

Climate Change Mitigation, Monitoring and Evaluation: Waste Management Flagship

Authors:

ABSTRACT

The South African National Climate Change Response White Paper (NCCRP) published in 2011, and the ratification by South Africa of both the United Nations Framework Convention on Climate Change and its Kyoto Protocol heralded the transition to a lower carbon economy and more importantly a climate resilient society. To this end South Africa has pledged a voluntary mitigation target to reduce its GHG emissions by 34% in 2020 and 42% in 2025 below business as usual, taking into account that developed countries meet their commitment to provide financial, capacity-building, technology development and technology transfer support.

The National Climate Change Response Strategy (White Paper) of 2011 includes eight “Near-Term Priority Flagship Programmes”. Three of them are focused on climate change adaptation and five on mitigation:

- Climate Change Response Public Works Flagship
- Water Conservation and Demand Management Flagship
- The Renewable Energy Flagship
- The Energy Efficiency and Energy Demand Flagship
- The Transport Flagship
- The Waste Management Flagship
- The Carbon Capture and Sequestration Flagship
- The Adaptation Research Flagship

The rationale for flagships stems from the need to reflect both a sense of urgency and to accommodate climate change response measures into the respective climate impacting infrastructure and development sectors. These flagship programmes, as identified in the White Paper, are deemed to act as front runners in the transition to a lower carbon economy and resilient society. They provide the transformative stimulus for alternative socio-economic developmental measures as compared to the business as usual approach.

The focus of this paper is on the Waste Management Flagship Programme.

1. Introduction

Waste management is the mandate of local government. The prevalent waste management practice implemented by municipalities is landfilling. It is the anaerobic digestion of the organic waste component of landfills that results in the emission of the biogases Methane and Carbon Dioxide. Organic waste accounts for 15 % of South Africa’s general waste composition (SAWIC, 2011). In 2000 the waste sector accounted for 2% of GHG emissions; 85% of which represented solid waste disposal on land (South African Mitigation Potential Study Draft, n.d.). Thus, the diversion of waste from landfills and the separation of waste are not only significant to mitigating the adverse effects of the waste sector on the climate but also provides an opportunity to adapt to technological advancements that support improved environmental management. To achieve this, the implementation of climate smart initiatives within the waste sector therefore present a significant opportunity.

2. Problem Statement

Landfilling remains for most municipalities the main strategy of disposal. Despite significant international advances to waste management and disposal technologies over the last four decades, together with new regulatory imperatives and the glaring risk of reduced landfill space in metropolitan areas, municipalities continue to remain steadfast in their landfill policies.

As waste volumes increase annually throughout the country, it becomes increasingly apparent that this approach is no longer ideal or preferable in the long-term. In addition, the methane released from landfilling is further contributing to climate change. The CSIR (2013) maintains that the lack of an enabling environment is a major limitation towards the implementation of alternative waste management practices. A fundamental problem is achieving scale whereby municipalities at least 50% of them earnestly consider alternatives to current landfilling practices. So how can the near-term priority flagship programme of climate change support the paradigm shift from landfilling to proper implementation of the waste-hierarchy, and thereby avoid or minimise landfilling?

3. Waste Management Flagship Framework

3.1 Creating an Enabling Environment

Government has responded to these challenges in order to create an enabling environment through the following:

Policy: The National Development Plan sets the climate policy framework for the country, from this there is a commitment to global and national emission reduction efforts along with the NCCRP. The Waste Management Flagship Framework is a mechanism outlined by the NCCRP to mobilise the utilisation of alternative waste management practices in order to achieve effective emission mitigation.

Regulatory: the promulgation of the National Environmental Management Act: Waste Act (2008) which promotes waste diversion and minimisation through the implementation of the waste hierarchy. The waste hierarchy promotes alternative waste management practices in order to reduce, reuse, recycle, compost or utilise waste as a renewable energy resource. The legislation makes provision for a National Waste Management Strategy (NWMS) and Integrated Waste Management Plans (IWMPs) to support the implementation of the waste hierarchy.

Knowledge Management: knowledge products developed by The Department of Environmental Affairs (DEA) include the Guidelines Defining Appropriate Technology for Advanced Waste Treatment. The guidelines clearly identify the types of technologies that can treat municipal solid wastes to reduce the volume left for disposal. Technologies suited to mixed residual waste streams, as well as those for the treatment of source segregated waste, such as recyclables, food waste and green or garden waste are covered. Treatment technologies include mechanical, biological and thermal processes; and frequently hybrids of each. The treatment processes are described in detail with a focus on the suitability for elements of the municipal waste stream. Flexibility, constraints and plant sensitivities are identified, as are the various outputs, products and residues. Commentary is also included on the markets and outlets for the outputs on a local, national and international level.

Financing Instruments: The Financing and Fiscal Commission of South Africa published research on financing waste management. Their research explored how waste management can be a viable, sustainable service with the potential to generate revenues and create jobs. The research provided policy recommendations for possible and practical funding mechanisms for waste management. It is contended that financial resources are available but, without the provision of fiscal guarantees in place, borrowing is difficult for climate smart initiatives. Government needs to treat the financing of waste in the similar way that energy and water are treated.

Institutional Mechanisms: The creation of the Waste Management Officer (WMO) through regulation offers significant opportunity for transitioning the waste sector towards a climate smart economy. It is here that the mindset shift should begin. Currently they operate from a compliance mindset, however this needs to transition towards climate smart business principles.

Near Term Priority Flagship Programme: derived from the NCCRP, work on the waste management flagship programme and will focus on strengthening an enabling environment for the uptake of projects that divert waste from landfills. The selected programme will undergo project preparation supported by technical assistance through the GIZ. The programme is intended to provide support to selected municipalities for the development of alternative waste treatment strategies and the actual implementation thereof.

3.2 Key goals for demonstration

The purpose of the waste management flagship is to demonstrate and promote a paradigm shift from current waste management practices towards alternative waste management strategies. The combination of thermal, mechanical and biological mechanisms offers opportunities for implementing the waste hierarchy.

The waste flagship goals include:

- The transition to a lower carbon economy,
- The promotion of better waste management practices, and
- Additional sustainability benefits such as green jobs, generation of renewable energy and reduced GHG emissions (DEA, 2014).

The achievement of the stipulated goals is dependent on the successful implementation of the waste hierarchy.



Figure 1: Goals for demonstration (DEA, 2014)

3.3 Aims and Objectives

The aim of the waste management framework is to demonstrate and promote emission mitigation waste management strategies to reduce the GHG emissions of the waste sector.

Consequently, the waste flagship **project aims at reducing GHG emissions** within the framework of an integrated waste management system (IWMS) with a particular focus on **diversion of municipal solid waste (MSW) away from landfills**.

The **objectives** of this project are:

- a. To develop a **strategy** which outlines **interventions** to improve the IWMS with emphasis on waste diversion away from landfills, per municipality, inclusive of a **status quo** analysis;
- b. To formulate detailed **scenarios** based on the outlined short- and medium term interventions determined in point a. above, to improve the IWMS with emphasis on waste diversion away from landfills, per municipality, inclusive of a **comparative analysis** thereof ;
- c. **Project preparation** based on selected scenario(s) for each municipality, which is inclusive of the development of a **bankable business plan** and an **implementation plan**;
- d. Compilation of **lessons learnt** from the project preparation process which feed into the web-based waste treatment guide with a view to developing recommendations for the **uptake** of similar projects across the country.



Figure 2: Waste management flagship process

3.4 Flagship Project Preparation Approach

The project preparation entails the following: Status Quo Analysis, Scenario development, business planning and procurement strategy:

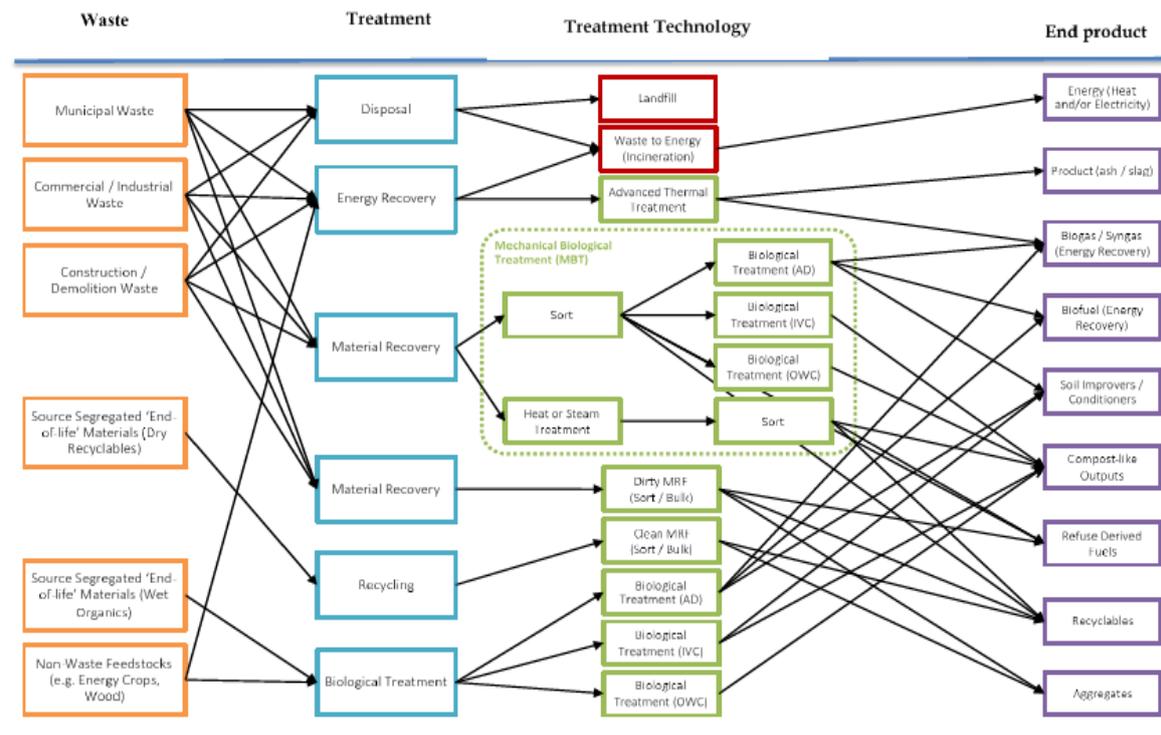
- **Status Quo Analysis:** A key issue in this analysis is that of waste characterisation. Most municipalities do not undertake such studies and are therefore unable to quantify the potential value of their waste streams. In addition the status quo analysis will need to also consider systems and processes, socio economic status, GHG emissions, data availability etc.

Consequently the status quo directly influences future interventions and scenario development for disposal. Hence interventions and scenario development should inter-alia consider the following:

- Identification of short, medium and long term interventions to further improve IWMSs;
- Identification of the high level cost implication per intervention;
- Analysis of the high level pros and cons to the suitability of each intervention;
- Estimation of the potential GHG emission reduction per intervention and of the interventions collectively;
- Establishment of the communication and awareness requirements per intervention;
- Enhancement of monitoring and reporting mechanisms;
- Review of alternative technology waste by-laws to inform alternative waste management strategies and the improvement of IWMSs.

When identifying IWMs intervention strategies, the mixing of methods or technologies required by alternative waste management strategies should be taken into account (DEA, 2014). Various alternative waste management pathways are to be considered to improve IWMs. These pathways are defined as scenarios. Figure 2 (ERM, 2014) identifies and illustrates the various waste treatment pathways, advanced technology options and the combination of mechanical, biological and thermal mechanisms with an emphasis on the following Advanced Solid Waste Management technologies for municipalities (ASWM):

- Advanced Thermal Treatment (ATT), inclusive of gasification and pyrolysis;
- Mechanical Biological Treatment (MBT);
- Applications of Mechanical Heat Treatment;
- Materials Recycling Facilities (MRFs) for both clean and dirty waste streams;
- Biological Treatments (BT) inclusive of Anaerobic Digestion (AD), In-Vessel Composting (IVC) and Open Window Composting (OWC).



⁷ Landfilling and Incineration is not considered to be an ASWM technology

Figure 3: Technology Summary (ERM, 2014)

The pathways which offer optimal (cradle to grave) emission reduction are to be identified.

The analysis of various scenarios must take into account the suitability of current systems and processes, as well as the incorporation of incentive and compliance mechanisms per municipality. The adequate monitoring and evaluation of accepted scenarios is critical.

The effective implementation of the formulated scenarios is dependent on the IWMS of municipalities, as well as the development of a bankable business plan and implementation strategy. The business plan should take into account, per scenario:

- The chosen scenarios and associated operational costs;
- Cost benefit analysis;
- Financial modelling to determine optimal return on investment;
- Sources of funding
- Calculation of GHG emissions;
- Risk and mitigation analysis;
- Monitoring and evaluation measures.
- A Procurement strategy.

At the point of the procurement roll out it would mean there is sufficient bankability, the Council has given approval to proceed and most importantly the financing and risk models are significantly in place. Ownership for implementation will remain at the level of the municipality and it is envisaged the project will have provided the skills and support for the local officials to proceed independently.

4. Institutional and Governance Arrangement

Given the nature of the waste flagship and the importance of ensuring that the vertical relationship is clearly defined and managed, as well as ensuring local ownership of the respective municipal projects, the following institutional and governance arrangements have been agreed upon. There will be:

- 6 x Municipal Project Steering Committees
- A National Waste Flagship Steering Committee
- A Waste Flagship Project Management Team

4.1 Governance Structure

The figure depicts the respective proposed committees.

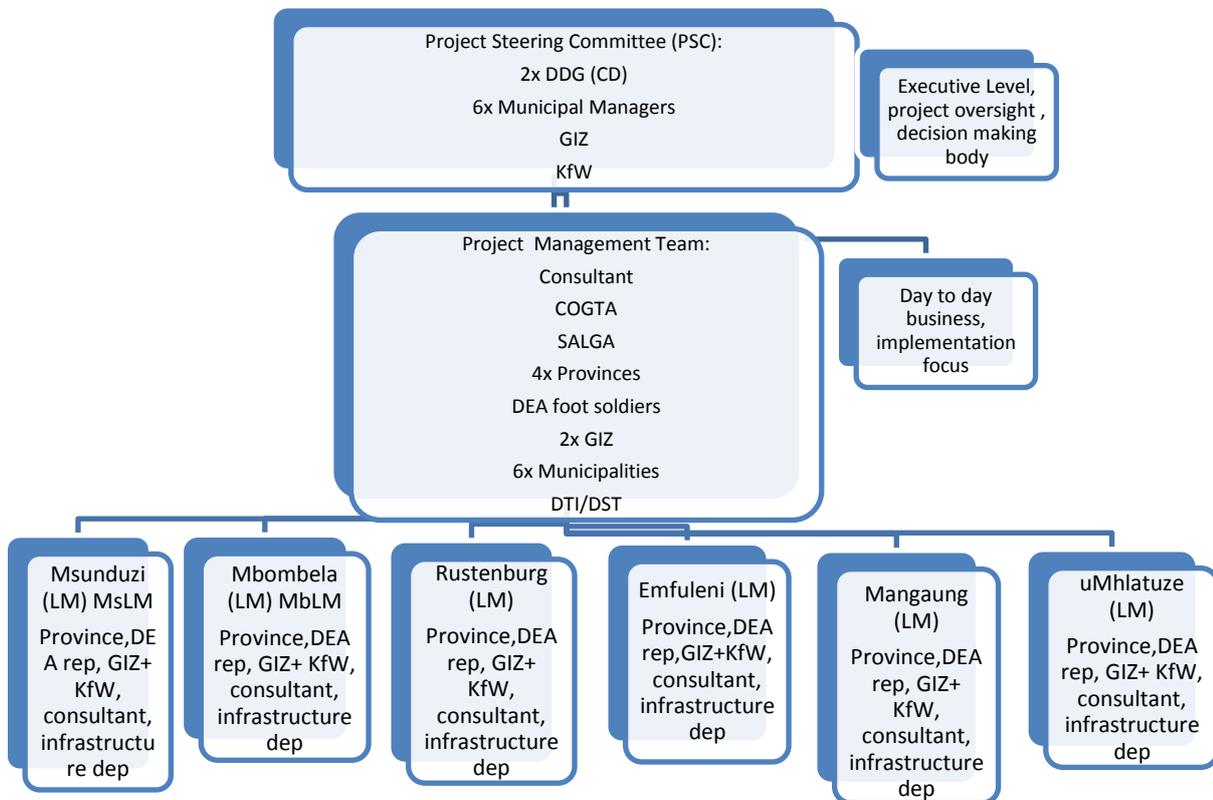


Figure 4: Governance structure

The roles and responsibilities of the above will need to be carefully defined in order to avoid duplication and potential confusion. The options are to have six municipal steering committees in which the task teams can participate. Stakeholder engagement is required throughout the Waste Management Flagship process.

4.2 Municipal Steering Committee

The selected municipalities shall each have their own local steering committees. The role of these committees would be to oversee and manage the project at a local level. The municipality shall chair the committee and take responsibility for the projects therein. The committee shall include members of the respective provinces, DEA representatives, GIZ, KfW and consultants where necessary. Ideally existing structures should be used where possible. The committee will be responsible for regularly submitting reports to the Waste Flagship Steering Committee.

4.3 National Waste Flagship Steering Committee

The role of this committee is to ensure project oversight and decision-making. The members therefore shall include the two DDGs (or nominated officials) from the Waste and Chemicals Branch and the Climate Branch, the respective municipal manager (or nominated officials), GIZ and KfW. This committee shall be the executive steering committee in which decisions shall be taken. DEA shall develop the terms of reference and establish the first meeting.

4.4 Waste Flagship Project Management Team (PMT)

The role of this team is to provide support to both the National Steering Committee as well as to the municipal steering committees. It will provide secretariat support to the Waste Flagship Steering Committee and ensure the flow of information between municipalities and the Waste Flagship Steering Committee. The PMT shall comprise CoGTA, SALGA, DEA, DTI, DST, GIZ, KfW and project managers from the municipalities.

5 Study Tour

As part of the programme, a study tour which provides the municipalities with an opportunity to visit local and international projects that emphasise diversion of waste from landfills. The location of the study tour shall be based on the outcome of the consultants' initial assessment and recommendations.

6 Project Timeline

Table 1: Waste Management Flagship CSP 2 Timeline

Milestone	Timeline
Compilation of Concept note + DG Approval	07/2014-12/2014
Identification and Selection of Municipalities	08/2014-12/2014
Municipal visits	09-12/2014
Munics (Kick off meeting) to establish a common understanding of the aims, objectives and deliverables	12/2014
Establishment of steering committee	01/2015
Establishment of PMT	01/2015 – 03/ 2015
Service Provider TOR Finalized	02/2015- 04/2015

Appointment of Consultant	05/2015 & 09/2015
Inception Report	10/2015
Status Quo	12/2015
Scenarios and project proposal	02/2016
Business & Implementation Plan	04/2016
NAMA funding Proposal Submission	06/2016
Study Tour	07/2016
Meeting with potential funding institutions	01/2016 -07/2016
Procurement Strategy approved	07/2016
Procurement Roll Out	08/2016- 03/2017
Implementation	06/2017

The timeline is subject to the respective municipalities' capabilities and willingness to proceed towards actual implementation. The outcome of actual implementation shall provide the critical lessons learnt for achieving scale in the next round of implementation.

7 Conclusion

This paper provides a brief synopsis of the proposed development of a scaled-up waste management flagship programme which seeks to support and demonstrate diversion of solid waste from landfills. This intervention heralds the practical implementation that forms the foundation of transformation in waste management and disposal. The intended outcome should, therefore, be a significant scale up of alternative approaches to landfilling.

The biggest challenge facing municipalities with regards to moving away from landfills and adopting alternative technologies is the perceived high costs of these technologies. However, Public Private Partnerships (PPP) for financing of alternative waste solutions are becoming more readily available.

AISWM is also more feasible when considered in line with long term sustainable development goals and job creation possibilities (ERM, 2014).

Some South African metropolitan municipalities such as the City of Johannesburg, eThekweni Metropolitan Municipality and Ekurhuleni Metropolitan Municipality have already initiated projects that seek to avoid or minimise landfilling of solid municipal waste, through a combination of Treatment technologies. The Rustenburg Local Municipality (RLM) and the uMgungundlovu District Municipality (UMDM) are both adopting AISWM technologies and moving towards a cleaner economy. Material Recycling Facilities have also increased rapidly in the last 10-15 years. However, AISWM is still fairly new to the South African landscape and municipalities need to move towards progressively implementing these new technologies (ERM, 2014).

It is contended that the next IDP process should include alternative waste disposal strategies as part of the IWMS. There is no one size fits all technological solution as far as waste technologies are concerned, rather each municipality can adapt and incorporate these technologies depending on their local context. However, municipalities need to increasingly move away from landfills and select alternative viable AISWM technologies (ERM, 2014). The issue now is to remove the barriers to scale through direct implementation efforts.

Business also has an important role to play in deepening the decarbonisation process for land-filling in a manner that is affordable and sustainable. The ambitious climate action window presents a significant opportunity for business.

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