Fiscal Instruments to Internalize the Environmental Costs of Solid Waste in Cote d’Ivoire
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I. Executive Summary

This study of fiscal instruments to internalize the social costs of solid waste is part of a broader Partnership for Market Readiness – Carbon Pricing Leadership Coalition (PMR-CPLC) initiative aimed at addressing greenhouse gas emissions in Cote d’Ivoire. Improvement of solid waste management is an integral part of Cote d’Ivoire’s climate change strategy. According to Cote d’Ivoire’s nationally determined contribution (NDC) strategy, the waste sector accounts for approximately 10 percent of greenhouse gas (GHG) emissions. The strategy targets reducing the growth of waste sector emissions through 2030 from 47 percent to 3 percent, accounting for 7 percent of total targeted GHG reductions. As part of its strategy to reduce emissions, Cote d’Ivoire is planning to introduce a modest carbon tax of FCFA 1,000–2,500 (US$1.90–4.70) per ton of CO₂ equivalent.

Environmental externalities from solid waste far exceed GHG emissions: Improperly disposed of waste has numerous other social costs, including air, soil and water pollution, disease, flooding, poisoning domestic and wild animal populations, reduced fishing catches, and loss of tourism revenue. To address these other environmental costs of solid waste, Cote d’Ivoire plans introduce “circular economy” reforms comprising legal, educational, research and financial initiatives for improving waste reduction and recycling.

This report is an exploration of the fiscal instruments that can be deployed to correct incentives relating to the generation, recycling and disposal of solid waste. Where externalities exist, private markets do not produce efficient results. Public policies are needed to internalize social costs and give actors the correct incentives to produce socially desirable outcomes. Fiscal instruments play an important role not only in financing waste recycling and disposal, but in correcting the associated costs so that actors have the proper incentives to reduce and recycle waste. Fiscal instruments include not only taxes, fees, and fines, but also regulatory policies that contain imbedded environmental charges.

Cote d’Ivoire currently produces solid waste at the rate of approximately 0.5 kilograms (kg) per person per day, consistent with its status as a lower-middle income country. Its current generation rate of 4.7 million tons of solid waste is projected to grow to 5.7 million tons by 2025—a 2.6 percent annual growth rate reflecting growth in population and urbanization. This figure will be augmented by any real growth in incomes.

Cote d’Ivoire’s solid waste collection rate varies widely across regions. Trash collections have risen sharply in major urban centers over the past two years, following the hiring of two international waste management firms. However, the overall collection rate is still thought to be only about 50 percent. Uncollected trash is often openly dumped or burned. Most formally collected trash is still deposited in uncontrolled landfills, which have far greater externalities than

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1 Cote d’Ivoire (2015).
2 MinEDD (2016). CO₂ = carbon dioxide.
sanitary landfills. However, since 2018 Abidjan’s uncontrolled landfill, Akouedo, has been closed and replaced with a sanitary landfill at Kossihouen.

This report makes several recommendations regarding improving solid waste statistics—an important step toward enacting effective policies to improve waste generation and management. First, studies of waste composition should be updated, and existing projections of waste generation should be adjusted to reflect projected income growth. Statistics on waste collection, recycling and disposal methods (including landfilling, incineration, and dumping/burning) should be regularly collected. These statistics can be used to inform goals for improved waste management as well as a public information campaign to encourage better household waste management.

Additionally, the authorities should conduct a study to measure the social and environmental costs of solid waste beyond carbon emissions. These include air, water and land pollution, human and animal health, and economic impacts on industries such as fishing and tourism. Understanding these costs is important to setting appropriate rates on fiscal instruments to internalize solid waste externalities.

Cote d’Ivoire’s waste management administration is undergoing comprehensive reform from a decentralized system to centralized administration under l’Agence Nationale de Gestions des Dechets (ANAGED). ANAGED currently covers waste collection and processing in major urban centers, and its strategic plan calls for it to cover 100 percent of the population by 2025, targeting a 95 percent collection rate throughout the country. The plan also calls for replacing uncontrolled landfills with sanitary landfills, converting landfill methane to energy, composting, and recycling.

To accomplish this task, ANAGED projects revenue needs rising from FCFA 113.2 billion in 2018 to FCFA 300 billion in 2025. Currently, its own revenues are FCFA 42.5 billion, indicating a 62 percent financing gap that is covered by central government subsidies. Without revenue reforms, this financing gap will rise to 78 percent by 2025. The Ivorian authorities have proposed an increase in ANAGED’s share of property tax revenues from 25 percent to 50 percent, which would reduce the funding gap to 67 percent by 2025. Closing this financing gap would require additional revenues of roughly 0.5 percent of GDP by 2025. If a carbon tax is introduced, additional revenues will likely be needed to cover increased fuel and landfilling costs.

ANAGED’s revenues derive from the following taxes: 25 percent of the property tax (impot sur le patrimoine foncier, or IPF) and 100 percent of revenues from the following taxes: rent tax (impot sur le revenu fonciere, or IRF), electricity surcharge (taxe remunatoire pour l’enlevement des ordures menagere, or TEOM), sanitation tax (taxe de voirie, d’hygiene et d’assainissement, or TVHA), plastic tax (taxe speciale sur certains produits en matiere plastique, or TSCP), and the used vehicle tax (taxe de salubrite et de protection de l’environnement, or TSPE). Together with a small revenue stream from ANAGED’s own profits, sales and fines these revenues amount to less than 0.3 percent of total revenues.
This report analyzes ANAGED’s current fiscal instruments as well as potential new instruments for their efficiency, fairness, administrability, and transparency. Fiscal instruments can be applied anywhere along the waste generation and disposal chain—from importers/producers to retailers to households to disposal sites—but their incidence or burden should ultimately fall on consumers, because waste is generated by consumption.

Upstream fiscal instruments to curb solid waste generation and finance recycling or disposal include advance disposal fees (ADFs) and deposit-return schemes. ADFs can be levied at either the producer/importer or retail level; levying them at the higher level is likely to be administratively easier, while levying them at the retail level (or stating them clearly on the retail receipt) will make them more transparent. ADFs should be set equal to the cost of recycling or disposing of the taxed good, plus any residual externalities including methane emissions. Deposit-return schemes, which are ADFs where (part of) the charge is refunded to consumers when they deliver the used good or container for recycling, are more challenging to administer than ADFs but are highly salient and provide incentives for appropriate consumer behavior.

Cote d’Ivoire’s TSCP is an ADF on imported and domestically produced plastic bags and films. Its tax base should be broadened to include all plastic products, or at least all single-use plastics and packaging. The rate of the TSCP—currently FCFA 50 per kilogram—should also be reviewed for adequacy. Cote d’Ivoire should also introduce a deposit-refund scheme for beverage containers, a prominent component of solid waste.

The TSPE is an ADF on used vehicles designed to curb air pollution, although the tiny yield of the tax suggests that it is unlikely to have a material effect on emissions. The most appropriate fiscal instruments for curbing vehicular externalities are motor fuel excises and vehicle taxes. Cote d’Ivoire should review the adequacy of those taxes for addressing those goals, and it is receiving technical assistance in this task as part of this PMR project. The TSPE could then be transformed into an ADF or deposit-refund scheme for financing recycling and disposal of end-of-life vehicles.

Extended producer responsibility (EPR) is a regulatory regime that requires importers and producers to reclaim their used goods and/or packaging at the end of their life cycle. Practically, this results in producers establishing a non-profit recycling entity to which they pay recycling charges, based on the cost of recycling their products. The main benefit of an EPR scheme is that it gives producers an incentive to design their products for easy recycling (which allows them to reduce their fees.) It also places a lower information requirement on government, which unlike for ADFs does not have to set the recycling charges itself.

Cote d’Ivoire has a prototype EPR scheme for cement sacks. It also has a decree controlling electrical and electronic wastes that is plans to develop into an EPR scheme for those products as well as batteries and tires. Manufacturers prefer this solution to increased taxation. Vehicles could also be included in this scheme, as an alternative to revising the TSPE. Deposit systems could be built into the recycling charges in order to provide consumer incentives to recycle.
In addition to the TSCP, Cote d’Ivoire has a ban on plastic bags that are less than 30x25 centimeters in dimension and 30 microns thick. If distribution of plastic shopping bags remains an issue despite this ban, an FCFA 5-10 per bag charge—either a tax or a fee retained by retailers—would likely prove highly effective at encouraging consumers to provide their own reusable bags.

Household-level charges on solid waste include pay-as-you-throw (PAYT), property taxes and utility bill surcharges. PAYT, under which households are charged per kilogram or bag of waste disposed of, is perhaps the ideal waste tax, since it provides an incentive for households to reduce their waste output—for example, by increased reuse and recycling. However, because PAYT is difficult to administer and increases incentives for dumping, it is not appropriate for most developing countries.

Property taxes are the most common instrument for waste management finance. They have the benefit of being both efficient and progressive; however, they are difficult to administer, and because they typically finance a variety of government services, they do not provide households with any information about waste management costs. Property taxes also tend to be only weakly correlated with waste generation and provide no incentive for waste reduction.

The IPF is ANAGED’s most important fiscal instrument, accounting for almost half of own revenues and about 18 percent of expenditures. The government intends to increase ANAGED’s share of the property tax from 25 percent to 50 percent, doubling that income. The IPF yields about 0.33 percent of GDP—somewhat below the 0.45 percent average for lower-middle income countries. Property tax reform could thus yield higher revenues over the medium term, given sufficient investments in cadaster extension and updating of property valuations. This could help replace revenues from the IRF, a capital income tax not appropriately allocated to waste management. Elimination of property tax expenditures could provide for incorporation of the TVHA into the IPF.

Utility surcharges—most commonly, surcharges on electric bills—are used to finance waste management in many developing countries. Although they tend to be less progressive than property taxes, they are far easier to administer and more strongly correlated with waste generation (since household size and income drive both electricity and goods consumption). Like property taxes, however, electricity surcharges provide no incentive for households to reduce waste output.

The TEOM is ANAGED’s third-largest fiscal charge, accounting for 14 percent of own revenues and about 5 percent of expenditures. Charged at the rate of FCFA 2.5 per kilowatt hour in Abidjan and FCFA 1 in other areas, the rate of the TEOM have not changed since the charge’s introduction in 1982. Simply restoring the real value of this charge in terms of the consumer price index would increase its revenues by almost 300 percent. The rate differential between Abidjan and other regions should be reevaluated in this process: The charge should ideally reflect local waste disposal costs, although ability to pay may be taken into account.
ANAGED raises very little revenue from fines and penalties. While setting fines too low will provide little disincentive for littering, setting them unrealistically high will discourage their enforcement, resulting in similar outcomes. As part of the overall strategy to improve waste management, the Ivorian authorities should review existing fines and penalties, ensuring that they are adequate but not excessive, and investing sufficient resources in their enforcement.

Increased fiscal charges should be accompanied by administrative capacity-building to ensure that both existing and new charges are properly enforced. Fiscal policies should also be designed for compatibility and complementarity with environmental regulations.

All changes in solid waste charges should be accompanied by a public information campaign that educates consumers about the social costs of solid waste and instructs them on proper household waste management and recycling opportunities.
II. Solid Waste Generation, Externalities and Management

Generation

In 2018, Cote d’Ivoire generated approximately 4.7 million tons of solid waste (figure 1), according to estimates by the National Agency for Waste Management (L’Agence Nationale de la Gestion des Dechets, or ANAGED). Abidjan, the commercial capital and largest city in Cote d’Ivoire, accounted for 35 percent of that amount. Total waste generation is projected to grow to 5.7 million tons by 2025—an annual growth rate of 2.6 percent, while waste generation in Abidjan is projected to grow at a slightly higher rate of 2.7 percent. These growth projections derive from projected population growth rates in Abidjan and the country as a whole.

Figure 1.

In per capita terms, Ivorians on average generate 189 kilograms (kg) of waste per person per year, or 0.5 kg per day—in line with the average generation rate of 0.53 kg per person per day for lower-middle income countries found in Kaza, et al. (2018). The generation rate in Abidjan is substantially higher at 321 kg per person per year, or 0.9 kg per person per day. This higher rate of waste generation likely reflects the higher average income level in the largest city, as well as higher consumption of packaged goods by urban dwellers. As Kaza, et al. (2018) demonstrates, per capita waste generation relates positively to both per capita income and urbanization. The average waste generation rate for a low-income country in 2016 was 0.4 kg per person per day, while the corresponding figures were 0.7 kg for upper-middle income countries and 1.6 kg for high-income countries.

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3 ANAGED (2019).
Insofar as the ANAGED (2019) waste projections take into account local population growth and waste generation rates, they incorporate the effects of urbanization on waste generation. However, they do not take into account the effect of income growth on waste generation rates. If average real incomes rise over the next five years, it is therefore likely that the waste generation projections in ANAGED (2019) will prove to be underestimated.

Not only the volume but also the composition of solid waste change as per capita income rises (figure 2). Kaza, et al. (2018) show that as income increases, the share of food and green waste declines, while the shares of paper and packaging materials such as cardboard, plastic, metal, glass and wood increase. Some of this growth comes from better classification of waste, as demonstrated by the declining share of “other” waste as income increases. Cote d’Ivoire can therefore anticipate a growing share of inorganic waste to accompany development.4

Figure 2.

The composition of solid waste in Cote d’Ivoire appears fairly typical for a lower-middle income country (figure 3)—although the classification differs somewhat between Kaza, et al. (2018) and BURGEAP (2011), making direct comparison difficult. The categories of food and putrescibles and wood, hay/straw, and charcoal together account for 53 percent of Ivorian waste, which is the same as the share of food and green in the World Bank study. Packaging products such as paper and cardboard, plastics, metal and glass account for another 18 percent of Ivorian waste, which is closer to those products’ waste share in low-income countries (16.4 percent) than lower-

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4 The International Monetary Fund projects real per capita GDP growth for Cote d’Ivoire of 4.5 percent per year for 2021-2025: https://www.imf.org/en/Countries/CIV.
middle income countries (29 percent). However, Cote d’Ivoire’s most recent waste inventory dates from 2010, so it is possible that these shares are now higher.\(^5\)

Since waste volume and composition change with growth and urbanization, it is important for countries to update their waste inventories periodically in order to understand their waste management needs. According to Ministry of Environment officials, Cote d’Ivoire’s current waste projections are based on studies conducted about a decade ago (e.g., BURGEAP 2011). An updated waste inventory therefore appears advisable.

Figure 3.

![Waste Composition - Cote d’Ivoire - 2010](image)

**Externalities**

Improvement of solid waste management is an integral part of Cote d’Ivoire’s climate change strategy. Cote d’Ivoire’s National Climate Change Response Strategy (2015) set a goal of reducing Ivorian greenhouse gas (GHG) emissions by 28 percent below the business-as-usual (BAU) level projected for 2030. In 2012, the waste sector generated an estimated 1,582 kilotons of carbon dioxide (\(\text{CO}_2\)) equivalent, or approximately 10 percent of total GHG emissions (figure 4). Left unchecked, emissions from the waste sector are projected to grow by 47 percent between by 2030. The goal of the strategy is to restrict their growth to only 3 percent over that period, accounting for 7 percent of the total targeted reduction.

GHG emissions from the solid waste sector are largely due to methane (\(\text{CH}_4\)) emissions from decomposing organic matter in landfills and dumps. Compared to carbon dioxide, methane is a

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\(^5\) The IMF measures average annual real per capita GDP growth in Cote d’Ivoire at 3.6 percent per year since 2010: [https://www.imf.org/en/Countries/CIV](https://www.imf.org/en/Countries/CIV)
powerful but relatively short-lived greenhouse gas, possessing about 30 times as much warming power but an atmospheric life of only about a decade (rather than centuries). Reducing methane emissions from the waste sector requires a reduction in landfilled, capture of landfill methane for use in energy production, and/or segregation of organic waste for composting.

Figure 4.

Improper solid waste management produces many social costs in addition to global warming. These include illnesses due to pollution of air, water and soil from landfills; lost agricultural and land value due to soil contamination from leachate; illnesses due to vermin that proliferate around waste dumps, such as rats and mosquitos; loss of life and property due to flooding caused by improperly disposed of waste (especially plastics); poisoning of domestic and wild animal populations; poisoning of marine life, resulting in reduced fish catches; loss of valuable recyclable materials, such as aluminum; and loss of tourism income.

Fiscal charges to internalize the social costs of solid waste—whether applied at the producer, consumer, or disposal stage—should be calibrated to those costs. In order to set appropriate fiscal charges, measure of those costs is therefore necessary. Solid waste externalities are likely to vary considerably from country to country, depending on local conditions. For example, a 2006 study of the Pacific island nation of Palau found a variety of solid waste-related costs (figure 5), which including public spending on waste management totaled 1.6 percent of GDP. The largest social costs were from lost tourism and illnesses, which accounted for 87 percent of total costs. (Notably, some of the costs of solid waste in Palau are due to waste mismanagement by other countries, which result in plastic litter washing up on beaches, impairing their value as tourist locations. The study also did not account for GHG emissions from solid waste deposits.) Public spending on waste management and litter collection
accounted for only 6.5 percent of total costs, or less than 0.1 percent of GDP, while waste externalities accounted for 93.5 percent of costs or 1.5 percent of GDP. These figures demonstrate that an increase in public resources devoted to waste management, including increased fiscal charges on waste generation, would improve overall welfare.

Figure 5.

To date, Cote d’Ivoire has evaluated GHG emissions from its solid waste sector: Evaluating the GHG emission levels estimated in Cote d’Ivoire (2014) using the social cost of carbon parameters from IMF (2017) yields a value of approximately FCFA 42 billion or 0.2 percent of GDP for 2018. However, Cote d’Ivoire has not yet evaluated the other externalities from its waste sector, and should therefore do so in order to set appropriate fiscal charges and waste management spending levels.

Management

Cote d’Ivoire is mapping out an integrated strategy for a “circular economy” to better manage its waste cycle and encourage recycling (MinEDD, 2020). The strategy comprises legal, research and development, training and education, and financing. Fiscal charges to internalize the social costs of solid waste can form an integral part of this strategy, as well as helping to finance its implementation.

Waste collection rates in Cote d’Ivoire have historically been low: According to the Plan National de Developpement (Cote d’Ivoire 2016), the national solid waste collection rate in 2014 was 40 percent. Since that time, however, the country has initiated a major reform of its waste management institutions and procedures aimed at raising the national collection rate to 95 percent by 2025. The goal of reducing GHG emissions from the waste sector served as a major impetus to this reform.
Under the terms of the reform, solid waste collection and processing for the entire nation will be centralized under ANAGED, a public agency under the joint authority of the Ministry of Sanitation and the Finance Ministry. Waste management was decentralized to local governments under the fiscal federalism law of 2003. However, as that system did not generate positive results, a recentralization process began with the creation of the Agence Nationale de la Salubrite Urbaine (ANASUR) under the authority of the Sanitation Ministry in 2007. In 2017, ANASUR was merged with the Fonds de Financement des Programmes de Salubrite Urbaine (FFPSU), the funding agency for waste management under the authority of the Finance Ministry, to create ANAGED.

In accordance with the World Bank’s recommended strategy for solid waste reform (World Bank 2018), ANAGED is first targeting universal collection of solid waste. ANAGED was initially charged with waste management in Abidjan and four other urban regions (Yamoussoukro, San Pedro, Poro and Gbeke), which together account for 27 percent of the Ivorian population. It is scheduled to extend its coverage to the entire population by 2025, with a goal of collecting 95 percent of waste in each region.6

The waste collection rate varies widely across geographic regions and is generally much higher in urban areas than in rural areas. According to ANAGED (2019), Abidjan generated about 1.7 million tons of waste in 2018, of which about 1.3 million tons were collected, for a collection rate of roughly 76 percent.7 Target collections were roughly 1.6 million, for an official collection rate of 78.5 percent (Table 1).8 Reported 2018 collection rates in four other large cities covered by ANAGED range between 60 and 86 percent.

<table>
<thead>
<tr>
<th>City</th>
<th>Collections</th>
<th>Collection Target</th>
<th>Collection Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abidjan</td>
<td>1,273,298</td>
<td>1,622,036*</td>
<td>78.5%</td>
</tr>
<tr>
<td>Bouake</td>
<td>137,952</td>
<td>229,500</td>
<td>60.1%</td>
</tr>
<tr>
<td>San Pedro</td>
<td>139,761</td>
<td>162,000</td>
<td>86.3%</td>
</tr>
<tr>
<td>Korhogo</td>
<td>162,982</td>
<td>213,690</td>
<td>76.3%</td>
</tr>
<tr>
<td>Yamoussoukro</td>
<td>107,690</td>
<td>144,000</td>
<td>74.8%</td>
</tr>
</tbody>
</table>

*World Bank calculation

Source: ANAGED (2019)

There are no comprehensive statistics on waste not captured by the government collection system. Cote d’Ivoire (2020) estimates that 15 percent of the population burn waste openly on their own properties, and an additional 20 percent burn waste at collective sites. Open waste burning is particularly prevalent in rural areas. In Abidjan, Cote d’Ivoire (2020) finds that 5

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6 ANAGED (2019).
7 Of the roughly 1.3 million tons collected, ANAGED collected 1.2 million, and private collection services delivered 0.07 million.
8 1.2 million tons were collected by ANAGED, and 0.07 tons were collected by private collections services.

ANAGED’s reported collection rate for Abidjan of 78.5 percent is likely due to its targeting a 95 percent collection rate for waste not covered by private collection services.
percent of households engage in open burning, while 39 percent of households use pre-collection services (see below) and 55 percent either deliver their trash to public collection sites or dump it. In the coastal region surrounding Abidjan, more than 75,000 tons of dumped waste ends up in waterways, leading to severe marine pollution of estuaries and intracoastal lagunas (SCE, 2020).

Part of ANAGED’s reform strategy (ANAGED, 2019) entails hiring international waste management companies to handle trash collection. Two international operators have been hired to collect trash in the Abidjan region; the government compensates them per ton of waste delivered, providing an incentive to increase collections. This initiative has led to a sharp increase of waste collection in major urban centers (figure 6). Effective use of private sector contractors is thus a key component of ANAGED’s plan for improving waste collection.

Figure 6.

![Urban Waste Collection](image)

Not all urban neighborhoods in Cote d’Ivoire are serviced by formal waste collectors. In areas where streets are too narrow or otherwise unreachable by standard collection trucks, a system of “pre-collection” prevails. Pre-collectors are informal actors who collect trash door-to-door using hand trucks or smaller mechanized vehicles. Traditionally, they are compensated by their clientele, with fees that vary with local household income and waste generation (Andrianisa et al., 2016). Since households have to pay pre-collectors to remove trash, and pre-collectors receive no additional compensation for delivering their collections to formal transfer stations, both households and pre-collectors have an incentive to dump their waste – and often do (BURGEAP, 2011; SCE 2020).

ANAGED’s current reform plan (ANAGED, 2019) calls for pre-collectors to be compensated by formal waste operators based on the weight of collected trash delivered to transfer stations. Making pre-collection free to households and compensating pre-collectors based on deliveries
to the formal system should improve incentives for both households and pre-collectors to comply with waste management regulations.

Cote d’Ivoire’s push to improve waste management includes not only raising collection rates but also improving disposal methods. At the time of ANAGED’s creation, Abidjan had one landfill, Akouedo, which was essentially an open dump with no sanitary landfill controls such as coverage of deposits with earth layers or capture and treatment of leachate and landfill gas. Like other open dumps around the country, Akouedo therefore caused significant air, water, and solid pollution. In 2019, Akouedo was closed, and a new landfill with sanitary controls and a capacity of 1.5 million tons, Kossihouen, was opened to the northwest of Abidjan. A second sanitary landfill, Attiekoi, is planned for the northeast of Abidjan. Additional transfer stations are also planned for the surrounding areas to widen the scope of collections (PricewaterhouseCoopers, 2019).

The Ivorian government is in the process of improving its post-collection waste processing (Gosselin, 2019). According to Cote d’Ivoire (2020), in the next five years the government plans to create 5 new sanitary landfills with gas-to-energy conversion and integrated recycling centers; two composting centers; ten biogas production units; and one trash-to-energy incineration plant. When fully implemented, these installations will result in a 40% reduction of GHG emissions from the solid waste sector. Collection and combustion of methane emissions from closed non-sanitary landfills are also being studied.

There are at present no official statistics on recycling rates in Cote d’Ivoire, as most of the activity takes place in the informal sector. Pre-collectors and scrap dealers recycle many higher-value items without their ever entering the formal waste stream. According to SCE (2020), Cote d’Ivoire has dynamic recycling markets for metals and many types of plastic. Since 2012, Cote d’Ivoire has banned exports of scrap metal, a measure introduced under industry pressure to ensure an affordable supply of inputs. Nonetheless, policymakers acknowledge that recycling rates, which some estimate as low as 3 percent, could be greatly improved.

Policymakers recognize the need to formalize and regulate recycling activity, not only to improve recycling rates but also to improve health and safety practices as well as compensation. Working conditions in informal recycling markets expose workers, including children, to numerous physical risks and toxic substances. While men working in informal waste recycling tend to earn the minimum wage of FCFA 60,000 per month, women are likely to earn only half as much (Koutoua, 2020). Public and private officials concur in the view that a professionalized recycling industry could become an important source of green employment.

Cote d’Ivoire has enacted regulations aimed at encouraging recycling and improving the processing of hazardous wastes. Decree 2017-217 on the ecologically rational management of electric and electronic equipment waste forbids burning, dumping, and international trade in

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9 Prior to the ban, an export tax on scrap metal was put in place to promote that goal.
10 Terms of Reference, Cote d’Ivoire PMR-CLPC Program, World Bank (2020).
used electrical and electronic goods, many of which contain toxic (as well as valuable) substances. The decree also provides a framework for producers and traders in those goods to establish regulated processes for their recycling. Ordinance 319 of 2019 requires producers and importers of cement to recycle all plastic sacks in which cement is sold. These regulations move the direction of “extended producer responsibility” (EPR), a quasi-fiscal approach to solid waste management that will be discussed in greater detail in the following section.

To make the planned improvements in waste management, the Ivorian authorities will need to build institutional capacity at central and local levels, including managerial, operational and technical capacity at waste treatment and disposal sites. Detailed recommendations on the necessary steps are beyond the scope of this study, so additional research will be needed to create a viable plan for institutional deepening.

Once basic waste collection mechanisms are in place, the authorities should focus on addressing the most GHG-intensive waste segments, notably organic matter. Separation and composting of organic wastes at source should be a second-phase priority for waste management improvement.

Finally, Ivorian policymakers acknowledge that public awareness of waste management issues is at present extremely limited. The success of their efforts to improve waste reduction, collection and recycling will therefore require the commitment of significant resources to public awareness campaigns. Awareness in private industry and civil society organizations appears to be fairly well developed, as evidenced by the involvement in waste issues of organizations such as the Patronat, Nestle, the Association Ivorienne de Valorisation des Dechets Plastiques, Africwaste, and Recyplast. There are also numerous pilot projects in plastic recycling and composting. Ultimately, however, awareness of solid waste pollution and best management practices will need to penetrate to the household level.

**Recommendations**

- Conduct a study to estimate the social costs of solid waste other than GHG emissions.
- Adjust waste projections for income growth.
- Update inventory of waste composition.
- Collect and publish detailed statistics on waste collection and disposal, including collection rates, dumping/burning, landfilling, recycling, composting and incineration.
- Use these statistics to inform goals for improved waste management.
- Support all waste management reforms with a public information campaign educating citizens about the environmental costs of waste and best practices to minimize them.
- Study the institutional capacity needs for adequate functioning of the public waste management sector and develop a plan for developing that capacity.
III. Financing Solid Waste Management

ANAGED Budget and Revenues

ANAGED’s Strategic Plan (2019) projects its revenues and expenditures through 2025 (figure 7). Expenditure for collection and disposal of waste in sanitary landfills is projected to grow from FCFA 113.2 billion in 2018 to FCFA 300 billion by 2025—an average annual growth rate of more than 15 percent. This growth is driven by the government’s ambitious plan to modernize its waste management system and curb environmental externalities. Meanwhile, revenues\(^\text{11}\) are projected to grow from FCFA 42.5 billion in 2018 to FCFA 67 billion in 2025, an average growth rate of less than 7 percent. In 2018, existing revenues covered 38 percent of expenditures, which share will fall to 22 percent by 2025. In terms of GDP\(^\text{12}\), expenditures are projected to grow from 0.47 percent of GDP in 2018 to 0.77 percent in 2025, while revenues are projected to fall slightly from 0.18 percent of GDP to 0.17 in 2025. The financing gap will thus rise from 0.3 percent of GDP in 2018 to 0.6 percent by 2025.

Figure 7.

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\(^{11}\) Revenues consist largely of those detailed in figure 8 (“Title 1”), plus a small capital investment injection (“Title 2”) that constitutes less than one percent of the total.

\(^{12}\) Nominal GDP was projected using IMF inflation and growth projections for Cote d’Ivoire: [https://www.imf.org/en/Countries/CIV#whatsnew](https://www.imf.org/en/Countries/CIV#whatsnew).
Projected growth in ANAGED’s expenditures and revenue needs is likely to be underestimated for two reasons. As discussed in the previous section, income growth will likely cause greater than expected waste generation, resulting in need for higher collection and processing expenditures. Further, the government’s plan to introduce a modest carbon tax (MinEDD, 2016) may lead to higher fuel and energy prices than are assumed in ANAGED (2019) projections. A variety of revenue sources are designated to finance ANAGED’s waste management (figure 8). These include 25 percent of revenues from the property tax (impôt sur le patrimoine foncier, or IPF) and 100 percent of revenues from the following taxes: rent tax (impôt sur le revenu fonciere, or IRF), electricity bill surcharge (taxe remunatoire pour l’enlevement des ordures menagere, or TEOM), sanitation tax (taxe de voirie, d’hygiene et d’assainissement, or TVHA), plastic tax (taxe speciale sur certains produits en matière plastique, or TSCP), and the used vehicle tax (taxe de salubrite et de protection de l’environnement, or TSPE). A scheduled subsidy yields 2.8 percent of revenues, and ANAGED’s own sales, profits and fines yield about 0.3 percent. In 2018, ANAGED’s total revenue from these sources was FCFA 42.2 billion, or 0.18 percent of GDP.

Figure 8

To help reduce ANAGED’s financing gap, the authorities have proposed an increase in ANAGED’s share of IPF revenues from 25 percent to 50 percent. The IPF currently yields about 0.33 percent of GDP, so the proposed measure will raise about 0.08 percent of GDP. Additional revenue

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13. The revenue shares in figure 7 are from a single year’s detailed revenue data published in a consultancy report (PricewaterhouseCoopers, 2019) and may therefore not represent steady-state revenue shares.

14. In principle, ANAGED also receives 100 percent of revenue from the scrap metal export tax (taxe sur l’exportation de la ferraille et des sous-produits ferreux, or TFPF), but since scrap metal exports are currently banned, this tax yields no revenue.
sources of about 0.5 percent of GDP would thus still be needed by 2025 to cover ANAGED’s projected deficit.

The difference between ANAGED’s revenues and expenditures is typically covered by transfers from the central government budget. While it may be feasible for the central government to continue covering ANAGED’s finance gap as it widens, it would be more efficient and transparent to reform and expand ANAGED’s own revenues to cover its full expenditures. And of course, reducing subsidies to ANAGED will free up scarce fiscal resources for other pressing expenditure needs.

**Principles of Solid Waste Taxation**

There are four basic principles of taxation—efficiency, equity, administrability, and transparency—that should be taken into account in designing a solid waste tax system. Efficiency, which is summed up in the expression “The polluter pays,” requires that the social and environmental costs of solid waste generation be internalized by charging the polluter fees or taxes commensurate to those costs. The efficient solid waste charge should equal the marginal social cost of waste generation, including but not limited to GHG emissions.

Making the polluter pay raises the question, “Who is the polluter?” The waste generation chain can be quite long and complex, ranging from primary industries such as agriculture, mining, and forestry, to manufacturers and importers, to wholesale and retail distributors, to consumers and households, to waste management industries and landfills, which are often controlled by local or national governments (figure 9). While solid waste pollution—and charges to correct that pollution—can take place anywhere along the chain, it is ultimately driven by the act of consumption. Therefore, it is the consumer (or households) that should ultimately bear the burden of solid waste charges. Most of the solid waste tax instruments detailed in figure 9, which will be discussed in the following sections, are ultimately borne by consumers, regardless of where in the waste cycle they are actually imposed.\(^{15}\)

Equity can be interpreted in two ways with regard to waste taxation: Generally, consumers should pay waste charges proportionate to their waste generation, which is both equitable and efficient. Since the rich consume more than the poor, they should therefore pay higher waste charges. Where poverty is an issue, however, concerns about affordability and/or incentive-compatibility may prevent charging poor consumers fully for the costs of their waste generation. In that case, it may make sense to finance waste management in a more *progressive* manner, subsidizing waste management for poor households with taxes levied disproportionately upon wealthier households. The classic example of a progressive tax used to finance solid waste management is the property tax.

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\(^{15}\) The exception to this is taxes on extractive industries, including royalties, severance taxes, and virgin material taxes. Depending on the structure of primary product markets, the burden of these taxes may not fall on the consumer. These instruments are dealt with in other PMR-CLPC reports and are not discussed here.
In order for a tax to be effective, it must be administrable given the resources of the government that imposes it. An “ideal” fiscal instrument to internalize a social cost will not be ideal if it is too hard to assess or enforce. An example of an “ideal” solid waste tax that is seldom applied due to administrative concerns is the “pay-as-you-throw” (PAYT) regime discussed below. Administrability may also dictate the stage of the waste cycle at which a tax should be introduced. Although consumers are the ultimate target of waste taxes, it may be easier to impose taxes at the import or production stage, since importers and manufacturers are much fewer in number than retailers or consumers/households.

In order to raise consumer awareness of the social costs of solid waste, corrective waste charges should also be transparent, or salient. Solid waste management is frequently financed out of general taxes, such as the property tax. Although the property tax is salient to property owners, it may finance a variety of services, so that households do not perceive the cost of waste management. Whenever possible, therefore, waste charges should be explicitly stated, whether as a component of the property tax or on the consumer invoice in the case of an advance disposal fee (discussed below). Salient invoicing is an important component of educating the public about waste issues and inducing desired behavioral changes.

It is likely that the social cost of solid waste will differ, depending on how it is disposed of. At the end of the product cycle, solid waste may be recycled into new goods, formally disposed of through landfilling, composting or incineration, or informally dumped. Where recycling has a positive net value, its social cost will be lowest, formal disposal will be second lowest, and informal disposal (litter cost) will be highest (figure 10).

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16 For certain materials, recycling costs may exceed the cost of formal disposal, even after any environmental externalities from disposal are taken into account. For those materials, disposal is a more efficient solution than recycling.
Porter (2002) shows that solid waste charges can be set equal to any of these three levels, with the difference between the actual disposal method and waste charge debited or credited to the consumer if the goods are disposed of in a different manner. For example, if the charge is set equal to the high social cost of littering (figure 10, green lines), then a portion of the charge should be refunded to households for their ordinary trash collection or recycling. Alternatively, if the charge is set equal to the recycling cost, an additional charge should be levied on household trash set out for formal disposal (for example, through the property tax or utility surcharge discussed below), and heavier fines or penalties should be imposed on dumping.

Business-level Fiscal Instruments

Advance disposal fees

Advance disposal fees (ADFs) are charges levied on products at the import, manufacturer, wholesale or retail level in order to prepay the cost of their recycling or disposal. They can cover the product itself, its packaging, or both. Ideally, ADFs should be set equal to the marginal social cost of recycling or disposing of a particular product and/or its packaging—that is, they should cover not only the cost of collecting and processing the good after use, but also compensate for any residual externalities from the good’s waste stream.

Businesses usually pass along the cost of the ADF to their customers, raising the price of the good by the amount of the charge. Customers typically respond to the higher price by reducing their consumption of the good, which may in turn lower producers’ and/or retailers’ profit margins. The extent of these effects depends on the relative elasticities of supply and demand for a particular good. ADFs may therefore raise concerns about affordability, particularly if applied to goods that comprise a large share of lower-income household budgets. Nonetheless, in deciding
whether to levy a solid waste charge, it is important to recall that waste already imposes significant costs, although the people who pay them do so not with money but with reduced utility due to waste pollution. In general, these externalities tend to fall more heavily on the poor, who tend to live in more polluted neighborhoods. Thus, it is arguably just to require the individual who consumes a particular good to also pay for the cost of its disposal.

As previously noted, levying waste charges at the business level may be less costly from an administrative point of view than at the household level. Within the business level, it may also be less costly to levy charges at the importer/manufacturer level than at the retail level, if importers and manufacturers are fewer in number and more likely to be formal than retailers. The level at which ADFs are imposed can also impact the transparency of the charge. A charge levied at the retail level and clearly stated on the consumer receipt will tend to be more salient than a charge imposed at the importer/manufacturer level. Retailers can, however, be required to state ADF on the receipt, even if it is imposed upstream, in order to improve salience.

The appropriate ADF regime depends on goods’ characteristics. Highly pollutive goods, such as batteries and tires, or goods that are frequently dumped, such as plastic bags and bottles, are the most appropriate subjects for ADF taxation. ADFs on these goods should arguably be set in line with their litter cost, with a refund given for proper disposal or recycling. Some goods should not be subject to ADFs for administrative or equity concerns. For example, applying ADFs to agricultural products and foodstuffs might prove not only administratively difficult, due to informal agriculture, but politically untenable as well, due to the large share of these items in the budgets of low-income households. For the majority of consumer goods, a detailed system of ADFs is likely needlessly complex, particularly in the presence of adequate household-level charges for formal disposal. However, a general sales tax or VAT increment could also be applied, if household-level charges are inadequate.

ADFs on goods with high waste costs—batteries, tires, appliances, and plastic packaging—are increasingly common in the OECD, particularly in eastern Europe (Matheson, 2019). Revenues from these taxes are frequently earmarked for environmental expenditures. The rates charged on these goods vary widely across countries, reflecting local income levels and disposal costs. For example, ADFs on plastic packaging range from as high as EUR 2.7 per kg in Denmark to as low as EUR 0.1 in Macedonia (figure 11). ADF tax bases frequently contain significant exemptions, such as for medical and emergency service supplies.

ANAGED is funded by two taxes that could potentially be characterized as ADFs: the plastic tax (TSCP) and the used vehicle tax (TSPE). The TSCP is levied at a rate of FCFA 50 (about USD 0.09) per kilogram on plastic bags and films, whether imported or domestically produced. Specifically, the tax applies to plastic bags covered by tariff codes 3923.21 and 3923.29, and to plastic films covered within categories 39.20 and 29.21 (which also cover numerous other plastic items.) Additionally, Cote d’Ivoire bans plastic shopping and street food bags with a thickness of 30
microns or less with dimensions of less than 35x20 centimeters, with the exception of bags used for medical, agricultural or sanitation purposes.\textsuperscript{17}

**Figure 11.**

![ADF Rates - Plastic Packaging](chart)

Along with carbon emissions, plastic pollution is one of the world’s most acute solid waste problems. Most plastics are not biodegradable and thus remain in the environment indefinitely. Water-borne plastic, both alluvial and oceanic, is particularly harmful: it causes flooding and disease (e.g., by creating mosquito breeding sites), poisons marine life (resulting in reduced fish catches and human health effects from eating seafood), and has negative aesthetic effects that can lead to loss of tourism revenues. Plastic bags—and thin plastic bags in particular—constitute one of the worst forms of plastic pollution due to their mobility (being easily blown by the wind), conformability (easily blocking drains), and free distribution by many retailers.

Confronted with these risks, many countries have taken action to tax or ban certain plastics and to encourage recycling. Measures to curb the use of plastic bags are particularly prevalent, including bans and taxes or charges (figure 12). Côte d’Ivoire’s plastic tax and ban on thin bags are thus in keeping with international norms.

**Figure 12.**

\textsuperscript{17} Additionally, bags must be imprinted with manufacturers’ specifications including material, thickness, resistance, and biodegradability.
Plastics account for about 8 percent of Cote d'Ivoire’s total solid waste (BURGEAP, 2011) but almost 55 percent of marine waste (SCE, 2020). As discussed in Section II, the share of plastic in the country’s waste stream can be expected to grow with per capita income. While plastic bags may pose some of the worst pollution risks, other forms of plastic are also important sources of pollution. For example, SCE (2020) reports a high share of plastic drink bottles among plastic waste.

The current base of the TSCP is extremely limited, as are the revenues it generates—about FCFA 600 million per year, or less than 0.003 percent of GDP. The base of the TSCP should therefore be broadened to include all items that contribute to plastic pollution, including packaging, bottles and containers. Babayemi et al. (2019) suggest a broader range of customs codes that could be subject to a broad-based plastic tax, including:

- 3901-3916: Inputs into plastic production, including plastic waste and rods
- 3917-3926: Finished plastic products

All plastics in the above categories (except for those that are re-exported) contribute to plastic waste production in Cote d’Ivoire and could thus be potentially subject to an enlarged TSCP. However, different plastic products have different useful lives: Plastic products used in the building trades, such as piping and sanitary fixtures, have much longer useful lives than single-use plastics such as bags, containers, and tableware. At a minimum, the base of the TSCP should cover all single-use plastics, such as tableware and drink containers. As for the value-added tax, plastic tax paid on inputs should be credited against plastic tax due on outputs, or if the final product is exported it should be refunded. The tax rate of FCFA 50/kg should be aligned with the recycling or disposal costs of plastic wastes discovered in the recommended study on the social costs of solid waste.
Ivorian authorities report that some consumers have responded to the ban on small, thin bags by shopping with reusable bags. However, there were no data available with which to measure the impact of the ban. Where shopkeepers provide bags “free of charge”, consumers are in fact paying for them through the general retail margin. But because there is no explicit charge for such bags, consumers nonetheless perceive them as free. Requiring retailers to charge for bags helps educate consumers about the environmental cost of those bags, and studies show that consumers respond to such charges by sharply reducing their bag consumption: Imposing an average per-bag fee of 0.3 percent of national per capita daily consumption results in an average decline in bag consumption of almost 70 percent (Matheson, 2019). There is some evidence that consumers become inured to the cost over time, however, so that bag charges have to be raised to prolong their initial impact. If additional measures are needed to curb plastic bag use and raise consumer awareness of plastic pollution, authorities could also introduce a consumer-level charge on plastic bags of FCFA 5-10/bag.

The TSPE is levied at the rate of FCFA 50,000 on used vehicles with an age of 5-10 years and at the rate of FCFA 100,000 on vehicles with an age of greater than 10 years. The Ivorian authorities plan to replace the tax on vehicles with an age greater than 10 years with an outright ban. They affirm that the objective of the TSPE is not to internalize the social costs of disposing of vehicles, but to discourage import of older cars due to their lower fuel efficiency and higher pollution rate. Although its revenues are allocated to ANAGED, the TSPE is therefore not a solid waste charge, but an air pollution tax.

A tax on used vehicles is not the best way to address air pollution from road transportation. Ideally, fuel excises should be set equal to the environmental costs of fuel combustion—not only carbon emissions, but local air pollutants as well. Additional fuel excises, annual vehicle registration fees, license fees or circulation charges can address other vehicular externalities, such as traffic congestion, accidents, and road damage.

Coady et al. (2019) find that, as of 2015, Cote d’Ivoire undertaxed energy consumption with regard to carbon emissions, local air pollutants, and vehicular externalities by 5.6 percent of GDP. Clearly, the TSPE, which raises 0.00001 percent of GDP, makes virtually no contribution toward rectifying this problem. The authorities should take immediate steps to address the undertaxation of fossil fuels, which could raise substantial revenues as well as reduce GHG emissions.

Recycling vehicles at the end of their life and disposing of any residual waste is costly, and end-of-life vehicles are an important solid waste issue in many countries (Sakai et al., 2014). To finance vehicle recycling and disposal, the TSPE should be transformed into an ADF or deposit-refund scheme covering all vehicles. The charge on each vehicle should be commensurate with

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18 According to the World Bank database, 2019 average per capita daily consumption in Cote d’Ivoire was approximately FCFA 2,850. An average per-bag fee of 0.3 percent of this amount, FCFA 8.5, could be expected to reduce bag consumption by 70 percent in the absence of other plastic bag restrictions. Given the existing plastic tax and ban on thin plastic shopping bags, the expected percentage reduction would be somewhat less.

19 For a detailed discussion of these issues, see Parry et al. (2014).
the cost of its recycling/disposal, so charges should increase with vehicle size and complexity. Alternatively, vehicles could be covered by an EPR scheme, as discussed below.

**Deposit-refund schemes**

ADFs that are (partially) refunded on goods delivered for recycling are commonly known as deposit-refund schemes. Compared to ADFs, deposit-refund schemes are more salient and therefore better at encouraging recycling, since consumers are explicitly compensated for returning recyclable goods. Deposit-refund schemes thus raise fewer concerns about affordability than ADFs, and refunds can also help generate an income stream for the urban poor from collecting and returning covered litter.

Deposit-refund schemes are generally more administratively complex than ADFs, since they require retailers or other designated entities to collect and store recycled goods and to disburse refunds. Some portion of the deposit fee, often referred to as a handling fee, is often retained by merchants and/or recycling entities to compensate them for this activity. Goods on which the deposit is paid but not reclaimed generate net government revenue, which is often designated to fund recycling activities.

Many countries have successfully used deposit-refund schemes to encourage recycling, especially of beverage containers. CM Consulting (2018) provides a detailed review of these schemes—mostly for high-income countries, but also for lower-middle income countries Kiribati and Kosrae (Micronesia). Kiribati charges a AUD 0.05 deposit on beverage containers of aluminum and plastic, of which AUD 0.04 is refunded to the consumer. Micronesia charges a USD 0.06 deposit on aluminum, plastic and glass containers, of which USD 0.05 is refunded to the consumer. In both countries, a private contractor is hired to administer and operate the system.

Cote d’Ivoire should consider introducing a deposit-refund scheme, especially for beverage containers, which as previously noted are a prevalent form of litter. The deposit should be sufficient to motivate consumers to return containers, and the handling fee should be adequate to cover the cost of administering the program. If necessary, an international operator could be hired to administer the program.

**Extended Producer Responsibility**

In contrast to ADFs, a fiscal policy under which the government sets tax rates on goods according to their recycling or disposal costs, extended producer responsibility (EPR) is a regulatory policy under which the government imposes strict liability for recycling and disposing of used goods and packaging on producers (i.e., manufacturers or importers) of those goods. Producers can meet their obligations under an EPR scheme by collecting their used goods and packaging themselves, often using retailers as intermediaries. However, producers more typically establish a third-party recycling entity—often a non-profit organization—to collect, sort, and recycle goods, and to dispose of any residual wastes appropriately. The third-party entity charges each producer fees equal to the cost of recycling and disposing of its products and packaging. As with ADFs,
producers usually add the EPR fees to their product prices, so their burden in most cases falls on the consumer. EPR legislation has become widespread under the European Union’s “circular economy” initiative, where it was first introduced in 1990 by Germany’s “Green Dot” system.  

EPR schemes have certain distinct advantages over ADFs, particularly in a developing country context where government resources are relatively scarce. First, EPR schemes place a lower informational burden on government administrations. Imposing the appropriate level of ADF on each type of product or packaging requires the government to know its recycling and/or disposal cost. Given the wide variety of materials and goods available on the market, as well as their continuous evolution over time, this is a considerable challenge. Private-sector entities specializing in product recycling will often have an advantage over government in setting accurate environmental charges.

The second major advantage of EPR schemes over ADFs is that requiring producers to pay the full waste cost of their products incentivizes them to (re)design their products for maximum recyclability. Thus, if the fees charged by the recycling entity accurately and dynamically reflect waste processing costs, the EPR scheme creates an information feedback loop that encourages continuous reduction of the environmental costs of consumption. Of course, importers do not have the same level of control over their products as manufacturers, but they can nonetheless choose among competing brands for goods with lower recycling costs.

According to the Ivorian Patronat (Koutoua, 2020), another advantage of EPR schemes is that the fees paid to the recycling intermediary are not a tax. Producers, who typically participate in the governance of the recycling intermediary, are likely to feel more confident that their fees accurately reflect the cost of recycling their products. While it may thus be more effective for the government to delegate recycling fees to the private sector, the government must still play a critical role in ensuring that the EPR scheme is properly enforced through maximal recycling and proper disposal of residual wastes.

Cote d’Ivoire has some existing regulations with the character of EPR. As noted in Section III, Ordinance No. 319 (2019) requires that all producers and importers of cement bags reclaim their bags after use for recycling. And Decree 2017-217 on electrical and electronic equipment lays the groundwork for future EPR schemes relating to these items. The authorities state that they intend to introduce similar decrees for batteries and tires.

Like ADFs, EPR fees can be designed to include refundable deposits aimed at encouraging consumers to deliver goods for recycling. Whether or not this is the case, their salience—and consumer awareness—can be enhanced by stating them separately on retail invoices.

**Household-Level Fiscal Instruments**

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**Pay-as-You-Throw**

Under a PAYT system, households are charged per kilogram, bag or bin of waste generated. The collection truck may weigh or count the number of containers each household puts out for collection, on which basis the household is then billed. More commonly, however, households purchase pre-taxed bags or bag stickers that must be used to deposit their trash for pickup; or alternatively, households may be required to rent authorized trash bins, with higher fees charged for larger or multiple bins. Compliant households subject to a PAYT regime clearly have an incentive to reduce the amount of trash that they generate and will thus be more likely to maximize alternative disposal methods, such as recycling and composting.

The major weaknesses of PAYT are that it does not function well if households can dispose of their trash in an anonymous manner, either by depositing it in communal bins or by dumping it illegally. Although PAYT is used successfully in some countries (e.g., South Korea) and single-family home communities (e.g., in the United States), its administrative complexity as well as its increased dumping risk make it inadvisable in most developing country contexts.

Given the immediate goal of improving waste collection and the high incidence of illegal dumping, waste collection should be provided free of charge to low-income households to inculcate appropriate waste disposal behavior. In the longer term, when separation of trash at source, composting and recycling become the primary objective, it may be possible to alter fee structures to encourage those activities—for example, by providing composting and recycling collection for free while charging for residual waste collection.

**Property Tax**

Property taxes are the most common household-level tax used to fund waste management. In this capacity, they have both strengths and weaknesses. Generally, property taxes are both efficient and progressive: Since land is in fixed supply, taxing it does not distort economic behavior, and since real estate ownership tends to be concentrated in the hands of wealthier taxpayers, even a flat tax on real estate tends to be progressive. This combination of efficiency and progressivity is unusual among fiscal instruments and highly desirable.

The main weakness of the property tax—particularly in a developing country context—is that it is difficult to administer. Land cadasters in developing countries are often incomplete and out of date, so ownership of many properties may be obscure. Even where ownership is clear, property valuation may be inadequate or out of date, so the tax base will often be too low. Updating cadasters and valuations is a costly, time-consuming process. For this reason, property tax yields in developing countries are usually well below those in developed countries. Norregaard (2013) finds that while the property tax in high-income countries yields an average of 1.8 percent of

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21 Taxing the value of buildings—as is typically done—is somewhat more distortive insofar as it can discourage land development. However, including the value of buildings in the tax base also makes the property tax more progressive.
GDP, the average yield in developing countries is only 0.8 percent of GDP. For lower-middle income countries like Cote d’Ivoire, the average yield is 0.45 percent of GDP.22

As a funding mechanism for household waste management, the property tax has additional weaknesses. Although the property tax in general is quite salient—property owners tend to be highly aware of their property tax liabilities—the allocation of property tax revenue among the various government services that it funds is usually not clear to taxpayers. For these reasons, property tax bills usually do not communicate to households even the average cost of household waste management. Moreover, the value of a property is likely to be only weakly correlated with waste generation. Higher income households do tend to generate more waste per capita than low-income households, so to the extent that high-income families live in more valuable properties, property taxes will correlate positively with waste generation. However, that correlation is far from perfect: For example, a big family living in a small house may generate a lot more waste than a small family living in a big house. Because property taxes do not vary with the amount of trash actually generated, they create no incentive to reduce waste at the margin.

The property tax (IPF) is ANAGED’s most important revenue source, accounting for almost half of its total revenue. For most properties, the tax base of the IPF is the (imputed) rental value of real estate. Real estate used by a business is taxed at a 15 percent rate; rented real estate is taxed at a 9 percent or 11 percent rate, depending on whether it is owned by a natural or juridical person, respectively; owner-occupied real estate (including second homes) is taxed at a 4 percent rate; and developed but unoccupied real estate is taxed at a 3 percent rate. Undeveloped bare land is taxed at 1.5 percent of its market value.

As noted in the previous section, the government plans to increase ANAGED’s allocation of the IPF from 25 percent to 50 percent. Under current law, other recipients of IPF revenue allocations include communal government (35 percent), regional governments (30 percent), and the Organization for Sanitation and Drainage (10 percent). The authorities did not specify how these shares would be adjusted, but presumably the shares of local governments will be significantly reduced. If ANAGED assumes expenditure responsibilities from these entities as it expands its territorial coverage, then it is appropriate to increase its allocation of property tax revenues accordingly. Waste management is often the largest share of local government spending, accounting for 20-50 percent of the budget (Medina, 2010). However, if IPF revenues currently finance other local government services, then the reallocation will have to be compensated by raising other local taxes, increasing central government subsidies, or cutting services.

The sanitation tax or TVHA, which yields about 0.005 percent of GDP, is also levied on the property tax base; it applies a rate of 2 percent to the market value of properties owned by entities exempted from the IPF, such as businesses benefitting under the investment code and embassies. Because owners of properties exempted under the IPF still receive the benefit of sanitation services, the TVHA is a reasonable measure to offset that tax expenditure. A more fundamental approach to this problem would be to eliminate their tax exemption under the IPF.

22 Developing country averages in Norregaard (2013) are based on a selective sample of 30 countries.
A rate of 2 percent for a property tax applied to market value is well above average, suggesting that properties subject to the TVHA are likely undervalued.

The property tax’s current yield of about 0.3 percent of GDP could likely be improved over the medium term in line with the lower-middle income country average of about 0.45 percent. This will, however, require considerable investment of time and resources. Ivorian authorities say they have undertaken property tax reform and may wish to seek technical assistance in that effort. Issues to address in property tax reform include:

- Expanding coverage of the property cadaster
- Updating rental values and property valuations
- Rationalizing the relationship between rental values and market values, and evaluating their pros and cons as property tax bases
- Unifying tax rates on properties owned by businesses and individuals
- Reducing the tax expenditure for owner-occupied properties and eliminating it for second homes
- Eliminating other property tax expenditures, such as for embassies and businesses under the investment code

Where property tax coverage is complete and its revenues funds 100 percent of waste management costs, stating the waste management component of the property tax separately on property tax bills is a desirable practice in order to increase transparency. However, neither of those conditions prevails in Cote d’Ivoire. In this context, it is reasonable to use the progressive property tax to cross-subsidize waste management for low-income households from taxes paid by higher-income households and businesses. Indeed, as previously discussed, the appropriate charge for collecting trash from low-income households is likely zero, at least in the medium term, in order to remove the incentive for dumping.

**Rent tax**

The rent tax (IRF) yields about 0.06 percent of GDP, accounting for almost a third of ANAGED’s revenues. The base of the IRF is the gross rent of leased properties, which are taxed at a 12 percent rate, if owned by individuals, or 15 percent, if owned by businesses. Owner-occupied buildings pay 3-4 percent of imputed rental value, depending on whether the owner is an individual or a business.

Taxes on rental income are a typically a component of the income tax—specifically, the income tax on capital income, whose base includes dividend and interest income. Like the property tax, the capital income tax tends to be quite progressive; and indeed, in countries like Cote d’Ivoire that use rental value as a property tax base, they are levied on the same tax base. However, since revenue from the IRF is earmarked 100 percent to ANAGED, the Ivorian rent tax serves as a sanitation tax.
Under the current system, rented properties appear to pay a higher waste charge than owner-occupied properties, which is unlikely to reflect actual waste generation. Property tax reform should therefore encompass IRF reform. If sufficient additional revenue can be raised from a reformed property tax, earmarking the revenue from the rent tax for ANAGED could be discontinued.

**Utility surcharge**

Surcharges on electricity bills are used in numerous developing countries to finance waste management (Cointreau and Hornig, 2003). In sharp contrast to the property tax, they have the advantage of being simple to administer, being collected by the electricity company along with its other tariffs and remitted to the government. Since households must pay the waste charges to avoid having their electricity cut off, they have strong incentives to comply. Generally, electricity consumption is also a better proxy for waste generation than property value, as it is more closely correlated with household consumption. Unlike the property tax allocation to waste management, the waste charge stated on the electricity bill is also salient and transparent. However, like the property tax, the electricity surcharge gives households no incentive to reduce their waste output: Producing less trash will not result in a lower surcharge, which depends only on consumption of kilowatt hours.

The electricity surcharge (TEOM) yields 0.02 percent of GDP and accounts for about 14 percent of ANAGED’s revenues. It is levied at the rate of FCFA 2.5 per kilowatt hour in Abidjan and FCFA 1 per kilowatt hour outside of Abidjan on all recipients of low-tension electricity. As of 2018, about 67 percent of Cote d’Ivoire’s households had electricity. The average cost per kilowatt hour is currently about FCFA 72.6 for households and FCFA 121.7 for businesses. In ad valorem terms, the TEOM thus increases electricity charges by 1.4-3.4 percent for households and 0.8-2.1 percent for businesses, depending on location.

The rate of the TEOM has not changed since it was originally imposed in 1982. Due to inflation, its real value has therefore declined over almost four decades by 74 percent. Restoring its real value in terms of the consumer price index would increase the rate to FCFA 9.7 per kilowatt hour in Abidjan and FCFA 3.8 per kilowatt hour elsewhere. This would raise the ad valorem rate to 4-13.4 percent for households and 2.4-8 percent for businesses. If necessary, the value restoration could be phased in to buffer its impact.

If compliance and electricity consumption did not decline in response to the higher rates, restoring the TEOM’s real value would nearly quadruple the revenues from this tax, raising an additional 0.07 percent of GDP. Increasing electrical connectivity as envisioned in the PND would further enhance this revenue gain. When reforming the rates, the differential between Abidjan and elsewhere should be reviewed to see if it makes sense in terms of local waste management costs and incomes (affordability).

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24 [https://www.globalpetrolprices.com/Ivory-Coast/electricity_prices/](https://www.globalpetrolprices.com/Ivory-Coast/electricity_prices/)
Disposal-level fiscal charges

Landfill charges

Landfill charges or “tipping fees” are charges levied at landfills (or incineration sites) per ton of waste deposited. Although they are paid by the entities directly responsible for waste management—local governments, government contractors and private entities undertaking their own waste management—the fees’ incidence is ultimately on households and consumers. Like ADFs, which cascade down the waste generation chain from producer to consumer, tipping fees cascade up that chain from landfills to households. In order to pay the tipping fees, government must charge waste generators higher taxes, and private businesses paying those fees must raise the prices of their products. By raising the relative cost of waste disposal, landfill charges can render recycling or incineration a financially more attractive alternative.

Ideally, tipping fees should reflect the entire cost of waste disposal, including the private cost of providing land and landfill management as well as the environmental costs of waste deposits. A carbon tax on landfill emissions would thus constitute part of a comprehensive landfill charge; however, the landfill charge should exceed the carbon tax by the amount of other social and environmental costs, such as local air pollution and leachate.

Landfill charges are widely used in developed countries, where they are negatively associated with landfilling rates (figure 13). They thus appear to be effective in encouraging recycling, incineration and other alternatives to landfilling. Of course, in the case of incineration, an appropriate environmental tax should also be levied on incinerator emissions—including a carbon tax on GHG emissions—and disposal of any residual wastes.25

Landfill charges are most effective where waste management is decentralized: That is, the party charging the fees is distinct from the party paying them. This would, for example, be the case where local governments deposit waste in privately owned landfills. In Cote d’Ivoire, landfills are usually located on government land but are managed by private contractors. Levying landfill charges in this context would be tantamount to the government taxing itself. For example, if waste management contractors have to pay higher fees per ton of waste delivered, they will demand higher compensation from the government.

Figure 13.

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25 A large share of the GHG from waste management comes from vehicle emissions. This analysis assumes that those emissions are addressed by a comprehensive carbon tax on motor fuels.
Penalties and Fines

Fines and penalties on improper waste management practices—notably dumping—are an important component of the overall waste management system. According to numerous government and expert accounts, dumping of household trash is a prevalent practice in Cote d’Ivoire, giving rise to serious environmental damages. However, ANAGED’s total fine revenue in 2018 was only FCFA 8,525,000 (about US$15,500), or 0.02 percent of ANAGED’s total own revenues. This suggests that either fines are too low or that their enforcement is inadequate to ensure compliance.

While fiscal and regulatory measures aimed at curbing solid waste externalities—especially plastic pollution—are increasingly common in West Africa, they are frequently ineffective due to lack of proper enforcement (Adam et al., 2020). Fines may be either too low to deter undesirable behavior, such as dumping or smuggling of banned or taxed items, or so high that they are unlikely to be enforced. Other factors undermining solid waste measures include lack of stakeholder engagement in the legislative/regulatory process and public education programs.

In order to guarantee appropriate behavioral changes by all households and businesses, fines for littering and dumping of household trash, as well as their enforcement levels, should be evaluated for appropriateness. These fines should at least cover the environmental cost of dumping—including the associated GHG emissions. The expected value of the fines—the amount of the fine multiplied by the likelihood of detection—should furthermore be adequate to deter

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26 See, for example, Cote d’Ivoire (2020) and SCE (2020).
dumping. Conversely, however, fines—especially on individuals—should not be set so high that they are unaffordable to most consumers.

**Administration**

Increasing fiscal charges on solid waste will require additional administrative capacity at both ANAGED and the Ministry of Finance to ensure that the new charges are adequately enforced. Compliance levels of existing and introduced charges should be carefully monitored, and additional administrative capacity added as needed where these levels are inadequate.

**Recommendations**

- Broaden the base of the TSCP to include at least all forms of single-use plastic and packaging.
- Calibrate motor fuel excises and vehicle registration fees to fully offset the environmental costs of transportation.
- Transform the TSPE into an ADF or deposit-refund for end-of-life vehicles.
- Establish a deposit-refund scheme for beverage containers.
- Introduce an EPR system for the most pollutive waste streams: electrical and electronic products, batteries and tires. Build in deposit-refund mechanisms to encourage recycling.
- Reform the property tax to improve its coverage and yield, eliminating tax expenditures that necessitate the TVHA.
- Introduce a retail-level plastic bag fee or tax to raise consumer awareness of plastic pollution.
- Restore the real value of the TEOM to its 1982 level.
- Review fines and penalties for violation of solid waste laws and regulations to ensure that they are adequate but reasonable, and if necessary improve their enforcement.
- Develop administrative capacity at ANAGED and the Ministry of Finance to ensure that both new and enhanced waste charges are adequately enforced.
IV. Sources


Parry, I., D. Heine, E. Lis, and S. Li (2014). Getting Energy Prices Right: from Principle to Practice. International Monetary Fund, Washington DC.


## Appendix A: Pros and Cons of Fiscal Charges on Solid Waste

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Pros</th>
<th>Cons</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance disposal fees (ADFs)</td>
<td>Cascades down the waste chain onto consumer prices. Efficient if ADFs are accurately assessed. Upstream taxes are generally easier to administer than downstream taxes. Retail-level ADF may be more salient than producer-level ADF.</td>
<td>Requires government to measure recycling, disposal and environmental costs of different waste streams accurately. Retail-level ADF may be harder to administer than producer-level ADF. Raises goods prices, affecting affordability.</td>
<td>Expand the base of the plastic tax (TSCP) to include all plastic goods, whether manufactured or imported.</td>
</tr>
<tr>
<td>Deposit-refund scheme</td>
<td>Similar to ADFs, but has added advantage of providing consumer incentive for recycling.</td>
<td>Similar to ADFs, but more complex to administer refund mechanism. Refund offsets affordability impact of ADF.</td>
<td>Apply deposit-refund scheme for plastic bottles and sachets. Transform the used vehicle tax (TSPE) into a deposit-refund scheme for end-of-life vehicles.</td>
</tr>
<tr>
<td>Extended producer responsibility</td>
<td>Provides incentives for manufacturers to design goods and packaging for easy recycling. Fewer information requirements for government than ADFs.</td>
<td>Requires effective government enforcement and oversight.</td>
<td>Develop EPR scheme for electrical and electronic waste, batteries and tires.</td>
</tr>
<tr>
<td>Plastic bag charge</td>
<td>Salient charge has proven highly effective at reducing plastic bag use.</td>
<td>Collecting retail-level tax can be administratively difficult.</td>
<td>Impose a FCFA 10 plastic bag charge on shopping bags not subject to plastic bag ban.</td>
</tr>
<tr>
<td>Policy Type</td>
<td>Description</td>
<td>Challenges</td>
<td>Recommendations</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pay-as-you-throw</td>
<td>Most efficient household-level waste instrument. Creates an incentive for households to reduce their waste.</td>
<td>High administrative cost. Increased dumping risk.</td>
<td>Not recommended for Cote d'Ivoire.</td>
</tr>
<tr>
<td>Property tax (IPF)</td>
<td>Efficient and progressive.</td>
<td>High administrative cost. Waste management charges are often not salient. Property value may not correlate strongly with waste generation. Does not create an incentive for households to reduce waste.</td>
<td>Reform property tax to increase coverage, eliminate exemptions, unify rates and increase revenue yield.</td>
</tr>
<tr>
<td>Rent tax (IRF)</td>
<td>Progressive.</td>
<td>Unclear why rental properties should pay higher waste charges than owner-occupied properties.</td>
<td>Replace revenues from this capital income tax with reformed property tax revenues.</td>
</tr>
<tr>
<td>Sanitation tax (TVHA)</td>
<td>Efficient, progressive and salient.</td>
<td></td>
<td>Replace revenues from this tax by eliminating exemptions under the property tax.</td>
</tr>
<tr>
<td>Electricity surcharge (TEOM)</td>
<td>Easy to assess and administer. Electricity consumption is a reasonable proxy for waste generation.</td>
<td>Does not create an incentive for households to reduce waste.</td>
<td>Restore the real 1982 values of the TEOM. Reassess the local costs of waste management in Abidjan and elsewhere and adjust rates accordingly.</td>
</tr>
<tr>
<td>Disposal charges</td>
<td>Internalizes environmental costs of landfilling and incineration--including GHG emissions--by cascading up waste chain. Efficient if costs are accurately estimated.</td>
<td>May not function well where landfills are state-owned.</td>
<td>Conduct a study to estimate full environmental costs of waste management, including landflling and incineration.</td>
</tr>
</tbody>
</table>
## Appendix 3. Summary of Recommendations

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Time Frame</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct a study to estimate the social costs of solid waste other than GHG emissions.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Adjust waste projections for income growth.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Update inventory of waste composition.</td>
<td>M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Collect and publish detailed statistics on waste collection and disposal, including collection rates, dumping/burning, landfilling, recycling, composting and incineration.</td>
<td>M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Use these statistics to inform goals for improved waste management.</td>
<td>M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Support all waste management reforms with a public information campaign educating citizens about the environmental costs of waste and best practices to minimize them.</td>
<td>S/M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Study the institutional capacity needs for adequate functioning of the public waste management sector and develop a plan for developing that capacity.</td>
<td>M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Broaden the base of the TSCP to include at least all forms of single-use plastic and packaging.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Calibrate motor fuel excises and vehicle registration fees to fully offset the environmental costs of transportation.</td>
<td>S</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>Transform the TSPE into an ADF or deposit-refund for end-of-life vehicles.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Establish a deposit-refund scheme for beverage containers.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
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<td>Introduce an EPR system for the most pollutive waste streams: electrical and electronic products, batteries and tires. Build in deposit-refund mechanisms to encourage recycling.</td>
<td>S</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Reform the property tax to improve its coverage and yield, eliminating tax expenditures that necessitate the TVHA.</td>
<td>M</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>Introduce a retail-level plastic bag fee or tax to raise consumer awareness of plastic pollution.</td>
<td>S</td>
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</tr>
<tr>
<td>Restore the real value of the TEOM to its 1982 level.</td>
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</tr>
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<td>Review fines and penalties for violation of solid waste laws and regulations to ensure that they are adequate but reasonable, and if necessary improve their enforcement.</td>
<td>M</td>
<td>ANAGED</td>
</tr>
<tr>
<td>Develop administrative capacity at ANAGED and the Ministry of Finance to ensure that both new and enhanced waste charges are adequately enforced.</td>
<td>M</td>
<td>ANAGED/MOF</td>
</tr>
</tbody>
</table>

S = short-term (1-2 years); M = medium term (3-5 years)