Towards attaining the Polokwane waste reduction goals – where are we?

Oluwatoyin Taiwo, Fred Otieno & Christa Venter

Peer reviewed and revised

Abstract

The concept of sustainable waste management has increased in momentum as it attempts to deal with society's waste in an environmentally efficient, economically affordable and socially acceptable manner. Rapid population growth, the use of high-tech materials and the tendency to concentrate in large cities have resulted in increasing amounts of waste being generated. The resultant effect is increasing pressure on waste management resources, such as landfills, collection and disposal services and the environment. The Polokwane Declaration set targets of zero waste to landfills by 2022 and to reduce the same by 50% by the year 2012. The set target of zero waste to landfills was recently revised to 70% waste to landfills by 2022. It is four years before the first target date, and progress made thus far has not been very encouraging. This article examines and analyses the progress made against these targets using the data from the City of Johannesburg, and evaluates the possibility of achieving both the 2012 and the 2022 targets. Evidence presented in the article points to the following possibilities: the set targets are too ambitious and may not be achieved in the set time frames and, if these targets are to be achieved, significant resources and effort will need to be expanded to make the necessary progress. The article ends by drawing certain conclusions and making recommendations aimed at assisting the authorities in South Africa to make reasonable progress in this noble intention.

DIE BEREIKING VAN DIE POLOKWANE AFVALVERMINDERINGDOELWITTE – HOE VORDER ONS?

Die konsep van volhoubare afvalverminderingsbestuur wat poog om die gemeenskap se afval te hanteer op 'n manier wat omgewingseffektief, ekonomies bekostigbaar en sosiaal aanvaarbaar is, het in momemtum toegeneem. Merkbare populasiegroei, die gebruik van hoë-tegniese materiaal en die geneigdheid om in groot stede te bly het gelei tot die vermeerdering van die hoeveelhede afval wat gegenereer word. Die gevolg is toenemende druk op afvalbestuurhulpbronne, soos opvullings, versamel- en verwyderingsdienste asook die omgewing. Die Polokwane Verklaring het doelwitte van geen afval-stortings teen 2022 gestel asook 'n vermindering van stortings met 50% teen die jaar 2012. Die gestelde doelwit van geen afvalstortings is onlangs aangepas tot 70% minder afvalstortings teen 2022. Dit is vier jaar voor die eerste doelwitdatum en vordering gemaak tot hede is nie baie bemoedigend nie. Hierdie artikel ondersoek en analiseer die vordering wat gemaak is wat gemeet is teen hierdie gestelde doelwitte deur die data van die Stad van Johannesburg te gebruik asook die moontlikheid om die 2012 en 2022 doelwitte te evalueer. Die bewyse wat gebruik is in die artikel wys die volgende moontlikhede uit: die gestelde doelwitte is te ambisieus en gaan moontlik nie in die gestelde tyd bereik word nie; indien hierdie doelwitte wel bereik word, sal merkbare hulpbronne en pogings nodig wees om die nodige vordering te maak. Die artikel eindig deur sekere gevolgtrekkings te maak en aanbevelings voor te stel wat daarop gemik is om die betrokke Suid-Afrikaanse owerhede by te staan om redelike vordering te maak.

USEBENZELA EKUFIKELELENI KUMNQWENO OSEKWE EPOLOKWANE WOKUNCIPHISA UKUNGCOLA NEMFUNGUMFUNGU – SINDAWONI NGOKU?

Umba wokunciphisa ukungcola ngendlela ezinzileyo uya uqwalaselwa kakhulu, ngakumbi amalinge okucoca amadlelo omphakathi ngendlela efanelekileyo, efikelelekayo (ngokwendleko) kunye nevumelekileyo.

Ukukhula komphakathi ngokukhawuleza, ukusetyenziswa kweemashini kunye nokuxinana kwabantu ezidolophini zezinye zezinto ezidala ukongezeka kokungcola.

Zonke ezizinto ziba ngoyena nobangela wokutshutshiseka kwenkonzo zogcino lococeko, ezifana nemingxunya yokulahla ukungcola, uqokelelo nokutshiswa kokungcola kunye nendalo ubuqu bayo. Isiseko esabekwa ePolokwane sakhetha unyaka ka2022 ekubeni kufikelelwe kwelona zinga liphantsi lokungcola okufakwa emingxunyeni, nalapho kuyakube sekunciphiseke ngeepesenti ezimashumi mahlanu ukungcola ngonyaka u2012. Esi sigqibo siphinde sajikwa kwaza kwagqitywa ekubeni kufikelelwe kwiipesenti ezimashumi asixhenxe kwangaloo nyaka ka 2022. Sekufikeleleke koonyaka abane ekubeni lo mthetho abe sele ufezekisa isiqendu sokuqala solu nciphiso, kodwa izinga lenkqubela eyenziweyo alikonelisi.

Le ncwadi iqwalasela, ide icalu-calule inkqubela eyenziwayo ngalo mba, iyijonga ngokwamazinga ekufuneke kusetyenzelwe kuwo ngokwengxelo ethathwe kwiSixeko saseGoli, nangelinge lokuzama ukuba kufikelelwe kuloo mazinga abekelwe u2012 no2022 ngaxeshanye.

Ubungqina obufumanekayo bukhokhelisa ekubeni:

Okokuqala, amazinga abekiweyo aphakeme kakhulu kwaye angangafikeleleki ngamaxesha abekiweyo. Okwesibini, ukuba kuyenzeka ukuba lamazinga namaxesha abekiweyo afikeleleke, loo nto iyakubangela ekubeni kongezwe izinga lamandla nezixhobo ekuya kusetyenzwa ngazo ukuze kubonakale inkqubela phambili.

Le ncwadi igqiba ngelokuba kubekwe izphumela kunye neengcebiso ezijonge ukuncedisana neenkonzo eziphethe lo mba ukuze kude kufumaneke impumelelo ngawo.

Ms Oluwatoyin Taiwo, Department of Civil Engineering, Tshwane University of Technology, Private Bag X680, Pretoria 0001, South Africa. Telephone number: 012 382 4616 (office), 076 540 3000 (cell), Fax: 0866973688, E-mail: <taiwoo@tut.ac.za>; <toytaiwous@yahoo.com>

Prof. Fred Otieno, Faculty of Engineering and the Built Environment, Tshwane University of Technology, Pretoria West Campus, Private Bag X680, Pretoria 0001, South Africa. Telephone no: 012 382 5120 (office), 082 3357019 (Cell), Fax no: + 27 12 382 5568, E-mail address: <otienofao@tut.ac.za>

Ms Christa Venter, City of Johannesburg, 2010 office, 125 Simmond Street, Braamfontein, Johannesburg, South Africa. Telephone no: 011 381 0343 (office), 082 492 2424 (Cell), Fax no: 0865041917. E-mail address: <ChristaVen@joburg.org.za>

1. INTRODUCTION

The concept of sustainable waste management has gained tremendous momentum in an atempt to deal with society's waste in an environmentally efficient, economically affordable, and socially acceptable manner. To this effect, in September 2001, the Department of Environmental Affairs and Tourism (DEAT) convened the first National Waste Summit at Polokwane, the capital of Limpopo Province in South Africa, attended by delegates from Government (national, provincial and local), civil society and the business community. The basis of the Summit was the recognition that waste management should be a priority for all South Africans and that there is a need for urgent action to reduce, re-use and recycle waste in order to protect and establish a clean and healthy environment.

The Polokwane Declaration sets targets and committed the country to reducing waste generation and disposal to landfills of 50% by 2012 and develops a plan for zero waste to landfills by 2022. The influx of people from the rural areas of South Africa and elsewhere in Africa has resulted in phenomenal urban growth rates of 9-11% per annum (Millard, 2002). Rapid population growth, use of high-tech materials, the tendency to congregate in large cities and the mushrooming of informal settlements (where waste management is limited or non-existent) have resulted in increasing pressure on waste management resources, such as landfills, collection and disposal services, and the environment (Taiwo & Vorster, 2006; Wiechers, Borland & Matsabu, 2002: 337).

Disposing of waste in a landfill is the most traditional method of waste disposal, and it remains common practice in most countries, including South Africa. In more advanced societies, notably some countries in Europe, there is now a drive towards zero waste (Taiwo & Vorster, 2006). This is an effort to eliminate the negative impact landfills have on the environment, including lack of space for landfills and because of large areas of land made semi-permanently unsuitable for residential or industrial development (Taiwo & Vorster, 2006). These typically European problems also apply to the Johannesburg Metropolitan Area which is surrounded by densely populated areas, making it difficult or near impossible to find new landfill sites. It is therefore relatively important for Johannesburg to minimize the amount of waste it sends to its landfills as a partial solution to its waste disposal problem. Finding such sites that would not disturb the residents, are geologically suitable and meet all the permitting requirements of the Department of Water Affairs and Forestry (DWAF) is a big challenge (Harris, 2005: 21).

This article reviews the progress made towards attaining the Polokwane waste reduction goals and seeks to establish whether the set targets are achievable by using data from Johannesburg as the largest Metropolitan Municipality in South Africa.

2. WASTE AND PRE-POLOKWANE DECLARATION ON WASTE

2.1 What is Waste and what is Zero Waste?

Human beings have created a society with rural, urban and industrial sectors, which create waste. The term 'waste' derives from the Latin *uastus*, meaning to ravage, to leave desolate, or to fail to husband or culture (Pongrácz, 2003: 22).

Waste is defined as:

> *an undesirable or superfluous by-product, emission, residue or remainder of any process or activity, which has been discarded by any person; accumulated or stored by any person for the purpose of eventually discarding it with or without prior treatment (Department of Water Affairs and Forestry, 1998).*

It may be gaseous, liquid or solid or any combination thereof and may originate from a residential, commercial or industrial area. Many items can be considered waste, for example, household rubbish, sewage sludge, packaging items, waste from manufacturing activities, garden waste, e-waste, *etc*.

This article is concerned with municipal solid waste (MSW) which is waste collected by, or on behalf of municipalities, originating from households, commerce and trade, small businesses, office buildings and institutions such as schools, hospitals and government buildings. Waste from parks and gardens and street-cleaning are also included. MSW are the most heterogeneous, and are composed of diverse materials with varying physical and chemical characteristics, such as food and other organic wastes, papers, plastics, clothing, leather, metals, glass and miscellaneous other materials (Themelis, Kim & Brady, 2002: 223; Vesiland, Worrell & Reinhart, 2002: 30).

'Zero Waste' is not defined in the Declaration but encompasses waste elimination at source through product design and producer responsibility, and waste reduction strategies further down the supply chain such as cleaner production, product dismantling, recycling, re-use and composting. In addition, these principles create jobs and economic development opportunities. Zero waste is a goal that is both pragmatic and visionary, for guidance so that people can emulate sustainable natural cycles, where all discarded materials are resources for others to use.

2.2 Pre-Polokwane Declaration on Waste

Historically, pollution control focused primarily on impact management and remediation of pollution (Wiechers *et al.*, 2002: 337). Prior to the Polokwane Declaration, two key national policy frameworks were in operation in South Africa. These are the White Paper on Integrated Pollution and Waste Management (IP&WM) and the National Waste Management Strategy (NWMS). The White Paper on IP&WM (Department of Environmental Affairs and Tourism, 2000a) was in response to the challenge to address the problems of environmental degradation. The objective of the policy was to move away from the fragmented and unco-ordinated waste management to integrated waste management. Such an approach extends over the entire waste cycle from cradle to grave and covers prevention, generation, collection, transportation, recycling and re-use, treatment and final disposal, focusing on waste prevention and minimization. The NWMS (Department of Environmental Affairs and Tourism, 2000b) was undertaken to ensure that the White Paper on IP&WM was translated into practice. The overall objective of the NWMS is to reduce the generation and environmental impact of all forms of waste, to ensure that the health of the people and the quality of environmental resources are no longer affected by uncontrolled and unco-ordinated waste management.

3. POLOKWANE DECLARATION REVISITED

3.1 Polokwane declaration on waste management

The Polokwane Declaration (Department of Environmental Affairs

and Tourism, 2001) sets the following goals for tackling waste management:

- "To stabilize waste generation and reduce the waste disposal by 50% by 2012"; and
- "To develop a plan for ZERO WASTE by 2022".

The vision of the Summit was 'to implement a waste management system which contributes to sustainable development and a measurable improvement in the quality of life, by harnessing the energy and commitment of all South Africans for the effective reduction of waste.' To meet this objective, the delegates committed to 'reducing waste generation and disposal by 50% and 25%, respectively by 2012 and develop a plan for zero waste by 2022.'

The Polokwane Declaration text is inconsistent and ambiguous, and the resultant contradictions often lead to confusion and different interpretations. As far as the first goal of the Declaration is concerned, 'to stabilize waste generation' is not qualified by a specified amount, a reasonable interpretation is that 'stabilize' means to stop the growth in waste generation (Ball, Novella, Fiehn, & Tlhoaele, 2005: 34). It is also stated in the Declaration that the Government, Business and the Civil society need to accomplish the 'goal for reduction of waste generation and disposal by 50% and 25% respectively by 2012.' This is not consistent with the first goal and in fact contradictory which prompts Vorster (2006) to ask: *How can waste disposal be reduced by only 25% if waste generation had been cut by 50%? Where is the shortfall going to come from?*" Ball *et al*. (2005: 34) inform us that the contradiction has introduced two new concepts, namely:

- The "reduction of waste generation by 50%", instead of merely stabilizing it, as stated in the Goal.
- The "reduction of … disposal by … 25%, instead of reducing waste disposal by 50% as stated in the Goal.

The second goal is stated clearly: 'to develop a plan for zero waste by 2022'. However, a reference to 'our shared vision for Zero Waste 2022' is ambiguous and open to interpretation according to Ball *et al*. (2005: 35). Vorster (2006) further asks:

> *Do we really need 21 years from 2001 to 2022 to 'develop a plan for zero waste by 2022' or do we hope to actually achieve zero waste (rather than just a plan) by that year?*

If it was the intention of the drafters of the Polokwane Declaration to follow the approach of the European Union (EU) Landfill Directive (Council Directive 99/31/EC of 26 April 1999), they made a mess of it. The EU Landfill Directive (European Council, 1999) sets targets for reduction of biodegradable waste sent to landfills as 75% of the 1995 level by 2010, 50% of the 1995 level by 2013 and 35% of the 1995 level by 2020. One is at a loss as to whether the enthusiastic and patriotic delegates who drafted the Declaration actually had biodegradable waste in mind but in the common enthusiasm forgot to mention it, or whether they had an open mind and the intention was to address the total waste stream. Ball *et al*. (2005: 34) state that addressing the biodegradable waste fraction would have been more practical.

The authors of this article had a telephonic communication with a senior official of the Department of Environmental Affairs and Tourism (DEAT) on 10 March, 2006 on the ambiguity and contradictions contained in the Polokwane Declaration and some of the official's views expressed are summarised below:

- The Declaration has always been misunderstood and misinterpreted by some waste practitioners.
- The Declaration does not literally mean that waste disposal will be reduced by 50%, it is just a goal, or that there would be zero waste by 2022.
- The Declaration must be understood in terms of setting targets for the 5 priority waste streams, namely plastic bags, beverage cans, paper, glass and tyre.
- To ensure the success of the Declaration, a Memorandum of Understanding has been signed with the plastic bag producers and the glass industries, and the department was in the process of also signing a Memorandum of Understanding with stakeholders in the beverage cans, paper, polyethylene (waste) and tyre industries.

The conversation came to an end with the official stating emphatically that the Polokwane Declaration was working.

3.2 Progress made since the Polokwane declaration

During her keynote address at the Wastecon conference held in Somerset West, Cape Town, South Africa, in September 2006, the Deputy Minister of Environmental Affairs and Tourism stated that, *the target for developing a plan for zero waste by 2022 had been revised to 70% reduction target of waste to landfills by 2022*. The efforts of the Government so far to achieve a sustainable environment, which is not harmful to its citizens, are commendable but it appears that more needs to be done in order to achieve the revised targets set in the Polokwane Declaration. Some of the efforts include:

3.2.1 The Case of Plastic Bags

The collection and disposal of plastic bags reached a climax in 2003 as thin non-re-usable plastic carrier bags freely supplied by retail stores littered the streets to such an extent that they earned the nickname, 'National Flower' (Wikinews, 2005). This resulted in the degradation of the environment. To deal with the problem, the Government introduced the Plastic Bags Regulation under Section 24d of the Environment Conservation Act (Act 73 of 1989) (South Africa, 1989), which came into effect on 9 May, 2003. This legislation requires manufacturers to produce thicker plastic bags which must have a minimum thickness of 30 microns and last longer, among other requirements. The legislation also seeks to encourage the re-use of plastic bags, reduce litter, raise public awareness on environmental issues and encourage recycling as thicker bags make recycling more economically viable (Gosling, 2003: 1).

According to Nhamo (2004: 659), three months after the enforcement of the Plastic Bag Regulation, there was 80%-90% reduction in plastic bags going directly to the consumer and a year later the figures dropped slightly to an average of 70%. A follow-up by the first author of this article with the waste management bodies of the large metropolitan municipalities shows that the legislation has resulted in a significant reduction (average of 70%) of plastic shopping bags, litter and pollution in the environment. The key indicators being the reduction in the blockage of storm drains and less plastic shopping bags litter on beach fronts and against fences.

3.2.2 National waste bill

There is currently no legislation explicitly requiring Waste Minimisation measures as part of day-to-day waste management. However, a variety of national

acts and policy documents govern the management of waste. That is about to change. As from November 2006, the Department of Environmental Affairs and Tourism has published a National Waste Management Bill for general comment. The Bill is expected to enforce generators to manage their waste according to the hierarchy of waste management (avoid, minimise, re-use, recycle, treat and lastly dispose) in a sustainable way and plans for the implementation of legislation at the local level are currently being discussed (EnviroServ Waste Management Ltd, no date).

3.2.3 New waste agreements

In a speech on 'Targeting Zero Waste', Van Schalkwyk (2005) informs us that, in order to address the targets agreed upon in the Polokwane Declaration, targets have to be set to reduce the five priority waste streams (plastics, cans, paper, glass and tyres) that reach the landfill by 70% by 2022, and also have in place plans to minimise and treat the remaining 30%. This is South Africa's Zero Waste goal according to Van Schalkwyk (2005), in addition to a number of other national initiatives. Among the initiatives are the agreements that have been signed and the ones that are pending on the priority waste streams, as was mentioned to the authors of this article in a telephonic conversation with a DEAT official.

3.2.4 The annual cleanest town competition awards

The award which took off in 2002 was launched by the Department of Environmental Affairs and Tourism at the National Waste Summit in Polokwane in 2001. The scale and scope of the campaign has grown, with a focus not only on physical conditions such as waste disposal facilities and social services, but also on programmes and projects such as greening initiatives, waste management practices, education programmes and community mobilisation (Van Schalkwyk, 2005). As part of the implementation of the NWMS, the campaign plays an important role in raising awareness and promoting good and responsible waste management practices at the local level (Van Schalkwyk, 2005), and awards points for visual cleanliness levels and access to services, and progress towards the eradication of the bucket system (Coetzee, 2007).

A prize of R 1 million is awarded to the metropolitan city that wins the competition which is utilized for development-related programmes and projects to sustain cleanliness in communities.

3.3 City of Johannesburg and the Polokwane Declaration

Johannesburg has a population of 3.2 million people, living in 1 million households, in an area of 1620 square kilometres, making the average population density 1975 persons per square kilometre (City of Johannesburg, 2006: 13; City of Johannesburg, 2005: 28). Johannesburg's expanding economy and rapid urbanization has given rise to rapid population growth exacerbated by the influx of jobseekers, often seeking shelter in informal settlements (Integrated Regional Information Networks, 2006). This has resulted in the city facing a mammoth task of managing an increase in the volume of garbage generated. The waste generated per person per day is approximately 1.6 kilograms. The population is growing at the rate of 4.1% each year and is set to double within the next 18.2 years (City of Johannesburg, 2005: 28).

As of September 2006, the COJ had four operational landfill sites, a number of illegal waste disposal sites, especially in the townships, and an incinerator for health-care waste. The four landfill sites cannot cope with the volume of wastes generated and the city is faced with declining airspace capacity for solid waste disposal. The Johannesburg Metropolitan Area is surrounded by densely populated areas which makes it difficult or almost impossible to find new landfill sites in the vicinity that do not conflict with residential development. The opposition from the surrounding communities on the siting of new landfill sites near their dwellings compounds the problem.

Table 1 shows the quantity of waste disposed to landfills for the July 2001/June 2002 and July 2005/June 2006 financial years. The data show no significant (< 0.1%) decline in the waste sent to the landfills. It appears therefore that the adoption of the Polokwane goal, that is, the reduction of waste going to landfill by 50%, or even stabilising it by 2012, remains optimistic but non-achievable based on current practices.

From the current waste disposal quantities, a prediction was made (Table 2) (Kwezi V3 Engineers) for the waste generation figures for the coming years. A population growth rate of 4.1% per annum was used and was based on assumptions made for population growth rates obtained from the planning division of the City of Johannesburg. The data show an increasing waste generation trend.

From the waste composition data developed by Ball & Associates (2001: 11) and the study conducted by Kwezi

Table 1: Waste Disposed of at the Various Landfill Sites

Robinson Deep		*Linbro Park		Goudkoppies		Marie Louise		Ennerdale	
Tons/Year		Tons/Year		Tons/Year		Tons/Year		Tons/Year	
2001/2002	2005/2006	2001/2002	2005/2006	2001/2002	2005/2006	2001/2002	2005/2006	2001/2002	2005/2006
425 696	355 526	316 941	267 533	287 685	244 081	362 754	503 599	75 711	96 723
Total Waste Disposed to Landfills for 2001/2002 = 1 468 787 tons/annum									
Total Waste Disposed to Landfill for 2005/2006 = 1 467 462 tons/annum									

* Closed down Sept. 2006 after reaching the end of its lifespan.
Source: (Ball, 2003: 55; Naidoo & Associates, Jan Palm Consulting Engineers & Envirosense, 2007: 16)

Table 2 – Projected waste generation rates (Kwezi V3 Engineers)

Total waste generated (1000 Ton/Year)					
2006	2008	2010	2012	2017	2022
1 395	1 512	1 639	1 776	2 170	2 654

V3 Engineers & DSM Environmental (2004: 3), the yearly average estimates for Johannesburg's waste stream was as follows: paper (18.05%), plastics (10.26%), glass (4.15%), metal (3.00%), garden waste (19.40%), textiles (2.84%), putrescibles (13.37%), fines/residues (13.37%), and others (4.97%).

The COJ waste management company, Pikitup, has established a composting plant to direct green waste into compost from landfills, a move that needs to be encouraged by all local Governments. If the waste stream reaching the landfills can be reduced by approximately 20% *via* this route, we are on the way towards the first goal set by the Polokwane Declaration. Pikitup also provides drop-off centres for recycled material in Johannesburg. Currently only 13% of Johannesburg's waste is recycled (Naidoo & Associates *et al.*, 2007: 2). This is a good start, but it is far from reaching the Polokwane targets.

According to Wiechers *et al.* (2002: 338), the economic cost of attaining the goals set in the Declaration has not been calculated, but it is expected to be significant. In addition, the social and environmental costs of not achieving the goals have equally not been calculated. Expensive technologies such as thermal, mechanical or mechanical-biological methods available in more advanced countries for dealing with solid waste, are unaffordable and generally not considered appropriate for developing countries such as South Africa.

If the revised set targets are to be met, the following actions might be necessary:

- The input of significant resources at the various levels of Government, the private sector and from the public.
- Commitment, support and input from international funding agencies.
- Availability of financial resources to develop the essential human skills at national, provincial and local Government levels.
- Incentives for waste minimisation and recycling as well as penalties and fines will have to be introduced.
- Public education and environmental awareness need to be intensified to stamp out the throw-away culture of the manufacturer and consumers.
- Markets for recyclable material need to be established.

4. IS ZERO WASTE TECHNICALLY POSSIBLE – THE GERMAN SCENARIO?

Germany is recognised as a front runner in the field of waste management and is among the most regulated industries in Europe. The German government instituted a comprehensive national framework to promote recycling. This framework includes high national recycling targets for municipal waste, extended producer responsibility (EPR) policies on used packaging, a deposit system for beverage containers, and requirements for the commercial sector to source-separate recyclables. For years, there has been a trend towards waste avoidance and resource recovery. An examination of some of the successful solid waste reduction and management practices in Germany may provide a helpful road map to achieving the goals set out in the revised Polokwane Declaration.

When Germany adopted its Ordinance on the Avoidance of Packaging Waste in 1991 due to landfill space crisis, it shifted the costs of collecting, sorting and recycling used packaging from municipal government to private industry. It was a first-in-the-world revolutionary policy that sent shock waves around the world. At the time packaging waste accounted for approximately a third (by weight) and a half (by volume) of the landfilled waste (Schnurer, 2002). The packaging industry is responsible for ensuring that government-specified recycling rates are met. Recycling targets are 60% for aluminium, plastics and composites, 70% for paper and cardboard, 70% for steel and 75% for glass (Barlaz & Loughlin, 2005: 32). Retailers and packaging companies are required to accept and recycle used packaging from consumers. Alternatively companies can contract with a third party to collect packaging from households and ensure that government-specified recycling targets are met. Packaging was recycled at a rate of roughly 50% in 1991 and increased to over 85% by 2000 (Barlaz & Loughlin, 2005: 33).

As a result of the adoption of the Waste Storage Ordinance, the land filling of untreated waste in Germany was outlawed from 1 June, 2005. The new law states that waste must be treated in such a way that it cannot degrade further or release pollutants following land filling (Germany New Waste Law Comes into Force, 2005: 16). All the waste entering the landfills will have to be treated using thermal (waste incineration), mechanical or mechanical-biological methods. This means biodegradable organic waste components must be removed or mineralized and soluble pollutants such as heavy metals have to be eliminated or fixed in such a way that they do not leak into the environment. Waste-to-energy plants have been constructed for residual waste in order to minimise the requirement for landfill.

By 2020 Germany hopes to have completely phased out the land filling of municipal wastes. The plan is that all waste will by then be pre-treated and recycled for materials or energy in such a way that practically nothing remains to be land filled. Zero waste is an emerging trend and an inspiring way of dealing with the intractable problem of waste, although an idealistic, if not impossible concept. However, going by Germany's current efforts in dealing with its waste issues, it may surpass the goals set in the revised Polokwane Declaration by the year 2020.

5. CONCLUSIONS AND RECOMMENDATIONS

According to the data presented in Table 1, the set targets in the revised Polokwane Declaration are still a long way off. The Polokwane Declaration has good intentions but is best regarded as a political statement of intent, meant to focus the efforts of the stakeholders that drafted the policy document, in order to make a paradigm shift from their current positions with respect to waste management. The Declaration appears ambitious when viewed against increased public consumption, corporate packaging and advertising.

According to Hayes (2006: 40), industry insiders do not consider zero waste to landfill by 2022 as realistic, even though it is always good to have a target. For this to happen, or even get close to it, the public has to collectively change its mindset to the way waste is treated, which calls for waste to become wealth, refuse to become resource and trash to become cash.

In order to move towards the stated goals of the Polokwane Declaration, alternative waste management options need to be found and regulated to

ensure that the environment is not compromised. The three R's – reduction, re-use and recycle - must be adopted, as was the case in other countries and regions (for example in the EU). This approach is capable of diverting waste away from the landfills.

The strategy of waste reduction, which is synonymous with waste prevention, provides the largest gains because no material or energy is required to make that which does not need to be produced. According to Vesiland, Worrell & Reinhart (2002: 10), waste reduction can be achieved in three basic ways, namely adopting efficient manufacturing methods in order to reduce the amount of material used per product (hence generating less waste) without sacrificing the utility of that product, increasing the life-time of a product, and/or eliminating the need for the product.

Re-using an object and material, either for its original purpose or for a similar purpose, without significantly altering its physical form, prevents objects and materials from becoming waste.

Recycling practices help to reduce the amount of waste that requires disposal by landfill, thereby conserving scarce landfill space and reducing the need for new landfills and combustors. If materials such as metals, paper, glass and plastics are recovered from solid waste, they become sources of valuable raw materials to industry, thereby reducing foreign importation, while excess production could be exported.

Households must also begin to understand their contributions to the waste stream and take steps, such as the sorting of waste at source and disposal to the correct facilities, designed to handle that material. Residents also need to take responsibility for the environment they live, play and work in.

Information programmes to raise awareness of the environmental and economic benefits of moving up the waste management hierarchy are integral to meeting the objectives of zero waste (Wiechers *et al*, 2003: 341). Gemede (cited by Wiechers *et al*, 2003: 341) informs us that programmes proposed by DEAT include formal and informal education programmes, data collection and reporting, labelling requirements for products that indicate recycled content and recycling instructions, and public recognition of innovative product design. Unfortunately, all these have been tried previously and unless specific action plans are put in place, the attainment of all these may not be feasible.

When the National Waste Bill is passed into law, it must translate into delivery on the ground. There must be enforcement and monitoring to ensure that the objectives of the NWMS and Polokwane Declaration are met within a reasonable time frame.

To get the country moving towards the goals set in the revised Polokwane Declaration will require well-implemented waste elimination, recycling and composting systems based on source separation and sustainable implementation programmes on the part of all stakeholders.

ACKNOWLEDGEMENTS

This article is based on partial work undertaken towards a doctorate study by the principal author. We would like to thank Tshwane University of Technology, City of Johannesburg and Pikitup (Johannesburg) (Pty) Ltd for their assistance in various ways.

REFERENCES

BALL, J. & ASSOCIATES. 2001. A Waste Stream Analysis of the General Waste Stream. Danced Environmental Capacity Building Project, Report 1A. Johannesburg.

BALL, J. & ASSOCIATES. 2003. Status Quo Report on the Current Waste Generation and Management in the City of Johannesburg. Final Draft Report 1. April: 1-104.

BALL, J., NOVELLA, P., FIEHN, H., & TLHOAELE, J.B.A. 2005. The Future of Landfill in South Africa. [Online]. Available from: <http://www.geosynthetica.net/tech_docs/landfill2005/ballnovella.pdf> [Accessed: 22/3/2007].

BARLAZ, M.A. & LOUGHLIN, D.H. 2005. Recycling Worldwide: Politics to Strengthen Markets for Recyclables. *Waste Management World,* 6(4), pp. 31-40, July-August.

CITY OF JOHANNESBURG. 2005. Integrated Development Plan for the City of Johannesburg. [Online] Available from: <http://www. joburg-archive.co.za/city_vision/idp2004/ch2.pdf>, pp. 1 - 37. [Accessed: 8/2/2006].

CITY OF JOHANNESBURG. 2006. Integrated Development Plan for the City of Johannesburg. [Online] Available from: <http://www.joburg.org.za>, pp. 13 -19. [Accessed: 7/2/2006].

COETZEE, B. 2007. Cape Town Cleans Up With National Award. [Online] Available from: <http://www.capetown.gov.za>. [Accessed: 20/11/2007].

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM (DEAT). 2000a. White Paper on Integrated Pollution and Waste Management for South Africa: A Policy on Pollution Prevention, Waste Minimization, Impact Management and Remediation. Government Gazette, 417(20978) of 17th March 2000. Pretoria: Government Printer.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM (DEAT). 2000b. National Waste Management Strategy. Pretoria: Department of Environmental Affairs and Tourism.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM (DEAT). 2001. Polokwane Declaration on Waste Management 2001. First National Waste Management Summit held in Polokwane, Northern Province, South Africa on 26-28 September, 2001. [Online]. Available from: <http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declare.htm> [Accessed: 23/12/2005].

DEPARTMENT OF WATER AFFAIRS AND FORESTRY. (DWAF). 1998. Volume 1. *Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste*. 2nd ed. Cape Town: CTP Book Printers.

ENVIROSERV WASTE MANAGEMENT COMPANY LTD. S.a (no date). Introduction to Waste Legislation. [Online] Available from: <http://www.enviroserv.co.za/pages/Content.asp?SectionID=735> [Accessed: 19/3/2007].

EUROPEAN COUNCIL. 1999. Council Directive 1999/31/EC of 26 April on the Landfill of Waste.

GERMANY – New Waste Law Comes Into Force. 2005. *Waste Management World*, 6(4), p. 16, July-August.

GOSLING, M. 2003. Plastic Ban Means You Pay For Shop Packets. *The Cape Times*, p.1, 08 April.

HARRIS, D. 2005. Rehabilitation and Development of Landfill Sites. In: Supplement to Résource Magazine. Johannesburg: Pioneers in Waste since 1886. South Africa: Shorten Publications, pp. 21-25, August.

HAYES, R. 2006. Life After Linbro. *Urban Green File*, 11(3), pp. 36-41, August.

KWEZI V3 ENGINEERS. S.a (no date). Strategic Road Map for Pikitup.

KWEZI V3 ENGINEERS AND DSM ENVIRONMENTAL. 2004. Pikitup Johannesburg Material Reclamation Study, March.

INTEGRATED Regional Information Networks (IRIN). 2006. South Africa: Hope for Residents of Informal Settlements. [Online]. Available from: <http://www.irinnews.org/print.asp?ReportID=42783>. [Accessed: 8/3/2006].

MILLLARD, A. 2002. Waste Management. International Market Research. [Online]. Available from: <http://strategis.ic.gc.ca/epic/internet/inimr-ri.nsf/en/gr111865e.html>. [Accessed: 10/2/2006].

NAIDOO, P.D & ASSOCIATES, JAN PALM CONSULTING ENGINEERS, C.C & ENVIROSENSE, C.C. 2007. Report to Pikitup Johannesburg on Development of Strategic Road Map Phase 2. Volume 1, March.

NHAMO, G. 2004. Plastic Waste in South Africa: The Environment-Industry Interface. *Proceedings of the Biennial Congress of the Institute of Waste Management of Southern Africa* held at Sun City, South Africa on 11th-15th October, 2004. pp. 653-661. Johannesburg: Document Transformation Technologies cc. [CD - ROM].

PONGRÁCZ, E. 2003. Sustainable Waste Management: A Matter of Definition? *Waste Management World*, 4(4), pp. 21-27, July-August.

SCHNURER, H. 2002. Waste Management Policy in Germany (A Historical Survey). [Online]. Available from: <http://www.bmu.de/english/waste_management/doc/3433.php>. [Accessed: 22/11/2005].

SOUTH AFRICA. 1989. *Environment Conservation Act, Act No. 73 of 1989*. Pretoria: Government Printer.

TAIWO, O.E & VORSTER, K. 2006. Waste Reduction Strategies in Johannesburg Metropolitan Area and Some Major Cities. *Proceedings of the Biennial Conference of the Institute of Waste Management of Southern Africa*, held in Somerset West, Cape Town on September 5th –September 8th, 2006. Johannesburg: Shorten Publications (Pty) Ltd. [CD-ROM].

THEMELIS, N.J; KIM, H.Y. & BRADY, M.K. 2002. Energy Recovery from New York City Municipal Solid Wastes. *Waste Management and Research*, 20(3), pp. 223-233, June.

VAN SCHALKWYK, M. 2005. Statement of the Minister of Environmental Affairs and Tourism at the Annual Cleanest Town Competition Awards in Pretoria, November 17, 2005. [Online]. Available from: <http://www.deat.gov.za/NewsMedia/Speeches/2005Nov17/17112005.htm>. [Accessed: 20/3/2007].

VESILIND, P.A., WORRELL, W.A. & REINHART, D.R. 2002. *Solid Waste Engineering*. U.S.A: Brooks/Cole Inc. pp. 1-4.

VORSTER, K. 2006. Waste Reduction by Composting. *Proceedings of the Biennial Conference of the Institute of Waste Management of Southern Africa*, held in Somerset West, Cape Town on September 5th-September 8th, 2006. Johannesburg: Shorten Publications (Pty) Ltd. [CD-ROM].

WIECHERS, H.N.S., BORLAND, J. & MATSABU, M. 2002. Polokwane to Practice. *Proceedings of the Biennial Congress of the Institute of Waste Management of Southern Africa*, held in Durban, South Africa on 30th September-4th October 2002; 1: 325-335. Johannesburg: Shorten Publications (Pty) Ltd. [CD-ROM].

Wikinews. 2005. Report Urges Kenya to ban plastic bags. [Online]. Available from: <http://en.wikinews.org/wiki/Report_urges_Kenya_to_ban_plastic_bags>. [Accessed: 8/2/2006].