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Policy brief 2 and its technical notes

This publication was funded by the European Union.
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This policy brief and its technical notes were developed under the specific SIEA 2018 Framework contract number 300020766.

Title: Waste Governance: Technical Assistance to the EUD (Expected Result 2)

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> Waste management data are critical to creating policy and planning for the local context. Understanding how much waste is generated - especially with rapid urbanization and population growth - as well as the types of waste being generated, allows local governments to select appropriate management methods and plan for future demand.
>
> **What a Waste 2.0 – World Bank Group, 2018**

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A.

Context

Unsustainable waste management imposes major burdens on natural ecosystems, threaten public health, and impede efforts to achieve circular economies. Poor waste management services have severe environmental, health and social costs, estimated to be more economically damaging than the costs of bringing these services to healthy levels (Wilson and Velis, 2015). Lebanon is no exception, as the solid waste situation has always been problematic. The solid waste management (SWM) sector presents significant challenges underpinned by a weak environmental governance, lack of data, ineffective public participation, lack of coordination, inefficiency in decision-making as well as conflicting interests. The absence of objective environmental management standards and procedures, as well as the policy-making process characterized by weak transparency and accountability mechanisms, allow politicians and authorities to interfere with the outcomes of any scientific discourse favoring the interests of individual or special groups without any account for collective welfare.

In the absence of a political consensus regarding environmental decision-making, the country ran on “emergency decisions” and “emergency plans” for long decades. The subsequent waste crises and volatile decision processes in managing the sector have had long-term impacts on the citizens who lost trust in the government authorities to offer sustainable solutions. After extensive efforts, the solid waste Law No. 80 was ratified in 2018. It underlined progressive principles that would help initiate a paradigm shift, emphasizing integrated household SWM, the reduction, reuse and recycling, sustainability, precautionary measures, prevention of uncontrolled dumping, landfilling and burning, polluter pays principle, as well as decentralization. Despite some critics, this law is regarded as a core pillar for future legislative improvements. For effective implementation, the law requires a comprehensive financial feasibility study including a cost recovery system along with a strengthened regulatory and institutional framework and an improved enforcement capacity. All these are constrained and delayed due to the sinking into the impediments of unresolved political debates. Recently, the progress on this path was hindered by the growing economic crisis, followed by the Covid-19 pandemic and lockdowns. In 2020, a technical committee was established to support the household SWM ministerial committee and propose necessary amendments. The committee issued its final report whereby a 2020-2030 roadmap was suggested addressing technical measures, infrastructural gaps by governorate, institutional and legal aspects, along with the financial and economic issues. At the financial level, the most critical concerns include

reimbursing the contractors and municipalities, deferring the municipalities debts, and verifying the SWM cost while assessing the share paid to provide waste services to the refugees – with the intent to demand the assistance of funding from international organizations. A revised national integrated solid waste management strategy (ISWM) strategy with a cost recovery law and a national master plan are under development. Nonetheless, still today, the waste continues piling onto the streets and the government's short term resolution lingers around expanding the capacity of the existing landfills, as another 'emergency' solution while waiting for solving evolving economic and political issues.

B.

Analysis

B.1. Responsibility for financing the waste sector

With no systematic monitoring of the waste sector, various studies project different amounts of waste generation figures. According to the latest State of the Environment Report, about 2.7 million tons of municipal solid waste (MSW) are generated annually, of which only about 20% are diverted from disposal, while 44% and 36% end in landfills and dumpsites, respectively (UNDP-SOER, 2020). Yet, most of the waste sorting and treatment facilities have stopped upon the economic crisis, after 2019-2020, leading to increased rates of landfilling and dumping. Considerable amount of special wastes (healthcare, hazardous, electronic and electric waste, etc.) end up in the MSW stream. Additionally, the huge influx of refugees has had severe impacts on the waste sector, comprising health and safety. With the increase in waste generation, additional tons should be collected, sorted and disposed. These services come at a cost that spends a substantial proportion of the operational budgets available to municipalities. Efforts to reduce waste remains a major challenge in the aim of enhancing the SWM chain management and its cost-effectiveness. Strengthening the database in the sector, investigating the financial feasibility to ensure cost recovery, as well as introducing incentives and economic tools are critical. Thus, financing waste management services is critical for the sustainability of the operations. Many actors are responsible for the environment-related spending through allocations of government funding to line ministries, the Council for Development and Construction (CDR), the Council of the South (COS), the Central Fund for the Displaced (CFD) as well as the government treasury through the fiscal replenishment of the Independent Municipal Fund (IMFU). Weak institutional capacities, complex legislations and regional disparities in the expenditures of solid waste-related investments have created a blurred fiscal relation between the government and local authorities. The responsibility for the financing of the waste sector should be shared between the state and the municipalities.

- State policy must oversee the enforcement of environmental objectives while providing financial support. Environmental protection has paramount implications on the national economy (Appendix 1). The financial instruments of the state should be carefully considered. Governments can influence the societal impacts on environmental development through various policy instruments geared to limiting resource consumption through the introduction of a commodity tax, limiting the release of waste into the environment through special levies, taxation of landfills or mandatory environmental licenses, promoting environmental measures such as recycling through a specific charging system in order to close the loop from the waste generation to secondary material production.

- The financial organization of the waste services should be managed by the municipalities taking into account the financing of the services citizens receive for their wastes (provision of waste containers, emptying and transportation of the collected waste to the disposal facilities) and the financing of municipal investments into enhanced SWM solutions (appropriate infrastructure, purchase of waste collection equipment, as well as the establishment, operation and maintenance of disposal and treatment facilities). Waste management related services for citizens should be levied to the citizens by the way of dedicated fees specified in municipal waste laws and regulations. For the expenses in infrastructure investments and improved SWM solutions, municipalities have to employ satisfactory financing models that consider the advantages and risks associated with the respective application and investment.

B.2. Strategies to financial feasibility of the waste sector

In the midst of the worst economic crisis the country is witnessing, the waste sector is funded through many sources that need support to increase available resources. These include the national budget through the tax system, the municipal revenues from the IMFU and the local waste fee "arsifa wa majarir", projects funded by international donors, gate fees charged at landfills and other SWM facilities, as well as sale of recyclables. Strategies are currently needed to increase revenues for SWM. These may include:

- Committed add-on to existing taxes - the VAT and the arsifa wa majarir fee – to provide additional revenue for redistribution to municipalities through the IMFU.
- Mainstreaming a landfill tipping fee to create an incentive to recycle and reduce the amount paid. Such fees could be differentiated with higher rates for recyclables that are being landfilled although differential fees would be difficult to apply as this involves sorting waste to determine the quantity of recyclables before tipping.
- Allowing waste collectors and landfill operators to retain returns from selling recyclables. This can create financial incentives to recycle rather than landfilling waste that can be reused.
- Both Pay As You Throw (PAYT) waste management charges and charges associated to another bill (possibly landlines or mobile phones) should be considered. Although the former charges are more desirable, they are harder to implement; however, they could be introduced for commercial organizations. Charges associated to another bill do not encourage waste reduction or recycling, but they constitute an efficient way to generate revenues if carefully implemented considering the citizens' ability to pay.
- Packaging taxes and deposit-refund system are both simple and effective ways to reduce material use, diminish waste disposal, and promote recycling.
- Extended Producer Responsibility (EPR) systems may also be useful to ensure recycling of specific packaging material. Feasibility studies should be carried out on the implementation of EPR systems.

The Law No. 80 and the corresponding ISWM endorse fundamental concepts such as the 3R principles (reduce, reuse, recycle), the polluter pays principle, economic instruments and circular economy. These approaches and principles, along with decentralization, provide substantial funding prospects. Such opportunities comprise investments in waste treatment, technical innovations, secondary raw material markets, enhanced service quality as a result of competition, as well as incentives for small businesses and/or local initiatives in waste reduction and sorting. Moreover, additional opportunities are driven by the availability of funding for consulting and contracting from international development partners involved in the sector.

C.

Recommendations

The solid waste sector in Lebanon continues to face non-ending serious challenges. Despite the enactment of the SWM law, the institutional framework is weak and cost recovery for waste disposal and treatment is lacking. SWM services are provided by the private sector through regional contracts adding up monopoly privileges and reducing competition, hence efficiency. The comprehensive costing of the waste management plan, the cost/benefit and cost-effectiveness analyses of the different options of SWM treatment and disposal, the cost recovery opportunities, and the institutional framework, are all overlooked due to time constraints and the need for 'emergency' solutions. Pursuing this approach will not provide effective solutions to the sector unless concrete steps are taken so that the legal, regulatory, and institutional design for waste management is set up and reinforced by cost-efficient investments in waste services. The approach adopted for solid waste disposal needs to be reformed.

Reaching financial sustainability cannot be achieved by solely increasing government investments in the sector. It also requires meeting socioeconomic criteria by setting priorities for investments, reallocating the O&M costs, devising a financial management system on the basis of well-defined priorities and outcomes. The lack of large state budget interventions is a challenge, but the insufficient cost recovery constitutes a greater challenge. An integrated SWM strategy should provide the available alternative options for the government to weigh budgetary interventions and optimize investments based not only on financial costs but also based on economic, social and environmental benefits. Changes are indispensable in the processes that the government uses to manage its social and economic development as well as in the way it makes choices among competing priorities. There is a need to adopt a systematic approach in which investments in the sector can be recovered while maximizing environmental benefits, in such a way that the environment turns out to be an asset for socio-economic development.

Sustainable policies related to public expenditures and institutional capacity in managing the sector are essential to maximize the Return on Investments (ROI). Policymakers should take actions on the insights emerging from the data, metrics and fact-based analysis in order to refine target policy agendas and facilitate communication with key stakeholders. Rigorous environmental indicators monitoring the waste generation, disposal, and recycling are indispensable to allow tracking trends, identify emerging problems, assess the success of interventions, ensure that investments offer the greatest returns possible, and enhance environmental decision-making. It is important to empha-

size that the current transformation in the direction of a circular economy and the subsequent initiatives towards the efficient allocation of resources indicates pursuing waste prevention, minimization, and circularity. To ensure a reduction in waste generation, it is essential to endorse new consumption patterns that are supported by all economic stakeholders, including consumers and producers. Proper infrastructure, institutions, regulations, and financing are necessary but not sufficient to mitigate end-of-life (EoL) environmental impacts without consequential changes in how people generate and dispose of waste. Social, psychological, and cognitive constituents of human behavior can impede any improvement. & OPPORTUNITIES

Much of the needed behavioral change is driven by policy and regulation, including policies promoting landfill diversion, recycling and material recovery, waste prevention and minimization, and voluntary schemes efforts around social responsibility and environmental action. Nonetheless. recent literature reveals that when such traditional instruments are complemented by behavioral change tools, the implementation of public policies are enhanced. An efficient system of waste collection and disposal remains a keystone to ensure the financial feasibility of the waste sector; yet, socially driven behavior change are pertinent particularly in the context of countries where widespread dumping and burning of waste are still high and where it may be early to apply advanced policy instruments, such as the case in Lebanon.

In addition to strengthening environmental governance, designing cost recovery mechanisms and implementing economic tools such as the Extended Producer Responsibility (EPR) and recycling solutions are key pillars to policy reforms that contribute to behavioral change, cost-efficiency, and to the maximization of environmental benefits and financial sustainability in the waste sector. Below are key recommendations based on the technical notes detailed below.

1) At the national level:
   - Introducing institutional, legal, and technical reforms related to the sector and developing performance indicators for the monitoring of service delivery.
   - Establishing performance indicators and a Waste Information System (WIS) for the monitoring of waste services.
   - Creating partnerships with the private sector - Public Private Partnerships (PPP) – can provide an efficient model for development cooperation. Involv¬ing the private sector can reduce monopoly power and lead to efficiency gains where competition, transparency, and accountability prevail.

2) Cost Recovery:
   - Municipalities need to increase their financial resources to meet their obligations instead of solely depending on government subsidies. Before considering increasing taxes, municipalities should reduce shortfalls in their collection of revenues and cut back in costs by avoiding ineffective expenses – including those due to less-than-optimum collection systems, non-sustainable source-sorting and awareness initiatives, among others. Understanding the expenditures is crucial to develop and implement strategies to cost recovery. Thus, there is a need to monitor expenditures on the various components of SWM services.

- Designing an affordable fee for cost recovery. Municipalities need to levy user fees to recover full or partial costs of waste services, provided the offered service is affordable and delivered to citizens at a satisfactory quality. They should cautiously consider how much they can charge fees for waste services in synergy with other authorities who have recently increased fees for other services as a result of the economic crisis and currency devaluation. The citizens' ability to pay requires careful consideration during the economic downturn the country is witnessing.
- Besides user charges, there is a need to consider various ways to raise funding from national or international programs.

3) Use of economic instruments: Implementing comprehensive financial solutions through the use of various economic instruments and based on a realistic business model with social and technical interventions.

4) Designing EPR schemes: Implementing policies aiming to minimize environmental impacts and waste generation through EPR schemes for cardboard and paper waste (CPW), e-waste, and other waste streams such as plastic, glass, and tires.

5) Implementing downstream recycling solutions: Recycling of waste helps decrease the quantity of waste to be disposed of in landfills and increase the lifespan of sanitary landfills. There is a need to design a feasible framework and awareness campaigns that aim to: a) foster source separation of wastes, b) create proper incentives to encourage recycling and c) develop standards for composting.

D.

Technical Note 2.1 – Cost recovery

D.1. Insufficient resources and failure in recovering costs

Despite efforts to appropriately manage the waste sector since the 1990s, the legislative and institutional reforms for cost recovery have failed to-date in ensuring efficient gains for the sector.

- Decree 9093/2002 provides municipalities with an incentive to host a waste management facility. It offers a 5-fold increase in the planned IMFU allocation if the municipality establishes a sanitary landfill or a waste processing plant within the municipal cadastral boundaries and a 10-fold increase if at least 10 municipalities are allowed to dispose of their waste in the sanitary landfill or use the processing plant.
- The 2006 SWM Plan was based on the following principles: 1) recycling and composting to reduce the quantity of dumped waste; 2) distribution of recycling, sorting and composting plants on all cazas, with one or more sanitary landfill in each of the four service identified areas, and 3) providing incentives to municipalities whose lands will be used for sorting stations, composting plants, sanitary landfills or incinerator centers (on the basis of $2 per ton for hosting a sorting and composting facility and $4 per ton for hosting a sanitary landfill).
- The 2010 SWM Plan provides incentives to the municipalities that will host the SWM activities including Waste to Energy (WTE), segregation, composting, recycling and landfilling through an increase of IMFU transfers that will be determined by the MoF and the MoIM.
- The law 80 provides venues for financing, charges and incentives. In its article 28, it specifies that the implementation of the national strategy for integrated solid waste management and local programs can be funded from various sources, including the public budget, funds allocated to the National Solid Waste Management Authority, budgets of local administrations, loans and donations, the National Environmental Fund (once in operation), as well as private sector investments. As for incentives, article 29 states that ministries and administrations concerned with SWM should promote projects involving recycling, reuse and energy recovery by providing non-financial incentives such as streamlining licensing procedures for service providers and operators, importing the materials resulting from solid waste treatment, etc. It stipulates that ways of incentivizing SWM shall be determined by a decree to be adopted by the Council of Ministers (CoM) upon the proposal of the Minister of Environment.

Yet, the solid waste sector is still not financially sustainable and is continuously inflicting more burdens on public and municipal finance. There is no tax imposed on waste generation or landfilling, implying that the limited IMFU municipality resources have been real-

located towards the cost of waste treatment and disposal. Consequently, municipalities charge a fee for waste collection that represents a small percentage of the operation and maintenance cost. Given the insufficient resources and the failure to increase waste fees, most expenditures are covered by indirect taxes (through the IMFU) that could have been used more effectively in other sectors.

D.2. Cost recovery recommendations to ensure financial feasibility

To date, Lebanon faces challenges with the cost recovery law through tariffs/fees/taxes which remains under deliberation. A draft law is currently being investigated by parliament committees. Devising and implementing SWM charges on top of all additional charges that are levied after the economic crisis is not appealing to politicians who would face public resentment. Nonetheless, the parliament should ratify the cost recovery law and standard decrees for its application, as there is an urgent need to develop the implementation modalities and start collect fees to achieve financial feasibility of the sector. A legal framework for cost recovery should set up sources of financing and establish a valid cost recovery system that can be implemented. Critical elements are to be considered:

- If properly administered, user charges can be a justifiable means of cost recovery especially when effectively used as an incentive to encourage recycling and reduce waste generation, in a way that ensures that those who pollute more pay more (the polluter pays principle).
- The level of acceptability of the citizens for any fee is crucial. To increase awareness and ensure transparency, the fee should be distinctly recognizable by citizens as related to solid waste. This fee could be integrated in the electricity bill (as is the case in Egypt and Jordan) or other fee collection mechanisms could be implemented. Examples at a global level reveal that people are willing to pay for SWM services, so long as the costs and quality of the services meet their expectations.
- A critical issue to consider when designing the cost recovery law is the lack of trust of the majority of Lebanese in the central government and national agencies involved in the management of collective projects. Specifically, there is a general distrust of public officials that is at stake in issues related to the waste problem. A greater community engagement is necessary to ensure acceptance of the cost recovery law and to remedy the problem of public's distrust. It is through participative decision processes that public awareness can be improved and trust in government agencies can be restored. It is more likely that citizens will accept a new law if a public participation process is conducted. Improved communal awareness and intensive outreach programs can be useful to improve the citizens' WTP to cover the cost of waste service provision. Public engagement is essential to inform people about the cost of service and encourage them to share the cost in the form of user charges in order to sustain a good-quality service. A shaping strategy can be used by initially introducing a small charge to meet the O&M cost of waste collection. If good-quality service is reliably offered, citizens will be willing to pay the user fees without much resistance. Different monthly rates can be set for diverse groups of waste generators, such as households in poor communities, affluent households, shops and offices, as well as large commercial and industrial establishments.
- The endorsement of a cost recovery law in itself is not sufficient to successfully implement an integrated SWM system. The implementation necessitates the issuing of the necessary implementation decrees, setting the strategies and plans as well as the institu-

tional framework. Also, the government should be vigilant in designing the users' charges scale. The fees for a good-quality SWM service have to be affordable and flexible. They should be based on actual cost, technology adopted and location and they should cover, along with any governmental or international funding, the return on investment, the maintenance cost and the upgrading of the services. To ensure the financial feasibility, it is important that externalities are carefully considered in the cost recovery law.

D.3. Results of data collection related to cost recovery in selected municipalities

In the absence of a long-term solution, diverse international organizations have provided funding for technical and financial support to local initiatives in several Lebanese villages for SWM projects. Recognizing the need for a disciplined sorting at the source policy, a EU grant of around 14 million Euros was approved by the CoM in 2005 which allows the Office of the Minister of State for Administrative Reform (OMSAR) to implement a program and fund investment projects submitted by municipalities. To ensure the sustainability of the implemented projects, OMSAR conducted awareness campaigns to encourage local communities to separate their wastes at the source. Within this framework, a study was conducted (in 2010) in selected study areas; namely Ansar, Khiam, El-Marj and Jezzine to explore the determinants of waste management behavior, namely citizens' Willingness to Sort (WTS) their wastes at the source and the Willingness to Pay (WTP) additional fees for the municipalities to provide the sorting services (Appendix 2).

As a follow-up and to confirm the applicability, robustness and validity of the findings still as of today, an analogous study was recently conducted (in year 2024) with the mayors of 24 municipalities across all Mohafaza in Lebanon – as part of this proect. For the purpose of this study, interviews were conducted with the mayors to explore the material recovery from MSW and identify the gaps in the sector as well as the main source of income for the local authorities to recover the costs of their waste management system. The interviews also reveal the main financial, technical and social challenges related to the cost recovery system that is currently applied and the WTP of the local citizens (Appendix 3).

BOX 1

Results of data collection related to cost recovery in selected municipalities (Appendix 3)

- **Material recovery from MSW**
  About 56% of the studied municipalities have attempted to recover materials from MSW. The surveyed mayors expressed the negative impact of scavenging on returns from recyclables and their incapability to control these activities.
- **Gaps in the waste management sector**
  The mayors have considered the lack of a cost recovery system as one of the three main legal gaps in the sector. They identified the two other gaps as the implementation of decrees as well as the adjustment of the purchase limit of municipalities as specified by the MoF. About70% of municipalities rely on IMFU despite currency devaluation, with 85% unable to cover waste management expenses.
- **Willingness of the local community to pay waste management service fees**
  To improve the financial feasibility of the waste sector, about 37% of the municipalities attempted to impose service fees. Of those, about half were able to convince the local community to pay. Refer to the Appendix for percentage of citizens willing to pay (Appendix3, figure i). The majority of the interviewed mayors (48%) recommended a monthly fee of about $1 per household, whereas only 20% approved that $3 would remain feasible.
- **Challenges of waste storage, collection and treatment**
  - The interviewed mayors have conveyed that they are facing various financial, technical and social challenges related to the local ***waste storage and collection systems.***

    Financial challenges: related to the operational costs of waste storage and collection, budget needed for equipment.

    Technical challenges: about 74% of the mayors considered that the equipment currently used for waste storage and collection is inadequate.

    Social challenges: littering, the use of loosely sealed waste bags, rejection of nearby waste bins by local communities.
  - As related to the local ***waste treatment systems,*** about 85% of local authorities are not capable to pay the current expenses of waste treatment. About 80% of the local waste treatment facilities need upgrading and they are facing multiple financial, technical and social problems.

E.

Technical Note 2.2 – Economic Instruments

E.1. Designing economic instruments to ensure SWM financial feasibility

Improvements in SWM can be achieved with the right economic instruments and financial incentives. A comprehensive legal framework and proper tax and subsidy policies can encourage waste reduction / recycling, change the nature of products, transform waste streams, and reduce social costs. Appropriate economic tools can promote the use of recycled materials, and favor products manufactured with them. While regulations are essential, market and financial incentives can be even more effective in changing behavior and increasing waste diversion. Studies indicate that economic instruments are useful as they play a central role in recovering the operational costs of waste management (Nahman and Godfry, 2010). In addition to their significant contribution to the cost recovery, economic instruments provide strong incentives for waste reduction and recycling via change of behavior. By selecting the optimal pricing mechanism in a specific context, they can minimize waste generation avoiding adverse impacts, and they can strengthen resource recovery and recycling.

Recent scholarly works on environmental issues suggest that solutions should not only focus on economic tools, but rather on changes in people's behaviors. Given the embedded aspect of the commons as it relates to the waste problem, taking advantage of the distinctive characteristics of the different instruments, a mix of tools is most effective for developing a sustainable SWM system and strengthening policies that enhance social behavior and collective action. That said, efforts are necessary by bringing together various instruments i.e. regulatory (e.g. ban on single-use plastic, ban on open dumping, EPR, etc.), social (e.g. awareness campaigns, participatory decision-making process, etc.) as well as economic (incentives and disincentives through taxes and subsidies).

In Lebanon, the use of economic instruments for SWM is still deficient. The existing policy framework as a regulatory structure and as an economic tool contributes to ambiguous signs related to incentives and community engagement. Few examples are cited below:

- Outsourcing treatment and disposal contracts lack tariff capping and financial incentives as they were based on waste input instead of an input/output ratio that would have enhanced composting and recycling.
- Since 2002, the Ministry of Interior and Municipalities (MoIM) gave fiscal incentives to municipalities to host waste from other municipalities although environmental protection is only voluntary and never enforced.
- As for households, any financial incentive to reduce waste and increase recycling and source separation was completely overlooked. Even worse, few successful communi-

ty-based initiatives to sort waste at the source through voluntarism were not sustained because they were never rewarded by local authorities. Due to the inability to provide markets for the recyclables and the scarcity of available land to stock them, these initiatives were suspended. A situation that created an overall distrust of local communities, further justifying public opposition to pay additional direct fees and worsening the Not in My Back Yard (NIMBY) syndrome.

- Although the 3Rs approach was included in the SWM contracts, they were never enforced. However, these specifications were never realized, which led to additional waste disposal that reduced the lifespan of landfills.

Despite the development of the Law No.80 (2018), the absence of the needed implementation decrees and decisions constitute a challenge to local authorities who are unable to use economic instruments. Law No. 80 endorsed decentralized solutions; and the ISWM strategy promotes fundamental models, namely the 3Rs approach, polluter pays principle, economic instruments and circular economy. Even though some of the requirements of Law No. 80 have been achieved (e.g. drafting of the ISWM strategy and establishment of the National Solid Waste Coordination Committee (NSWCC)), other components (e.g. local SWM plans and establishment of the National Solid Waste Management Authority (NSWMA)) remain to be completed and implemented. The 2019-2030 roadmap submitted by MoE and approved by CoM (Decision No. 3 on August 27, 2019) concentrates on the financial instruments and on other aspects required for the implementation of the law. As a result of the economic crisis and the increase in the inflow of refugees, the roadmap was revisited in June/July 2020. Recently, new (3-year and 5-year) road maps were developed by the Ministry of Environment (MoE) relying almost solely on international funding organizations. To successfully implement Law No. 80 in relation to the decentralization of waste management activities, the financial self-sufficiency of municipalities need to be secured through the development of diverse sustainable sources of income, governmental funds, environmental taxes, etc. Such a system would encourage investment in new markets and help divert special waste streams from landfills and dumpsites. Also, recycling/reuse would become economically feasible through the implementation of decrees that incentivize investments in new secondary material markets such as Decree 167/2017 on tax reduction for activities that aim at environmental protection.

Economic instruments, such as environmental taxes and financial incentives, are suitable to ensure the financial feasibility of waste management systems through their contribution to reduce waste generation and promote recycling. For achieving effective results, it is recommended to use economic instruments along with other regulative and social instruments. The design of effective instruments should be established based on a comprehensive evaluation of the problems they are envisioned to tackle and a detailed Cost Benefit Analysis (CBA) of their implementation based on local conditions. Government agencies should thoroughly assess the proposed economic instruments for their technical and financial feasibility. In the case of Lebanon, for instance, local instruments such as user charges may not be sufficient to cover SWM expenses in specific jurisdictions. The municipal authorities should (1) run a detailed valuation of the costs, including environmental and social costs (externalities) resulting from unsustainable practices, and (2) request and endorse the use of supplementary instruments at the governorate and national levels. Close coordination between government levels remains essential for the successful design and implementation of economic instruments.

E.2. Classification of economic instruments

Economic instruments have drawn special attention for countries with poor solid waste management functioning in an attempt to reduce landfill rates and increase recycling rates. The use of these instruments provides important prospects as a tool for a dual purpose, lessening the size of the waste problem as well as enhancing better collection and disposal services. In the environmental policy literature, any instrument that alters behavior is considered a policy instrument. In this context, the term 'economic instrument' commonly denotes a policy tool or action which has the objective of changing the behavior of economic agents by modifying their financial incentives in order to enhance the cost-effectiveness of environmental protection. Economic instruments are differentiated from "command and control" actions. The latter are acts through principles and regulations, norms and sanctions to recommend both the standards to be adhered to by economic agents and their decisions of what, how, when, where and how much to produce, consume, pollute and clean up. On the other hand, economic instruments are characterized by (a) their flexible and non-prescriptive nature as the measures needed, which may allow for reduced costs while ensuring environmental norms; and (b) their incentives to effectively reduce the cost of environmental damage through technical innovation in pollution control and avoidance (Inter-American Development Bank, 2003).

The policy framework determines the authority to use economic instruments, such as providing financial incentives, tax exemptions for those who consume recovered material for instance, or charging environmental taxes for those who pollute or landfill. There are diverse economic instruments which can be implemented at various levels by local, national or international authorities based on the country-specific context (Figure 1). The levels of intervention can affect the effectiveness of the economic instruments. In the case of unit-based pricing for waste charges, implementation on a municipal level is most effective since municipal authorities are better able to account for local conditions. When relating to a Deposit Refund System (DRS), national implementation is more practical, given the need for a countrywide collection and refund system. In several countries, international intervention might be required through harmonization of import levies as well as setting up take-back schemes of their used products.

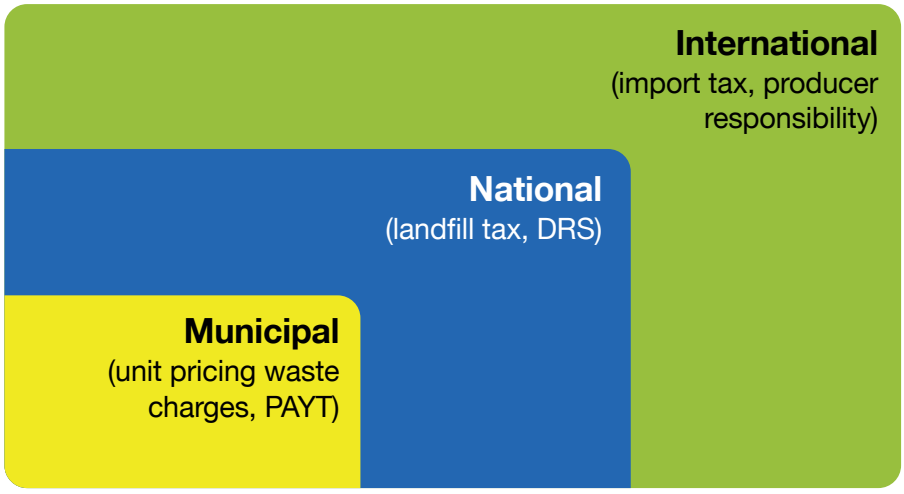


Figure 1. EPR Levels of intervention

A number of classifications can be proposed for categorizing economic instruments in the solid waste sector. We suggest below a classification based on the revenue streams. Under this approach, economic instruments are categorized into three types, those that (1) generate revenue to the public authorities, (2) generate revenue to the people and private companies, and (3) use the market mechanism without generating revenues.

CATEGORY 1:
Instruments that generate revenue to public authorities

These types of instruments apply charges to the waste generators in the aim of promoting waste reduction and recycling as well as generating revenues for the public authorities. The basic principle is that the costs caused by waste management should be recovered from those who generated the waste and benefited from the disposal efforts (polluter pays principle). In essence, charging the waste service in the form of cost-covering fees to each individual user implies a fair allocation of the financial burden for collection, treatment, disposal as well as for the prevention or mitigation of EoL environmental impacts. If people are willing to pay for the full costs of the waste service, then it is obvious that the service is highly regarded and it will be possible to generate the needed revenues to maintain it. The *Willingness-to-Pay* (WTP) constitutes an essential element to build on for cost recovery. Conversely, the extent to which people are willing to pay for the waste service also depends on how much they can afford. Therefore, next to the WTP, the affordability-to-pay is a key element to be considered by policy makers. Ignoring the affordability to pay implies the danger of a failure of the cost recovery instrument. Depending on the local context and based on a comprehensive mapping of both the willingness as well as the affordability to pay, charging mechanisms should be intelligently designed. These include:

a) User charges. It is probably the most basic economic instrument used by governments to ensure cost recovery of waste management. In most countries, the collection and treatment of solid waste are locally organized by the municipalities, either through public or private waste management services. User charges are relatively easy to implement and useful for generating the revenue to cover the costs. Various kinds of user charges can be levied for the provision of collection, transportation and final disposal services. Depending on how these charges are calculated, they can be further divided into the sub-categories:

- *Basic or Flat rate user charges:*
  These are used to cover the costs of waste management services in a way that all users pay the same amount independent of the quantity or quality of waste.
- *Service-unrelated variable-rate user charges:*
  - These are based on variable rates unrelated (or indirectly related) to waste quality/ quantity.
  - Rate is based on property tax, water or energy use, income tax, number of dwellers, etc.).
- *Service-related variable-rate user charges (unit-pricing):*
  Vary with the amount or quality of waste generated, thus creating an environmental incentive for waste reduction and better separation (PAYT system- see below (b)).

Users' charges can be imposed either as a uniformly flat rate irrespective of the amount of waste generated, or as a variable tariff based on the amount of waste generated. Under the variable rate, various indicators can be used as a proxy of income level and the amount of waste generated, for instance the property size and location or

the electricity consumption. These charges may be different for residential, commercial, industrial, and institutional entities. Depending on prevailing legal /institutional arrangements and the availability of a proper user database, user charges may be enforced in various ways. In some places, for instance, they are not charged separately, rather they are incorporated under property tax or as part of a general municipal tax through household electricity or telephone bills. When designing user-charging schemes, it is very important to consider a socially acceptable tariff structure and an effective billing mechanism.

b) **Pay-As-You-Throw-PAYT** (waste charge based on weight or volume). It is considered an equitable economic instrument that can create an incentive to reduce waste disposal. If a low fee (or no fee) is charged on source sorted recyclables, PAYT can help promote recycling. The weaknesses of PAYT are reflected in the fact that it is complex to administer because it requires a way to measure trash discarded and it is difficult to implement due to high transactions costs. Unless properly administered and implemented, it may lead to increased illegal dumping by poor households. This instrument requires a system to measure the amount of trash each household or enterprise produces.

   Both users' charges linked to another bill (electricity or telephone bills) and PAYT need further investigation in the case of Lebanon, especially during the recent economic crisis. PAYT is theoretically preferable but considerably more difficult to implement; it could be initiated for commercial enterprises to check its effectiveness. The users' charges, on the other hand, will not create an incentive to reduce waste generation or increase recycling, but it remains a useful way to generate revenue.

c) **Various kinds of taxes aiming to "internalize the externalities"** associated with the generation and disposal of wastes are included in this category. Unit taxes on final products and inputs may help provide funds for the financing of waste collection and disposal services (***Product taxes / advanced recycling fees***). Other taxes include those charged for residual pollution of air, water and soil at disposal sites (***landfill tax, incineration tax, on-site fines***).

   - ***Product taxes / advanced recycling fees.*** Taxation of specific types of products with high environmental impact is a tool used to promote efficient product consumption and reduce waste generation. The main goal of this instrument is to internalize the environmental and the social costs of such products and to discourage their demand by the consumers. This tax must be appropriately specified by the government in a way to internalize the costs of the recycling of discarded products in the product price. The 'plastic bag tax' and taxation on single-use plastic products and beverages are examples of product tax, aiming to reduce consumer use of plastic.
   - ***Landfill tax.*** This tax is charged on waste disposal in landfills. Its main aim is to discourage landfilling as a waste disposal option and to promote eco-friendly waste treatment alternatives such as composting and recycling. Landfill taxes are charged by the central government to landfill operators, which may be managed by private entities or by public local authorities such as municipalities. The landfill tax should be set at a price level, not only to cover waste management costs but also to finance maintenance and technological enhancements in the system. Mainstreaming a relatively high landfill tax could be useful in the case of Lebanon as it will generate revenues, reduce demand for landfill space, and create an incentive to recycle. Such fees could be progressive, with higher rates for recyclable material. Nonetheless, such differentiation is more difficult to implement than a single fee, as it requires sorting

waste in order to measure the quantity in each category before tipping. Landfill taxes require that effective regulation and monitoring of landfill sites are in place.

- ***Incineration tax.*** This tax may be charged for the incineration of recyclable materials. It specifically aims to promote the recycling of recyclable waste.
- ***On-site fines.*** Local authorities can impose on-site fines for littering in places that are considered environmental sensitive, such as nature reserves.

d) Performance-based grants. In some countries, grants are provided by the central government to the local authorities aiming to reward and incentivize the good performance achieved in waste management.

CATEGORY 2:
Instruments that generate revenue to the people and private companies

Subsidies of various styles that seek to reward desired behavior (waste reduction, improved recycling) rather than to punish the undesirable behavior. Subsidies can be direct payments, tax reductions, preferential access to credit, in-kind transfers, etc. These instruments are sometimes referred to as 'revenue providing instruments' as they tend to reduce revenues otherwise available to the authorities, in contrast to those in category 1 referred to as 'revenue raising instruments'.

These types of economic instruments include subsidies or tax exemptions that are commonly offered to the companies that provide environmental goods and services. They can be also provided to the small recovery, sorting, or recycling enterprises or cooperatives. Their main objective is to support resource-efficient waste management infrastructure and practices. Examples include:

a) Subsidy for home composting. To encourage home composting, some countries have introduced a subsidy aiming to strengthen support for households. Organic waste from gardens and kitchens can make up about a third of what people throw away. Composting is 'nature's way of recycling' and it is considered the most environmentally-friendly method of dealing with organic waste. A good-quality compost is free and easy to make, it improves the health of the soil and the biodiversity. Local authorities may grant 10%-20% of the users charges fees to citizens who compost their organic waste directly in their garden. This will contribute to reducing the amount of collected waste, thus local authorities will minimize the cost of collection as well as the costs of treatment and disposal of waste.

b) Subsidy for compost marketing. A subsidy may be provided to the compost manufacturers to lower the compost prices for the farmers and promote compost marketing.

c) Tax rebates / Tax exemptions on scrap materials and recycled goods. Industries could receive a tax benefit if they promote or implement recycling infrastructure. In order to encourage the scrap market and subsidize the sales of recyclables, a tax exemption or rebate is provided. Scrap has a monetary value, it consists of recyclable materials, usually metals, left over from product manufacturing and consumption, such as parts of vehicles, building supplies, etc. In some countries, for instance, municipalities may reduce the tax levied on goods and services sold for domestic consumption, such as electronic and plastic waste, scrap of glass and rubber waste. This tax reduction / exemption supports the sale of scrap materials and provides the competitive advantage for recyclable products as compared to the products made from raw materials. Another example that creates financial incentives to recycle rath-

er than landfilling material that can be reused is to allow landfill operators to retain revenues from the sale of recyclables.

d) **Custom duty exemption for the import of waste management equipment.** To facilitate and encourage investment in waste management and reduce associated risks, exemptions may be provided to customs duties for the import of specific equipment.

CATEGORY 3:
Using market mechanism with no revenue generation

a) **Deposit Refund System (DRS).** Under this system, an incentive is provided for the user to return the products after consumption to help reduce waste and ensure that the products are collected and disposed properly. The purchaser of the product pays a deposit which is paid back when the product is returned for waste treatment. DRS programs combine the incentive effects of charges for managing waste (when a good is purchased and the deposit is made) and subsidies (when the good is returned or otherwise handled properly and the deposit is refunded). The DRS have been developed in many countries for recyclable wastes, especially paper, cardboard, glass, aluminum cans and plastic. In this case, the companies that demand this type of materials have generated a significant market for the recycling of wastes, including their importation and exportation. This system can also be valuable for hazardous materials, such as car batteries.

b) **Other incentive-creating policies** can include liability laws and performance bonds (which increase the financial cost of irresponsible waste treatment or disposal); performance disclosure (in which information about the performance of a waste producer or handler affects their financial situation by affecting their reputation); and general public education (to change the demand for environmentally improved waste management).

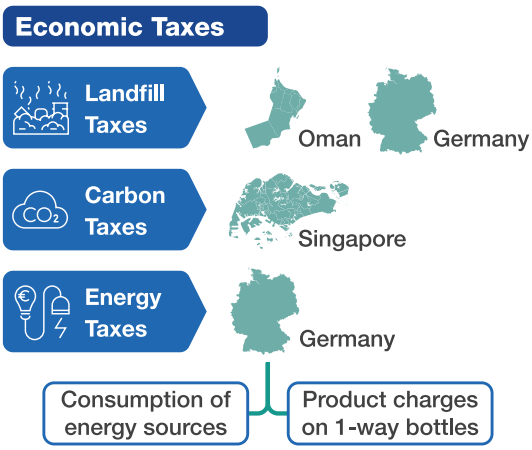
c) **Zero waste accreditation system.** To improve awareness towards zero waste generation and control waste generation from the stores, particularly food and beverage establishments, the accreditation system aims to certify stores and encourages customers to support certified businesses.

d) **Creation or facilitation of markets.** This instrument is appropriate to all segments of the product and waste cycle. As an alternative to the typical direct public administration of SWM, policies to encourage competitive markets in waste management services can be used to alter the incentives for participation in the provision of the services; the incentives of the public to trust the services; and the fiscal condition of the public authorities. An example of such economic instrument is the tendering of long-term agreements to private service providers.

E.3. Benchmarking

Integrating proper environmental taxes and financial incentives into the national framework for the solid waste sector would ensure its financial feasibility (Appendix 4). Charge taxes can be implemented to reduce waste generation and disposal while encouraging recycling. Financial incentives are essential to encourage recycling and investment opportunities to attract the private sector participation in recycling facilities, subsidies for purchasing recycling equipment, and financial support for community-led waste reduction initiatives.

Integrating economic taxes and financial incentives



EXAMPLE
Singapore Incentive Programs

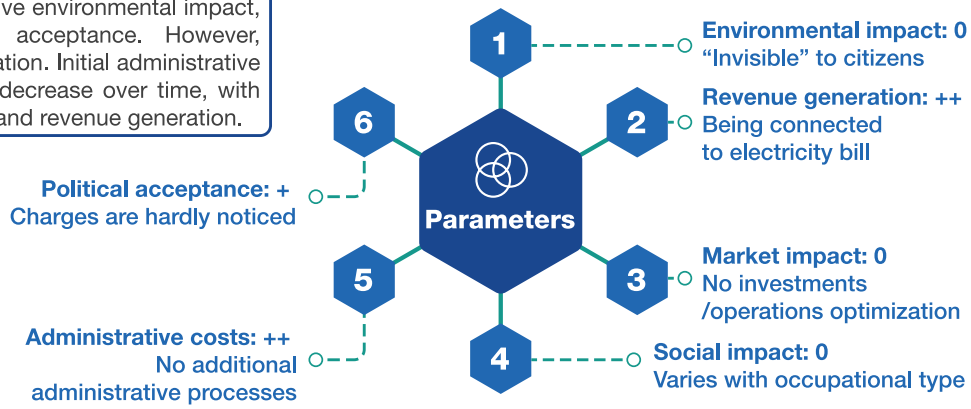
1. $1 billion waste fund for recycling
2. Cash for Trash
3. "RecycleNSave" initiative
4. Other grants and incentives

Economic instrument in Geence

Summary

Implementing economic instruments in Greece considers market and social effects. Waste valorization tools like EPR, PAYT, and taxes yield positive environmental impact, higher revenue, and political acceptance. However, incineration taxes lack representation. Initial administrative costs are high but expected to decrease over time, with enduring environmental benefits and revenue generation.

EXAMPLE
Evaluation of Waste Charges



Variable waste charges:

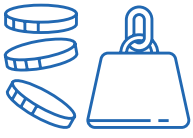
By weight / volume in Latin America and EU

In principle, user charges are an important economic instrument to encourage waste minimization and proper waste management throughout the product cycle.

Latin America

Initiatives to incorporate this charge in other public service bills have contributed to significantly increased collection (such as in cities of Colombia, Guayaquil and La Paz).

Market-based instruments can promote waste reduction and recycling.



Charges by weight are implemented in Chile, Colombia and Rio de Janeiro mainly to non-residential wastes.

Europe

EU favors variable waste charges rather than flat charges for environmental and social benefits, despite administration and financial challenges.

When considering the design and implementation of particular economic instruments for the waste sector, various evaluation criteria are recommended; including: environmental effectiveness, economic cost-effectiveness, administrative cost-effectiveness, revenue usefulness, ease of implementation and replicability, acceptance, distributional effects, short-term results, economic development enhancement, and waste type applicability (Inter-American Development Bank, 2003; Appendix 4).

Lessons from Latin America and the Caribbean

Summary

Economic instruments should complement, not replace, regulatory frameworks in waste management. Global literature lacks comparative data on the effectiveness of different instruments. Local concerns, priorities, and capacities shape instrument choice. Each government must decide where to begin, considering local context. Key questions guide instrument design and implementation.

1 Should efforts begin with improving future waste disposal or with remediating old sites that are causing contamination?

2 Is the focus on wastes from households or industries?

3 Do hazardous wastes have a priority over nonhazardous wastes?

4 Are the water pollution or air pollution impacts of SWM more important?

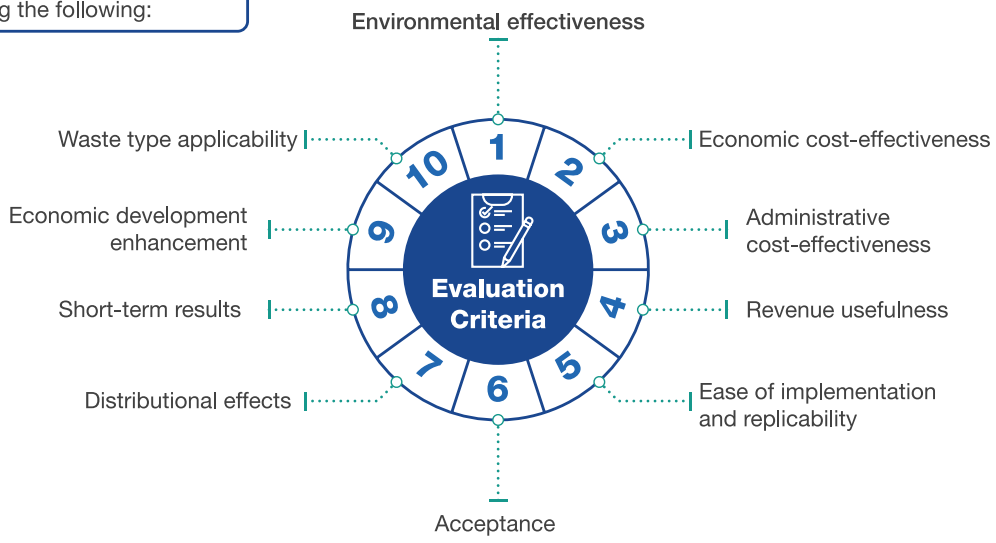
5 What is the priority? is it reducing waste generation or is it increasing recycling after waste generation? which waste category has priority?

6 Do instruments that address diffuse pollution have priority over those that address point-source pollution, given the potential to address the latter through command-and-control regulations?

7 To what extent factors, such as cost and ease of implementation of the specific economic instrument, influence the choice?

Summary

In choosing between economic instruments for the waste sector, there are various evaluation criteria that are recommended for consideration (Inter-American Development Bank, 2003); including the following:



BOX 2
Key recommendations for using economic instruments in the waste sector
(Inter-American Development Bank, 2003)

- Although SWM is a local responsibility, local implementation of economic instruments needs the support of a national policy. The first step in the process is to have a national policy to design appropriate economic instruments and a decision to implement them.
- Economic instruments need to complement rather than conflict with existing regulations. Some desired change is easier implemented through economic instruments, and another change is easier implemented through command-and-control approaches. For each country, the harmonious balance of regulatory controls and economic instruments will depend on local conditions and preferences.
- The instruments are not ranked; no one instrument is more effective than others. Nevertheless, lessons learned that provide some perspective of their relative pros and cons should be considered.
- Instruments should align with broader economic development objectives in terms of use of labor, energy and capital. Instruments that lead to greater use of labor and less use of energy and capital should be given priority over those that are investment and consumption intensive.
- In places with good administrative management and accountability, economic instruments that generate revenues may be preferable. In places where enforcement and revenue leaks are challenging, instruments that incentivize private sector investments in SWM improvements may be more appropriate. In places where the funds are available for media campaigns and education, instruments that focus on long-term behavior change should be implemented.
- Instruments that target areas of significant pollution loadings and environmental consequences should be given priority.
- New instruments should be gradually introduced in steps that allow their impacts to be assessed before full-scale implementation.
- Consideration should be given to how revenues from economic instruments will be used: for specific SWM investments, general improvement in SWM services, waste-related environmental remediation, etc.

F.

Technical Note 2.3 – Extended producer responsibility (EPR)

F.1. EPR policy instruments

The Extended Producer Responsibility (EPR) is a policy approach under which producers are responsible for the treatment or disposal of their products at the post-consumer stage of the lifecycle. It is a regulatory regime that imposes a legal liability on producers to reclaim their goods and/or packaging after use. While other policy instruments tend to target a single point in the product chain, EPR seeks to integrate signals related to the environmental characteristics of products and production processes throughout the chain. From a financial perspective, by shifting responsibility upstream toward the producer and away from municipalities, an EPR policy can contribute to shifting EoL management costs of products from the public sector to producers of targeted products. Assigning an extended producer's responsibility has the potential of generating environmental advantages through separate collection, material recovery and product design (refer to Appendix 5 for the detailed theoretical background on EPR and international policy debate).

Diverse EPR policy instruments exist to assign producers with financial, and sometimes physical, responsibility of waste management (Figure 2). Mandatory EPR instruments commonly finance or organize kerbside collection of EoL products, such as product take-back requirements, Advance Disposal Fees (ADF) or upstream product taxes combined with downstream subsidies for waste management. DRS is an EPR policy instrument where producers finance and/or operate the system (Laubinger et al., 2022). In some markets, where mandatory EPR policy instruments do not exist, producers also commit to taking responsibility through voluntary EPR schemes, such as product stewardship or Corporate Social Responsibility (CSR) initiatives.

A global survey identified about 400 EPR systems in operation (OECD, 2016). Legislation has been a major driver, and most EPRs are mandatory rather than voluntary. Small consumer electronic equipment accounts for more than one-third of EPR systems, followed by packaging and tires (each 17%), end-of-life vehicles (ELV), lead-acid batteries and a range of other products. Various forms of take-back requirements are the most frequently used, accounting for nearly three-quarters of those surveyed. ADF and DRS account for most of the rest. While in some cases individual firms have established their own systems, in most cases, industrial stakeholders usually set up collective EPR systems managed by Producer Responsibility Organizations (PROs). These are collective or in-

dividual entities, partially or fully owned by the industry that is liable to participate in the EPR scheme. To ensure transparency, PROs have contracts with the local authorities. They are also connected to the collection and/or treatment service providers, with the waste producers which finance the system, and with waste management companies. As EPR requirements differ between countries, the role of PROs varies as well.

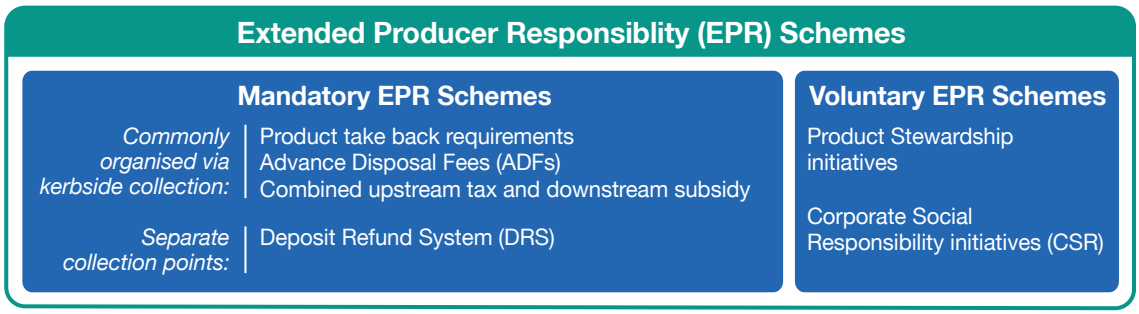


Figure 2. EPR policy instruments (Source: OECD, 2023)

By ensuring that targeted waste is collected, sorted, and recycled, EPR schemes absorb the producer's legal obligation to meet national recycling and recovery targets. This activity is funded by the material-specific fees paid by producers/importers to EPR schemes. The fees are usually charged based on the weight and/or type of material used by the producer and, accordingly, incentivize material optimization. The EPR policy can be applied for several types of waste streams such as packaging, waste electrical and electronic equipment (WEEE), used tires and oil, batteries, ELV, among others.

In some EU Member States, the fees paid to EPR schemes are used to pay private, or public waste management companies who collect and sort post-consumer packaging waste (e.g., Spain, Czech Republic). In other countries, these fees are paid to local authorities who collect packaging waste separately or appoint contractors to do so on their behalf (e.g., Austria, Belgium, Sweden). Collected and sorted used packaging are then sold to recyclers or, sometimes, to energy recovery operators. Typically, the revenues from sold secondary material are used to help offset the financial contributions of producers and importers to the EPR schemes (EUROPEN, 2019).

In collective implementation of EPR, the fee schedule set by the PROs is quite basic. Fee differences are based on easily measurable EoL cost differences. The lack of cost differentiation provides somewhat insufficient incentive for producers to invest in environmental design. For example, EPR fees for packaging material have traditionally been based on a per kilo fee assessment, which incentivized some material reductions but did not provide incentives for other design changes to improve product circularity. Some countries have started to modulate EPR fees to better reflect eco-design incentives based on criteria for design-for-repair or recyclability, or the use of secondary materials. Some systems have started to address externalities that occur outside the EoL phase through advanced EPR fee modulation (i.e. differentiating the cost paid by producers to the collective PRO to fulfil their EPR obligations based on product design criteria). While these policies are quite novel, some argue that the introduction of a more complex fee modulation based on detailed product design criteria can provide producers with significant incentives towards better recyclability of packaging. However, it can also lead to complications, such as complexity, administrative burden and resulting costs (Laubinger et al., 2021).

F.2. EPR challenges

Despite worldwide literature substantiating the main benefits to EPR implementation; namely shifting EoL management costs from the public sector to the producers and consumers of products, improving collection rates, and improving recovery rates in a cost-efficient way, there are EPR challenges, described below, that need to be addressed (OECD, 2023).

- *Defining a producer that is liable for paying the EPR fee for several product sectors can be challenging.* However, there is an ongoing policy debate that for some products, producers may not necessarily be the "actor" causing the environmental damage and that is best placed to affect change and as such it may be more effective to charge fees to other actors. This is the case of products such as tobacco product filters, fishing gear, and cooking oils, where collection and recovery rates greatly depend on the consumer disposal behavior.
- *Setting and calibrating of financial producers' responsibilities for several product groups is not straightforward.* While some claim that EPR fees should correspond only to observable EoL costs, others argue that observable EoL costs alone may not fully capture external costs of an EoL product, especially when mismanaged waste causes environmental damage. Establishing a methodology for EPR fee rates that is transparent, fair and operational constitutes a challenge. Unclear methodologies for EPR fee calculation can lead to a sense of arbitrariness and provide a reason for industry to engage in the fee-setting process (Laubinger *et al.,* 2021).
- *Data limitation poses a barrier to enlarge producer responsibility to products that are exported from the domestic market before their EoL and enter the waste stream in other markets.* Allocating a clear producer responsibility in the context of data limitation on littering of specific items complicates the ability to assign and enforce producer responsibility of litter clean up. Such complexities require data collection and management capacity that may be administratively costly and not easily accessible or available.

Given the above-described challenges, EPR may not always be the best suited policy tool to use. In several cases, it can be useful to compare the use of EPR to other alternative approaches and reflect on the added value of EPR beyond revenue generation. The primary intent and rationale for EPR is not only to generate revenues for EoL treatment, but also to consider producers' specialized expertise or position in the value chain to organize EoL treatment cost efficiently and possibly improve recyclability through sustainable design of products. For some product groups, it is questionable whether producers can ensure cost-efficient waste treatment or change product designs to reduce their products' EoL environmental impacts, thus, a debate lingers about whether there is a sufficient justification for an EPR.

In some cases, such as reducing littering of single-use plastic products, consumer behavior has a main role in mitigating EoL environmental impacts and thus is at least partly external to producer actions. In other instances, such as in EPR programs that aim to assign producer responsibility to micropollutants caused by synthetic microfibre shedding of textiles, the mitigation of EoL impacts lies outside the producer's expertise. While there is some opportunity for textile producers to adjust fabric designs to reduce microfibre shedding, much of it is dependent on consumer behavior (e.g. washing behavior) or on upgrades of wastewater treatment facilities. If consumer behavior is the key

source of environmental impacts, and in cases where producers are unlikely or unable to influence the cost-efficiency of EoL treatment, there is a question about the usefulness of EPR. For some products, a general waste collection or treatment system may be more effective than the implementation of an EPR. Thus, alternative policies such as waste charges or taxes can raise revenues and incentivize behavior change more effectively by implementing the polluter pays principle.

In a nutshell, *in cases where the EPR becomes a mere revenue-generation tool, other economic instruments may be more valuable. Also, in situations where the externality does not lie entirely with the producer, other policy tools may be more targeted and better suited to address the EoL impacts.* Should practitioners consider the implementation of an EPR scheme, they need to carefully contemplate the above challenges, ensure significant stakeholder involvement and determine which waste generator groups and waste handling practices should be prioritized. These data could also inform the design of complementary behavior change programs that are important for the successful implementation of an EPR scheme.

F.3. Recommendations to develop EPR system in Lebanon

To design EPR systems that are implementable and financially sustainable in Lebanon, the following recommendations should be considered:

- Simplifying the proposed amendments to Law 80 and justifying why funds are to be directed to the MoE or to the SWM legal authorities (not to the Ministry of Finance (MoF))
- Developing consultations to determine which solid waste streams are best advanced through which legal routes in the goal of enacting mandatory EPR
- Enhancing private sector business drivers
- Ensuring that voluntary individual or collective EPR are founded on a fair and transparent bidding process
- Setting up clear and effective administrative procedures for permitting and monitoring special waste recycling businesses
- Developing EPR systems to protect special waste recycling investments and ensure a sustainable inflow of waste
- Creating a plan for waste from solar energy systems (batteries, PV panels and others) as a result of the upsurge in the photovoltaic market as the only reliable and affordable source of electricity
- Organizing the work of the PROs.

F.4. Development of EPR schemes in Lebanon

EU-UNDP Towards a Decentralized Waste Management Integrated Response (TaDWIR)

The EU-UNDP *Towards a Decentralized Waste Management Integrated Response* (TaDWIR) project was designed to support the waste management system. The project aims to improve the environmental and financial sustainability of the system with specific objectives to reduce volumes of waste that go to landfills, improve qualities of waste that go to waste-facilities, and upgrade national systems for governance and cost coverage

of managing waste. The project targets various waste streams, such as hazardous waste (hazardous healthcare waste (HCW), e-waste and batteries), municipal waste, non-municipal waste (CPW, slaughterhouse waste, other special wastes) and for overall system improvement.

To-date, the project has contributed to the development of a baseline assessment and comprehensive master plan for the HCW sector – the environmental impact assessment study is undergoing. It has initiated the assessment of future market opportunities for the use of RDF including financial, social and environmental feasibility and scenario evaluations. Moreover, it has supported the national governance and cost recovery frameworks for the MSW management. It has also contributed to launching of bids targeting different waste streams potential interventions. In all assessments conducted within the framework of TaDWIR, the project has fostered social sustainability by raising awareness through intensive participation campaigns and by engaging citizens on environmental issues. Of the potential financing models planned within the project, extended EPR systems for CPW and e-waste are being developed. The establishment of EPR programs for the HCW is also considered. Moreover, EPR mechanisms for three waste streams (plastic, glass, and tires) are being proposed. Based on upcoming consultations to determine which waste streams are best advanced through legal routes, reports are still under development in the goal of enacting mandatory EPR systems.

EU Water and Environment Support (WES)

The *Water and Environment Support* (WES) is a regional project designed to contribute to the implementation of an integrated approach to pollution reduction and prevention, in line with the Union for the Mediterranean agendas and the Barcelona Convention. It aims at protecting the environment and improving the management of scarce water resources in the Southern Mediterranean region. The WES project addresses the needs for creating an enabling environment, enhancing the capacities of stakeholders involved in pollution reduction and water management and supporting the formulation and implementation of efficient policies in the partner countries (Algeria, Egypt, Jordan, Lebanon, Morocco, Libya, Palestine and Tunisia). Within this context, the project fosters the transformation towards a sustainable consumption and production model that promotes integrated water management and combats plastic pollution and marine litter. Recognizing the importance of circular economy, the project helps developing a detailed roadmap to encourage schemes that bring about sustainable use of plastics and management of waste plastic packaging in Lebanon based on the EPR principles.

The WES project has led key initiatives in Lebanon to tackle single-use plastics (SUPs) and promote sustainable waste management. Using BATs and BREFs, WES proposed revisions to the Ministry of Environment's guidelines for food and construction sector operations and reviewed Lebanon's new wastewater standards, suggesting updates as needed. In plastic waste management, WES conducted a gap analysis to identify stakeholder knowledge needs and assess legislative impacts on SUP reduction, contributing to a roadmap that led to the formulation of a Voluntary Agreement between the Ministry of Environment and the Syndicate of Restaurants. Additionally, WES co-developed and assessed Extended Producer Responsibility (EPR) scenarios, recommending the most feasible model for Lebanon. WES also mapped local initiatives on plastic reduction, collection, and recycling, and through a region-wide WES campaign run jointly with the UfM

and UNEP/MAP, awarded 8 Lebanese voluntary actions with the title of Mediterranean 'Champions in combating plastic pollution. Approximately 80 stakeholders participated in the WES capacity building actions. All WES outcomes and reports are accessible on the project website : www.wes-med.eu.

F.5. Benchmarking

In response to increasing waste generation, governments of all countries are seeking policy measures to improve solid waste management. Worldwide, an extensive diversity of regulatory (command and control) and economic instruments (taxes, fees and subsidies) are used to manage and finance waste collection and disposal. Typical regulatory instruments include EPR, sanitary landfilling requirements, and recycling quotas, while common fiscal instruments include waste collection charges, advance disposal fees, and deposit-refund schemes. Acknowledging that no single policy approach is superior, different instruments can serve as complements as well as substitutes depending on the context.

In recent years, EPR has gained further policy attention with more countries implementing policies aiming to minimize environmental impacts and waste generation by incentivizing producers to increase recycling rates and considering EoL environmental impacts in their product design. Typically, the EPR is included in a legislation that outlines its requirements and defines its scope. Through PROs, the EPR system is managed by establishing policies for efficient collection system of EoL products and fee collection from producers (Appendix 6).

EU provisions on EPR

Summary

EU regulations on EPR integrate waste management costs into product/service prices, ensuring consumers cover disposal costs and environmental impacts.

The 'Green Dot' scheme

Entails packaging license fees, indicating to consumers that waste collection and sorting costs are covered by producers and retailers.

Take back arrangements for (WEEE), EoL vehicles and batteries

Legal regulations consider the cost for the takeback and disposal service to be carried by the producers and retailers who will add them to the selling price.

Charges for waste material management:

- Tourists may incur waste management charges included in accommodation prices or special local taxes.
- Ships may have to pay a charge to avoid disposing of their waste at the sea and be able to get rid of them at the proper facility in the port when they enter this area.

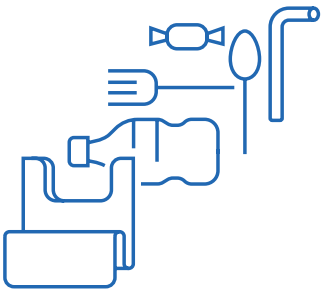
EPR scheme for E-waste in Singapore

Summary

The National Environmental Agency (NEA) in Singapore aims to raise the recycling rate to 70% by 2030, primarily by enforcing an Extended Producer Responsibility (EPR) system for e-waste. Under the Resource Sustainability Act (RSA), producers manage product collection and treatment at end-of-life (EoL). ALBA E-waste Smart Recycling Pte Ltd serves as the appointed Producer Responsibility Organization (PRO) until June 2026.

PRO Responsibilities

- Developing programs to encourage citizens to recycle e-waste
- Offering various e-waste collection possibilities for e-waste recycling (e.g. e-waste containers in public areas, arranged collection drives and planned door-step collection services)
- Collecting and transporting the e-waste to NEA-licensed e-waste recyclers
- Developing a data management system to trace and report to NEA the amount of e-waste collected



EPR on single-use plastic in Germany

Summary

The EU Green Deal aims for climate neutrality by 2050. The EU plastic tax, initiated in December 2020, targets plastic pollution. Directive 2019/904, the Single-Use Plastics Directive (SUPD), bans single-use plastics and mandates product redesign. Germany implemented a plastic tax through the Single-Use Plastic Fund Act in May 2023, aligning with SUPD requirements.

G.

Technical Note 2.4 – Downstream recycling solutions

G.1. The recyclables market in Lebanon

The Lebanese market for recyclables involves various players competing to acquire cheap recyclable material in an unregulated market characterized by indeterminate information. Recyclables are collected at the source by NGOs, companies, industries, unregulated scavengers, licensed scavengers and service providers. Rather than seeking to secure a large share of the recyclables, most players- including industries- are attempting to capture good quality material in order to minimize costs by substituting expensive imported raw materials with less expensive domestic recycled material. Their aim is to cover the high energy production cost they incur, which is reducing their local and regional competitiveness.

Among these, two major actors dominate the recyclables market; namely the industrialists who procure raw or semi-processed material as inputs into their own production processes and traders who purchase the recyclables for export. Other small-scale entrepreneurs and craftsmen seek to capture recycled material to be used as inputs in their manufacturing. On the other hand, there are the transformers who process recyclables for resale to other users, seeking to move up the recycling value chain in purchasing material. Each of these actors is attempting to grow his share of the recyclable supply; upstream by obtaining recyclables at the source; downstream by either buying recyclables directly from service providers and industries generating waste; or indirectly by buying unprocessed material from third parties such as informal scavengers.

Waste recycling in Lebanon lacks proper incentives. Most recycling industries suffer from the lack of a stable and affordable source of energy, a good quality waste inflow and a limited market for their products due to competition with imported goods (e.g. glass jars from China). Despite some initiatives to encourage recycling and composting, only a small proportion of the waste is treated in composting plants, while the bulk is disposed at the existing landfills or in open dumps without any prior separation of recyclables and composting of bio-degradable waste. Various national, private and entrepreneurial initiatives supported by development partners have created a growing formal and informal market for organic compost and recyclables. However, standards for composting still do not exist. Further, separation at the source has been ignored except in some areas of major cities where designated recycling bins are used by residents on a voluntary basis.

G.2. Recommendations for the financial feasibility of recycling in Lebanon

In Lebanon, the recycling business is distorted and unregulated, yet it is dynamic. It is well known that recycling contributes to reducing the consumption of raw materials. It also helps decreasing the amount of waste that ends up in landfills. The resulting decrease in waste disposal is likely to increase the lifespan of landfill facilities (Fullerton and Kinnaman, 1995). This is much needed in a country such as Lebanon with limited land availability. In addition to the potential financial savings, reducing the quantity of landfilled waste decreases soil, water and air contamination through cutting down emissions. By adopting a whole life-cycle approach in Lebanon, recycling can help recover raw materials that can be used for production contributing to better management of natural resources.

Currently, the common practice in Lebanon consists of mixing all categories of waste at the source using truck compactors for collection. This system increases transportation efficiency, but reduces the quality of recyclable material due to contamination, and thus reduces the total quantity which can be recycled. In fact, municipal trash management service providers are responsible for relatively little recycling as they have no financial incentive to recycle. Only some recycled materials are currently being collected at the source in some regions by NGOs, companies, industries, scavengers, etc. This may be attributed to the considerable effort by local communities to reduce the accumulated waste by sorting and recovering recyclables. These sorting initiatives gave a boost to the recycling industry. However, assessing the weight of recyclables collected at the source remains challenging.

Waste recycling and composting activities, if properly implemented in Lebanon, may generate operating revenues or at least decrease the cost of waste treatment. They provide direct paybacks in terms of tangible financial benefits associated with recovered materials and conserved energy as well as additional benefits from the avoided costs of landfilling. If landfill operators were allowed to collect and sell recyclable material, this could also create a new industry-such as mining existing landfills- to extract material for sale. However, preventing dumping in the first place would be a much more cost-effective way to obtain material for recycling.

Recycling schemes are prone to the free-riding problem. Free-riders, such as packers/fillers that do not pay the license fees to the entities in charge of managing the logistic chain of packaging waste recycling undermine the economic sustainability of recycling systems and create market distortions. The logistics chain of recycling is usually quite complex. To set up an effective recycling system in Lebanon requires high up-front costs, such as investments in new infrastructure for selective collection and sorting, as well as transportation costs.

To expand the scope of strong downstream market and ensure the financial feasibility of recycling solutions, it is important to consider the following:

1) Government decisions are needed to establish a proper downstream market for recyclables and compost. Decrees that incentivize investments in new secondary material markets (e.g. aggregate, glass, etc.), such as Decree 167/2017 on tax reduction for activities that aim at environmental protection should be implemented.

2) Recyclable material should be extracted, preferably at the source rather than after collection.
3) New metrics that assess recycling rates are needed to track the country's efforts to attain a closed-loop economy.
4) National standards for the use of the recovered materials should be developed.
5) Setting standards and guidelines for the compost such as the suitable process, acceptable input materials and quality of the final product would help in enhancing the market of composting materials.
6) Creating an infrastructure of recycling facilities and resource recovery technologies.
7) The most crucial step forward is to create a national framework for recycling and resource recovery, by integrating both economic instruments and behavior change.

G.3. Benchmarking

USAID: Diverting Waste by Encouraging Reuse and Recycling (DAWERR)

USAID
FROM THE AMERICAN PEOPLE

Summary

The USAID-funded DAWERR project in Lebanon, running from August 2020 to July 2025, aims to establish financially sustainable waste diversion solutions in rural areas. Despite setbacks from political and socio-economic crises, it collaborates with stakeholders to promote recycling and composting, addressing challenges exacerbated by recent events such as the Beirut port blast and the COVID-19 pandemic.

Recycling solutions in other countries

Composting Standards

- German Compost Quality Assurance Scheme
- National Environmental Agency

Solid Waste: Reduce-Derived Fuel (RDF)

- Germany has production facilities that process solid waste into RDF to be used as a substitute for fossil fuels.
- Be'ah agency in Oman has promoted the market of recyclables by increasing recycling facilities in the infrastructure and is currently exploring RDF as a form of energy source.

H.

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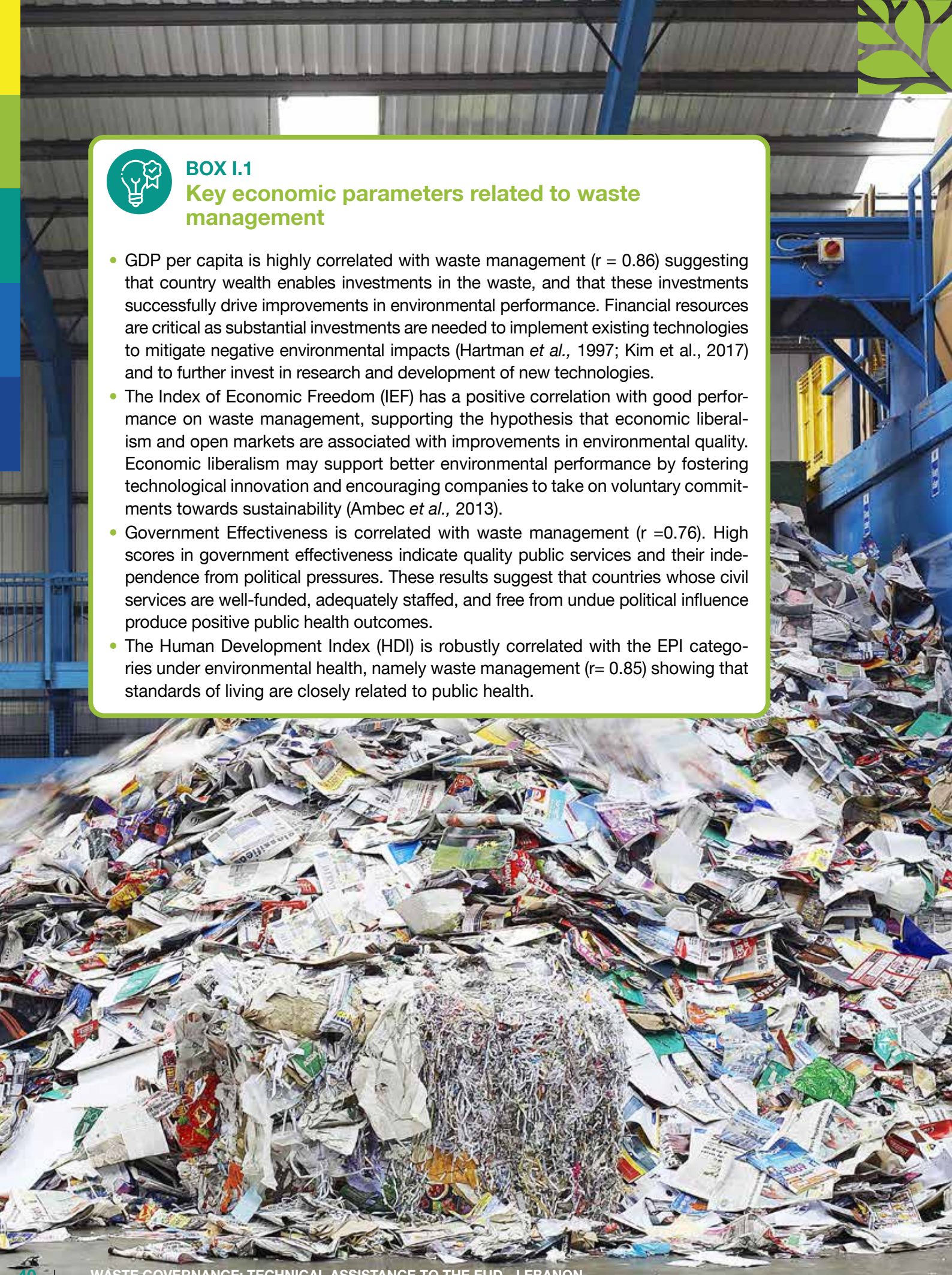
I.

APPENDIX 1.
Environmental and financial sustainability indicators

The **Environment-Related Spending (ERS)** indicator aims to ensure financial sustainability of environmental expenditures by assessing the equity, efficiency, and effectiveness of fiscal government resources invested on the environmental sectors, among which the SW sector. ERS weighs the appropriateness of budget allocations relative to critical policy priorities. It estimates investments made in environmental protection and evaluate their compatibility with the development and environmental priorities. In Lebanon, data show regional disparities in the expenditures of SWM investments with a divide between public expenditures and the environment, indicating that environmental priorities are not mainstreamed in the productive economic sectors. The situation is problematic by the large subsidies in the sector, as cost recovery is almost absent for the waste treatment and disposal because the municipal fee is used for waste collection and drainage (Arsifa wa Majarir) whereas the operation and maintenance costs are subsidized by increasing the share of the IMFU.

The **Environmental Performance Index (EPI)** is an indicator for benchmarking environmental performance of a country in comparison to others (Wolf et.al, 2022). Using 40 indicators, the EPI provides a data-driven summary of the state of sustainability by ranking 180 countries on their progress toward environmental performance. The higher the score, the higher is the environment performance of the country. A review of the trend of the EPI in Lebanon for the period from 2008 to 2010 shows that it was ranked 90th among 163 countries and its score decreased from 70.3 (in 2008) to 57.9 (in 2010), disclosing weak scores in environmental health and economic vitality, with Lebanon ranking 8th in MENA. In the latest EPI report (2022), the score decreased to 32.2 indicating a lower performance in achieving environmental sustainability. Lebanon is ranked 142nd among 180 countries at a global level and 11th in comparison with countries in the Middle East. Box I.1 shows key economic parameters that are related to waste management.



BOX I.1
Key economic parameters related to waste management

- GDP per capita is highly correlated with waste management (r = 0.86) suggesting that country wealth enables investments in the waste, and that these investments successfully drive improvements in environmental performance. Financial resources are critical as substantial investments are needed to implement existing technologies to mitigate negative environmental impacts (Hartman *et al.,* 1997; Kim et al., 2017) and to further invest in research and development of new technologies.
- The Index of Economic Freedom (IEF) has a positive correlation with good performance on waste management, supporting the hypothesis that economic liberalism and open markets are associated with improvements in environmental quality. Economic liberalism may support better environmental performance by fostering technological innovation and encouraging companies to take on voluntary commitments towards sustainability (Ambec *et al.,* 2013).
- Government Effectiveness is correlated with waste management (r =0.76). High scores in government effectiveness indicate quality public services and their independence from political pressures. These results suggest that countries whose civil services are well-funded, adequately staffed, and free from undue political influence produce positive public health outcomes.
- The Human Development Index (HDI) is robustly correlated with the EPI categories under environmental health, namely waste management (r= 0.85) showing that standards of living are closely related to public health.

J.

APPENDIX 2.
Empirical research: source separation vs. WTP

The reported results are considered valuable in gaining broader perspective and providing insights into effective solutions for the waste sector (Box J.1 and J.2).

BOX J.1
Results of stakeholder interviews
(mayors and heads of municipalities)

- The management of the waste problem is considered at a major crossroads with serious concerns about ensuring the financial feasibility and cost-effectiveness of waste management practices.
- Municipalities face challenges in finding landfill sites due to the prevalence of the NIMBY syndrome. Local populations are opposed to siting landfills near them as they do not trust the government to implement effective regulations and enforce environmental standards.
- The majority of the stakeholders consider that the absence of a fully articulated national strategy and the failure of previous projects are the main reasons for which local populations have lost trust in the government.
- Most stakeholders believe that the corruption in government institutions and the inadequacy of risk communication are key challenges. They indicate that there is a need to implement a public participatory process where all involved actors (e.g. government, municipalities, NGOs and local communities) get an opportunity to voice their opinions and develop proactive commitment towards sustainable solutions, such as source separation of waste.

- There is a consensus among health, environmental, and economic concerns of the waste problem. Most interviewees cite the perceived health and environmental threats to local communities as major factors in mobilizing people to become sensitized about the problem, consequently more involved in solutions, such as source separation of wastes. They suggest that citizens are aware of the risk factors associated with the waste problem and they are ready to sort their wastes if the implementation process is transparent.
- Economic instruments, including financial incentives and environmental taxes, are perceived as important tools to ensure the viability of source separation policy. It is important to review the political, legal, and institutional elements that may affect the implementation of this policy-mainly the legal jurisdiction of the municipalities to use economic instruments and to collect fees for waste services.

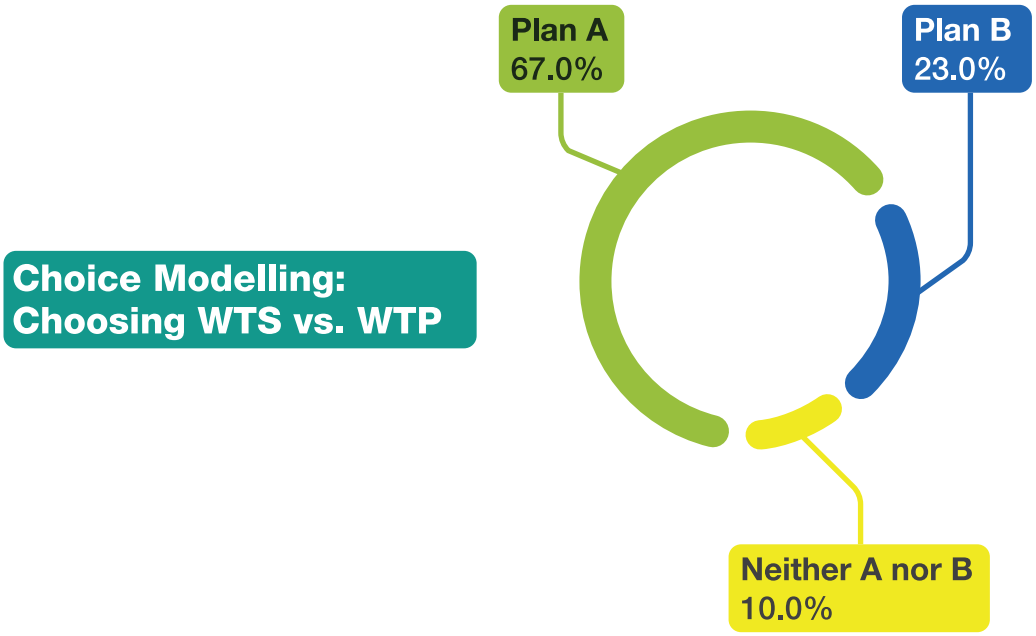
BOX J.2

Results of community surveys

- More than 75% of the respondents are suspicious of the government's decisions in Lebanon.
- About 80% believe that the government does not manage the solid waste problem effectively.
- About 85% indicate that government officials don't really tell the public what is going on.
- About 25% indicate that they are willing to sort their wastes only if they know that their neighbors are sorting.
- About 65% are willing to pay higher municipal fees in order to solve the waste problem.
- About 20% indicate that they would be willing to sort their wastes only if they get financial incentives.

These results suggest that government authorities should be vigilant in designing policies that rely solely on economic instruments, namely taxation. The trust factor has shown to be critical in regards to how citizens might react to an increase in the tax charged on SW services; namely, trust in the government to enforce regulations and manage the waste problem effectively. Another level of trust has shown to be important, the trust in other households in the community to sort their wastes without free-riding. Also, the results imply that financial incentives can be efficient in increasing the willingness of citizens to sort their wastes at the source.

Based on a choice modeling framework, respondents were asked to choose one of two SWM plans they prefer and state the reason of their choice. Two plans A and B; each with two attributes (Willingness to Sort (WTS) food wastes and Willingness to Pay (WTP) additional municipal fees) were presented to each respondent. While plan A enforces source separation of food wastes without any payment of additional fees, plan B enforces payment of additional municipal fees with no source separation. Respondents were given the option to oppose both plans and state the reason why they do so. The results show that about 67% of the respondents chose plan A, about 23% chose plan B, and about 10% refused both plans (Box J.3).



BOX J.3

Willingness to Sort (WTS) and Willingness to Pay WTP in selected study areas

Of those who chose plan A, about 55% believe that separation provides environmental and/or economic benefits; 33% consider that the management of local problems (waste problem) is the responsibility of locals, and about 12% indicate that they will sort their wastes because they cannot afford to pay.

Of those who chose plan B, about 28% indicate that they believe that other members of their community will not separate their wastes, 54% argue that they do not have time to separate wastes at home, and about 18% indicate that separation of wastes at home will not solve the problem,

Of those who refuse both plans A and B, about 50% indicate that the government should solve the waste problem without costing them anything, 27% believe that the government will not enforce any effective regulation, and 23% indicate that they do not have a waste problem in their region.

Willingness to Pay (WTP)

Households who chose plan B (pay additional fees) were asked about their maximum monthly WTP. About 44% of those indicated that their WTP was less than or equal to $6 (equivalent to 10,000 LL in 2010), with the mean maximum WTP estimated at 9.8 $/month.

The data collected **in 2024** shows that the WTP varies between $1-3 per month household only. The majority of the interviewed mayors (48%) recommended a monthly fee of about $1 per household, whereas only 20% approved that $3 would remain feasible (*figure j, Appendix 3*).

The framework of this empirical research offers clear-cut messages that help answer key questions related to the successful implementation of cost recovery, the proper use of economic tools, as well as the reinforcement of environmental behaviors, such as source separation of wastes. The findings have straightforward implications:

- The government needs to develop a national strategy for waste management taking into account not only political, environmental, and economic factors, but also social factors. Examining individual and social motives and ensuring citizens' cooperation in the development of SWM policies is key to the success of implementing any cost recovery law.
- Policies must continue to elicit the message of sustainability by emphasizing that the environment is a joint resource. Thus, environmental awareness is an effective strategy to encourage reciprocity norms and individual responsibility to engage in collective behavior. These findings imply the need to create an environment where trust is prevalent.
- An important finding estimated that, on average, Lebanese are willing to pay a maximum of $9.8 (2010 prices) per month for solid waste services. These figures are comparable to a WTP of $6.92 (2004 prices) per month with a maximum stated monthly WTP of $20 (Kanbar, 2006). The results suggest the potential range of fees that public officials can impose for waste services, keeping in mind both the willingness to pay and the ability to pay of the local community.
- The link between public awareness (i.e. demand for change), policy structure (i.e. the way by which change will be achieved) and institutional framework (i.e. the tools for implementing change) needs to be established while ensuring transparency and accountability. Approaches to dealing with the waste problem are often complex due to the uncertainty and information imprecision. Despite this complexity, a political will as well as the will of the local populations can help reach sustainable solutions.

K.

APPENDIX 3.
Results of data collection related to cost recovery

A recent study was conducted in Feb-Mar 2024 to explore the main financial, technical and social challenges related to the cost recovery system that is currently applied and the WTP of the local citizens. Issues examined relate to the material recovery from MSW, gaps in the sector as well as the main source of income for the local authorities to recover the costs of their waste management system. Interviews with the mayors of 23 municipalities across all Mohafaza in Lebanon were done in the villages below:

Bechmezzine, Karm Saddeh, Zgharta/ Ehden in North Lebanon; union of municipalities of Jerd El Kteh, El Mehamra, and old Akkar in Akkar; Machghara and Kab Elias in Bekaa, Hermel and Deir Al Ahmar in Baalbeck / Hermel; Kfarchima, Beit Meri, and union of municipalities of Shouf Sovayjani in Mount Lebanon; Jbeil / Byblos, Monsef, Daroun / Harissa in Keserwan-Jbeil; Alabassieh, Deit Anoun Al Nahr, Sour, Alaychiyyi in South Lebanon; as well as Ain Ebl, Nabatiyeh, and Khiam in the mouhafaza of Nabatieh.

Material recovery from municipal solid waste

About 56% of the studied municipalities have attempted to recover materials from MSW (figure a) through various means: sorting at the source (25%), sorting at the waste treatment facility (25%) and separate collection of single-source streams (13%) (figure b). In addition, 37% of the municipalities reported that the only recovery means are through the informal sector – with a minority (2%) working under the umbrella of the local authority. Overall, only 30% of the municipalities receive returns from the material recovery activities (figure c).

The surveyed mayors strongly expressed the negative impact of scavenging on returns from recyclables and their incapability to control these activities. Also, focus group meetings with the local citizens revealed the concerns of the citizens about visual and health impacts of littering caused by bins scavenging.

Materials recovery and returns (% Municipalities)

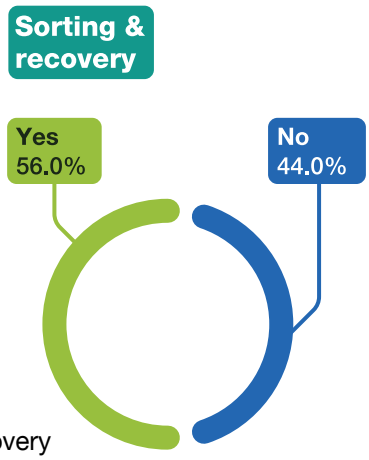


Figure a.
Sorting & Recovery

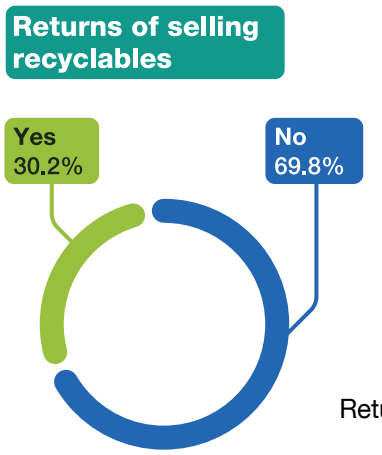


Figure c.
Returns of selling recyclables

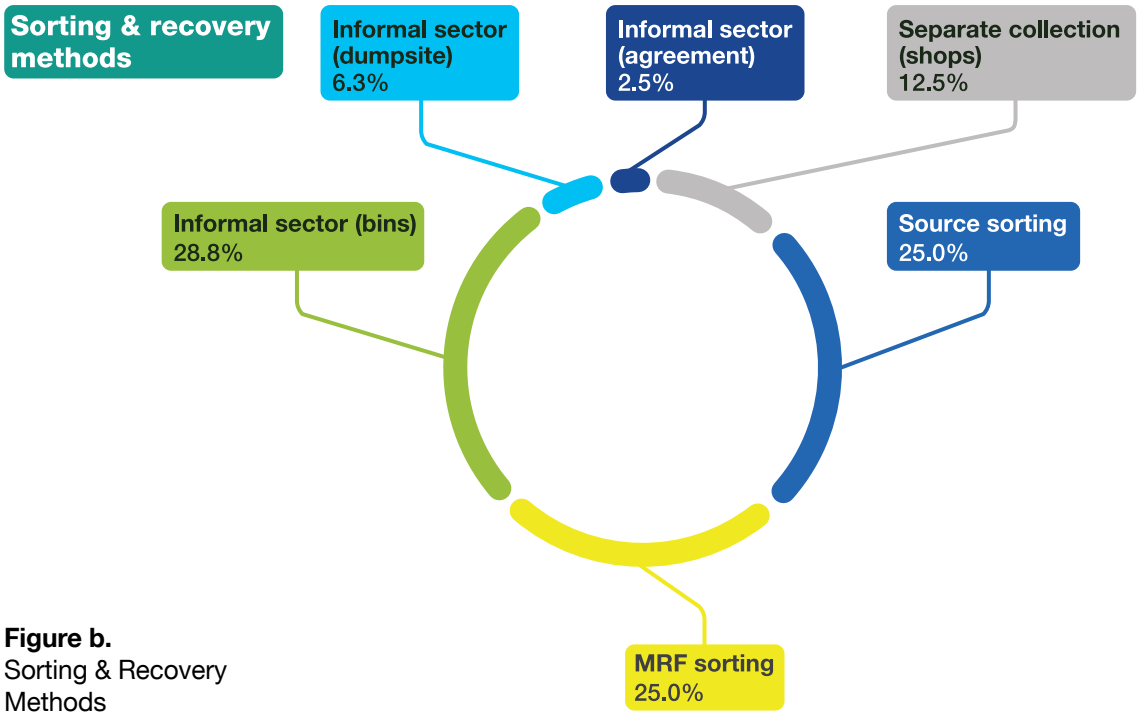


Figure b.
Sorting & Recovery Methods

Gaps in the waste management sector

The mayors have considered the lack of a cost recovery system as one of the three main legal gaps in the waste management sector. They identified the two other gaps as the implementation of decrees as well as the adjustment of the purchase limit of municipalities as specified by the Ministry of Finance (figure d).

Despite payment delays and the current devaluation of the Lebanese currency, the results of the interviews show that about 70% of the local authorities depend on the IMFU as their main source of income (all municipalities receive IMFU money, only 30% have other sources; namely from international and local funding, OMSAR, political parties and other sources (figure e). As a result, about 85% of the mayors have expressed their inability to pay the current expenses of waste management (figure f).

Legal and financial gaps (% Municipalities)

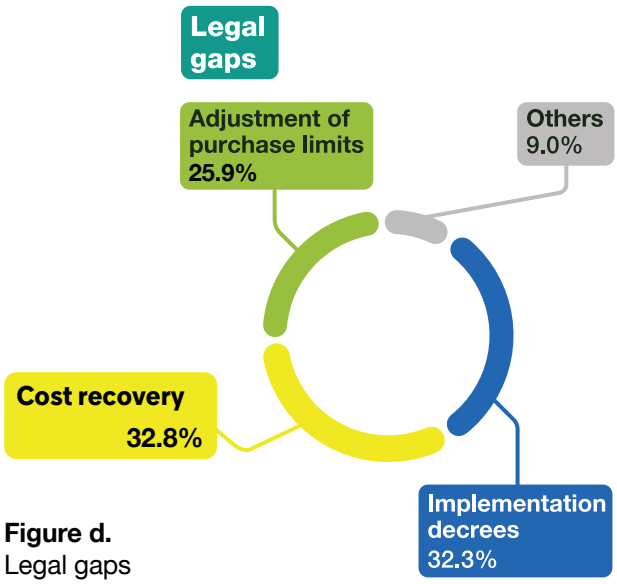


Figure d.
Legal gaps

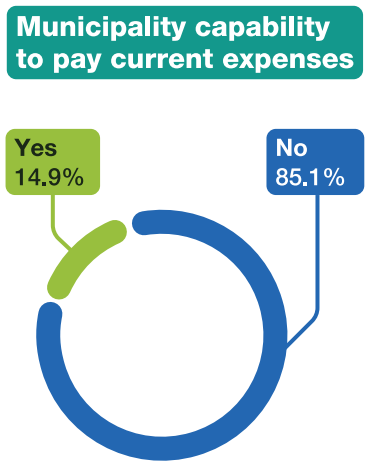


Figure f.
Municipalities capability to pay current expenses

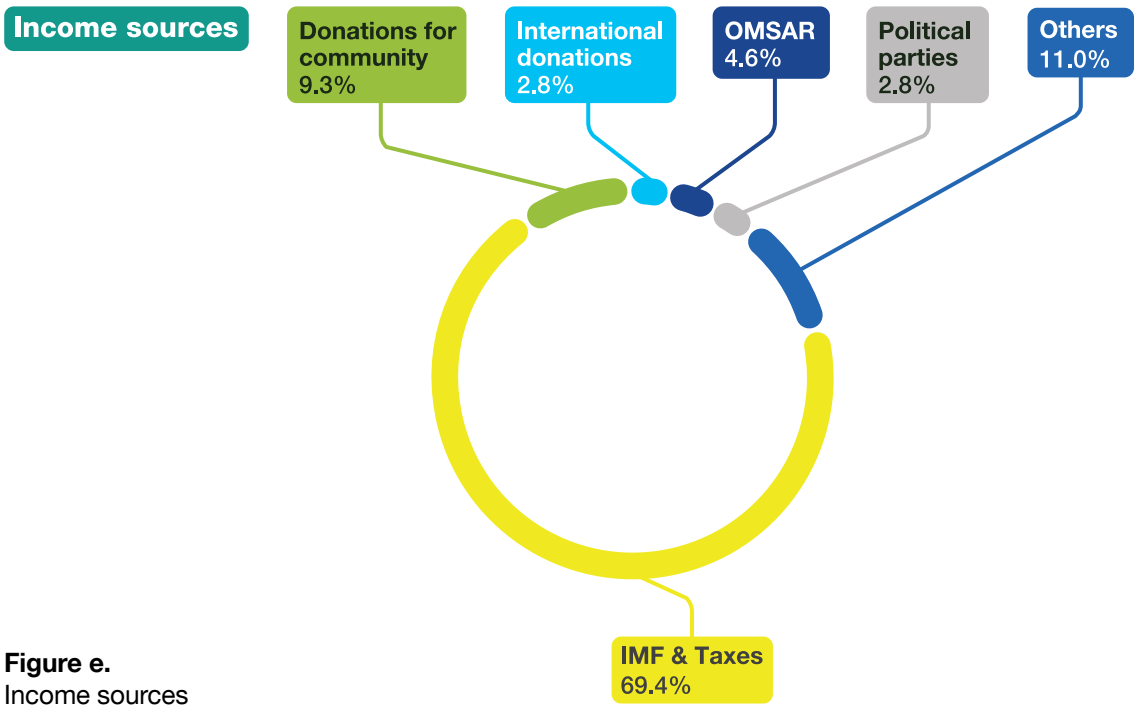


Figure e.
Income sources

Willingness to Pay of the local community

To improve the financial feasibility of the waste sector, about 37% of the municipalities attempted to impose service fees (figure g). Of those, about half (52%) were able to convince the local community to pay (figure h). When the mayors were asked about the willingness of the community to pay for waste management service fees, their answers were as follows (figure i):

- No one is willing to pay (28% of the sample),
- 90% are willing to pay (19% of the sample),
- and half of the community would pay (17% of the sample).

The majority of the interviewed mayors (48%) recommended a monthly fee of about $1 per household, whereas only 20% approved that $3 would remain feasible (figure j). *These results are comparable to the previous empirical study that surveyed households (Box J.1; J.3).*

People willingness to pay (% Municipalities)

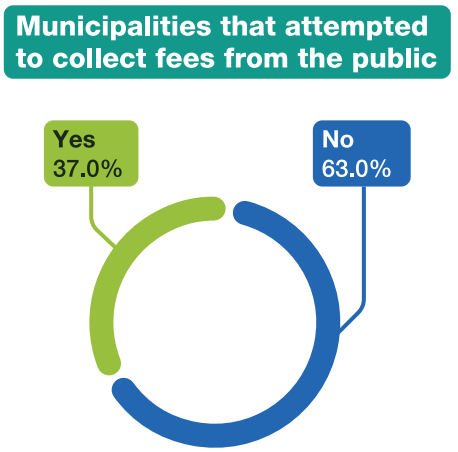


Figure g: Municipalities that attempted to collect fees from the public

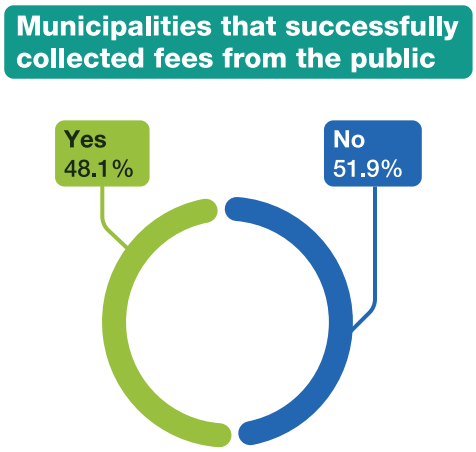


Figure h: Municipalities that successfully collected fees from the public

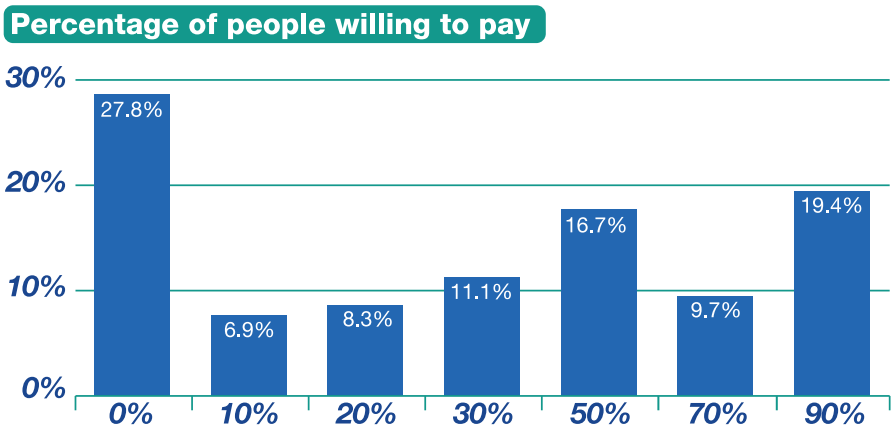


Figure i: Percentage of People willing to pay

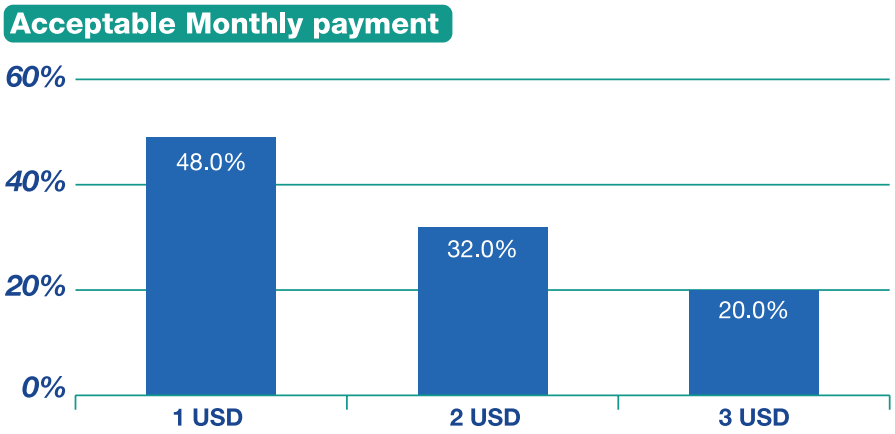


Figure j: Acceptable Monthly payment

Challenges of waste storage, collection and treatment

As related to the local waste storage and collection systems, the interviewed mayors have conveyed that they are facing various financial, technical and social challenges. They identified the financial challenges as directly related to the operational costs of waste storage and collection in addition to the budget needed for equipment (figure k). In terms of technical issues, about 74% of the mayors considered that the equipment currently used for waste storage and collection is inadequate (figure l). Also, they have determined social challenges such as littering, the use of loosely sealed waste bags and rejection of nearby waste bins by local communities (figure m).

Challenges of local waste storage and collection systems (% Municipalities)

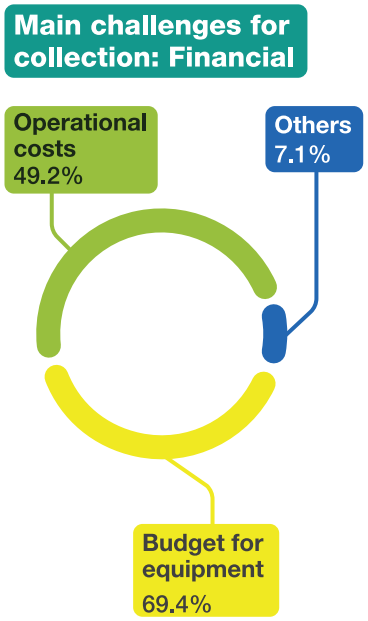


Figure k: Main challenges for collection: Financial

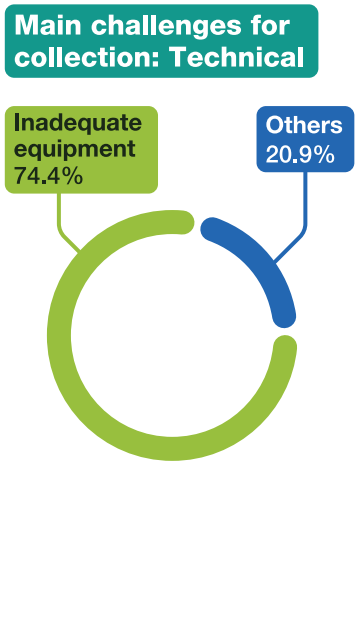


Figure l: Main challenges for collection: Technical

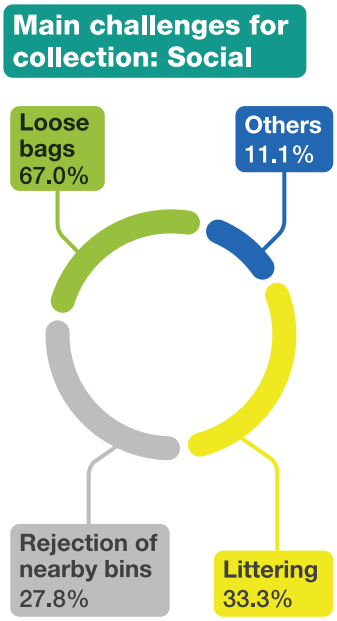


Figure m: Main challenges for collection: Social

As related to the local waste treatment systems, about 85% of local authorities are not capable to pay the current expenses of waste treatment (figure n). About 80% of the local waste treatment facilities need upgrading (figure o) and they are facing multiple financial, technical and social problems (figure p).

Challenges of local waste treatment systems (% Municipalities)

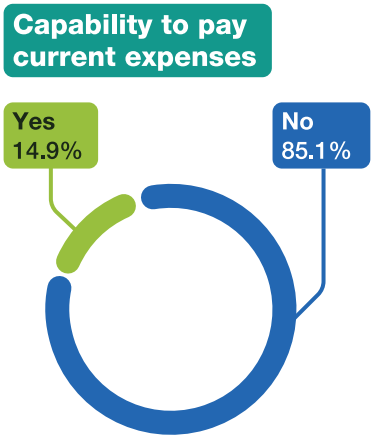


Figure n: Capability to pay current expenses

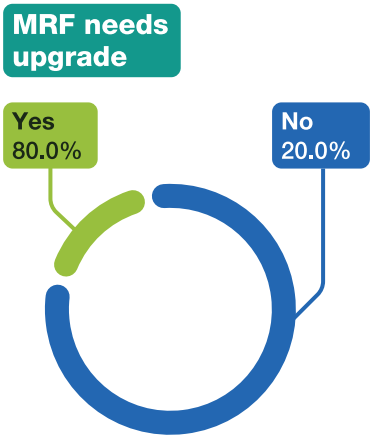


Figure o: CMRF needs upgrade

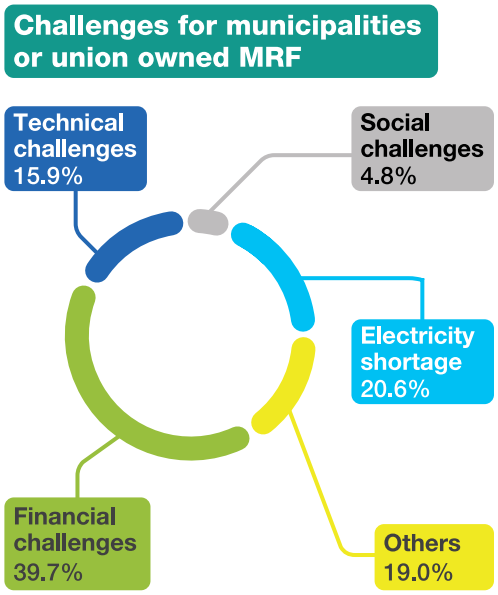


Figure p: Challenges for municipalities or union owned MRF

L.

APPENDIX 4.
EPR Theoretical background and international policy debate

Depending on their material composition and production process, different products generate waste streams with varying environmental impacts. A system of goods-specific excises known as Advance Disposal Fees (ADFs) are used to internalize those environmental costs. The ADFs are considered an integral constituent of EPR. The recycling responsibility imposed on producers and importers, under EPR, increases their costs which they pass along to consumers through increased prices, abating consumer demand. Then, producers use the higher income to either recycle the goods themselves or, as is often the case, to compensate an intermediary to fulfill this function. In this way, EPR functions as an ADF or producer-level DRS, reducing source demand and encouraging recycling. EPR schemes offer certain advantages over producer-level ADFs. They are less information-intensive than ADFs as they place less information requirements on governments, since producers choose how to regulate their prices to reflect their projected recycling costs. Under EPR schemes, internalizing recycling costs allows producers to design their products in such a way to reduce waste and maximize recycling and reuse (Matheson, 2019).

The justification for an EPR implementation can be tracked to evidence about its ability to deliver benefits that can be classified into the following categories:

- *Cost recovery:* EPR contributes to shifting the financial responsibility of waste management from municipalities to producers of waste generating products.
- *Separate collection:* EPR enhances the separation of collected waste that can be challenging when mixed in the general waste stream.
- *Material recovery:* EPR enhances material recovery, resource productivity and the circular economy, issues that are currently high on the environmental policy agendas of many countries. EPR policies often contain targets or incentives that aim to increase collection and recycling rates. The private sector is believed to reach these targets more cost-efficiently.
- *Design for environment:* By implementing the "producer pays principle", EPR incentivizes producers to invest in product design that reduces downstream environmental impacts from waste treatment and/or prevents the upstream environmental impacts from resource extraction.

The EPR concept has been introduced in various countries since the late 1980s. Many governments and companies adopted it extending the producers' responsibility for the environmental impacts of their products throughout the product chain, from design to the post-consumer phase. Since 2001, the number and variety of EPR systems have grown significantly. Currently, the most commonly used EPR systems include electronics, packaging, vehicles, and tires. The success of EPR in promoting recycling and ensuring funding for waste management in these sectors has initiated policy discussions about extending the use of EPR instruments to additional product groups; namely products that often evade public collection causing costly environmental impacts. In this context, the EU calls member states to adopt EPRs for tobacco product filters and EoL fishing gear by 2023 and 2025 respectively to help cover clean-up and recycling costs. Also, the EU Single-Use Plastics Directive requires member states to develop EPR schemes for several plastics products found in litter streams. EPR is also being recognized to extend producer responsibility to additional products that make up high-volume or high-impact waste streams as a significant portion of solid waste and that exhibit relatively low rates of material recovery. Examples of these include construction and demolition waste (C&DW), food waste and textiles. The EU requires member states to implement separate collection of food waste by 2024 and textiles by 2025. Several US states have adopted novel application of EPR, including EPRs for textiles, C&DW and paint.

Along with the increasing use of EPR in both traditional and new product sectors, there is currently a policy debate of expanding EPR schemes to include additional impact categories, which go beyond the traditional use of EPR to cover EoL costs that occur at the domestic level. These impact categories include micropollutants, as well as products that are regularly exported as used goods for extended use in other markets (Yamaguchi, 2021).

Micropollutants are natural and synthetic contaminants that infiltrate into ground and surface waters. The production and use phases of the product lifecycle can generate pollutants that, if not appropriately captured and treated, can cause negative environmental impacts. For instance, micropollutants released during the use-phase by textiles and tires are costly to capture and treat. EPR is under consideration by some policymakers as a means to finance related mitigation measures. Infrastructural improvements in wastewater treatment plants can mitigate the leakage of microplastics into freshwater systems. Despite the diffuse nature of micropollutants and the difficulty in assigning responsibility, some proponents of EPR are considering the feasibility of using EPR schemes as a means to finance such mitigation measures, notably upgrades to municipal wastewater treatment plants that would enable retaining microplastics in sewage sludge.

Products traded as second-hand goods and exported for extended use in other markets prolong the products' lifespan, which is environmentally desirable. Since value chains are interconnected worldwide, some products are traded for repair and reuse in other markets. Eventually, products purchased in one market become waste in another. Current EPR structures do not address the multiple product use cycle (second hand) and across borders (transboundary trade) of products. They only target the recycling of products that become waste in the home country and producer responsibility ends at the point of export. Products that are regularly exported for extended use in other countries fall out of the scope of traditional EPR in domestic markets. As they become waste in foreign mar-

kets, they are not captured by the requirements of the EPR system in the purchase market, creating externalities in financing the collection and treatment in the market where they ultimately become waste (Yamaguchi, 2021). This raises policy questions on how to incorporate such products into producer responsibilities at the EoL. Additionally, uncertainties about the environmentally sound management of this waste in final destinations lead to environmental concerns especially in least developed countries. Examples of these products include textiles, vehicles and electronic and electrical equipment (EEE) as significant volumes of these products are commonly exported to developing and emerging economies for re-use.

Proponents of an extension of the geographic scope of EPR claim that producers should bear the ultimate responsibility for their products, even when exported. They argue that this responsibility could comprise finance, capacity building and knowledge transfer to support the countries that ultimately handle the product at end of life (Thapa *et al.,* 2022a). To address the limited scope of the existing EPR schemes, where producers are made responsible for EoL management of products under the "polluters pay principle" within the national jurisdiction, Thapa *et al.* (2022b) outline a new format accounting for the multiple product use cycles and border crossing features and expand the EPR concept to the Ultimate Producer Responsibility (UPR), defined as the financial responsibility for collecting and recycling according to the highest possible value retention option (Reike, 2018). To ensure fairness, global circularity and sustainability, funding could be collected by the EPR scheme in the domestic market to finance collection and EoL management in the destination country. Thus, primary producers should be responsible for their product until its ultimate EoL, no matter where the product geographically is finally collected and recycled.