Implementing Economic Instruments and Incentives to Divert Waste from Landfill

A Guideline for National Government

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Waste Research Development and Innovation Roadmap Research Report

31 MARCH 2021

science & innovation
Department:
Science and Innovation
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Implementing Economic Instruments and Incentives to Divert Waste from Landfill: A Guideline for National Government

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CSIR External Report # CSIR/SPLA/SECO/MEMO/2021/0001/A

March 2021

TABLE OF CONTENTS

Acronyms

Acronym	Definition
ARF	Advance recycling fee
C&D Waste	Construction and demolition waste
CAPEX / OPEX	Capital expenditure / Operating expenditure
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DfR / DfE	Design for recycling / Design for environment
EPR	Extended Producer Responsibility
MIG	Municipal Infrastructure Grant
MRF	Materials Recovery Facility
NWMS	National Waste Management Strategy
PMG	Parliamentary Monitoring Group
PRO	Producer Responsibility Organisation / Product Responsibility Organisation
SWM	Solid Waste Management
tCO_2e	Tonnes of Carbon dioxide equivalents
WEEE	Waste electrical and electronic equipment

1 About this guideline

The National Environmental Management: Waste Act, 2008 (No. 59 of 2008) (RSA, 2008) and the National Waste Management Strategy (NWMS) (DEA, 2011; DEFF, 2021) call for increased diversion of waste away from landfill towards reuse, recycling and recovery. This is in line with the waste management hierarchy (see Figure 1), according to which waste should first be avoided, reduced, reused, recycled or recovered (in order of preference); with disposal as a last resort. It is also in line with the concept of a circular economy, which is central to the updated NWMS (DEFF, 2021).

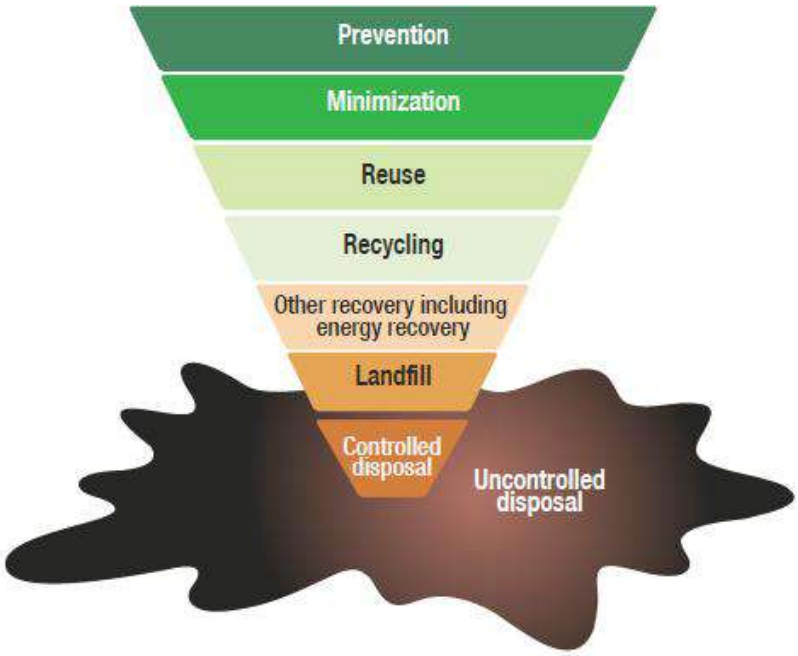

Figure 1: The Waste Management Hierarchy (UNEP, 2015). This depiction of the hierarchy emphasises that disposal to well managed landfills is still preferable to 'uncontrolled disposal' (i.e. open dumping).

However, the majority of solid waste generated in South Africa is still disposed of (either to landfill or a communal/own dumpsite, or illegally dumped) (DEA, 2018a). During this project, a wide range of root causes were identified as to why South Africa is not yet moving up the waste management hierarchy; i.e., why disposal is still the predominant option for solid waste management (SWM), and why waste is not being diverted toward alternative waste management options, such as recycling.

The issues identified included a wide range of legislative barriers, economic/financial barriers, and behavioural and institutional issues (see Figure 2).

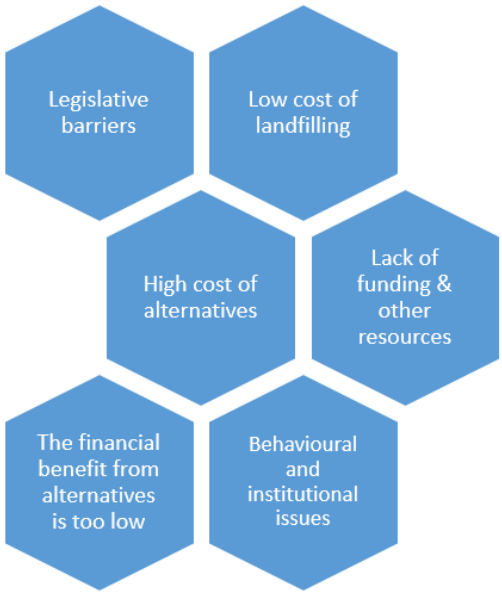

Figure 2: Root causes for the dominance of landfilling as a waste management option in South Africa

In the full project report, we unpack this broad range of issues, and identify potential solutions for addressing them; i.e., for increasing the diversion of waste from landfill toward alternatives. Given the complex nature of the problem, and the broad range of challenges and issues, no 'silver bullet' or 'one size fits all' solution is possible. Instead, implementing the waste hierarchy and transitioning to a circular economy will require a coherent set of mutually reinforcing regulatory, economic and other interventions; with actions required by all relevant role-players.

In this guideline, however, the focus is specifically on the economic and financial issues; and on the economic instruments and incentives that can potentially be implemented to address them. In particular, the focus is on economic instruments that can be implemented by national government, in order to create incentives for waste to be diverted from landfill toward alternative waste management options, such as recycling and recovery.

It should also be noted that this project focused specifically on 'downstream' economic instruments for diverting waste away from landfill (as per Figure 3); and not on the upstream measures required to reduce waste generation in the first place. However, in line with the waste management hierarchy (Figure 1), it is clear that there is also a need to focus on achieving waste avoidance and reduction, rather than solely relying on 'end-of-pipe' solutions to deal with the waste problem.

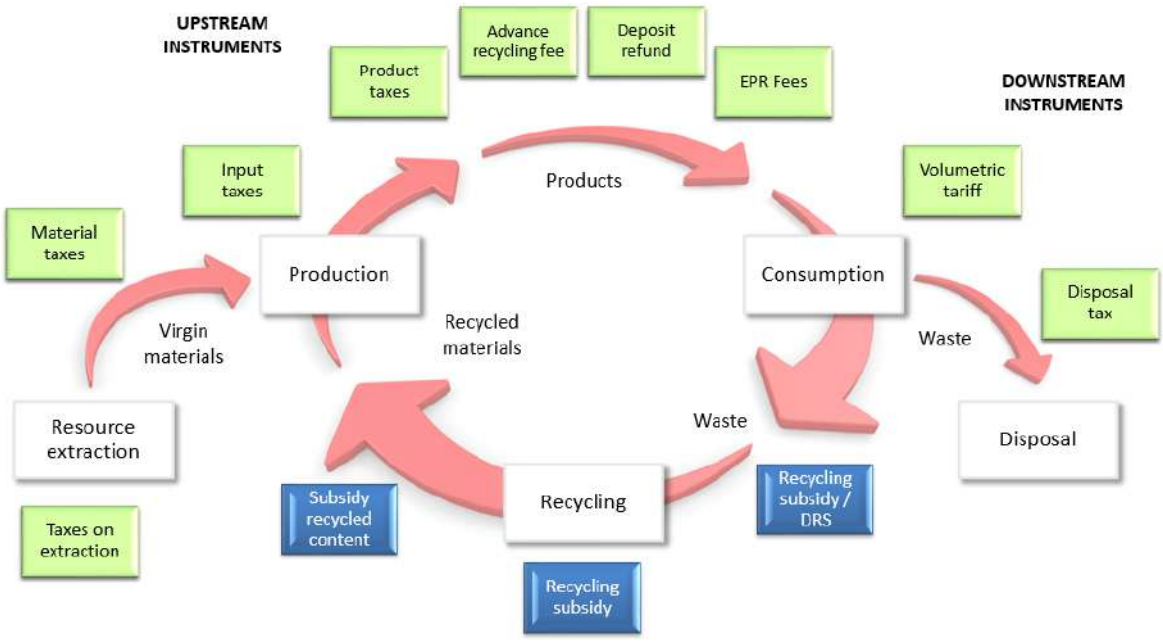

Figure 3: Examples of economic instruments along the product-waste value chain (DEA, 2016).

Note also that instruments that would typically be instrumented by either local government (such as 'pay-as-you throw' tariffs) or industry (such as extended producer responsibility (EPR) and deposit refund systems) are excluded, since the focus of this guideline is on instruments that would typically be implemented by national government.

Section 2 of this guideline unpacks the economic and financial barriers to the implementation of the waste management hierarchy. Section 3 identifies potential economic instruments with a role to play in addressing the challenges, while Sections 4 and 5 provide guidelines for implementation.

2 Why is waste not diverted from landfill? Unpacking the economic and financial challenges

As mentioned above, a wide range of different root causes were identified as to why waste is not currently being diverted from landfill in South Africa, including legislative barriers, economic/financial barriers, and behavioural and institutional issues (see Figure 2). The economic and financial issues that were identified can be categorised as follows:

1. Low cost of landfilling
2. High cost of alternative waste management options
3. Lack of funding
4. The financial benefit from alternatives is too low

Sections 2.1 to 2.4 describe these issues in more detail.

2.1 Low cost of landfilling

One of the main reasons for the predominance of disposal to landfill as a waste management option in South Africa relates to the low cost of landfilling, in comparison with alternative options. There is a common understanding that landfilling is 'under-priced' – i.e., that the cost of landfilling is artificially low, which creates a perverse incentive for the continued preference for disposal over alternative waste treatment technologies. It is generally understood that getting the 'prices right', i.e. increasing the cost of landfilling to reflect the true cost of this form of disposal, would create incentives for waste to be diverted away from landfill towards alternatives.

However, in order to get the prices right, it is first critical to understand the factors at play behind the current low cost (and low price)[1] of landfilling. The following can be identified as the main factors for the current low cost (and low price) of landfilling in South Africa:

- **Many landfill sites in South Africa are unregulated, unlicensed and/or non-compliant, and therefore the cost of landfilling is artificially low**. The net result of landfills being unlicensed, unregulated, or non-compliant with licence conditions is that many disposal sites in South Africa are not properly engineered sites, and are deficient in terms of infrastructure and/or operating standards; and as such the costs of landfilling are artificially low. In particular, many landfill sites do not comply with the Norms and Standards for Disposal of Waste to Landfill (DEA, 2013); which "increased the specifications, and hence the capital costs, of landfills" (DEA, 2018b). Specifically, the new Norms and Standards specify minimum engineering requirements for containment barrier design to prevent leachate and other negative environmental impacts; which implies a significant increase in

[1] It is important to distinguish between the 'cost' and 'price' of landfilling. In the case of municipal landfill sites, the cost refers to what it costs the municipality to dispose of waste to landfill, per tonne. The 'price' refers to landfill gate fees and/or waste tariffs. In theory, the cost of landfilling determines whether there is an incentive for municipalities to seek alternatives; while gate fees and waste tariffs (in theory) influence the behavior of private disposers and waste generators respectively. Generally speaking, both the costs and the price of landfilling are currently low in South Africa, so there is no incentive for municipalities, private disposers or waste generators to seek alternatives.

the cost of developing new landfill sites and cells that meet these requirements (nearly double when compared to the previous Minimum Requirements for Waste Disposal by Landfill). The significant increase in cost "has been felt by those municipalities who needed to construct new cells or new landfills" (DEA, 2018b) in compliance with the new standards. To the extent that these requirements are not met, however, the cost of landfill disposal will be too low. Many municipalities, particularly in cases where landfills were constructed prior to 2013, do not yet comply with the standards, "and thus the cost of landfilling is artificially low" (DEA, 2018b).

- **Lack of full cost accounting**. Full cost accounting is a systematic approach to identifying and quantifying the full cost of providing a service, including not only current and direct capital and operating costs; but also the indirect, past and future costs of providing the service; including overhead costs, maintenance costs, administration costs, replacement costs, and interest charges. Importantly in the context of waste disposal services, full cost accounting includes future costs that are directly related to current activities, such as the costs associated with landfill closure and post-closure (including rehabilitation) (DEA, 2012; DEA, 2018b). The Municipal Solid Waste Tariff Strategy (DEA, 2012) promotes the principle of full cost accounting for waste services, while the NWMS (DEA, 2011) set a target for all municipalities to conduct full cost accounting for waste services (and to set cost reflective tariffs) by 2016. However, according to DEFF (2021), aside from the large metros, very few municipalities have achieved this.
- **Lack of cost recovery for waste services**: Even if waste disposal standards and permit conditions are being met, and the actual costs of disposal to landfill are in line with what municipalities "should" be spending; in many cases, solid waste tariffs and landfill tipping fees are set too low to reflect these costs. This means that municipalities are not obtaining sufficient revenues to properly maintain and improve landfill infrastructure. It also implies that there will be no incentive for waste generators to reduce the amount of waste that they generate, or to seek alternative waste management options such as recycling (DEA, 2018b).
- **Externalities are not internalised**: Externalities refer to the positive or negative side effects (external benefits or costs) of a particular economic activity or process. Examples include the environmental and social impacts of landfilling, such as methane emissions, leachate generation, odours, etc. (Nahman, 2011). In the absence of some form of government intervention, negative externalities will not be incorporated in the direct financial cost associated with landfilling; which is another factor behind the current under-pricing of landfill disposal. Importantly, the external costs associated with landfilling can be mitigated to a certain extent through improved landfill infrastructure and management. For example, fully engineered landfill sites, constructed with liners to contain leachate, and landfill gas capture systems to prevent methane emissions, will have a lower environmental impact. In this case, the external costs of landfilling would be internalised in the financial costs. As such, addressing the artificially low costs of landfilling through compliance with the Norms and Standards (see above) will not only raise the cost of landfilling, thereby creating incentives to divert waste toward alternatives, but will also reduce the environmental impacts associated with landfilling.

2.2 High cost of alternative waste management options

Although diverting waste from landfill gives rise to a number of benefits, these are often indirect or long term in nature (e.g. cost savings associated with the extension of landfill lifespans). In the shorter term, alternative waste management options can be costly to implement. Costs are likely to be particularly high in the absence of the required economies of scale.

In particular, alternative treatment technologies tend to be waste stream-specific, and require a higher level of segregation of waste into different fractions, which increases the costs of waste management relative to the traditional model of collect and dispose. On the other hand; where waste has not been separated at source; additional pre-processing steps (such as sorting and washing) are required, which increases the capital and operating costs of the downstream processing industry.

As such, relative to landfilling, alternative waste management options generally have:

- **high capital costs** (e.g. additional vehicles required for separate collection; new infrastructure required for sorting, treatment and processing; etc.)
- **high operating costs** (e.g. costs associated with separate collection of waste, energy costs associated with processing, etc.).

2.3 Lack of funding

In Sections 2.1 and 2.2 above, it was evident that:

- **Landfill infrastructure is generally deficient in South Africa**, such that the costs of landfilling are artificially low (see Section 2.1). There is therefore a need to improve/upgrade landfill infrastructure.
- **Implementing alternative waste treatment increases the overall cost of waste management relative to landfilling** (see Section 2.2). The relatively high cost of alternatives (in terms of both CAPEX and OPEX) is generally seen as unaffordable to municipalities.

Owing to various competing priorities, municipalities generally lack the funds either to invest in waste-related CAPEX, or for the ongoing OPEX:

- **Capital expenditure** (for upgrading landfill sites or for investing in the infrastructure required for alternative waste treatment technologies) is not generally suited to funding from municipal sources (such as tariffs). Instead, municipalities rely on funding from national sources for such infrastructure. Currently, the Municipal Infrastructure Grant (MIG) is the only source of funding from national government that can be accessed by municipalities for waste-related infrastructure. However, waste projects have to compete with projects from other sectors (e.g. water, sanitation and electricity), which are typically prioritised (World Bank, 2019a).
- **In terms of operating expenditure**, covering the higher OPEX costs associated with alternatives would require that tariffs are raised, which is difficult from a political and affordability perspective.

2.4 The financial benefit from alternatives is too low

In many cases, the financial benefits associated with diversion of waste from landfill are indirect or long term in nature (e.g. cost savings associated with the extension of landfill lifespans); or are too low to justify the relatively higher cost associated with alternative waste treatment. In particular, there are a number of issues related to the markets for recyclables (or for the products produced from recycled materials), which have an impact on the financial benefits from recycling activities:

- **Market prices are too low**: In many cases, market prices for recyclables are too low relative to the costs of collecting and recovering such materials; and as such there are no incentives for collection and recovery.
- **The fluctuating market price of virgin materials** (linked to global commodity prices) relative to recycled materials means that there is no guaranteed market for recycled materials, which disincentivises investment in recycling infrastructure.
- **Lack of markets**: In many cases there is a lack of markets for recyclables, or for the end-products produced from recycled materials. For example, the global demand for recyclables has crashed as a result of the Chinese ban on waste imports; while the local market is limited in many cases.
- **Some recycled materials (or the end-products produced from such materials) are unable to compete in the market, because virgin alternatives tend to be cheaper**. This is particularly the case when oil prices are low, which reduces the price of virgin plastics and other virgin materials, such that recycled materials are unable to compete.

3 Creating incentives: The role of economic instruments

As mentioned in Section 1, there are a wide range of complex issues which lead to waste not being diverted from landfill in South Africa. As such, a coherent set of mutually reinforcing regulatory, economic and other interventions is required, with actions required by all relevant role-players. In this guideline, however, the focus is specifically on economic instruments that could potentially be implemented by national government to address the economic/financial challenges identified in Section 2, and to create incentives for waste to be diverted from landfill. Economic instruments that could potentially be implemented to address each of the identified issues are identified in Table 1.

Table 1: Potential economic instruments for incentivising the diversion of waste from landfill in SA

Economic and financial issues / challenges		Potential economic instruments to address the issues
Low cost of landfilling	Many landfill sites in SA are unregulated, unlicensed and/or non-compliant, and therefore the cost of landfilling is artificially low	• Funding to upgrade waste management infrastructure (e.g. through a **dedicated fund for waste infrastructure**) • Provision of funding for landfill infrastructure should be conditional on landfill sites being licensed and/or on the degree of compliance with permit conditions/ Norms and Standards (**conditional grants**)
	Lack of full cost accounting for waste services	• Provision of funding for landfill infrastructure should be conditional on full cost accounting practices being followed (**conditional grants**)
	Lack of cost recovery for waste services	• Provision of funding for landfill infrastructure should be conditional on the degree to which tariffs are cost reflective (**conditional grants**)
	Externalities are not internalised	• In the long term, once all of the prerequisites have been addressed; if the cost of landfilling remains too low relative to alternatives; a **landfill tax** could be considered; following the guidelines, recommendations and timelines of the Landfill Tax Feasibility Study (once available) and the National Pricing Strategy (DEA, 2016).
High cost of alternative waste management options	High capital costs	• Funding for the infrastructure required for alternatives (e.g. through a **dedicated fund for waste infrastructure**) • **Tax credits for investing in infrastructure for alternative waste treatment**
	High operating costs	• **Subsidies paid per unit or per kg of material processed through alternative waste treatment**
Lack of funding	Lack of funding for capital infrastructure	• **Dedicated fund for waste infrastructure**
	Difficult to raise tariffs for higher operating costs	• Not specifically addressed through economic instruments
The financial benefit from alternatives is too low	Market prices are too low	• **'Top-up' incentives** (e.g. paid to collectors per kg of material collected), to increase the value of recyclables and thereby incentivise collection/recovery
	Fluctuating market price of virgin materials (linked to global commodity prices)	• **Income guarantees/price support** for recyclers, to provide a buffer against market volatility
	Lack of markets	• **Tax credits/rebates for using recycled materials**
	Some recycled materials (or the end-products from such materials) are unable to compete in the market (virgin alternatives are cheaper)	• **Virgin material taxes** • **Elimination of perverse subsidies** on virgin materials

In Sections 4 and 5 of this guideline, guidance is provided with respect to implementation of these instruments. Note that the various types of subsidies, tax concessions and related instruments are discussed collectively, since these types of instruments share many common elements. As such, Section 4 focuses on the following categories of instruments:

1. Conditional grant funding for waste infrastructure (through a dedicated fund for waste infrastructure, with conditions attached to funding).
2. Landfill tax
3. Subsidies, tax concessions and incentives (includes tax credits for investing in infrastructure for alternative waste treatment, subsidies paid per unit or per kg of material processed through alternative waste treatment, tax credits/rebates for using recycled materials, income guarantees/price support to recyclers, and 'top up' incentives to collectors)
4. Virgin material taxes (and elimination of perverse subsidies).

4 How to implement economic instruments?

The National Pricing Strategy for Waste Management (DEA, 2016) provides some guidance regarding the steps to be taken in selecting an appropriate economic instrument (Section 3 of the Strategy) and setting waste management charges (Section 4). It also provides some preliminary guidance regarding the implementation of economic instruments (Section 5 of the Strategy); although this is fairly generic in nature. In particular, it provides a recommended process for considering government intervention (see Figure 4).

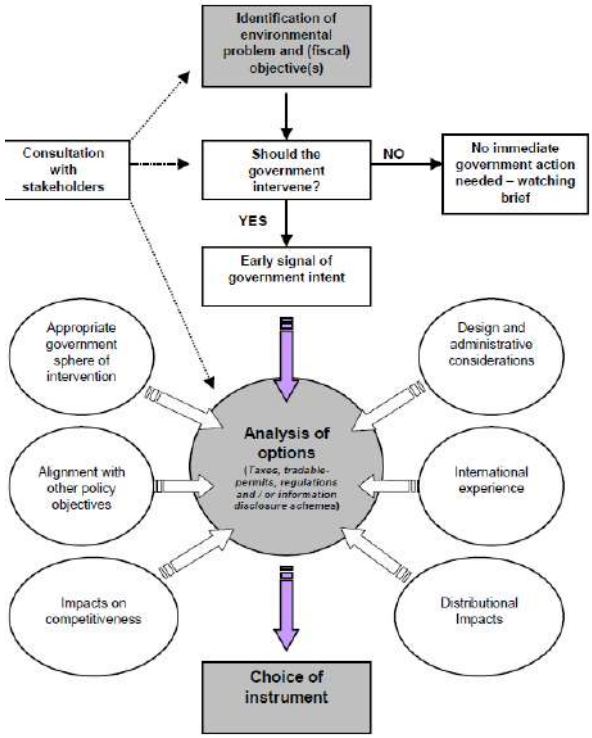

Figure 4: Process for considering government intervention (DEA, 2016)

Finally, the Strategy provides recommendations regarding the institutional arrangements for the collection and disbursement of revenues from the various types of economic instruments (Section 6 of the Strategy), and for monitoring and evaluation (Section 7) (DEA, 2016).

In general, the process to be followed in considering government intervention (in the form of economic instruments) is as follows (see Figure 4) (DEA, 2016):

1. Identification of environmental problem and (fiscal) objective(s)
   - E.g. is the objective to create an appropriate set of incentives and thereby change behaviour, by addressing a specific market failure (e.g. internalising an environmental externality), or is it to raise revenue?

2. Should the government intervene?
   - Government intervention in the form of environmental taxation or other economic instruments is generally only justified where there is a specific market failure (e.g. an environmental externality) to be addressed.
   - A number of pre-conditions need to be in place before economic instruments can be implemented; including
     i. Well-functioning markets (including removal of existing price distortions) and related institutions
     ii. Institutional capacity (e.g. for acquiring relevant information, monitoring compliance and illegal activities, and enforcement)
     iii. Political will.
   - Economic instruments are not recommended in cases where there are underlying structural issues to be addressed. For example, where pervasive under-pricing exists due to landfill sites being largely unlicensed or non-compliant, a lack of full-cost accounting, and/or tariffs being set below the levels required for cost-recovery (see Section 2), these issues need to be corrected before considering the implementation of a landfill tax, which could create further distortions (DEA, 2016).
3. Early signal of government intent
4. Analysis of options (selecting an appropriate economic instrument to address the identified market failure and create the required incentives)
5. Choice of instrument.

Thereafter, once a preferred economic instrument has been identified, a thorough evaluation of the appropriateness and potential impacts of the instrument is required. This should include an assessment of the full social, economic and environmental costs and benefits, including potential impacts on municipalities, producers and/or consumers (DEA, 2016). Specifically, the following criteria should be applied when assessing economic instruments (National Treasury, 2006):

- Environmental effectiveness
- Tax revenue
- Support for the tax
- Legislative aspects
- Technical and administrative issues
- Competitiveness effects
- Distributional impacts
- Adjoining policy areas

Once it has been established that the identified instrument is appropriate; and that the overall social, economic and environmental benefits outweigh the costs; the process of instrument design can be undertaken, including establishment of the required administrative mechanisms. The instrument should be designed so as to maximise social, economic and environmental benefits, and minimise social, economic and environmental costs (including potential competitiveness and distributional impacts).

In Sections 4.1 – 4.4 of this guideline, we build on the information presented above and in the National Pricing Strategy, by providing further guidance regarding the implementation of specific economic instruments that can be potentially be used by national government to incentivise the diversion of waste from landfill. In Section 5, the discussion turns to the use of tax revenues, and the funding of grants and subsidies.

4.1 Conditional grant funding for waste infrastructure

4.1.1 What is it?

As seen in Section 2, many of the barriers to diverting waste from landfill relate to the following:

- Many disposal sites are not properly engineered/sanitary landfill sites (and therefore the costs of disposal are artificially low, creating incentives for continued disposal).
- High capital costs of waste infrastructure (this applies to upgrading or developing new landfills that comply with the 2013 Norms and Standards; as well as the development of infrastructure for alternative treatment technologies).
- A lack of funding for municipalities to invest in upgrading landfill sites, or developing the infrastructure required to put in place alternative waste treatment technologies.

In the case of landfill sites specifically, there is a lack of funding to upgrade/improve landfill infrastructure such that landfills comply with licence conditions and with the Norms and Standards for Disposal of Waste to Landfill (DEA, 2013). Not only would upgrading landfill sites reduce the environmental impacts associated with disposal of waste to landfill, it would also raise the cost of landfilling, which would in turn create incentives for waste to be diverted from landfill.

In the case of alternatives to landfilling, funding is likewise required to develop municipal infrastructure, such as:

- Composting and/or anaerobic digestion (AD) facilities for the treatment of organic waste
- Materials recovery facilities (MRFs) for the sorting and recovery of recyclable waste
- Buy-back centres, particularly in formal neighbourhoods (or, mobile buy-back centres) for the collection of recyclable materials collected by communities and informal waste pickers. Locating buy-back centres closer to where the waste is generated will enable informal collectors to work more efficiently and therefore recover more materials per day.
- Drop-off centres for the collection of recyclable waste and organic waste streams not typically collected by the municipality.

In addition, grants could potentially be provided not only to municipalities, but also for the establishment of recycling businesses, thereby contributing toward the development of small businesses.

Currently, the Municipal Infrastructure Grant (MIG) is the only source of funding from national government that can be accessed by municipalities for waste-related infrastructure. However, waste projects have to compete with projects from other sectors (e.g. water, sanitation and electricity), which are typically prioritised (World Bank, 2019a).

As such, the potential need for a dedicated fund for waste management infrastructure should be considered (World Bank, 2019a; 2019b). According to a World Bank study, "one common approach to developing waste infrastructure is to develop a national 'Waste Infrastructure Development Fund' to which municipalities can apply for capital support to improve infrastructure" (World Bank, 2019b). Examples of countries with this type of funding mechanism include India (the Jawaharlal Nehru National Urban Renewal Mission, JNNURM) and the UK (Waste Infrastructure Fund).

However, in the case of funding for upgrading landfill infrastructure, such a fund should ideally have conditions attached, to ensure that municipalities implement the necessary waste management reforms in order to access such funding.

Conditional grants are grants that are provided by national government to provincial or local government on condition that certain criteria are met; as opposed to unconditional grants, which are provided with 'no strings attached.' According to the Financial and Fiscal Commission (2000), conditional grants are particularly well suited for financing the building up of public infrastructure to an acceptable level to enable improved service provision. In the case of conditional grants for solid waste infrastructure, in particular landfills, conditions which could be attached to grants include the following:

- Licensing of landfill sites
- Compliance with license conditions / Norms and Standards
- Application of full cost accounting principles
- Application of cost-reflective solid waste tariffs and landfill tipping fees
- Cost recovery for waste services
- Reporting to the South African Waste Information System (SAWIS)

The intention of attaching such conditions to grants is to create incentives for municipalities to ensure that these fundamental issues are addressed, in order to improve the state of waste management; while also increasing the costs of landfilling to reflect best practice, and ensuring that tariffs reflect the full costs of disposal to landfill. In turn, this would create incentives to divert waste away from landfilling, towards alternatives.

For example, according to GIZ (2015), "a national programme for subsidising/financing SWM infrastructure can be a powerful way to incentivise local authorities to tackle cost recovery issues if the degree of cost recovery is a criterion for financial support". This approach has been adopted in India, for example, under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

programme. This programme provides finance for local authority infrastructure, based on criteria such as the percentage of cost recovery, and the collection efficiency of solid waste user charges. A benchmarking system is applied, which "helps with the identification of local authority interventions worthy of financial support" (GIZ, 2015).

4.1.2 How to implement it?

It is proposed that a dedicated fund for waste infrastructure be considered, in the form of a conditional grant allocation to municipalities. Conditional allocations from national government to local government are provided for in Sections 214 and 227 of the Constitution (RSA, 1996). According to Section 227, in addition to the equitable share received by municipalities to perform their functions and provide basic services, municipalities "may receive other allocations from national government revenue, either conditionally or unconditionally" (RSA, 1996).

Section 214 of the Constitution highlights that allocations to local government, and the conditions on which such allocations may be made, must be provided for by an Act of Parliament. Such an Act can only be enacted after "organised local government and the Financial and Fiscal Commission have been consulted, and any recommendations of the Commission have been considered" (RSA, 1996). The Act must also take into account:

- the national interest
- any provision that must be made in respect of the national debt and other national obligations
- the needs and interests of the national government, determined by objective criteria
- the need to ensure that the municipalities are able to provide basic services and perform the functions allocated to them
- the fiscal capacity and efficiency of the municipalities
- developmental and other needs of municipalities
- obligations of the municipalities in terms of national legislation
- the desirability of stable and predictable allocations of revenue shares

- the need for flexibility in responding to emergencies or other temporary needs, and other factors based on similar objective criteria (RSA, 1996).

In the case of a dedicated fund for waste infrastructure, some specific issues and challenges that will need to be addressed include:

- How such an instrument will be funded (see Section 5).
- The need for careful design to ensure that the parameters, accessibility requirements and conditions of such a fund are clearly defined (World Bank, 2019b). As mentioned above, some of the relevant conditions required to incentivise improved waste management practises, higher landfilling costs, and, ultimately, increased diversion of waste from landfill would include:
    - Whether or not landfill sites are licensed
    - The extent to which landfill sites are in compliance with license conditions / Norms and Standards
    - The extent to which full cost accounting for waste services is being implemented
    - The extent to which cost-reflective solid waste tariffs and landfill tipping fees are being applied
    - The degree to which the full costs of providing waste management services are recovered
    - The extent to which municipalities and landfill sites are reporting to SAWIS.
- The need to provide municipalities with technical support to develop appropriate proposals for funding (World Bank, 2019b).
- Funding for waste infrastructure should be allocated on a “cost sharing” basis to incentivise the municipality taking ownership. In other words, municipalities should be required to match the funding from their own budgetary allocation, to ensure that they take responsibility and ownership of the infrastructure, and that ‘white elephants’ are avoided.

In establishing such a fund, a broader consultative process should also be followed, as per Sections 72 and 73 of the Waste Act.

Once established, conditional grant allocations to local government are published annually as annexures to the Division of Revenue Bill for the financial year in question, and then enacted in the Division of Revenue Act (The Presidency, 2013; Vulekamali, 2021). Specifically, a dedicated grant for waste infrastructure would be set out in Schedule 5b, which relates to specific-purpose allocations to municipalities, including infrastructure grants (The Presidency, 2013). The Division of Revenue Bill specifies the value of such grants for the budget year, as well as projected values over the medium-term expenditure framework (MTEF) period (Vulekamali, 2021).

Conditional grants are managed by the relevant national government line department, which submits frameworks and allocations to National Treasury (Vulekamali, 2021). Consultation is also required with a number of other key stakeholders, including other national and provincial departments, the South African Local Government Association (SALGA), non-governmental organisations, the office of the Auditor-General, and civil society organisations (Vulekamali, 2021).

4.2 Landfill tax

4.2.1 What is it?

Landfill taxes are generally levied by national government, per tonne of waste disposed at landfill sites. The aim is to increase the overall cost of landfilling, and thereby to discourage landfilling in favour of alternative waste management options.

Landfill taxes are aimed at addressing the externalities associated with disposal of waste to landfill. Externalities refer to the positive or negative side effects (external benefits or costs) of a particular economic activity or process, which are not incurred by those undertaking the activity (e.g., the landfill owner/operator), but are instead borne by other parties, broader society, and/or future generations (Nahman, 2011). In the case of disposal of waste to landfill, externalities include the environmental, social and health impacts arising from this form of disposal; such as emissions of leachate and methane, odours, visual impacts, etc. (Nahman, 2011). Landfill taxes aim to "internalise" these externalities, by incorporating the external costs within the cost structure of those undertaking the activity (e.g. the landfill owner/operator); such that they can then be incorporated within landfill tipping fees and/or waste tariffs.

4.2.2 How to implement it?

In South Africa, all national taxes are imposed through the introduction of Money Bills by the Minister of Finance in the National Assembly, as per Section 77 of the Constitution (RSA, 1996). According to Section 77, Money Bills must be considered in accordance with the procedure under Section 75 (Ordinary Bills not affecting provinces) (RSA, 1996).

According to DEA (2016), before considering the implementation of a landfill tax, extensive consultation with stakeholders (including municipalities) is necessary to establish the need for and appropriateness of such a tax. Factors to consider include:

- Suitability of the tax for addressing the problem at hand. Specifically, what is the reason for the current under-pricing of waste services in South Africa (e.g. artificially low landfilling costs, lack of full cost accounting, lack of cost recovery, externalities, etc.); and is a landfill tax the most appropriate means of addressing this? According to DEA (2016), if landfill costs are artificially low, and the full costs of providing waste collection and disposal services are not being recovered, these issues need to be addressed before considering the implementation of a landfill tax (DEA, 2016).
- The availability of alternatives, and price elasticity of demand for landfill disposal; in relation to the purpose of the tax (reducing disposal of waste to landfill, or raising revenue).
- Monitoring and enforcement capacity; specifically, the existence of weighbridges to record the quantities of waste entering landfill sites; and to control illegal dumping (DEA, 2016; 2018b).
- Socio-economic (and in particular, distributional) impacts; such as impacts on municipal finances and on low-income households (DEA, 2016).

Each of these issues is addressed in turn below:

- **Suitability of a landfill tax for addressing under-pricing of waste services in South Africa:**
    - Before considering the implementation of a landfill tax, it is crucial to understand whether such a tax is in fact the most suitable mechanism for addressing the problem at hand (i.e., the under-pricing of waste services in South Africa). As discussed in Section 4.2.1, landfill taxes are aimed at addressing a specific type of market failure; specifically, the externalities associated with disposal of waste to landfill.
    - However, it is important to bear in mind that externalities are not the only (or even the main) reason for under-pricing of waste services in South Africa. As seen in Section 2, the under-pricing of waste services extends beyond the failure to internalise external costs. Other reasons for the under-pricing of waste services include:
        - Artificially low cost of landfilling, due to landfill sites being deficient/unsanitary/non-engineered (i.e. landfill sites are unregulated, unlicensed and/or non-compliant with permit conditions and/or with the Norms and Standards)
        - Lack of full cost accounting
        - Lack of cost-reflective waste tariffs and landfill tipping fees.
    - Landfill taxes are not designed to address issues relating to artificially low landfill costs, lack of full cost accounting, and tariffs that are set too low to recover costs. These are underlying structural issues that need to be addressed before landfill taxes could be considered. Indeed, implementing landfill taxes before these fundamental issues are addressed could lead to further distortions.
    - In addition, it should be noted that externalities represent only a small proportion of the overall 'gap' between current landfill tipping fees and the full costs of disposal to landfill:
        - For example, Nahman (2011) found that the externalities associated with landfilling of solid waste in the City of Cape Town are in the order of R111 per tonne.
        - By contrast, the gap between current landfill tipping fees and the costs of landfill disposal in line with the Norms and Standards is much higher. Taking into account that many municipalities do not charge disposal fees at all, the average disposal fee among municipalities sampled by DEA (2018b) is R92 per tonne. On the other hand, estimates of the cost of landfilling in line with the Norms and Standards are in the range of R480 per tonne (Hanekom, 2016; Haider, 2016). As such, the failure to comply with the Norms and Standards results in landfill tipping fees being approximately R388 per tonne less than the cost of compliant landfilling. Even this ignores other elements of the full cost of landfilling, such as allowances for post-closure and rehabilitation.
        - It should therefore be clear that issues relating to non-compliance with the Norms and Standards, the lack of full cost accounting, and failure to set

cost-reflective tariffs have a far bigger impact on the under-pricing of landfill disposal, as compared to the failure to address externalities. This reiterates the point that these prerequisites should be addressed before an environmental tax aimed at addressing externalities (i.e. a landfill tax) can be considered; since externalities represent only a small proportion of a far broader problem.

- **Availability of alternatives, price elasticity of demand for landfill, and the purpose of the tax (reducing disposal or raising revenue):**
    - Price elasticity of demand refers to the responsiveness of behaviour to changes in price; that is, the extent to which the tax would be effective in stimulating a reduction in waste disposed to landfill.
    - In the absence of viable alternatives, price elasticity of demand for landfill is likely to be low. In this context, a landfill tax will not be effective in reducing disposal to landfill; it will only be effective in raising revenues.
    - A landfill tax can only act as an effective price signal (i.e. it will only be effective in diverting waste from landfill) if price elasticity of demand is high. This requires that alternative disposal options are available, allowing for municipalities and private disposers to reduce their tax burden by switching to more desirable alternatives.
    - In the South African context, given the lack other alternatives, and of enforcement capacity; the likely result is that illegal dumping (or disposal at unregulated sites) will increase, as this is the most feasible alternative for avoiding the tax. This will result in worse environmental outcomes as compared to disposal at regulated landfill sites, while also reducing the potential for revenue to be generated.

- **Monitoring and enforcement capacity:**
    - DEA have commissioned a study into the feasibility of a landfill tax as a deterrent to divert waste away from landfill (DEA, 2018b). While the final report has not been released, some preliminary lessons can be drawn from the Status Quo Report (DEA, 2018b) that was produced as part of the study. Specifically, DEA (2018b) finds that South Africa does not currently have adequate systems in place (in particular, functioning weighbridges) to adequately measure and report on the quantities of waste entering landfill sites, which is a prerequisite for a landfill tax to be implemented. For example, only 7% of operational landfills in South Africa have functioning weighbridges (DEA, 2018b).
    - Furthermore, DEA (2018b) finds that "an increase in the cost of landfilling as a result of a landfill tax may lead to perverse incentives and tax avoidance. Tax avoidance in the form of illegal dumping or increase in disposal at unregulated landfills, would have a worse environmental outcome than before" (DEA, 2018b). Most South African municipalities are unlikely to have capacity for the increased monitoring and policing of illegal dumping that will likely be required as a result of the tax.
    - Again, only once these prerequisites are in place, could a landfill tax be considered.

- **Socio-economic impacts:**
    - According to DEA (2018b), municipalities will be negatively impacted by a landfill tax, as they "will have to pay a new charge that may not be recoverable from customers, and will receive less tariff revenue if the objective of diversion of waste is achieved" (DEA, 2018b). A landfill tax will therefore have a negative impact on municipal finances, which are (generally speaking) already constrained. The additional costs of a landfill tax would need to be covered either through grant funding, or internal cross-subsidisation within the municipality (DEA, 2018b).

It is clear from the above that a number of prerequisites need to be put in place, before a landfill tax can be considered. To summarise, these include:

- Licensing of landfill sites and compliance with permit conditions and with the 2013 Norms and Standards; to ensure that the actual costs of landfilling accurately reflect the costs associated with best management practices, rather than deficient landfilling
- Viable alternatives to landfill disposal (such as options for recycling), such that municipalities, private disposers and waste generators can respond to the price signal in an appropriate way, and that the tax does not stimulate an increase in illegal dumping
- Effective access control, functioning weighbridges and adequate reporting systems, to enable accurate monitoring and reporting of waste quantities entering landfill sites
- Capacity to monitor and control illegal dumping
- Full cost accounting of waste services
- Cost recovery for waste services, through cost reflective gate fees and waste tariffs
- Municipalities must be in a sufficiently sound financial position for payment of the tax.

As such, the National Pricing Strategy (DEA, 2016) provided an Action Plan, which includes a number of fundamentals which need to be put in place, prior to the consideration of economic instruments such as a landfill tax. In particular, Action 1 set targets addressing the pervasive under-pricing of waste services through full cost accounting and ensuring that municipalities charge for waste management services to an extent that the costs are recovered; over the 2015-2018 period. Similarly, Goal 6 of the 2011 NWMS (DEA, 2011) set a target for all municipalities to conduct full cost accounting of waste services and set cost-reflective tariffs, by 2016. However, according to DEFF (2021), aside from the large metros, few municipalities have achieved this.

Importantly, putting in place some of the prerequisites listed above (e.g. fully compliant landfill sites, functional weighbridges, improved management and enforcement, etc.) will in and of itself increase the cost of landfilling (and thereby result in a diversion of waste from landfill); even without the imposition of a landfill tax. Therefore, once these fundamentals have been addressed, it could potentially be found that there is no longer a need for a landfill tax.

In addition, the externalities associated with landfilling can be mitigated to a certain extent through improved landfill infrastructure and management. For example, fully engineered landfill sites, constructed with liners to contain leachate, and landfill gas capture systems to prevent methane emissions, will have a lower environmental impact as compared to landfill sites without such

systems in place. In this case, the external costs of landfilling would have been internalised in the costs to the municipality of constructing and managing the landfill site.

In other words, there is a trade-off between the financial costs of landfilling, and the external costs. Engineered landfill sites, which are compliant with the Norms and Standards for Disposal of Waste to Landfill (DEA, 2013), will have higher capital and operating costs, but lower environmental costs; whereas non-compliant landfill sites will have lower capital and operating costs, but higher environmental costs. It is therefore clear that addressing the artificially low costs of landfilling through compliance with the Norms and Standards will not only raise the cost of landfilling, thereby creating incentives to divert waste toward alternatives; but will also reduce the environmental impacts associated with landfilling. Again, this might mean that there will no longer be a need for a landfill tax.

Only once the above-mentioned prerequisites have been addressed; and only if the cost of landfilling remains too low relative to alternatives; could a landfill tax be considered; following the guidelines, recommendations and timelines of the Landfill Tax Feasibility Study (once available) and the National Pricing Strategy (DEA, 2016).

Once a decision has been made that a landfill tax is required, the focus switches to the design of the tax, including the setting of an appropriate level of the tax. The tax needs to be designed in such a way as to “maximise positive impacts and minimise negative impacts on the economy, society and environment; which should also involve extensive consultation with affected parties” (DEA, 2016).

According to DEA (2016), as with any tax, “it is important that due diligence and extensive consultation be conducted in the setting of the tax level, rather than setting taxes at an arbitrary level, which can often do more harm than good” (DEA, 2016). Specifically, the tax should be levied per tonne of waste landfilled, at a level reflecting the external cost (taking into account environmental, social, health and other impacts) per tonne of waste landfilled.

As mentioned above, Nahman (2011) valued the externalities associated with landfilling of solid waste in the City of Cape Town at R111 per tonne; although this figure is not necessarily applicable to South Africa as a whole, and would need to be updated. If a landfill tax were to be implemented, it is suggested that a comprehensive economic valuation study be commissioned to quantify the

externalities associated with landfill disposal in South Africa, and to determine an appropriate level for the tax. Such a study should be based on the following broad approach (DEA, 2016):

- Identify the environmental, social and health impacts associated with landfilling (e.g. methane emissions, leachate, etc.)
- Quantify the impacts in physical terms (e.g. tCO_2e of methane emissions per tonne of waste)
- Value (quantify in monetary terms) the external costs per tonne of waste landfilled, using an appropriate economic valuation technique (such as the Contingent Valuation Method, the Hedonic Pricing Method, the Benefits Transfer Method, Production Function approaches, etc.; and/or through the application of appropriate shadow prices (e.g. carbon prices, in the cases of methane emissions).

Differentiated tax rates could also be considered, based on levels of compliance with environmental standards. For example, sites with lower environmental standards (e.g. sites without liners or landfill gas capture systems) should have a higher tax imposed on them, while sites with higher environmental standards (e.g. those that comply with the Norms and Standards) could be rewarded with lower tax rates (or be exempt from the tax altogether). Such an approach is justified from an economic perspective; since sites with higher environmental standards will have internalised much of the environmental externalities within their financial costs; and should therefore face lower or zero rates of environmental taxation. This would incentivise a reduction in disposal specifically to sites with lower standards, in favour of those with higher standards. It would also create incentives for upgrading of landfill sites to comply with the Norms and Standards.

Thereafter, it would be necessary to conduct extensive consultation on the level of the tax; and to conduct extensive modelling of the impacts of the tax in terms of social, economic and environmental outcomes (taking into account price elasticity of demand for the service in question, among other variables). In particular, attention should be paid to potential negative unintended consequences, such as illegal dumping. The issue of how revenues raised through the tax will be used should also be considered (see Section 5).

Finally, the proposed new tax must be introduced by the Minister of Finance as a Money Bill in the National Assembly, as per Section 77 of the Constitution (which follows the same process as for Section 75 Bills) (PMG, 2021). This process, which is led by National Treasury, involves:

- Announcement of proposal for a new tax in the Budget
- Publication of a policy paper or draft bill for stakeholder consultation, subject to Cabinet approval (either on the day of the Budget speech, or thereafter)
- Consideration of comments received
- Revision of the policy or bill to address comments received
- Introduction of the Bill in Parliament
- Debating the Bill within the Parliamentary process, including by the Standing Committee on Finance, the Select Committee on Finance, and the National Assembly (Hemraj, 2021).

4.3 Subsidies, tax concessions and incentives

4.3.1 What is it?

While environmental taxes (such as landfill taxes) are aimed at addressing 'negative' externalities (such as negative environmental impacts) by increasing the cost (and thereby reducing the demand) for activities giving rise to such impacts; subsidies essentially act in the opposite direction: They aim to support and incentivise activities that give rise to 'positive externalities' (e.g. job creation and environmental benefits); such as recycling and other alternative waste treatment technologies.

Subsidies could potentially be applied at various points along the value chain, in order to create incentives for improved product design (using recycled materials, or designing products for recyclability), reduced waste generation, or diversion of waste from landfill; or to support the development of markets for recyclables, recycled materials, or products produced using recycled materials (DEA, 2016). Similarly, as an alternative to direct, explicit subsidies, 'implicit' subsidies could be provided in the form of various types of tax concessions, such as tax credits, rebates or exemptions.

Specifically, subsidies or tax credits/rebates could potentially be extended to various actors, including:

- Producers, e.g. to provide incentives to design products for recyclability; or to use recycled materials/inputs
- Households, to provide incentives to separate their waste
- Collectors (either waste collection authorities, private sector companies, or informal collectors), in order to provide incentives to collect recyclable materials
- Businesses undertaking alternative waste treatment (e.g. recycling), in order to support such activities and increase the viability of alternative waste treatment relative to landfilling (DEA, 2018b).

Internationally, a wide range of subsidy-based instruments are used to incentivise movement up the waste management hierarchy (DEA, 2018b). Specific examples of such instruments include:

- Incentivising design for recycling (DfR) / design for the environment (DfE); e.g. subsidisation of products that are designed for recyclability, or that don't generate non-recyclable waste (DEA, 2018b).
- Incentivising the desired waste management behaviour among waste generators; e.g. preferential tax treatment provided to businesses for improved waste management practices or initiatives; as in the USA and Poland (UNEP, 2005; DEA, 2018b).
- Incentivising diversion of waste from landfill; e.g. through rebates on waste collection/disposal charges for activities that divert waste from landfill, based on the avoided costs.
- Incentivising investment in recycling infrastructure; e.g. through recycling investment tax credits, in which government gives a credit on income taxes to organisations investing in

recycling infrastructure (OECD, 2006); or through providing price support, investment grants, accelerated depreciation, or soft loans designed to encourage private enterprises to invest in such infrastructure (UNEP, 2005).

- Supporting informal waste collectors, e.g. through mobile buy-back centres, payment for waste pickers' labour, compensation through subsidies (Dias and Samson, 2016), subsidised rental of warehouses for cooperatives/small businesses (Perrupato-Stahl, 2016), etc.
- Financial support of recycling activities, e.g. tax rebates for recycling (DEA, 2018b), preferential loans for the recycling industry (DEA, 2018b), subsidies paid per unit or per kg of material recycled, or lump-sum grants paid to communities or recycling centres (as is common in the USA) (OECD, 2006).
- Incentivising demand for secondary materials (DEA, 2018b), e.g. tax rebates or credits to industries for using recycled materials as an input in their products (UNEP, 2005); or providing preferential treatment in terms of public procurement practices to suppliers using recycled content (DEA, 2016). In turn, this will create a market for recycled materials, which will increase the viability of recycling activities.
- Stabilising the market for recycled materials (i.e. providing a buffer against market price volatility), e.g. through providing income guarantees to recycling facilities (DEA, 2016); or providing price support (on top of market prices) to recyclers, to enable recycled materials to compete with virgin materials even at times when market conditions are unfavourable (e.g. when virgin material prices are low as a result of low oil prices); while still allowing recyclers to receive sufficient income to ensure their viability.
- Other forms of 'implicit subsidisation'; e.g. municipal support of formal and informal recyclers and composting operations through the provision of land and equipment and the supply of material free of charge; funding of feasibility studies and research into recycling opportunities (DEA, 2018b); funding the capital cost of MRFs; providing soft loans; etc. (DEA, 2018b).

In particular, given the specific challenges identified during this project (see Section 2), a number of specific types of subsidies, tax concessions or similar instruments may be relevant in the South African context in order to create incentives for the diversion of waste from landfill. These include:

- Tax credits for investing in infrastructure for alternative waste treatment
- Subsidies paid per unit or per kg of material processed through alternative waste treatment
- 'Top-up' incentives (e.g. paid to collectors per kg of material collected), to increase the value of recyclables and thereby incentivise collection/recovery
- Income guarantees/price support for recyclers
- Tax credits/rebates for using recycled materials

Table 2 lists some of the challenges identified in Section 2; focusing specifically on those for which there may be a role for subsidy-type instruments. It also identifies which specific type of instrument is relevant in each case.

Table 2: Potential role of subsidies, tax concessions and related instruments in addressing economic/financial root causes for the dominance of landfilling as a waste management option

Economic and financial issues where there may be a role for subsidy-type instruments		**Relevant type of subsidy / tax concession / incentive**
High cost of alternatives	High capital costs	**Tax credits for investing in infrastructure for alternative waste treatment**
	High operating costs	**Subsidies paid per unit or per kg of material processed through alternative waste treatment**
The financial benefit from alternatives is too low	Market prices are too low	**'Top-up' incentives** (e.g. paid to collectors per kg of material collected), to increase the value of recyclables and thereby incentivise collection/recovery
	Fluctuating market price of virgin materials (linked to global commodity prices)	**Income guarantees/price support** for recyclers, to provide a buffer against market volatility
	Lack of markets	**Tax credits/rebates for using recycled materials**

Depending on the specific challenge to be addressed (middle column of Table 2), different types of subsidies could be implemented, at different points along the value chain. The various types of subsidy-based instruments listed in Table 2 should be explored by the Department of Trade, Industry and Competition (the dtic) and National Treasury, in order to "support the development of downstream recycling and recovery markets" (DEA, 2016). When considering subsidies, it is important to identify where in the value chain they could be applied in order to have the "largest impact on diverting waste from landfill" (DEA, 2018b).

For example, in the South African context, informal waste pickers play a significant role in the collection of recyclables and in the diversion of waste from landfill, but are vulnerable to fluctuations in the market value of recyclables, which means that they often 'cherry-pick' only the highest value materials, and are not able to derive a sufficient income when market conditions are unfavourable. As such, incentivising informal reclaimers, and ensuring that they are adequately compensated for the valuable service that they provide (in terms of their contribution to the recycling industry, and the cost savings that they generate for municipalities through landfill airspace savings); is of critical importance.

For example, the concept of 'top-up' incentives to informal waste pickers, in the form of an additional amount paid per kg of material collected, over-and-above the market value of the materials, may be relevant (Godfrey, 2019). Since both industry and municipalities benefit from the activities of informal reclaimers, such incentives could potentially be funded through EPR schemes (specifically through EPR fees or Advance Recycling Fees), or by passing on savings in disposal costs; or through some combination of these. The aim of such payments would be to incentivise increased collection (across a wider range of materials, rather than only cherry-picking the highest-value materials), to encourage pickers to sell recyclables directly to EPR-linked buy-back centres (Godfrey, 2019), and to compensate them for their activities.

4.3.2 How to implement it?

Since subsidies involve allocations of public funds for a specific purpose, they would fall under the scope of Section 77 of the Constitution (RSA, 1996; PMG, 2021), relating to Money Bills. Likewise, tax concessions and incentives would also fall under the scope of Section 77, which includes

measures which reduce or grant exemptions from national taxes (RSA, 1996). As such, as with landfill taxes (see Section 4.2.2); subsidies, tax concessions and incentives would need to be tabled in the National Assembly as a Money Bill by the Minister of Finance, in accordance with the procedure under Section 75 (Ordinary Bills not affecting provinces) (RSA, 1996).

When implementing subsidies, tax concessions and incentives; a number of issues need to be considered:

- How such an instrument will be funded (see Section 5).
- In the case of subsidies provided to private sector recyclers, "the distributional effects and impacts on competitiveness need to be carefully assessed. Subsidies should only be provided where a market would otherwise not exist and where access to the subsidy is not privileged" (DEA, 2018b: 56).
- Once subsidies have been implemented, there is a danger that they could become 'institutionalised', with the recipients "claiming financial harm if the support is reduced or stopped" (Forum for Economics and the Environment, 2002). For example, in the case of subsidies to recycling companies; often the companies involved are not financially viable after the subsidy is removed, and the policy therefore fails. Possible reasons include the lack of a stable market for recyclables, or the inability of recycled materials to compete with virgin materials (see Section 2.4). The challenge is therefore to ensure that these companies remain sustainable, i.e., that recycling remains financially viable, even after the subsidy is removed. This requires that:
    - The system is designed in such a way that the support provided to the industry is gradually reduced over time. In theory, as the industry grows, economies of scale will be realised and costs will be reduced, such that the industry could ultimately become self-sustaining. In principle, as alternative waste treatment industries become more competitive, they could ultimately become more attractive than landfilling, particularly if the costs of landfilling increase (e.g. if landfills are able to achieve compliance with the Norms and Standards) (see Section 2.1).
    - Distortions in the recycling market are permanently removed, so that the market can ensure an optimal level of recycling, without ongoing government support.

Finally, as with taxes (see Section 4.2.2), the proposed new subsidy must be introduced by the Minister of Finance as a Money Bill in the National Assembly, as per Section 77 of the Constitution (which follows the same process as for Section 75 Bills) (PMG, 2021). This involves:

- Announcement of proposal for a new subsidy in the Budget
- Publication of a policy paper or draft bill for consultation, subject to Cabinet approval
- Consideration of comments received
- Revision of the policy or bill to address comments received
- Introduction of the Bill in Parliament
- Debating the Bill within the Parliamentary process, including by the Standing Committee on Finance, the Select Committee on Finance, and the National Assembly (Hemraj, 2021).

4.4 Virgin material taxes (and elimination of perverse subsidies)

4.4.1 What is it?

Generally speaking, market prices for virgin materials tend to be lower than those for recycled materials (DEA, 2018b). This means that recycled materials are often unable to compete with virgin materials, which inhibits the development of markets for recycled materials.

In principle, taxes on virgin materials would help recycled materials to compete, by increasing the prices of virgin materials relative to recycled materials; thereby encouraging the use of recycled materials, and the development of markets for such materials (DEA, 2018b). The aim of a tax on virgin materials is to reduce the use of such materials as an input in the production of goods, in favour of secondary (recycled) materials. In the context of diverting waste from landfill, the intention of a virgin material tax is to increase the price of virgin materials relative to recycled materials, and therefore to increase demand for recycled materials as an alternative to using virgin materials in production. This would in turn create incentives for the collection and recovery of recyclable materials for recycling, and thereby increase the diversion of recyclable materials from landfill.

A common example of virgin material taxes are those applied on construction aggregates, such as sand and gravel. A number of European countries have taxes on virgin aggregates, including the UK, Sweden and Denmark (Söderholm, 2011).

In some cases, rather than a specific tax on virgin materials; there may be a need to first eliminate any perverse subsidies on such materials. Subsidies on virgin materials can be seen as an implicit ‘tax’ on recycled materials; since they create perverse incentives for the use of virgin materials rather than recycled materials. Eliminating subsidies on virgin materials would therefore contribute

towards making recycled materials more competitive, and thereby grow the market for recycled materials.

For example, the National Recycling Coalition (1999) identified nine separate subsidies in the USA, costing between $3 to $5 billion per year, which artificially lower the price of virgin materials (as well as landfilling), and thereby negatively impact on recycling. It was recommended that these subsidies be eliminated. However, it was also noted that "while the elimination of these subsidies is an important first step, their elimination alone will not guarantee an improvement in the market demand and prices paid for recovered materials" (National Recycling Coalition, 1999). In other words, elimination of subsidies on virgin materials should form part of a complementary package of instruments.

4.4.2 How to implement it?

As with landfill taxes, virgin material taxes would need to be introduced by the Minister of Finance as a Money Bill in the National Assembly (Section 77 of the Constitution), following the procedure under Section 75 (RSA, 1996).

As with any economic instrument, the first step in considering the implementation of a virgin material tax is to establish the need for such an instrument, in consultation with relevant stakeholders, including relevant government departments and industries (particularly businesses across the supply chain that would be impacted by such a tax) (DEA, 2016). A tax on virgin materials will have impacts across the economy, not only within the solid waste sector; and as such widespread consultation will be required. Some specific issues to consider will include, among others:

- The nature and structure of the industry in question – e.g. the degree of competition vs. monopoly, etc.
- Externalities (external costs) associated with the use of the virgin material throughout its life cycle, which would justify the imposition of a tax. Ideally, a comparative life cycle assessment of both the virgin material and the recycled alternative should be conducted, to establish the extent to which the alternative material is indeed superior from an overall environmental perspective, across the full life cycle.
- Potential impacts on businesses, and on consumers (since taxes on virgin materials will in all likelihood be passed on to consumers in the form of higher product prices). In particular, it needs to be established whether the tax may have disproportionate impacts on smaller businesses and/or lower income consumers (DEA, 2016).
- Price elasticity of demand for the material in question, in relation to the intention of the instrument (changing behaviour vs. raising revenue) (DEA, 2016). Since the intention of a tax on virgin materials is to reduce the demand for such materials in favour of recycled alternatives, a key determinant of the price elasticity of demand in this case is likely to be the extent to which the alternative material provides similar (or superior) performance characteristics in terms of functionality and quality, and the extent to which it meets relevant standards.

Once the need for a virgin material tax has been established, the focus switches toward the design of the tax, including the setting of an appropriate level of the tax. As with any tax, a tax on a virgin material would need to be designed in such a way as to "maximise positive impacts and minimise negative impacts on the economy, society and environment; which should also involve extensive consultation with affected parties" (DEA, 2016).

In terms of setting the level of the tax, as with landfill taxes, "it is important that due diligence and extensive consultation be conducted in the setting of the tax level, rather than setting taxes at an arbitrary level, which can often do more harm than good" (DEA, 2016).

A tax on virgin materials should be levied per tonne of material purchased, at a level that reflects the external cost per tonne. Specifically, it should "be based on the external (social, environmental and health) costs associated with the use of the virgin material relative to the use of the secondary (recycled) substitute; taking into account costs and benefits throughout the lifecycle of the materials in question. In practical terms, these costs could be based on the damage costs associated with the extraction and processing of the virgin material input (to the extent that these are not already incorporated in prices for the virgin material, perhaps through an existing environmental levy on extraction of the material)" (DEA, 2016).

Therefore, similarly to the case of a landfill tax, a study would need to be commissioned (unless relevant studies have already been conducted) to determine the external (social, environmental and health) costs associated with the use of the virgin material throughout its life cycle, relative to the recycled alternative (DEA, 2016).

As with a landfill tax; extensive consultation on the level of the tax would need to be conducted; as well as "modelling of the impacts of the tax in terms of social, economic and environmental outcomes (taking into account price elasticity of demand for the material in question, among other variables)" (DEA, 2016). According to DEA (2016), differentiation of the tax rate (based on, for example, the size of the business) should be considered; so as to minimise the impacts on smaller businesses. The issue of how revenues raised through the tax will be used should also be considered (see Section 5).

Finally, as with a landfill tax (see Section 4.2.2); the proposed new tax must be introduced by the Minister of Finance as a Money Bill in the National Assembly, as per Section 77 of the Constitution (PMG, 2021). As for landfill taxes, this process involves:

- Announcement of proposal for a new tax in the Budget
- Publication of a policy paper or draft bill for consultation, subject to Cabinet approval
- Consideration of comments received
- Revision of the policy or bill to address comments received
- Introduction of the Bill in Parliament
- Debating the Bill within the Parliamentary process, including by the Standing Committee on Finance, the Select Committee on Finance, and the National Assembly (Hemraj, 2021).

5 Approaches to the funding of subsidies and grants

The economic instruments discussed in Section 4 can be categorised either as instruments that provide funding, i.e. grants (Section 4.1) and subsidies (Section 4.3); or as revenue-raising instruments, i.e. landfill taxes (Section 4.2) and virgin material taxes (Section 4.4).

In the case of taxes, a key consideration relates to how any revenues raised from these taxes will be used. On the other hand, when implementing grants and subsidies, a key challenge relates to how such systems will be funded. Generally speaking, three options are available:

1. Funding from general government revenues
2. Funding through a complementary revenue-raising instrument (e.g. landfill taxes or virgin material taxes)
3. 'Self-funding' subsidies, e.g. funded through savings in disposal costs.

These approaches are discussed in turn in the following sections.

5.1 Funding from general government revenues

In the first approach, subsidies are funded from general government revenues, with allocations made through the normal budgetary process. In this case, the funds used to pay subsidies could have been raised from any source of government revenues.

5.2 Funding through a complementary revenue-raising instrument

Secondly, in theory, the revenues required to fund subsidies for recycling activities could potentially be raised through a complementary revenue-raising instrument, such as a product tax, EPR fee, advance recycling fee or landfill tax.

Indeed, an important consideration when designing tax-based instruments, such as landfill taxes (Section 4.2) and virgin material taxes (Section 4.4), relates to what will be done with the tax revenues. In this regard, the Waste Management Bureau, which is responsible for implementing the "disbursement of incentives and funds derived from waste management charges" under Section 34E of the Waste Amendment Act (The Presidency, 2014), has an important role to play.

It is worth considering that, as with existing product taxes, "the use of the revenue raised through a landfill tax is likely to be controversial" (DEA, 2018b). Ideally, the revenues from a landfill tax should be channelled back to the solid waste sector; for example, to finance improved waste management services, infrastructure, or facilities; or to finance complementary policies to support alternatives to landfilling, such as infrastructure development grant funding (see Section 4.1) or subsidies (Section 4.3).

Indeed, DEA (2016) suggests that environmental taxes should ideally be implemented in combination with a subsidy; for two reasons:

- A tax-subsidy combination can in principle be designed to be revenue-neutral, in that revenues raised through the tax can be used to fund the payment of subsidies.
- A tax-subsidy combination, whereby a tax is implemented on an 'undesirable' behaviour (e.g. landfilling), while a subsidy is provided for a 'desirable' behaviour (e.g. recycling); can be an effective way of creating an appropriate set of mutually reinforcing incentives for driving the desired behaviour; as opposed to simply implementing a punitive tax without providing appropriate alternatives. Activities imposing negative externalities (e.g. landfilling) can be discouraged by means of a tax, while the revenue collected can be used to encourage activities (such as recycling) which give rise to 'positive externalities', by means of subsidies (National Treasury, 2006).

According to the National Pricing Strategy (DEA, 2016): "There is increasing evidence that a coherent combination of tax and subsidy-based instruments is far more effective than implementing any single instrument in isolation. A tax-subsidy combination has the dual benefit of ensuring a source of funding for the payment of subsidies (and an environmentally-related avenue for directing revenues received from the tax); and allowing for a coherent and complementary set of incentives to be created, whereby incentives are created to both discourage environmentally damaging behaviour (through the tax) and encourage environmentally friendly behaviour (by both providing and subsidising a viable alternative)".

Examples of such tax-subsidy combinations include:

- Subsidies provided for the use of recycled materials in production; in combination with a tax on virgin materials (see Section 4.4); so as to create price differentiation in the market for inputs that favours the use of recycled materials over virgin materials (DEA, 2016).
- Similarly, subsidies could be applied on the purchase of products that are made from recycled materials or that are designed for recyclability; in combination with a tax on products made from virgin materials or that are not designed for recyclability; so as to create price differentiation in the product market; favouring those products that are made from recycled materials or are designed for recyclability over those that are not.
- An upstream combination tax/subsidy is a tax (paid by producers) levied on produced intermediate goods, thereby providing incentives for producers to alter their material inputs and product design; the revenues from which are then used to fund a financing mechanism to support recycling activities; i.e., a subsidy provided to collectors, recyclers, waste management firms or local government in order to incentivise recycling (DEA, 2016).
- Revenues generated through a landfill tax (see Section 4.2) could be used to fund subsidies provided to waste collectors and processors per unit of waste collected or processed.
- EPR fees can be used to "provide funding to cover the costs of establishing and implementing systems for collection, sorting and other treatment required prior to the sale of materials to recyclers; or the provision of incentives, subsidies, infrastructure and/or information to consumers, collectors and/or processors; so as to increase the supply of recyclables" (DEA, 2016).
- Deposit-refund schemes are essentially a combination of a product tax and a subsidy. An initial deposit is paid upon the purchase of a product; which is refunded when the used product (or packaging) is returned for re-use or recycling.

- An advance recycling fee (ARF) can be combined with a recycling subsidy. An ARF is a tax on product sales, with the explicit aim of raising revenue to cover the cost of recycling (OECD, 2006; DEA, 2016). In this case, the revenue could be used to fund subsidies paid per unit or per kg of material processed through alternative waste treatment (OECD, 2006). ARFs "are often assessed per unit of the product sold, but can also be assessed on a weight basis. ARFs may be visible to the consumer when [s]he purchases a product – i.e., a separate line item on the bill, similar to sales tax – or they can be assessed upstream on producers and later be incorporated into the product retail price" (OECD, 2006). The level of the ARF is determined (generally by an industry association) "based on the estimated costs of collection, treatment, recycling, re-use and/or recovery of the product" (DEA, 2016).

Advance recycling fees (ARFs) may have a particularly important role to play in this respect. Unlike product taxes (which are intended primarily to reduce demand for environmentally harmful products, with revenue raising as a secondary benefit), advance recycling fees (ARFs) are "intended primarily to raise revenues to cover recycling costs, with potential secondary benefits in terms of reducing demand" (DEA, 2016). As with EPR fees, revenues from ARFs can be used to fund financial incentives (payments) to consumers, collectors or processors per unit or per kg of material returned, collected or recycled. Several studies have shown that a combination of an ARF and a recycling subsidy is an economically efficient approach to achieving multiple policy objectives (OECD, 2006).

Specific examples of how such tax-subsidy combinations have been applied in practice are as follows:

- Estonia: Revenue from a landfill tax is "made available by Government to subsidise private sector recycling activities. Recyclers can apply for up to 50% of their costs to establish recycling facilities" (DEA, 2016).
- Western Canada: Sales and imports of motor oil, oil containers and filters are subject to an ARF, payable by the seller. Revenues from the ARF are "used to fund collection and recycling programs, via the payment of a recycling subsidy to authorised collectors, transporters, and processors for every litre of oil, every container, and every filter that is recycled or reused. The level of both the ARF and the recycling subsidy is set by a non-profit industry association... The value of the return incentive varies by location, in accordance with differences in transport costs. In turn, the level of the ARF takes into account the revenues required to support the recycling programs through the payment of the return incentives" (DEA, 2016).
- China: Producers and importers of electronic and electrical products pay a fee on each unit produced (for domestic use) or imported. The fees are paid into an 'electronic waste disposal fund'. The fund is used to subsidise the collection and safe disposal of waste electrical and electronic equipment (WEEE). Fees are paid "on a quarterly basis, via the tax authority, or when declaring imports via the customs authority… Certified recyclers who can provide proof of the WEEE they have recycled or disposed of are eligible to apply for a subsidy, which is also unit-based. Fee and subsidy rates are set based on a series of consultations with experts, producers, importers and recyclers. The rates are adjusted as necessary as collection and disposal costs change, again based on extensive consultation. Importantly, the fee is set at a much lower rate than the subsidy; such that the authorities distribute and utilize the funds without surplus (i.e. no revenue is generated). The value of

> the subsidy is based on the basic cost of the recycling and disposal (which in turn varies for each of the five targeted types of WEEE), excluding collection costs; while the fee is typically set at between 10 and 20% of the subsidy" (DEA, 2016).

A potential obstacle to an effective tax-subsidy combination in the South African context is that ring-fencing of tax revenues is not possible. In this context, combined with the lack of viable alternatives (and therefore low price elasticity of demand), the argument for environmental taxation in the solid waste sector (particularly landfill taxes) becomes weaker – such taxes will only have the effect of raising revenues (and/or stimulating illegal dumping), rather than incentivising the desired behaviour; and any revenues raised will not be flow back to the solid waste sector. There is therefore no benefit to the sector from such a policy.

A compromise may be to use 'soft' or 'partial' earmarking, whereby "revenues will flow via the fiscus with the provision that special consideration be given to fund certain activities, but with no fixed commitment to allocate all the revenues from a specific source to such activities" (National Treasury, 2006:105). Alternatively, allocations can be made through the normal budget process. However, in this case, there is again no guarantee of revenues being channelled back to the solid waste sector. In general, there are no clear guidelines to determine whether earmarking is appropriate; instead, the desirability of earmarking needs to be assessed case-by-case, and, where earmarking is granted, regularly re-evaluated to ensure its ongoing desirability (National Treasury, 2006).

Alternatively, the system could in principle be managed by industry; e.g. as part of an EPR scheme, with the revenue raising instrument taking the form of an EPR fee or industry-managed ARF; rather than a tax levied by government. In this case, the Producer Responsibility Organisation (PRO) would be responsible for the allocation of revenues. This may help to ensure that revenues from the fee are used to fund the payment of subsidies. For example, the Western Canada used oil program referred to above is "an industry-run program in which an industry association sets the level of the ARF and the recycling subsidy" (OECD, 2006). The role of government in such a programme is to pass legislation mandating that that such a fee be paid, and by whom.

5.3 'Self-funding' subsidies

Finally, subsidies could be designed so as to be 'self-funding', based on the savings in disposal costs that arise as a result of the diversion of waste from landfill. This is the approach adopted in the UK recycling credit scheme, in which the subsidies paid to collectors and recyclers are funded through the savings in terms of avoided disposal costs that arise as a result of the diversion of waste from landfill, through the actions of the collectors/recyclers. In other words, savings in collection and disposal costs as a result of increased recycling are passed on from disposal authorities to organisations undertaking collection and sorting of recyclables (DEFRA, 2006), in order to incentivise recycling activities. In this scheme, "credits are calculated as a percentage of the collection and disposal avoidance costs and thus ensure some income for recycling businesses, even when the market demand for recyclables is low" (Inter-American Development Bank, 2003). In this way, the scheme is "not a drain on the central government budget, as it is simply a transfer payment between different tiers of local government and third parties" (Turner et al., 1996).

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