible consequences of waste-related air, water and soil pollution on the health of people living close to a dump**.

Studies have shown that in Bogotá (Colombia) residents of the Ciudad Bolívar neighborhood, next to the saturated Doña Juana dump, are statistically more prone to certain diseases and respiratory infections: 3.70% of medical consultations in Ciudad Bolívar concerned respiratory diseases (such as nasopharyngitis and bronchiolitis), against only 1.59% in the whole of Bogotá. **By estimating the average cost of medical expenses to treat these patients, it is possible to identify part of the cost of the poor waste management in Bogotá.**

These cost analyses also focus on the economic repercussions of poor waste management on tourism, land value, etc.

The findings vary, but we often see that **the cost of poor waste management for a city or country is of the same order of magnitude as the investments required** for sustainable waste management.

HUMAN AND MATERIAL RISKS RELATED TO WASTE IN CITIES

In many of AFD's countries of operation, we see that waste is often directly thrown into the stormwater drains that run through residential areas. **The accumulation of waste and obstruction of drains expose residents to a major flood risk.** These floods generally cause considerable human and material damage, resulting in costs (houses or informal settlements uninhabitable, essential public services suspended, power cuts, etc.), in addition to the direct risks of drowning and the spread of disease.

The waste is dumped in illegal dumps sometimes located in residential areas and forms mountains that can reach heights of several tens of meters. **There is a major risk of collapse, endangering the surrounding makeshift homes and the lives of the families that live in them.** In 2017, the collapse of Ethiopia's largest uncontrolled dump in Addis Ababa killed 115 people, including children, and injured dozens of people, most from the informal waste management sector and living in precarious neighborhoods next to the dump.[23]

A CLEAN CITY FOR A LIVING ENVIRONMENT CONDUCIVE TO SOCIOECONOMIC DEVELOPMENT

Improving the waste collection rate, along with proper supervision by the public authorities, will considerably reduce the risk to the health and lives of residents. Furthermore, **the city's cleanliness and the efficiency of essential services are prerequisites for the development of a city**. They improve the quality of life of its inhabitants, as well as the territory's attractiveness for the development of economic and tourism activities.

Figure 25: Welcoming ceremony for the Rescue project, which is taking action following the floods in Burenit village, Fiji. Credit: Andrew Murray/AFD

The waste sector involves a range of operators: public, private, independent, major industrial groups, formal and informal. There are many economic activities related to waste management and treatment. They often have quite a low level of mechanization, especially in low-income countries. The informal sector is omnipresent in these countries, in particular in the pre-collection and sorting activities. **Structuring trades in the waste management sector provides a working framework and safety equipment** for workers in this sector, who are on the front line in terms of the health risks caused by waste production.

The inclusion of the private sector in this management is a powerful vehicle for transferring technologies, boosting local economic activity and bringing about organizational improvements which can lead to a higher level of public service performance. To attract the private sector, it is essential to establish a robust regulatory, financial and fiscal framework.

The waste sector creates jobs:[24]

Landfill	Composting	Recycling
= **2.4** jobs/10,000 t of waste/year	= **6.6** jobs/10,000 t of waste/year	= **115** jobs/10,000 t of waste/year

[23] Addis Standard (9 March 2017)
[24] Ribeiro-Broomhead, J., N. Tangri (2021), "Zero Waste and Economic Recovery: The Job Creation Potential of Zero Waste Solutions".

The climate impact of waste and its mitigation potential

EMISSIONS CONTRIBUTE TO GLOBAL WARMING

On a global scale, in 2016, waste caused 1.8 billion TeqCO_2 of emissions.[25] These emissions are expected to reach 2.6 billion TeqCO_2 by 2050.[26] **In Africa, the decomposition and storage of waste accounted for 8.1% of total GHG emissions in 2010**, which is considerably higher than the global average of 3% of GHG emissions from landfills.[27]

While waste management involves GHG emissions, in particular from the energy used (electricity, fuel, natural gas, transport), the treatment processes and the use of goods (buildings, infrastructure, equipment, etc.),[28] **emissions from the sector are still mainly related to the disposal of waste in open landfills** without a gas recovery system and to its open burning.[29] Indeed, in a low-oxygen environment such as a landfill or illegal dump, the decomposition of organic waste, which amounts to an average of almost 56% of the composition of the waste produced in low-income countries,[30] generates biogas. Biogas is mainly composed of methane[31] and carbon dioxide and is **the main source of GHG emissions from the waste sector**.

According to the UNEP "Global Methane Assessment" report[32], **the waste sector is estimated to account for 20% of anthropogenic methane emissions into the atmosphere and to be the third largest sector emitting this gas** after fossil fuels and agriculture.

Figure 26: Toxic smoke spreads at the downtown dump in Koshe Reppi, Ethiopia.
Credit: Didier Gentilhomme/AFD

[25] Institute for Climate Economics (2019), "Key Climate Figures".
[26] World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050".
[27] Couth, R., C. Trois, S. Vaughan-Jones (2011), "Modelling of Greenhouse Gas Emissions from Municipal Solid Waste Disposal in Africa".
[28] Astee (2018), Sectoral Guide on the GHG Emissions of Sanitation Services.
[29] Hausfather (2017), "The World Bank 2018a".
[30] World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050".
[31] The global warming potential (GWP) of methane is 28 times higher than CO_2 over a period of 100 years, the duration generally used (IPCC, 5th Assessment Report, 2014).
[32] https://www.unep.org/news-and-stories/press-release/global-assessment-urgent-steps-must-be-taken-reduce-methane

DRIVERS FOR CLIMATE CHANGE MITIGATION

The main driver for mitigation consists of a controlled management of biogas emissions, which are the main source of GHG emissions. It is essential to capture them, then destroy or recover them in order to massively reduce GHG emissions into the atmosphere. **It is estimated that on landfills, the equipment of the sites captures 85 to 90% of the biogas produced.**

If the quantity and quality of the biogas produced are sufficient, the methane can be recovered and converted into electricity and/or heat. These processes limit the sector's impact on climate change.

The second driver for mitigation aims to reduce CO_2 emissions more or less directly, **by ensuring the material is used more effectively**. The recovery of objects or appliances destined for a new use and the recycling of materials that can be converted into raw materials for industry are both ways of **promoting the circular economy and reducing demand for raw materials**, the extraction of which is energy-intensive and also generates GHG emissions.

Energy recovery from materials due to their calorific value reduces the use of fossil fuels, which also cause CO_2 emissions. Finally, the waste transport item also plays a role in climate mitigation. Optimizing the collection and transport of waste can also reduce GHG emissions. Efforts to improve solid waste management can therefore considerably reduce its impact on the climate, which is why over **80 countries committed to improve their solid waste management systems** *via* their Nationally Determined Contributions (NDCs)[33] during COP21.

Figure 27: Overview of the eThekwini power plant, which recovers the methane formed by the fermentation of waste and uses it to produce electricity. Durban, South Africa.
Credit: Cyril le Tourneur d'Ison/AFD

AFD'S ACTIONS

AFD in tune with the Paris Agreement

AFD was one of the first international donors to integrate the fight against climate change into its practices. AFD Group has committed to ensure that 100% of its financing is in line with the Paris Agreement. It has also set the objective for **an average of 50% of its commitments to have climate co-benefits, through mitigation and/or adaptation**. Depending on the regions, this objective can reach a minimum rate of 70% of AFD's commitments.

Household waste management is a sector where there can be major issues in terms of reducing or avoiding GHG emissions. According to ADEME, the French solid waste recycling sector could avoid the emission of 23 Mt of CO_2 over a year.[34]

In Senegal, the PROMOGED project plans to improve waste management in four regions (Greater Dakar, Saint-Louis, Ziguinchor and Thiès), which initially consisted of dumps with little or no control. This project ultimately plans to create landfills with facilities to capture and eliminate and/or recover biogas and to recover materials. The carbon footprint, which has been calculated using the World Bank's CURB model, assesses the impact of the improvement in solid waste management in these four regions will be a net reduction of emissions of 10.8 million tCO_2e. The reduction in emissions is mainly due to the ban on burning and landfill with little or no control, as well as the creation of landfills equipped with systems for the capture then destruction/recovery of biogas.

[33] Kampala Waste Management (2017).
[34] ADEME (2020), "Waste Key Figures – 2020 Edition".

Minimizing the negative externalities on ecosystems and biodiversity

IMPACT OF WASTE ON THE ENVIRONMENT AND BIODIVERSITY

Poor waste management **affects the quality of air, soil, surface water and groundwater, as well as flora and fauna**. The presence of waste decomposing in the open air disrupts natural ecosystems by concentrating populations of rodents, raptors and birds which feed on it and move closer and closer to the nearby cities. The risks of ingestion and injuries affect the species living in this environment, but also wildlife that crosses the dumps on their migration route.

The leakage of leachates from uncontrolled waste deposits leads to a physical and chemical disturbance of the soil and groundwater they infiltrate and affects biodiversity more or less directly. The deterioration in water quality, in particular due to a reduction in the amount of oxygen available, is conducive to the growth of pests[35] and eutrophication.[36] **The leachates have a very negative impact on the development of plant and animal species**. They damage the roots of certain plants[37] and disrupt certain vital functions of marine flora and fauna. A recent study has shown that the decomposition of waste increases the mortality of the contaminated fish and copepods and disturbances in the growth of sea urchins.[38]

Figure 28: A herd of goats feeding on waste, Senegal. Credit: Clément Tardif/AFD

[35] World Bank (2018), "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050".
[36] Proliferation of plant species in an aquatic environment due to a surplus of nutrients (which can come from waste). This destabilizes the ecosystem and deprives the environment of oxygen by creating a biodiversity deficit.
[37] Sang, N., L. Guangke (2006), "Municipal landfill induces cytogenetic damage in root tips of Hordeum vulgare. Ecotoxicology Environmental Safety".
[38] Gunaalan, K., E. Fabbri, M. Capolupo (2020). "The hidden threat of plastic leachates: A critical review on their impacts on aquatic organisms".

ZOOM ON…

Plastic pollution in marine ecosystems

According to the report of the French Parliament published in December 2020, the analysis of the production of plastics and their final destination between 1950 and 2015 highlights the fact that out of the 8.3 billion tons of plastics produced, 5.8 billion had become waste, *i.e.* almost 70% of the goods produced[39]. This study also finds that 4.6 billion tons of this waste were not sufficiently treated and degrade in the environment. Developing countries are particularly concerned due to their low resilience in terms of this issue. **Five countries are reportedly responsible for over half the plastic waste transported by the oceans: China, Indonesia, Thailand, the Philippines and Vietnam, in a context where the volume of waste generated in the Southeast Asia/Pacific region is projected to double by 2050.**

According to WWF estimates, 8 million tons of plastic waste are discharged into the world's oceans every year. 90% of it is carried by ten rivers, which are mainly located in developing regions (UNEP, 2018).[40] **It is estimated that 80% of marine waste comes from land-based sources**, such as illegal or badly managed dumps, the uncontrolled discharge of stormwater, untreated wastewater, industrial facilities and coastal tourism. The waste can also be transported to oceans by waterways. Beaches and waterways in many countries are consequently strewn with litter. Maritime activities reportedly account for 20% of this pollution, mainly through fishing and fish farming activities, which leave some 640,000 tons of fishing nets in the oceans every year; maritime transport, through the loss of containers and the illegal dumping of plastic waste in the seas; leisure activities; mining and oil exploration and exploitation (French National Assembly, 2020).[41] Marine wildlife is exposed to physical risks (injuries, ulcers, feeling of fullness) and the specific toxicity of plastic (French National Assembly, 2019):[42] **it is estimated that 1.4 million birds and 14,000 mammals are found dead every year due to the ingestion of microplastics**. The Mediterranean Sea is reportedly the most polluted in the world, as it accounts for only 1% of the oceans but concentrates an estimated 7% of microplastics.

There are an increasing number of scientific studies on the impact of this waste on health. Plastics can be a source of contaminants (endocrine disruptors, persistent organic pollutants) through the chemical substances they contain (their plasticizers and additives in particular). In terms of economic impact, the United Nations Environment Programme estimates the annual damage caused to marine environments worldwide at $8 billion. The fishing, tourism and maritime transport sectors are the most affected.

AFD is a member of the Clean Ocean initiative in order to tackle the invasion of plastic in our oceans. This program aims to provide €2 billion of financing for a number of public and private sector projects for the management of solid waste near coasts. The objective is to limit the quantity of waste at risk of going into the oceans. Several such projects are ongoing at AFD, including the Indian Ocean Plastic Expedition (ExPLOI), a project to collect plastic in the Caribbean region implemented by the Organization of Eastern Caribbean States (OECS), and the South Pacific regional initiative through the South Pacific Regional Environment Program (SPREP) (see SPREP project sheet on page 66).

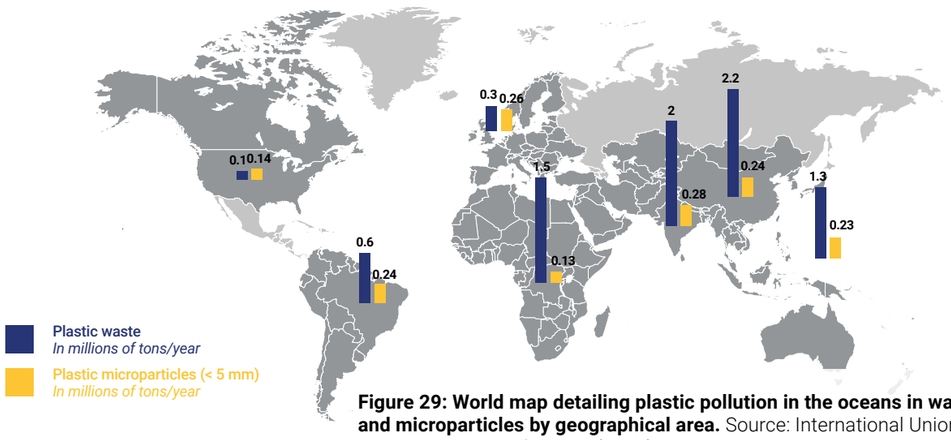


Figure 29: World map detailing plastic pollution in the oceans in waste and microparticles by geographical area. Source: International Union for the Conservation of Nature (IUCN)

[39] French National Assembly (2020), Report "Plastic pollution, a time bomb?", French National Assembly (assemblee-nationale.fr)
[40] UNEP (2018), "Our planet is drowning in plastic pollution" (https://www.unenvironment.org/interactive/beat-plastic-pollution/).
[41] French National Assembly (2020), Report "Plastic pollution, a time bomb?", French National Assembly (assemblee-nationale.fr)
[42] French National Assembly (2019), "Information report on endocrine disruptors in plastic containers".

MITIGATING THE NEGATIVE IMPACTS ON NATURAL ECOSYSTEMS

There are "ecological" landfill sites where biodiversity issues are taken into account and integrated at the design stage. However, **it is extremely difficult to reconcile the socioeconomic issues of low-income countries and an ecological design**, which involves a number of constraints and many costs. **Certain measures can nevertheless minimize the impacts on ecosystems and the environment**, without necessarily completely countering the negative externalities related to waste storage facilities.

The most common actions, which AFD seeks to integrate into its projects when the local context allows it, are the development of wetlands nearby, which can serve as stormwater outlets, filtration basins for the treatment of leachate and water reserves in the event of a fire in the mountain of waste. These wetlands then potentially become a habitat for flora and fauna. They are near the landfill site and serve as a support for local biodiversity. Many bird species, including protected, threatened and endangered species, can settle there when they reproduce or migrate.

These areas also contribute to the conservation[43] and settlement of amphibian species and wild birds, and the planted areas stimulate pollinization at a level that is sometimes similar to the level found in nature reserves.

Figure 30: Bird species living on wetlands created by the construction works for the Aképé landfill, Lomé, Togo.
Credit: JM Aurousseau, SAFEGE, 2021

In some cases, the flora is an integral part of the operation: reeds with phyto-purification properties can be used to filter the leachate. **However, it is impossible to achieve a "neutral" impact with this type of facility**, even in countries with strong technological potential.

8 million tons of plastic end up in the oceans every year

AFD'S ACTIONS

A better integration of biodiversity at the Lomé landfill

AFD's waste projects are often combined with **safeguarding the environment at former dumps**. The land freed up, which is often unfit for human habitation, can be an area to revegetate and favor biodiversity. These uses can influence the form of protection of the former mass of waste (type of covering). Similarly, the types of plants selected must take into account the presence of the waste and a possible shallow protection, so that the roots do not damage these installations.

AFD has been helping the city of Lomé, in Togo, improve its waste management since 2007. After assisting with the structuring of the collection sector, AFD, through the PEUL II project, financed the construction of a first tranche of a landfill site, where the earthwork modified the drainage, creating new wetlands. The various leachate treatment basins are also part of these areas, which are today a biotope, home to many plant and animal species that come there to nest, reproduce and feed. Over 40 bird species were identified in 2019, a year after the landfill opened.

Under PEUL III, which is ongoing, an **eco-pedagogical trail promoting the site's biodiversity will be developed** for visitors and schools. PEUL IV, which is in the appraisal phase, includes a commitment to limit the impact of the extension of the landfill on the recently installed biodiversity via a scheme to extend the wetlands beyond the initial site.

[43] https://www.servirlepublic.fr/2013/08/eteignieres-une-decharge-pour-la-biodiversite/, FedEpl (2013) "Eteignières: A landfill for biodiversity".

The challenges to be met for a sustainable public solid waste management sector

LACK OF PUBLIC FINANCING

The public waste management service has a cost for the local authority. The municipal budget, which is largely based on the financial contribution of citizens, is much harder to consolidate when precarious neighborhoods and populations with limited financial capacities are concerned.

Municipal solid waste management is often one of the main expenditure items of local authorities. It amounts to up to 30% of municipal budgets in Sub-Saharan Africa.[44] Yet the resources allocated in cities in developing countries still fall far short in terms of addressing the issues. While the public waste management service cost French local authorities an average of €89 per capita in 2012 according to ADEME, the city of New Delhi only allocated $7 per capita to it in 2010, and Bamako only $1.[45]

Furthermore, this expenditure is commonly only addressed in terms of the cleanliness of the city. It therefore **focuses on the visible stages of collection and transport to remove the waste from the streets**. Solid waste treatment is often considered as a low priority by public officials, in particular due to the difficulties intrinsic to projects. Indeed, a treatment facility requires land, which is often scarce in urban and periurban areas. This type of facility is unpopular with residents (NIMB: Not in My Backyard syndrome),[46] as the benefits of an efficient disposal are not very visible, unlike the benefits of refuse collection.

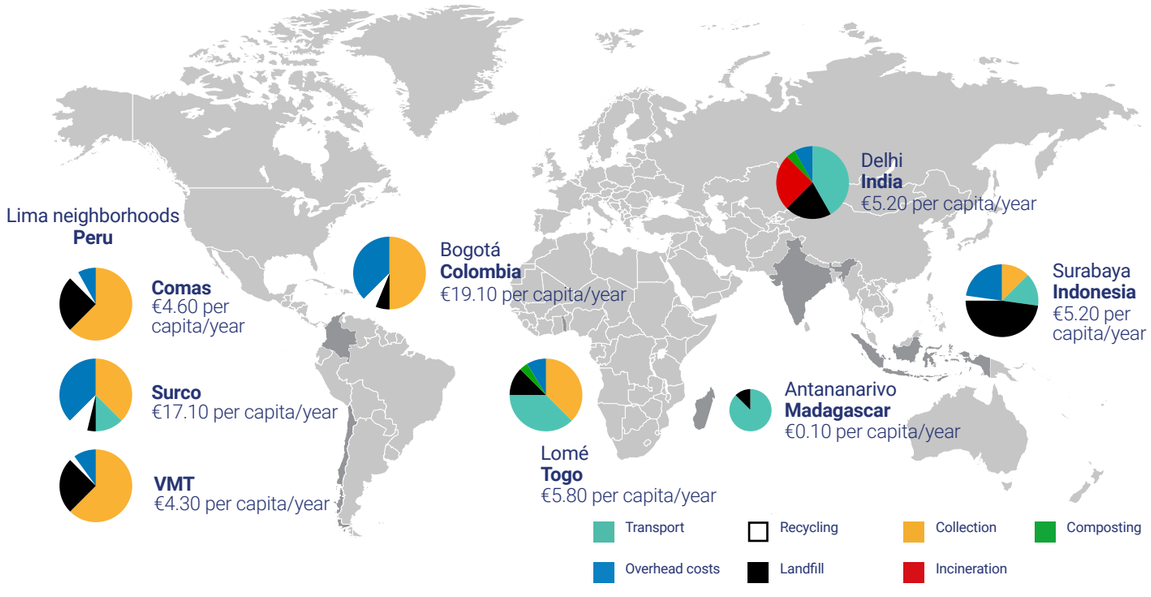


Figure 31: Cost of management per capita and per stage. Source: ORVA2D Municipalities, AFD, 2013-2016

[44] Chalmin, P., C. Gaillochet (2009), "From Waste to Resource – World Waste Survey", Paris, Economica Anthropos.
[45] UN (2010), "Solid Waste Management in the World's Cities: Water and Sanitation in the World's Cities 2010".
[46] Refers to a person who is not hostile to the installation of a facility, but refuses to have it in their immediate surroundings as they could suffer from the negative externalities.

$7 : The cost per capita and per year allocated to waste management in Delhi, against €89 in France

ABSENCE OF A REGULATORY FRAMEWORK AND THE RELATED COMPETENCES

There is often little or no definition of a regulatory framework for solid waste management operations. Very few specific standards (fiscal, social, environmental, technical) exist, which makes improvement initiatives difficult. On the contrary, waste management is regularly governed by a multitude of isolated texts (health, local authority, environment codes…). This results in a complicated coordination which can give rise to contradictions.

The legal vacuum is often more marked concerning the framework for the stages of waste treatment (recovery and disposal). This is due to the priority generally given to the visible stages of the sector (pre-collection, collection, transport).

This absence of a well-defined regulatory framework also results in an **unclear division of competences between the various public institutions:** between the local and national level, but also between the various ministries and agencies concerned at national level. There is also very often a mismatch between the needs for skilled labor and the available supply of workers and vocational and technical training in this field. Solid waste management is rarely a specific section in the internal organization of municipalities and there is hardly ever recourse to specialized external consultants. In a context where there is sometimes no vocational training on the theme of waste, **the technical and organizational capacities remain limited**, which holds back the implementation of effective and sustainable waste management sectors.

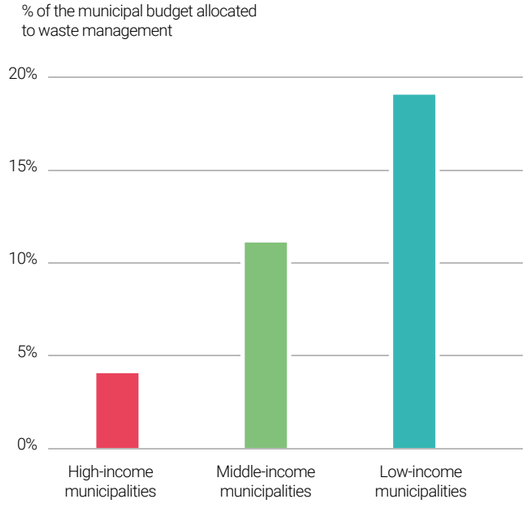


Figure 32: Average share of the budget of municipalities devoted to the waste sector depending on the level of income. Source: World Bank, 2018

Figure 33: Local contracting authority at the construction site of the Greater Lomé landfill, Togo. Credit: COVED, rights transferred by Alexandra Monteiro

AFD'S ACTIONS

Technical assistance and support for training

AFD supports its partners via technical assistance mechanisms and training. The technical assistance is generally carried out by consultants external to AFD, who can follow the progress of projects or the operation of sites on the spot. The companies which provide these services are selected for their expertise, adaptability and availability. The vocational and technical training in waste management can be directly given by AFD, or by an external training organization that prepares public service officials. Vocational training is essential to the sustainability of the projects developed. Its main objective is to **provide technicians and managers responsible for the sector with responses adapted to local contexts**, and help them implement an operational and organizational management in line with their specific needs.

The vocational training courses provide technicians and managers responsible for the sector with responses adapted to local contexts.

- In the context of the preparation of the project to structure the solid waste management sector in Conakry (Guinea), AFD has set up a mechanism to assist the contracting authority at the Guinean authorities responsible for solid waste management. This mechanism is based on the provision of a long-term resident expert (two years) at the National Agency for Sanitation and Public Health (ANASP), and short-term expert assistance depending on the needs: technical, institutional, financial, environmental, social, land issues, training needs. As part of this support, it is also planned for four Guinean officials to go to Lomé (Togo), accompanied by the resident expert, to follow the Expert in Urban Solid Waste Management training module set up by AFD.
- AFD's range of training courses on the management of territorial authorities includes a 1-week module on urban solid waste management. This module aims to disseminate knowledge about waste management, share experiences and help each participant structure their solid waste management project. The next session of this training is scheduled to take place in Lomé (Togo), in order to benefit from the 15 years of common experience between the Municipality of Lomé and AFD.

Figure 34: Participants at the "Expert in Urban Solid Waste Management" seminar, AFD Campus, 2018. Credit: Campus/AFD

LAND CONSTRAINTS TO THE INSTALLATION OF FACILITIES

As with the vast majority of urban projects, the land issue is central to the installation of waste management facilities. Land can be unavailable, too expensive or unsuitable for the installation of facilities. **It is one of the main causes of delays and blockages in starting a solid waste management project.** A strong political commitment is often required to overcome this difficulty.

It is essential to have a land diagnostic at the earliest possible stage in the project preparation, clearly establishing all the rights (including customary) related to the site identified to house a waste management facility.

There is often an overlapping of land rights on the same plot, which the project promoters will need to regularize before launching an operation. Due to the disturbances (smell, noise, visual, related to the increase in heavy vehicle traffic, etc.), the installation of a waste management facility is never easy in practice and must be based on an analysis taking into account the economic, technical, environmental and social issues. The waste treatment sites must be close enough to the waste production area to limit the transport costs, but far enough from homes, economic hubs and specific protected areas (airports, historical sites, protected areas and catchment areas).

Figure 35: Land consumption required for the creation of a landfill, Gabarre, Guadeloupe. Credit: SYVADE

Visit to a waste project by Rémy Rioux, Senegal.
Credit: Clément Tardif/AFD

PART 3

AFD's **Operational Policy**

Support governance and the division of responsibilities

Waste management **involves a multitude of stakeholders and requires a major financial, technical and human investment** by local authorities.

In low-income countries, AFD helps structure sectors, from the pre-collection of waste to its treatment, in satisfactory social and environmental conditions. **Special emphasis is placed on the progressive nature of the treatment solutions proposed** (emergency facilities before more technically sophisticated facilities). This progressiveness requires prior work on governance, the regulatory framework and local technical and financial capacities.

Emerging countries, where the legal framework and sectors are generally more advanced, can benefit from assistance including more industrial recovery and recycling projects (collection sector existing and efficient, possibility of sorting at the source, Extended Producer Responsibility, etc.).

In the French overseas territories, AFD helps local authorities perform their functions of planning, collecting, treating and recycling waste, in line with the framework set by French regulations. **Improvement projects focus on the institutional, legal and financial structuring of the sector**. AFD Group finances public, private or mixed investment projects, but also provides support-advice to local public partners.

AFD can mobilize a wide range of French, international, public and private expertise throughout the sector.

AFD'S ACTIONS

Supporting the creation of a strong legal framework

If environmental regulation exists in developing countries, there is generally no really specific regulatory framework for solid waste management or it has not been developed. Yet **a clear and demanding legal framework and ambitious public policy that can be developed over time are essential for the implementation of an effective and appropriate waste management system**.

AFD has been helping its partners implement sustainable public policies for many years. It does so by assisting with **the establishment of strategic plans for solid waste management** and appropriate regulatory frameworks, and by providing technical assistance to **build local capacities**.

AFD supports certain projects through **policy-based loans** (PBL) and provides financial support for the implementation of a new sectoral policy. The financing is disbursed when the sectoral structuring objectives defined in a public policy matrix have been achieved. This matrix is built jointly by AFD and the local partners. PBLs provide the structural financing required to establish an appropriate policy, regulatory and institutional framework.

In Costa Rica, AFD is supporting the implementation of the National Decarbonization Plan and the low-carbon and inclusive trajectory which aims to achieve this country's carbon neutrality by 2050. The project comprises a €150 million AFD policy-based loan to Costa Roca, a technical cooperation program and a multi-year public policy dialogue. This project is based on a public policy matrix (PPM) which defines the objectives to be achieved and serves as a trigger for the disbursements of the policy-based loan. The technical cooperation proposed to the local partner aims to support the introduction of appropriate public policies and feed into sectoral discussions in the solid waste sector, sustainable construction and the inclusive transition (see Costa Rica project sheet on page 76).

WASTE MANAGEMENT: A DECENTRALIZED COMPETENCE OF LOCAL AUTHORITIES

While waste management is often handled by local authorities, **the level of decentralization of this competence and multitude of stakeholders responsible for its application vary**. Megacities rarely have a legal entity in a position to take action on the entire urban area and, in some cases, major State intervention in public service management is necessary. Conversely, at the infra-urban level, there is a multiplicity of stakeholders operating in waste management, and therefore a dispersion of the drivers for action.

Alongside the implementation of a technical or financial waste management model, it is essential to structure the legal and institutional framework for this intervention. It involves **having laws adapted to local realities and not copying standards and regulations applied elsewhere**. Devising new models is the main avenue developed by cities seeking to resolve the problem of their waste, in order to turn it into social and environmental opportunities.

BUILDING THE CAPACITIES OF CONTRACTING AUTHORITIES

Whether the project is a fully-fledged waste management project or part of a more extensive operation in the urban sector, **adopting a cross-cutting approach and taking the capacities of the contracting authorities into account ensures its sustainability**. It is essential to balance the operation between investments and technical assistance, which can take many forms and address a number of issues:

- **Assistance to the technical and financial services of the contracting authorities.** This assistance is particularly important in the case of new or complex **technologies**
- **Support for public-private partnerships:** the waste sector is attractive to private operators, as waste can be an interesting resource. The private sector can provide high added value in terms of managing organizational and technological processes, optimizing operating costs and innovation capacity. However, this private sector involvement requires a secure and stable regulatory context, and a management and control by the public operators which remain responsible for the quality of the service and its fair cost for the taxpayer. There are many arrangements for contracts between the public and private sector, ranging from simply subcontracting a collection service to the concession of the full responsibility for waste, and including placing the treatment facilities under private management
- **Information to users and awareness-raising.** Through local communication and the use of appropriate media, households must be informed about the pre-collection and collection methods which concern them, their obligations towards the service provider and authorities, and the sanctions in the event of non-compliance. This approach can encourage them to improve their practices in terms of reuse, sorting and recycling
- **Support for strengthening data control.** The quantity and type of waste produced, the main cost centers and sources of financing, the operators present and coordination methods, and the technologies available on the market and the respective costs are all data that need to be collected reliably and systematically. A waste observatory can develop knowledge about the sector, centralize and disseminate the information and build networks between the operators in the territory.

AFD'S ACTIONS

Mobilization of the private sector by Proparco

The private sector financing arm of AFD Group, Proparco has been working for 40 years to promote sustainable economic, social and environmental development. In terms of solid waste management, Proparco has been financing about one project a year since 2014, with €10 million to €20 million each year. The objective is to **support companies involved in the waste management sector**, through loan guarantees, technical assistance and support for the implementation of social and environmental best practices. The strategic decision by local authorities to delegate one or several stages in the sector to private companies is increasingly common.

For example, Proparco is participating in financing the renewal of the fleet of dump trucks in Cameroon for the collection company Hysacam, in order to adapt to the increase in the quantity of waste to treat, which is in particular related to population growth. Furthermore, in Turkey, the company Heksagon called on Proparco with the objective of improving its activity to collect materials for recovery or recycling. The financing allocated has optimized organic waste treatment by improving collection, as well as the production of compost and electricity through methanization.

A comprehensive study of the context for coherent action

INSTITUTIONAL, TECHNICAL, FINANCIAL AND LAND DIAGNOSTICS

Carrying out a reliable diagnostic adapted to the local context makes it possible to determine the priority needs. Understanding the organization of the waste management sector requires conducting an inventory of the existing facilities and organization methods, through an analysis of the modes of transport, knowledge of the territorial organization and its socioeconomic characteristics, an identification of any anticipated projects (urban, urban displacement, development plans, etc.) and through an analysis of the mode of financing the sector (in particular the tax system and its collection rate). The issue of the **availability and ownership of land** must be addressed as early as possible.

Finally, **it is essential to have a recent waste characterization study**. It involves an inventory of municipal solid waste to identify the nature (organic, plastics, sands, metals, etc.) and the quantity of waste collected at the various pre-collection and collection stages until the landfill disposal.

DEVISE A CUSTOMIZED FINANCING MODEL

In AFD's countries of operation, the waste management sector is generally financed by the general budget. In addition to technical assistance, it is therefore necessary **to provide support to our counterparts for the financial and fiscal aspects**. These actions are essential in order to ensure the sustainability of the financing for the sector.

There can be various financing arrangements for the service:

- By the general budget financed by local or national taxes
- Through a specific tax levied by the State or local authority, which can, where relevant, be collected at the same time as other contributions (property tax in France, water or electricity bill in Gabon)
- Through a fee directly collected by the local authority from the user of the service. It can be an interesting tool to have information about the actual cost of the service provided. If the fee is combined with an incentive-based tariff, it can give users a sense of responsibility in terms of their production of waste, as everyone pays on the basis of the quantity of waste generated
- Through the introduction of an eco-tax on certain products and therefore directly levied on the consumer.

AFD'S ACTIONS

Diagnostic of project managers

Beyond planning, the practical response to waste management issues must take the entire sector into account. **The coherence between the management method considered and the local context on a technical, administrative and financial level is central to the analysis** made by project managers prior to the allocation of financing. The level of support for the project by the partner entity is also one of the main factors for the success of a project.

On the technical, environmental and social level, the project manager must ensure that the technology selected is adapted to the types of waste produced, in order to avoid the "white elephant" phenomenon (costly and oversized projects in terms of the local context, often resulting from the action of private suppliers) in the funded projects. A representative characterization of the solid waste produced is a factor that ensures **the technical compatibility between the solution proposed and the local context**. For example, if the waste that needs to be treated has a low calorific value, installing an incinerator is generally not the most appropriate solution.

Studies are also carried out on the organization of the existing sector and the governance of the sector. Similarly, financial and economic studies are conducted, as well as an assessment of the local technical capacity to manage and operate a waste management sector. These studies aim to ensure that the local public entity has the capacity to **maintain an optimal operation and ensure the sustainability of the waste management system** that is set up.

To this end, AFD's operations are based on the integration of a process to adapt to the needs of the sector in terms of legislation, expertise and financing, in order to ensure the quality of the projects implemented.

In any case, **the introduction of a fee system must be combined with an efficient service and good communication**, so that the users accept to pay the fees, but also so that they change their habits (stop fly-tipping, start sorting their waste, reduce the quantities of waste produced, etc.). Furthermore, the performance of the collection of a tax or fee depends on the human, logistical and IT resources in place, but also on the existence of a comprehensive addressing system (reliable database, land register, updating capacities). These resources are lacking in informal housing areas.

In situations where the ability to pay of residents is very low and/or in the case of these informal housing areas, there are alternative systems, such as billing with other public services (water, gas, electricity, etc.) or Corporate Social Responsibility. Other options could be developed, such as the use of public procurement to encourage the purchase of products from waste recycling, with a view to the circular economy.

Figure 36: Field diagnostic conducted by the local contracting authority, Lomé, Togo. Credit: JM Aurousseau, SAFEGE, 2021

FOCUS ON PROGRESSIVENESS IN THE IMPLEMENTATION OF TREATMENT SOLUTIONS

Analyzing the waste management sector in a comprehensive manner, taking the local context into account, makes it possible to adapt the technical recommendations. Indeed, the conditions for developing sectors are related to the socioeconomic and geographical contexts. For example, the techniques for the recovery of organic waste vary depending on a number of factors, such as the climate (humidity, temperature, rainfall seasonality, etc.).

In the case of an energy recovery project, strengthening regulations, such as environmental regulations, is often a prerequisite. As there are major technological constraints due to the complexity of the industrial processes and the diversity of the types of waste, **a phased technological development is generally recommended.**

While organic or material recovery can be implemented on a large scale in the dedicated facilities (anaerobic digester, for example), it can also be considered on a small scale through community composting or local recycling initiatives, without the need for major investments and as a first stage in structuring the sector.

AFD'S ACTIONS

The progressiveness of treatment methods in AFD's projects

A successful operation in the solid waste sector requires substantive work.

It is consequently necessary to integrate a number of interdependent factors in order establish a solid structure to base projects on:

- A restructuring of the governance of the sector at the local and/or central level
- The implementation of a clear and demanding regulation
- Systems to monitor and control the expected performance
- An increase in the local technical capacity for the regulatory coordination and controls
- The planning then operating capacity of the existing and future solid waste management structures
- A comprehensive restructuring of the financing framework for the sector, at both the local and central levels.

AFD assists local partners with this phased approach. For example, in the city of Lomé (Togo), AFD has been helping improve the waste management sector for over ten years. This phased approach has allowed the city of Lomé to equip itself over time and effectively and sustainably improve solid waste management in its territory. The partnership between AFD and the city is continuing, in particular with the search for financing solutions for the sector. It is only through this **preliminary work on structuring this sector** that treatment methods such as recycling can today be considered.

Involve the informal sector to improve social integration

MULTI-LEVEL AND MULTI-STAKEHOLDER ORGANIZATION

An effective waste management model is based on **a multi-level and multi-stakeholder approach, in order to locally draw on all possible treatment methods**. The success of a good organization is therefore often conditional on the integration of a wide range of stakeholders. In addition to local public operators, informal pre-collectors and collectors, traders and companies must also be included as much as possible in the implementation and in the national legal framework. Despite the fact there is still a strong reluctance among the "traditional" waste management operators, pre-collection, community-based management and recourse to informal operators would appear to be gaining momentum in a number of cities, where increasingly participatory, composite and circular models are emerging.

THE ROLE OF INFORMAL ACTIVITY IN WASTE MANAGEMENT

Informal activity in the sector is particularly strong and visible in developing countries. On some landfills, such as in Brazil and Indonesia, there are 2,500 ragpickers working on the site. In 2012, 15 million people around the world scraped a living from informal recycling activities.[47] These activities clearly bring added value to the waste sector, compensating for the deficiencies of the public authorities and providing a service to households, generally with reasonable tariffs.[48]

The informal workers operate at several levels in the waste management sector:

- Door-to-door **pre-collection**
- **The collection of materials** on the street and on markets
- **Sorting and preparing waste for its recovery on illegal or controlled dumps**. A large number of informal waste pickers can sometimes work at these treatment centers (2,000 people at the Mbeubeuss landfill in Dakar, for example).

While over 90% of plastics, paper, cardboard and other materials are sorted and recycled by this sector, **the inclusion of informal workers in the approach to the sector is not the priority of local authorities** for many reasons. Firstly, due to its informal nature, the sector lacks transparency, is constantly changing and difficult to assess, which makes it difficult to implement any operation in it. The operators are sometimes well organized and have strong potential for social mobilization, with a longstanding presence (such as the Zabbaleen in Cairo). They themselves see no point in integrating the formal sector, content with the conditions provided by their situation, which they feel they are in control of compared to the unknown and the constraints (administrative, fiscal) of a formal job. Consequently, the authorities often accept the status quo, considering that it is easier to wait for the gradual structuring of the sector to integrate informal operators rather than take proactive action.

However, the informal nature of workers in the sector raises many difficulties:

- **The status of the workers**, which is not recognized by the authorities, maintains an entire population, including women and children, in extremely precarious living and working conditions[49]
- **The problems of hygiene and health** persist: firstly, for the workers, who have no protection against the daily handling of garbage and the contact with toxic fumes. Secondly, for residents, as these workers only collect waste with a market value, the rest is therefore not collected
- **The level of involvement of the informal sector** is unsuited to the needs of an entire city, as the workers generally collect the waste in a neighborhood, in a patchy and fragmented manner depending on the segments of the sector (pre-collection, collection, recycling and recovery).

Informal workers can nevertheless provide a complementary response to the shortcomings of the public system. In Lomé (Togo), the informal sector provided most of the service for many years before the municipality, and today the Greater Lomé Autonomous District (DAGL), renewed action in the sector with support from AFD.

[47] World Bank (2012), "What a Waste: A Global Snapshot of Solid Waste Management to 2050".
[48] According to the ILO (International Labour Organization), in most developing countries, the informal sector manages 15-20% of waste, meaning the cost borne by the informal sector amounts to 15-20% of the annual budget for municipal solid waste. For example, in New Delhi, the annual saving stands a €6.7 million to €7.5 million. According to a study conducted by GIZ and CWG in six cities in developing and emerging countries, the avoided costs are mainly collection costs.
[49] For example, in March 2017, the collapse of the Koshe Reppi landfill in Ethiopia killed at least 65 people. This was followed by the collapse of the landfill in Colombo in Sri Lanka in April which killed over 23 people.

Figure 37: Result of the collection work by the informal sector on the landfill in Samarkand, Uzbekistan. Credit: Antoine Buge/AFD

In Brazil,
90%
of materials is sorted and recycled by the informal sector

AFD'S ACTIONS

Formalizing the informal in Senegal

The rehabilitation of the Mbeubeuss landfill under the PROMOGED project in Senegal requires the formalization of the solid waste management sector. In 2010, the Sinda landfill was supposed to replace the Mbeubeuss landfill, but was never developed for reasons of social acceptance. The purpose of a multi-sector and multi-stakeholder analysis is to highlight the issues related to the formalization of activities which have until now been carried out informally, and to understand the interests of each stakeholder. It is essential to compare the various needs in order to propose a public organization of the sector and operations that are consistent with the local context.

Three stages are necessary for this:
1) Identify the stakeholders
2) Outline the issues involved in taking informal actors into account
3) Build a stakeholder commitment plan.
In the case of PROMOGED, the stakeholders identified are:

- The solid waste Management Coordination Unit (MCU), set up by the State to support local authorities
- Bokk Diom, a waste pickers association
- WIEGO, an NGO that supports the integration of waste pickers into the restructuring process for the landfill
- The International Labour Organization (ILO) PAGE Senegal program, which supports the organization of waste pickers into a cooperative
- The residents campaigning for the closure of the site
- The two international companies that buy the waste from the waste pickers to recycle it.

Based on Figure 36 and the various issues outlined, an appropriate stakeholder commitment plan could involve grouping the waste pickers together in an association implemented by the MCU and supported by WIEGO.

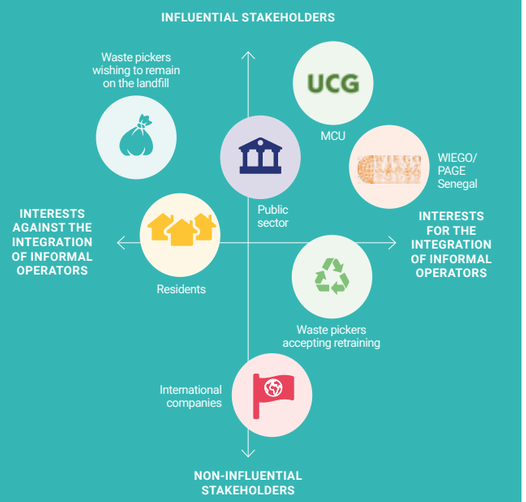


Figure 38: Outline of the issues related to taking informal operators into account at the local level in the project to rehabilitate the Mbeubeuss landfill, Senegal (see Senegal project sheet on page 70).
Source: AFD, 2019

AFD'S ACTIONS

Means of inclusion of informal operators

Whether we call them waste pickers or ragpickers, chiffonniers, cartoneros, pepenadores, or zabbalins, historically, and in most societies, the poorest have always handled waste management for the middle and upper classes. In many cities, there are more of these informal "small private operators" (waste pickers, wholesale traders, traders, etc.) than **workers in the formal sector**. And while collection is often the lowest paid activity in the recycling chain, some people earn much more than the minimum wage. However, the implementation of waste management projects by AFD, which often involves the closure of former uncontrolled dumps and the introduction of a formalized and more efficient collection system, leads to a substantial loss of resources for the waste pickers, who can find themselves with no livelihood.

AFD integrates the need to establish livelihood restoration plans for waste pickers in its environmental and social safeguard measures.

AFD is aware of these issues and integrates the need to establish **livelihood restoration plans (LRPs) for waste pickers, which are sometimes also called social assistance plans**, in its environmental and social safeguard measures. The aim is for people affected by the projects to find a new income-generating activity or a job in the waste management sector or in another sector. It also involves promoting the many initiatives in this sector, considering waste pickers and informal pre-collectors as key stakeholders in the sector, and encouraging the consolidation of the circular economy approaches they create in territories, often on a small scale.

One of the main challenges for AFD and its counterparts in waste projects lies in gaining a better grasp of the solutions to integrate informal operators in the sector. Indeed, assisting with structuring inclusive waste management sectors contributes to the resilience of the entire ecosystem. Several projects allow AFD to capitalize on feedback from several components of the integration of the informal sector:

- **Professionalization of pre-collectors through the creation of microenterprises:** in Togo, the Municipality of Lomé encourages the most structured informal pre-collectors to become professional by entrusting them with quite substantial services through contracts, ranging from waste pre-collection, to the sorting and transport, and up to the collection of collection fees from households. In addition to their economic impact on a highly vulnerable population, these actions give workers a great symbolic recognition which reduces their feeling of exclusion. At the same time, the 65 informal waste pickers at the Agoè-Nyivé landfill, which has been closed under the PEUL project, are subject to a social assistance plan. An NGO is helping them find other sources of income, either in the waste sector or in another sector and, where necessary, through training
- **Retraining workers:** in Madagascar, the city of Antananarivo has supported the retraining of ragpickers to allow them to diversify their sources of income or start a new trade. For example, training in agriculture and assistance with the management of a microenterprise have been financed
- **Community-based management of the pre-collection service:** in Port-au-Prince in Haiti, the community organization SNELAK has set up waste collection, door-to-door or on the streets, by selling garbage bags which are subsequently collected by trucks. The price of the bag finances the pre-collection and encourages residents to reduce their quantities of waste in order to limit their purchases. As the system has proved its effectiveness, surrounding neighborhoods have requested to benefit from it. For further information about the inclusion of informal operators, the "Informal Sector Guide" can be consulted online (see resources for more information on page 78).

The management of solid and medical waste from the Covid-19 health crisis

AFD has made several recommendations to local authorities and solid waste management operators in developing countries, in order to provide technical assistance to the areas of operation badly affected by the Covid-19 health crisis.

CONSEQUENCES OF THE PANDEMIC ON SOLID WASTE MANAGEMENT IN THE AREAS OF OPERATION

Solid waste management in times of health crises is a particularly important issue. The Covid-19 crisis is unprecedented and has required a massive and swift response by governments around the world. The slowdown in economic and industrial activities and national lockdown measures have led to changes in the types and volumes of waste collected.

The Covid-19 pandemic in 2020 has required a specific adaptation in terms of waste management in order to mitigate the risks related to the health situation. For example, **the rapid build-up of medical waste, called health-care waste (HCW)** (protective equipment, test tools, equipment in contact with infected patients), as well as a poor treatment of this waste or a treatment in an inadequate facility, can **exacerbate the health crisis by spreading the disease to people in contact with this waste**.

TACKLING THE CRISIS: RECOMMENDATIONS

Service continuity and the safety of people and workers are the main recommendations made to municipalities and governments by AFD.

In terms of the upstream waste sector, it is recommended to prepare a business continuity plan for the management of household and assimilated waste, set up a protocol for action for suspected cases of infection of a worker, systematically clean and disinfect collection and transfer equipment and train workers in these procedures.

To manage infectious clinical waste in a specific and priority manner, families with symptoms must be encouraged to isolate their contaminated waste in a tightly sealed plastic bag. Countries with a system to manage waste arising from care activities involving infectious risks are requested to **collect and incinerate hospital waste from patients who are infected or suspected of being infected with Covid-19**.

Figure 39: Two women carrying out Covid-19 screening tests with support from AFD. Institut Pasteur, Senegal.
Credit: Ricci Shryock/AFD

In countries where there is no system to manage waste arising from care activities involving infectious risks, AFD recommends setting up a **selective collection of this waste in hospitals and an urgent treatment of this waste** (decontamination shredders, specific incinerators). A landfill cell can subsequently be dedicated to it, combined with a lime treatment to make this waste inert. Countries must also include the specific treatment procedure for temporary health facilities.

Finally, to take swift action and mobilize operators in the sector, it is recommended to define a temporary margin of flexibility for the environmental and social impact with respect to general legislation in order to address the emergency (choice of temporary storage sites, for example), and mobilize professionals able to tackle the crisis, including the private sector and civil society organizations, to provide technical or operational support-advice.

Steam treatment	• Used to disinfect and sterilize infectious waste • *E.g.*: autoclaving, microwaves, heat treatment by friction
Treatment by incineration	• High-temperature dry oxidation (850 °C to 1,100 °C) • Toxic equivalent emissions must be below 0.1 ng (TEQ7)/m^3 of dioxins and furans
Automated chemical treatment	• Use disinfectants • Pay attention to the toxic effluents which can be produced
Biotreatment	• Use enzymes to accelerate the destruction of organic waste containing pathogens

Figure 40: Recommendations for the sorting, collection and treatment of hospital waste.

AFD'S ACTIONS

Waste management and gender equality

Women play a major role in waste management in many ways: within the family unit, where household chores such as cleaning and preparing meals continue to be traditionally assigned to them, women as the first producers and managers of waste. At the same time, their common role of educating children makes them key actors in raising awareness of hygiene practices and passing on good habits. However, **studies show that once collection systems move out of the family sphere and become formal, women tend to be pushed aside**, or suffer from inequalities: lower hierarchical positions than men, lower salaries and social protection for the same level of responsibility.

Furthermore, **women are often on the front line in addressing health crises** in lower income countries, during which they play a crucial role in the domestic sphere (care of the sick, hygiene and disposal of waste), but also for informal waste collection and the maintenance of facilities and infrastructure, which are tasks often assigned to them. Consequently, they are more exposed to infection than men and **it is therefore necessary to place special emphasis on informing and raising the awareness of women** in terms of the protective measures, the immediate responses to infection and the special treatment of hazardous waste.

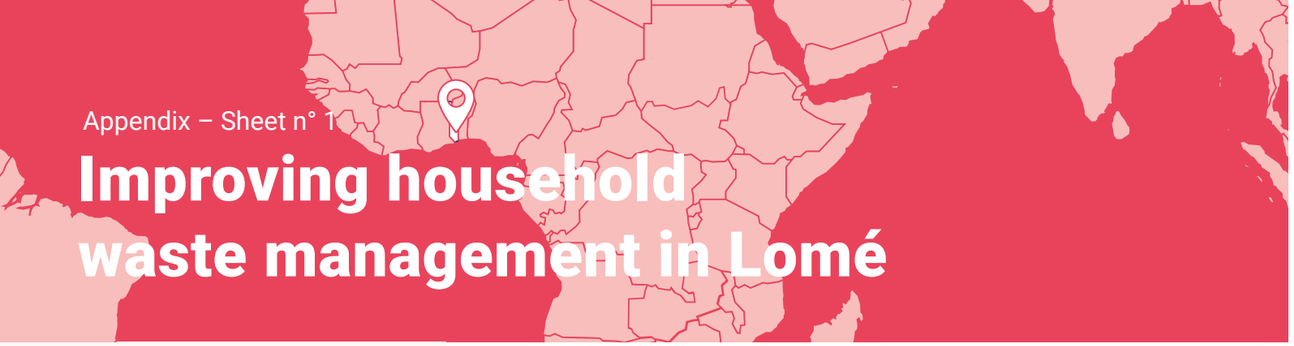
Assessing the barriers faced by women in the field of waste management can, by proposing appropriate action, **reduce the inequalities they are subject to**. It is therefore particularly important during projects to obtain data on the composition of groups by gender, get information about the needs of everyone and not just of men, and ensure that the implementation of a project does not unintentionally make their situation worse.

Figure 41: An inhabitant taking part in the informal recycling sector by picking up waste washed up along the Pasig River in the Baseco slum. Manila, Philippines. Credit: Ezra Acayan/AFD

Installation of bins for selective sorting built with AFD financing, Parque Mairi. Curitiba, Brazil.
Credit: Zuleika de Souza/AFD

APPENDIX

Projects



Appendix – Sheet n° 1

Improving household waste management in Lomé

AREA OF OPERATION

Lomé, Togo

Africa region

PROJECT IDENTIFICATION

Urban Environment Program in Lomé

PEUL I (2007-2014)

PEUL II (2019-2018)

PEUL III (2019-2024)

PEUL IV (2021-2026)

BENEFICIARY/ CONTRACTING AUTHORITY

Greater Lomé Autonomous District

(DAGL), formerly Municipality of Lomé

FINANCING

PEUL I:
€8 million of AFD grants

PEUL II:
€21.5 million (€5 million of AFD grants
+ €7 million of EU grants
+ €9.15 million of BOAD grants)

PEUL III:
€14 million of AFD grants

PEUL IV:
€15 million AFD grant and
€5 million EU grant


© Clémentine Dardy

Through its support to the city of Lomé, the capital of Togo, AFD plans to reconcile urban growth and the climate by cleaning up the living environment of people and improving the management of essential urban services. AFD's support for Lomé's sustainable urban transition has materialized in the implementation of three projects (PEUL I, II and III) and a fourth project under appraisal (PEUL IV).

LOCAL ISSUES

- Lomé has some 1.8 million inhabitants and **urban growth stands at about 4%**
- There are **chronic floods** during the rainy season and the lagoon system requires major **redevelopment investments**
- Stormwater drainage and solid waste management (over **300,000 tons of solid waste a year**) pose major challenges
- The permanent presence of waste and waste water in the daily lives of residents **jeopardizes their health**
- The **uncontrolled discharges have huge environmental consequences**
- The physical presence of waste and resulting externalities (odors, landscape degradation, insalubrious conditions) **hinder economic and tourism development**.

OBJECTIVES

Reduce **pollution.**

Improve **living conditions** for residents and workers.

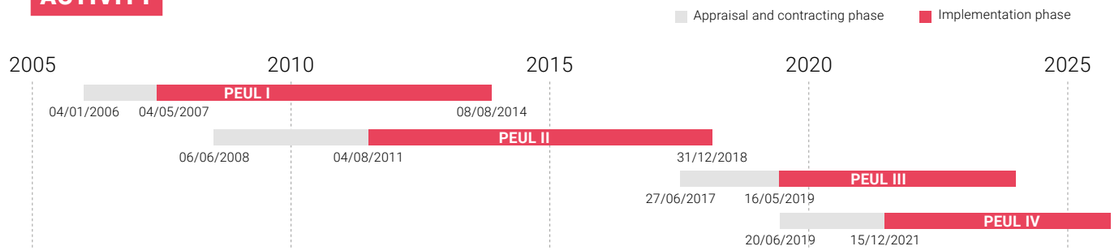
Ensure the **sustainability of the solid waste management service**.

REGULATORY FRAMEWORK

- At the start of the partnership, there was **very little legislation** for solid waste management in the municipality
- Need to **strengthen the financial and institutional capacities** of the contracting authority in terms of waste management
- Need to t**rain human resources** in the techniques of waste management.

The Municipality of Lomé, the former project beneficiary, has undergone an administrative reform which has modified the organization and institutions responsible for waste, by creating new municipalities and the Greater Lomé Autonomous District (DAGL). AFD has adapted its action to the local situation and the capacity building is now helping these new operators structure the collection sector.

ACTIVITY



PEUL I

Infrastructure & implementation

- Support to the **pre-collection structures and informal sector** in conjunction with the Municipality of Lomé
- Work with an NGO (Npro) on composting.

Capacity building

- Revision of the **organization of formal collection** with the Municipality of Lomé
- Support for **financing investments** and improving financial management
- Support to the **contracting authority**
- Strengthening **urban planning**.

PEUL II

Infrastructure & implementation

- Construction of the **Aképé** landfill
- Formalization of **recycling and recovery** activities
- Selection of a **private operator to operate the landfill** (firm 5-year contract with 5 additional years to confirm, each with 2 optional additional 5-year tranches).

Capacity building

- Improvement in the **mobilization of financial resources**
- Support to **technical services**
- Support to the **municipal policy for urban services management** and urban planning
- Raise the **awareness of residents**.

PEUL III

Infrastructure & implementation

- **Closure and rehabilitation** of the former uncontrolled dump in Agoé-Nyivé
- Rehabilitation and construction of waste **transfer stations**
- Assessment and strengthening of **recovery and recycling initiatives.**

Capacity building

- Technical assistance specialized in the **administration of local authorities**
- **Social assistance plan** for the informal workers from the former dump
- **Financial and organizational optimization** of collection
- Improvement in the mobilization of **financial resources for collection**.


© Mélanie Grignon

EXPECTED IMPACTS

- Over **1.5 million people with an improved quality of life** through access to essential public services
- **325 beneficiaries of vocational technical training.**

LESSONS LEARNED AND PROSPECTS

- The contracting authority is now **able to implement a project in a qualitative manner** thanks to long-term assistance
- The project has gradually addressed **various segments of the value chain**, from the collection to the outlet and the recycling/final recovery. **The capacity requirement has also been gradual**
- There are uncertainties over the **regulatory and administrative framework**, in particular concerning the handling of the various stages of the sector.

Future initiatives of PEUL IV

Infrastructures & implementation

- **Extension of the Aképé landfill** and operation for five additional years
- **Improvement in the operation of the landfill** in terms of climate, environmental and biodiversity issues
- **Improvement in the organization of waste management** in the Greater Lomé area
- **Reduction in the volumes of waste** transported and treated.

Capacity building

- **Mobilization** of financial resources
- **Strengthening** of territorial planning.

AFD is continuing to support DAGL to facilitate the dialogue between the administrative bodies and establish a sustainable financing method, in order to ensure the sustainability of the new solid waste treatment facilities.

Appendix – Sheet n° 2

Modernizing waste management services in Samarkand


© Antoine Buge

AREA OF OPERATION

Samarkand, Uzbekistan

East region

PROJECT IDENTIFICATION

Waste management in Samarkand

2016-2024

BENEFICIARY/ CONTRACTING AUTHORITY

Republic of Uzbekistan - Maroqand Obod (municipal waste management company in Samarkand)

FINANCING

€31.5 million
(€23.5 million of AFD loans
+ €8 million of EU grants)


© Antoine Buge

This project is AFD's first operation in Uzbekistan. It aims to cover the entire waste cycle in Samarkand, from collection to treatment, with a strong focus on local capacity building, raising the awareness of the population and the fight against climate change. It is fully in line with the National Solid Waste Management Strategy adopted by Uzbekistan in April 2019.

LOCAL ISSUES

- The city of Samarkand tried to **upgrade waste sector facilities** a few years ago, but there was only a moderate impact
- **The expansion of the city and population growth with some 600,000 inhabitants** have increasingly reduced collection rates and given rise to more and more illegal dumping, while **600 tons of waste** are generated every year
- The **city's landfill is not up to standard** and does not meet the municipality's needs
- The illegal dumping of waste has major **environmental and health impacts**
- Many **informal workers work** on the landfill
- The **institutional capacities** for waste management could be strengthened
- The **sorting and recycling of many materials** would reduce landfill storage.

OBJECTIVES

Achieve integrated, efficient and sustainable municipal waste management, from collection to treatment.

Build the capacities of stakeholders in the waste sector.

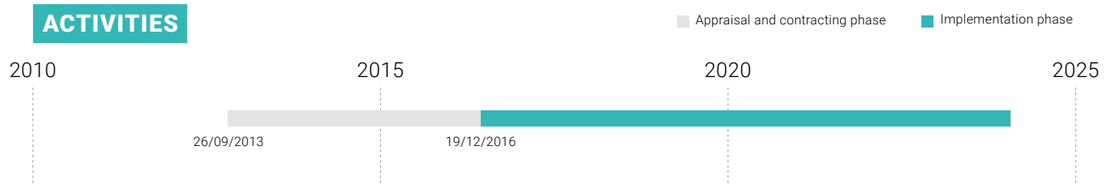
Raise the awareness of residents and stakeholders to the issues of solid waste management.

REGULATORY FRAMEWORK

- A sectoral reform of solid waste management has been initiated at national level. The project implemented in Samarkand is part of this process
- The high level of centralization in the country and competence for waste have delayed some decision-making at local level.

The project is the first operation by a donor in the waste sector in Samarkand. It therefore took quite a long time to become familiar with the procedures.

ACTIVITIES



Infrastructure activities

Waste collection

- Construction and renovation of **150 household waste collection points** (including 15 with AFD financing)
- Purchase of **70 collection vehicles**
- Introduction of a **Geographical Information System** (GIS) to optimize collection
- Construction of a **garage for the collection vehicles** (abandoned).

Waste treatment

- Construction of a **landfill**
- Closure of part of the former landfill.
- Construction of a **household waste sorting center**
- System to **recover and treat landfill gas** (financed with a European Union grant).

Capacity building

Institutional support, public awareness-raising, technical studies (financed by an EU grant)

- Resident **technical assistance** and capacity building
- Technical studies (design, project management)
- **Public awareness-raising activities** on waste management.

LESSONS LEARNED AND PROSPECTS

- As Samarkand is a city with an international reputation, waste management is a key issue for both **economic and tourism reasons**.
- **Cleanliness in the city** was the first issue the public authorities addressed through the project – the implementation of **efficient collection** was the program's first success
- There were significant delays in the initial phase of the program due to the **complex institutional validation circuits** (signatures, presidential decrees…)
- It was difficult to set up the project team as it was the **first infrastructure project financed** by AFD in Uzbekistan
- The **unavailability of land** for some of the program's facilities led to delays (collection points…)
- **Informal workers** on the landfill site will be taken charge of under an Environmental and Social Management Plan.

New assistance for waste management in the Samarkand region is currently being considered, as well as a greater inclusion of the private sector in waste management, in particular for the operation of the landfill.

OBSERVED IMPACTS

- The waste collection rate has risen from **35%** to almost **100%** in Samarkand
- Some **556,000 people** with an improved quality of life through access to solid waste management services
- **64** jobs created.

Appendix – Sheet n° 3

Regional South Pacific Initiative Capacity Building for Waste Management


© Andrew Murray

AREA OF OPERATION

Multi-country project, Remote Pacific Island Areas

East region

PROJECT IDENTIFICATION

Waste initiatives 2 – SPREP

2020-2023

BENEFICIARY/ CONTRACTING AUTHORITY

SPREP (South Pacific Regional Environment Program)

FINANCING

€3 million of AFD grants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The issue of waste management in the Pacific poses a major challenge for the sustainable development of small Pacific Island Countries and Territories (PICTs). The vulnerability of these territories to climate change and natural disasters makes the issue of waste management all the more important and necessary in order to protect ecosystems and a healthy environment for their inhabitants.

LOCAL ISSUES

- PICTs are made up of fragile ecosystems which are the basis for their development potential. They are extremely **vulnerable to climate change** and risks of natural disasters (floods, submergence, cyclones)
- **Strong population growth and urbanization**, changes in consumption patterns, the increase in the import of goods and the **prevalence of tourism** lead to an explosion in the tonnage of waste
- **The increase in waste resulting from natural disasters** and the poor management of the waste produced regularly cause coastal pollution and endanger **the balance of the ecosystem**
- Water pollution due to the presence of waste (plastics in particular) **endangers the water cycle.**

OBJECTIVES

Assist local authorities with the **development of comprehensive waste management policies** and strengthen their capacities for action.

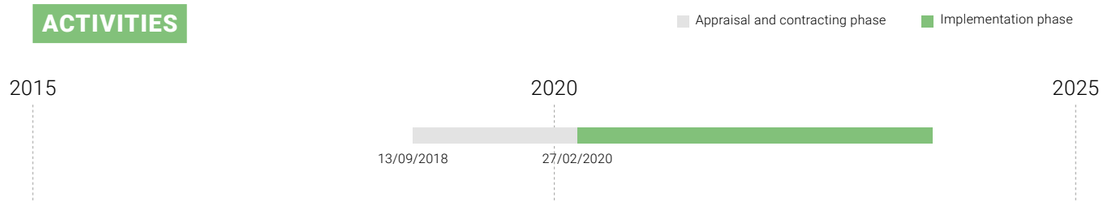
Improve the existing facilities by setting up pilot projects.

REGULATORY FRAMEWORK

- The 14 PICTs and 5 Member States of SPREP have received support to **prepare their national strategies** for waste management and the fight against chemical pollution, but most have **neither validated nor implemented them**
- A **regional strategy for the management of waste** and pollution called "Cleaner Pacific 2025" has been established by SPREP in consultation with its Member States
- The **priority actions** are reduction at the source, the development of recovery and recycling, an improvement in the treatment of non-recyclable waste and a better monitoring of pollution.

The project financed by AFD focuses its operations on marine debris, waste oil and post-disaster waste in several areas where the issue is more of a priority. They are selected through a preliminary study.

ACTIVITIES



- The project action plan is based on three sectoral thematic areas: **marine debris, waste oil, post-disaster waste,** and a cross-cutting theme concerning **sustainable financing methods**
- Implementation of a **grant to SPREP,** an intergovernmental organization led by UNEP and the South Pacific Community (SPC), which has a mandate to promote cooperation between the PICTs and **provide technical assistance to national policies** in the environment and sustainable development sectors.
- Creation of a **regional training program:**
  - Knowledge sharing
  - Preparation of pilot projects
  - Focus on the aspects of climate change adaptation.
- Creation of a **community of waste experts to facilitate the dissemination of knowledge** among decision-makers
- Project to strengthen capacities and incubators for "waste solutions" comprising a **call for pilot projects** in the field of waste management
- **Financing of three to six pilot projects** for solutions adapted to waste management, focused on waste oil, marine debris and post-disaster waste.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EXPECTED IMPACTS

- **200,000 people** with an improved quality of life through access to essential public services
- **10 structures** benefiting from capacity building.

LESSONS LEARNED AND PROSPECTS

- The project is complicated to implement (multi-country and difficult to access), but its success is based on a **quality partner** (SPREP) and **effective technical assistance**
- The area of operation selected using a preliminary feasibility study and synergies to maximize the expected impacts
- The **organization of experience sharing sessions** and training on the three themes covered by the project will build the expertise of the PICTs and structure their waste management operations.

The project aims to initiate a waste management movement adapted to small island Territories. By contributing to reducing and recovering waste that degrades natural environments, the project will have direct effects on the environment, the fight against climate change, living conditions and natural resources at local level. The effects on ecosystems and biodiversity contribute to producing global public goods. In the longer term, it will have an impact on the quality of life of the most disadvantaged populations, which are more dependent on the quality of natural environments and subsistence ecosystem services.

Appendix – Sheet n° 4

Priority solid waste management improvement program in Jordan

AREA OF OPERATION

Jordan

East region

PROJECT IDENTIFICATION

SoWP - Solid Waste Project

2017-2024

BENEFICIARY/ CONTRACTING AUTHORITY

MoLA - The Ministry of Local Administration

FINANCING

€55.3 million of European grants delegated to AFD

The program is supporting the implementation of the national solid waste management strategy through an integrated operation that aims to rehabilitate transfer and treatment facilities in the north and center of the country and build the capacities of the national and local authorities.

LOCAL ISSUES

- The country is undergoing **constant population pressure** related to various waves of refugee populations, exacerbated in recent years by the Syrian conflict
- The **new consumption patterns** brought about by economic growth are significantly increasing the tonnage of waste produced
- Jordan is **insufficiently equipped with infrastructure in line with international standards**. There is little or no control of the dumps which has major impacts on the environment
- Essential services are not fully provided in the areas subject to strong population pressure. The **lack of waste treatment capacity** in the north regions is estimated at about 20% of the waste produced
- The **pollution generated by waste**, in particular on the uncontrolled dumps, gives cause for concern from both a health and environmental perspective.

OBJECTIVES

Increase the waste treatment capacities in the areas under pressure in the north of the country.

Develop **environmentally-friendly and financially sustainable** transfer and treatment systems.

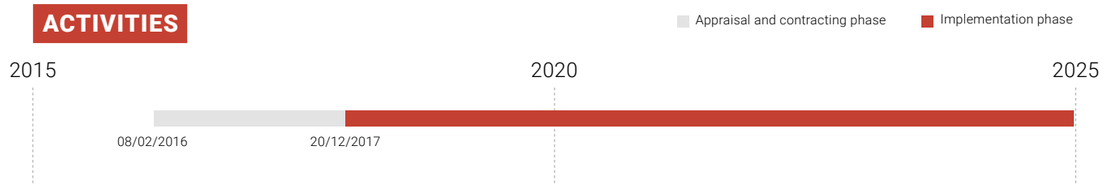
Build the capacities of the Jordanian authorities for solid waste management.

REGULATORY FRAMEWORK

- Improving solid waste management is a **priority objective of the Jordanian Government**, which approved its national strategy in 2015 with the objective, in 20 years, of moving from "a management of old, inefficient, costly and environmentally unstable dumps to a modern and integrated management, based on the principle of the 3R"
- This strategy is implemented in the country through **three regional plans**. The plans for the North and Center regions have been developed with support from the EU (European Union). The plan for the South region is currently being prepared with AFD financing
- A **framework law for solid waste management** came into force in 2020, which has strengthened the legal and regulatory framework of the sector in Jordan.

The project is part of a more comprehensive €100 million EU operation that also comprises €40 million of sectoral budget support which is contributing to structure the sector in Jordan.

ACTIVITIES



- **Rehabilitation and closure** of old dumps
- Creation of **new storage capacities in line with international standards** at the Al-Ekaider and Al Husayniyat sites for the medium/long term
- Creation of **transfer stations** in the north and center of the country, streamlining the organization of the solid waste management sector
- **Training and capacity building** for the teams of the MoLA, Ministry of the Environment, Joint Services Councils (JSC) and municipalities responsible for solid waste management
- Support to the authorities for the **overall financing of the sector** and private sector involvement
- Creation of a **project management unit** (PMU) at the MoLA responsible for the implementation of the project and composed of officials who are national and international experts. This PMU precedes Jordan's Solid Waste Management Department.

EXPECTED IMPACTS

- **3 million** people with an improved quality of life through access to an essential public service
- **4 national and local structures** responsible for solid waste management benefiting from capacity building
- **290,000 TeqCO$_2$ avoided** each year on average.

LESSONS LEARNED AND PROSPECTS

- Establish **partnership relations with the many technical and financial operators** (EU, GiZ, Austrian cooperation…) involved in the solid waste issue in Jordan and develop essential work on inter-donor coordination **for the Jordanian authorities**
- Establish the basis of a **constructive and balanced partnership between the public and private sectors**
- This **cooperation could be continued in the south of the country**, based on the recommendations of the regional solid waste management plan which is currently being prepared for this region.

The SoWP will have a significant impact on waste management in Jordan. In the north and center regions, it will make it possible to move away from an emergency management and in the long term will contribute to structuring and rationalizing the sector. It will also drastically reduce the negative externalities on the environment and health of people and will promote private sector involvement.

Appendix – Sheet n° 5

Promoting integrated waste management in Senegal

AREA OF OPERATION

Senegal
(Dakar and 3 regions: North, Thiès and Casamance)

Africa region

PROJECT IDENTIFICATION

PROMOGED – Project for the Promotion of Integrated Management and Economy of Solid Waste in Senegal

2020-2026

BENEFICIARY/ CONTRACTING AUTHORITY

Government of Senegal/Solid waste Management Coordination Unit (MCU)

FINANCING

€235 million
(€40 million of AFD loans +
€105 million World Bank +
€40 million AECID + €50 million EIB)

The PROMOGED initiative aims to support the efforts of the Government of Senegal and municipalities for waste management, improve the well-being of people through better access to essential services and reduce the pollution generated. On the outskirts of Dakar, the uncontrolled landfill in Mbeubeuss receives the waste of over 3 million people every day. This amounts to about 80% of the total solid waste generated in Senegal.

LOCAL ISSUES

- **The increase in the urbanization rate** has led to a reduction in extreme poverty and **significant economic growth** (6%), but inequalities persist
- The rapid growth of cities has not allowed municipalities to adapt and there is a **lack of access to essential services**
- Access to the **waste collection service is very unequal** (84% in Dakar and 22% on average in secondary cities)
- The **weak performance of the waste sector** has major impacts on the socioeconomic situation of the country and on the environment
- People in precarious situations, women and children in particular, who account for a large proportion of the informal collectors and waste pickers, are **the most vulnerable**
- There is a major **climate risk**. Mitigation actions are essential.

OBJECTIVES

Provide **integrated solutions** throughout the sector.

Improve the **regulatory, financial and fiscal framework** of the sector.

Develop **partnerships between the public authorities and private sector**.

REGULATORY FRAMEWORK

- The **Senegalese Government** has demonstrated its commitment to take action in the sector via a National Solid Waste Management Program (PNGD), launched in 2014
- The financing plans and equipment available in secondary cities are **very inadequate** in comparison to the needs
- It is essential to unleash the **potential of the private sector response** in terms of the creation of infrastructure and service provision, alongside and in coordination with public investment.

The PROMOGED project aims to cover every aspect of the sector and adjust its activities to allow the public and private sectors to coordinate their operations, in order to increase access to waste management services for all and develop climate change mitigation and adaptation initiatives in this sector (sorting, recycling, etc.).

ACTIVITIES

- **Secure the landfill** in Mbeubeuss to address the emergency situation and with a view to its rehabilitation and revegetation at the end of the project
- Development of a **public-private partnership** to manage the design, construction, operation and financing of a new waste management system in Greater Dakar
- Operationalization of **good practices**
- Creation of **inter-municipal governance agreements** in the regions to optimize costs and address the scarcity of land, with the development of management and financing plans
- **Technical assistance** to strengthen the institutional framework: regulatory and legal framework updated and improved and capacity building for governance
- Strengthen the framework of **public-private partnerships**
- Specific activities (particularly in the plastics sector) – **project labelled Clean Ocean Initiative (COI)**
- Creation of a **social program** for the reintegration of waste pickers.

EXPECTED IMPACTS

- At least **6 million** people with an improved quality of life through access to essential public services
- **6,800** people whose income-generating activities have been supported
- **134** structures benefiting from capacity building
- **542,285 TeqCO$_2$** avoided each year.

LESSONS LEARNED AND PROSPECTS

- Increased communication and the **full inclusion of citizens** in the project are essential to the achievement of the objectives set. The comprehensive social plan will ultimately **allow the closure of the landfill in Mbeubeuss**, while respecting populations
- The integration of gender inequalities will bring about **significant progress in terms of equal pay and training**, and increase the participation of women in stakeholder meetings
- Projects with such high amounts require a **particularly thorough structuring of the financing plan** to ensure a rational and efficient use of the allocated funds.

The implementation of the major PROMOGED project for Senegal will have a positive impact on all the municipalities in the country, which will benefit from a clearer institutional mandate for SWM in the country, an enhanced regulatory framework, a more effective mechanism for the mobilization of resources, as well as a framework conducive to public-private partnerships.

Appendix – Sheet n° 6

Improving waste management in the Gaza Strip (Palestinian Territories)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AREA OF OPERATION

Gaza Strip, Palestinian Autonomous Territories

East region

PROJECT IDENTIFICATION

Solid waste Gaza

2013-2021

BENEFICIARY/ CONTRACTING AUTHORITY

Municipal Development and Lending Fund (MDLF)

FINANCING

€25.6 million
(€10 million of AFD grants + €4.75 million of EU grants + $10 million of grants from the World Bank and Swedish Government + $0.7 million UNDP and UNRWA)


@ RR

Waste management is a major challenge for the Gaza Strip, where there is a growing population and particular living conditions related to a recurrent context of crises and conflicts. The waste management facilities (collection and controlled landfills) are no longer sufficient and do not comply with standards. AFD and its partners are supporting their upgrading in the center and south of the Gaza Strip. This project is improving living conditions for people and the environment by limiting soil and subsoil pollution.

CONTEXT AND LOCAL ISSUES

- With the **doubling of the population** by 2040, the **household waste produced is projected to increase from 1,500 to 3,500 tons** a day
- The blockade of the territory by Israel, despite its support for the project, makes it difficult to **acquire essential equipment and materials**
- There are very limited material and financial resources and the **collection rate from households is low**
- The permanent presence of illegally dumped waste on the streets **causes diseases and disturbances:** odors, insects, proliferation of rodents…
- Residents **regularly burn their waste** to get rid of it, causing significant damage to health and the environment
- **Water resources**, which are already scarce, are subject to major pollution.

OBJECTIVES

Give residents **decent living conditions** and create jobs.

Protect water resources and the environment.

Optimize structures to **cope with the political blockade**.

REGULATORY FRAMEWORK

- A National Solid Waste Management Strategy has been in place in the Palestinian Territories since 2010. It provides an **overview of the sector and the strategic guidelines**
- **The competence for waste management is shared** between the local authorities, which are responsible for primary collection, and the Joint Service Council (JSC), which is responsible for secondary collection, the recovery and final treatment and the disposal of household solid waste.

The lack of financing for municipalities and urgent nature of the situation require the intervention of bilateral and multilateral donors.

ACTIVITIES

- Construction of the **landfill** in Al-Fukhari and the provision of the equipment required for its operation (operating machines, vehicles and various equipment)
- Construction and/or rehabilitation of **two transfer stations** (Rafah and Khan Younis) and purchase of collection vehicles
- **Rehabilitation of access roads** to the landfill and transfer stations
- **Technical assistance for the operation** of the landfill and transfer stations
- Cleaning of 17 illegal dumps. Closure and **rehabilitation of the landfill** in Sofa (Al-Fukhari)
- Launch of **deux studies** on the Gaza Strip:
  - Study on the optimization and restructuring of the collection and cleaning service;
  - Study on the structuring of the recycling sector.
- **Institutional and operational assistance** to the inter-municipal management bodies responsible for collection
- Development of a **plan to acquire the land** required for the creation of the new landfill
- **Awareness-raring campaign** for the general public and schools
- Continuation of **information and awareness-raising campaigns for municipalities** on the management of the stages in the sector and its financing, as well as cleaning public spaces
- **Financial support** for the start of the operation (two years, provided by the World Bank).

LESSONS LEARNED AND PROSPECTS

- **The technical quality and interest shown by all the partners** and technical and institutional stakeholders, and in particular JSC (responsible for monitoring the project and the final beneficiary), have led to the achievement and success of this project
- However, there are possible **risks concerning the long-term operability and sustainability of the equipment**, related to the security and institutional context which may be affected by the local geopolitical environment
- The **future financing of the sector**, allowing a proper maintenance and operation of the facilities, remains a challenge, despite the financing provided by the World Bank for a period of two years. The economic and fiscal context will certainly need to be reviewed.

The implementation of the project financed by AFD and all its partners will have a positive impact on all the municipalities in the Center and South regions of the Gaza Strip, which will benefit from an enhanced regulatory framework and the equipment required for an appropriate solid waste management. Despite a complex political context, this project will really improve the situation in terms of the health and quality of life of residents in these regions.

EXPECTED IMPACTS

- **950,000** people with an improved quality of life through access to essential public services
- **2,200** people whose income-generating activities have been supported
- **2** structures benefiting from capacity building
- Several awareness-raising campaigns for the general public and schools.

Appendix – Sheet n° 7

Developing the sector for recycling food waste from catering in Shaoyang

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AREA OF OPERATION

Shaoyang, China

East region

PROJECT IDENTIFICATION

Waste Shaoyang

2017-2022

BENEFICIARY/ CONTRACTING AUTHORITY

People's Republic of China

FINANCING

€30.1 million
(€25 million of AFD loans +
€5.1 million of self-financing)


@Alexandra Monteiro

The Food Waste Commission of the Chinese Environmental Association estimates that over 40 million tons of food waste from catering are produced nationwide every year, with a growth rate of about 10% a year. Food waste from catering is still very rarely subject to a dedicated treatment and is landfilled, incinerated or used to feed farm animals.

LOCAL ISSUES

- The increasing wealth of Chinese people and development of the middle class have led to **rapid growth in the catering sector**
- Food waste and waste oil from restaurants are collected informally then illegally sold and reused
- The informal system for the collection of waste from catering is **a major public health challenge in China**
- The food residues are used to feed farm animals, with risks of causing diseases such as the mad cow disease. The oil is filtered, treated, then sold to restaurant owners who reuse it for cooking, causing **major health risks**.

OBJECTIVES

Set up a sector for the separate collection and recycling of food waste from catering.

Reduce public health risks.

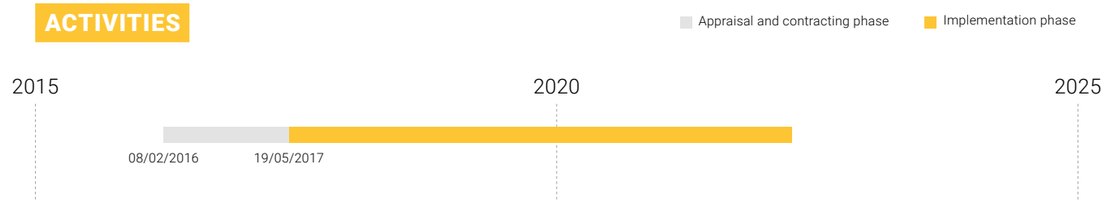
Reduce CO_2 emissions.

REGULATORY FRAMEWORK

- **Chinese law obliges restaurant owners to separate their food waste, keep a follow-up register** (quantity and composition) and prohibits them from giving/ selling this waste to collectors
- **The local authorities control the flows of food waste from catering** and fight against the collection, production and illegal sale of waste oil
- The country's objectives focus on improving the treatment of food waste and include **the creation of 118 organic recycling plants**.

Despite a highly structured regulatory framework and a waste recycling sector which is developing, the competition from informal collectors in the recovery of food waste from restaurants prevents a proper application of standards and there continues to be a major public health risk.

ACTIVITIES



- Introduction of a **selective collection system** (acquisition of 36 collection trucks and 5,620 collection bins), computer tracking and the transfer of food waste from catering to the treatment site 21 km away
- Construction of a **treatment plant using anaerobic digestion**, preceded by a hydrolysis phase, then the **recovery of the biogas** (from the process and capture of the biogas from the adjacent landfill)
- Installation of a **cogeneration unit** (production of heat and electricity) using the biogas produced from an anaerobic digestion of the food waste
- **Collection and pretreatment of waste oil** from catering (fatty oils and cooking oils), then sale for the production of biodiesel
- Mobilization of external support to the contracting authority to carry out **environmental monitoring**
- Financial viability ensured by a household **waste collection tax** partly financing the operating cost
- Operating costs reduced through the **sale of by-products** acquired after the treatment: cooking oils, fatty oils, electricity, heat.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EXPECTED IMPACTS

2 million people with an improved quality of life through access to essential public services

50,000 TeqCO$_2$ avoided each year

174 jobs created in the long term

114,480 TeqCO$_2$ a year avoided in the atmosphere.

LESSONS LEARNED AND PROSPECTS

- A project on this scale requires **the presence of a permanent contracting authority** which, in partnership with the final beneficiary of the project, must be able to ensure the coherence of each stage. The assistance to the beneficiary with the **application of satisfactory environmental and social measures** is key to the success
- The project uses an innovative process in a province (Hunan) which has very few facilities like this. It is the first pilot project integrating a cogeneration component.

The project will improve the quality of urban services in the city of Shaoyang and will contribute to reducing health risks related to the collection and use of waste and food oils in the pig industry. It will thereby have a positive impact on public health and improving the quality of life of residents. It will also have a positive effect on the climate by reducing the biogas discharged into the atmosphere.

Appendix – Sheet n° 8

A policy-based loan to Costa Rica for a green transition


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The policy-based loan (PBL) allocated to Costa Rica aims to bring about a change in the national regulatory framework in terms of solid waste management, sustainable construction and a fair transition. This support aims to assist with the implementation of the National Decarbonization Plan, while proposing a mainstreaming of the gender issue.

AREA OF OPERATION

Costa Rica

Latin America region

PROJECT IDENTIFICATION

PBL Sustainable trajectory

2021-2023

BENEFICIARY/ CONTRACTING AUTHORITY

Republic of Costa Rica

Climate Change Directorate of the Ministry of Environment and Energy (MINAE/DCC)

FINANCING

€151.73 million
(€150 million AFD loan + €1.73 million AFD grant)


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LOCAL ISSUES

- **Costa Rica is one of the 20 most vulnerable countries to climate change**
- **Extreme hydro-meteorological phenomena lead to major financial losses**, estimated at $30 billion by 2080
- **Sharp growth in GHG emissions has been recorded** in recent years in Costa Rica, in particular due to the energy, construction and waste sectors
- Despite inclusive public policies, **the economic participation of women still remains low**.

OBJECTIVES

Assist the Government with **the implementation of the decarbonization policy** for its economy in two highly emissive sectors (waste, construction).

Support the **development of the circular economy** by recycling and recovering waste.

Promote a **fair transition and gender equality**.

REGULATORY FRAMEWORK

- **Costa Rica has approved an ambitious National Decarbonization Plan (NDP)** which targets carbon neutrality by 2050
- **Several regulatory and strategic plans aiming to promote the circular economy have been prepared** (including a national composting plan), with major objectives for recycling, recovery and reuse
- **Costa Rica signed the Global Methane Pledge at COP 26**, pledging to reduce its methane emissions by 30% by 2030
- After becoming an OECD member in 2021 and with the social consequences of the Covid-19 health crisis, inclusion, **a fair transition and gender equality have become a national political priority**.

The country is a global leader in the low-carbon transition, but requires financial support to achieve its objectives.

ACTIVITIES

This PBL arrangement comprises a **budget loan, a multi-year public policy dialogue and a technical cooperation program** aiming to assist the local partner with the achievement of development objectives defined in a jointly built matrix of indicators:

- Support for the **creation of circular economy sectors** for household and assimilated solid waste:
  - Promotion of sorting and recycling units
  - Promotion of organic waste recycling
- Technical cooperation with the Climate Change Directorate and other public stakeholders to:
  - **Promote waste recovery** through composting and recycling
  - Consider **alternatives to landfill disposal**
  - Promote the process for the **active capture of the biogas** produced on landfills from present or future waste in Costa Rica

Program of training and inter-community exchanges of good practices to **promote the circular economy, recover materials and reintegrate second-hand goods** into the market

Creation of a methodology with an inter-sectoral approach to take **greater account of gender and a fair transition** in solid waste management projects

Continuation of a **public policy dialogue** aiming at the achievement of the country's decarbonization objectives.


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EXPECTED IMPACTS

- **42** structures should benefit from capacity building.

LESSONS LEARNED AND PROSPECTS

- The project should **substantially reduce greenhouse gas (GHG) emissions related to the waste management and building sectors** and aims to lead to the construction of new waste recycling centers
- A **better integration of gender and vulnerable people** is expected through the monitoring of the action plans
- The training and awareness-raising activities will ultimately promote a **better integration of the circular economy by civil society**.

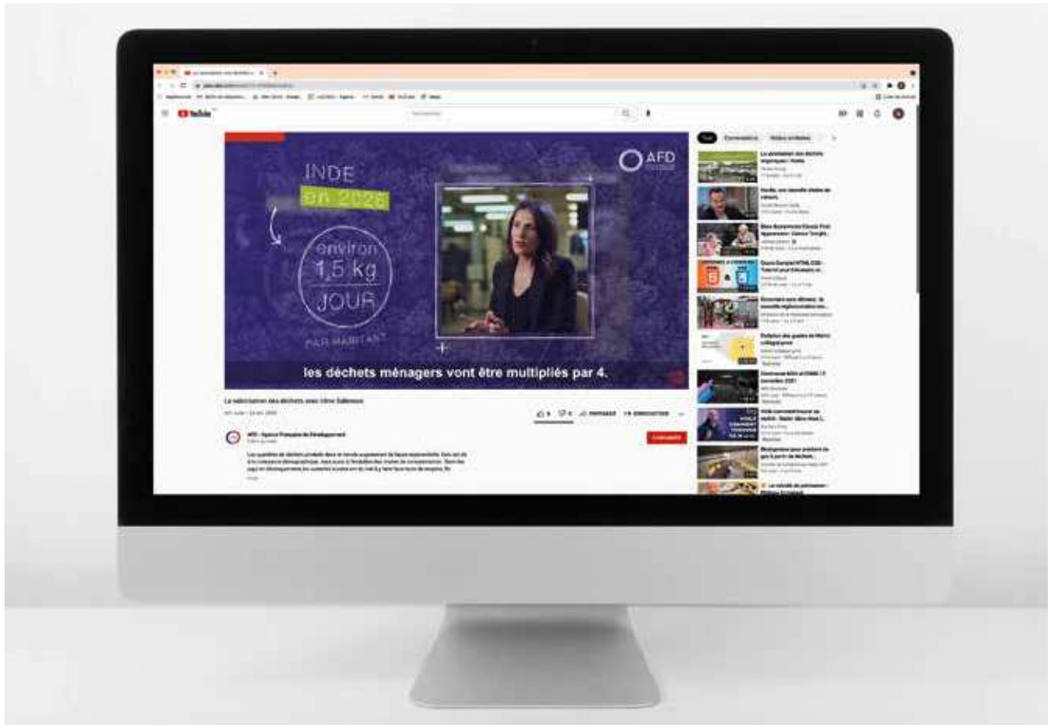
The project aims to establish a better control of the circular economy in terms of waste management in Costa Rica. It will reduce the climate impact of the solid waste and building sectors and improve the fair transition and gender equality, by using public policies as a driver for action. The development of a sound regulatory basis could consequently enable future sustainable public operations.

RESOURCES FOR MORE INFORMATION

MULTIMEDIA MATERIAL

VIDEOS

YouTube
La valorisation des déchets avec Irène Salenson
AFD, 2020



PODCASTS

L'écologie… Oui, et à quel prix ?
Institut Sapiens, participation of Alexandra Monteiro (AFD), 2021

7 milliards de voisins – Peut-on se passer du plastique ?
RFI, participation of Mélanie Grignon (AFD), 2021

NOTES AND PUBLICATIONS

INSTITUTIONAL PUBLICATIONS

Methodological guide - Integration of informal actors into waste management projects in emerging countries, AFD, 2021

Covid-19: solid waste management in response to the crisis, AFD, 2021

Focus – Sustainable Cities, AFD, 2021

RESEARCH DOCUMENTS

Diverting Solid waste – Socio-technical innovations in cities of the global South
AFD, 2019

Du rebut à la ressource
AFD, 2018

Waste, how much does it cost?
AFD, 2018

Urban Waste: between decentralized management and commons
AFD, 2018

PRIVATE SECTOR AND DEVELOPMENT MAGAZINE

Waste: the challenges facing developing countries
Proparco, 2012

URBAN DEVELOPMENT PUBLICATION

What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050
World Bank, 2018

For a World in Common

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