POLICY BRIEF 8

Transitioning South Africa to a Green Economy: Opportunities for Green Jobs in the Waste Sector

June 2016

KEY FINDINGS:

The prevention, reuse, recycling and recovery of waste can create considerable social, economic and environmental opportunities for South Africa. Recovering secondary resources from our waste streams and reintroducing them back into a local manufacturing economy has the potential to create jobs and improve livelihoods – more so than the disposal of waste to landfill, which remains the dominant means of waste management in South Africa. While the collection and sorting of mainline recyclables such as paper and packaging, waste electrical and electronic equipment (WEEE) and waste tyres, provides immediate opportunities for low-skilled job creation, opportunities exist across the waste hierarchy and across waste streams, including, amongst others, organic waste, construction and demolition waste, and the bulky waste streams such as mining and power-generation waste. At the Green Fund / ITC-ILO course on "*Green jobs in the South African waste sector*" representatives of the public and private sector identified four key policy recommendations necessary to strengthen job creation and enterprise development in the waste sector – The need to (i) enhance governmental capacity; (ii) identify environmentally sound and job-rich solutions to integrated waste management through policy interventions; (iii) unleash the potential for SME and co-operative creation; and (iv) integrate the informal sector into the waste economy. It is now, more than ever, essential for government to create a safe, stable and conducive environment for business to grow and prosper. It is only through private sector growth that the social and economic opportunities of waste prevention and secondary resources recovery can be fully realised. The promotion of decent work, and the integration of the informal sector into the South African waste economy, must be seen as a priority for the sector.

INTRODUCTION

This policy brief highlights the opportunities for green jobs in the waste sector, as South Africa transitions to a Green Economy. The contents and policy recommendations are intended to reflect the learning outcomes of the Green Fund / ITC-ILO course on "*Green jobs in the waste sector: Employment and skills needs in a greener economy*" held on the June 29 - July 3, 2015. The brief forms part of the Green Fund's Green Economy Policy Brief Series - to advance a Green Economy in South Africa.

CONTEXT

South Africa is part of a global economy and therefore influenced by advancements in global paradigms with respect to integrated waste management, secondary resources management and more recently, a circular economy. The following section explores these global trends and provides insight into the South African waste sector in terms of the policy framework, waste characterisation, value chain, and the challenges and opportunities facing the local waste sector, with a focus on job creation and decent work promotion.

Global trends in the waste sector

A review of global trends in waste management shows that the waste sector is currently undergoing a major global paradigm shift from one of end-of-pipe treatment of "waste" to that of a circular economy, recognising that waste is a valuable "secondary resource" that can be recovered and reintroduced back into the economy (DST, 2014). The environmental, social and economic benefits of waste minimisation and diversion away from landfill towards value-adding opportunities, has gained increasing local and global attention. This shift is being driven by a range of development issues such as population growth and urbanisation; growing consumerism; increasing quantities and complexity of waste; climate change; carbon economics; resource scarcity; commodity prices; energy access; food security; globalisation; unemployment; and tightening regulation. As a consequence, the strategic importance of the sector is spelt out across several Sustainable Development Goals (explicitly in Goals 2, 3, 11 and 12; indirectly in Goals 1, 8 and 9; and linked to the preservation of natural resources in Goals 6, 14 and 15).

The trend analysis shows that there are *economic opportunities*, with potential for substantial job creation, by considering waste as a secondary resource, particularly in waste streams such as organic waste (e.g. industrial and agricultural biomass, municipal organic waste, food waste and sewage sludge); mainline recyclables (e.g. metals, plastic, paper, glass, WEEE, tyres), and large municipal and industrial waste streams (e.g. construction and demolition waste, mining and power generation wastes).

Globally, it is estimated that 4 million workers are employed in the formal waste sector through management and recycling activities. In addition, approximately 15-20 million people

work as informal waste pickers, with the large majority in developing countries (ILO, 2012). The adoption of a life-cycle approach to waste management could bring about another 9-25 million new jobs and contribute up to a 15% reduction in global GHG emissions (UNEP, 2015). Sustainable waste management is also increasingly regarded as an opportunity to promote social inclusion and upgrade the quality of existing jobs.

Opportunity regions, or new waste markets, have been identified, with the fastest growth in waste management markets expected in the emerging markets, most notably China, India and Latin America. South Africa is identified as one of five emerging markets with "exciting opportunities" in the waste sector. (BofAML, 2013).

However, waste management is now part of a global economy, which has both positive and negative impacts on a local waste sector, including increasing exports (loss) of secondary resources. The growing demand for resources globally is driving flows of recyclables to countries with market opportunities (demand), and unless local markets are stimulated, secondary resources will increasingly flow out of South Africa to international markets. However, growing local markets, and managing investment and technology risks, is dependent upon increased access to recyclables (quantity and quality).

While the intention, internationally, is to move waste up the hierarchy away from landfilling, it is evident from the trend analysis that there are multiple approaches or solutions to achieving integrated waste management in a country, including different technology portfolios, and different combinations of materials and energy recovery, depending on the local environment. This is particularly relevant for developing countries, as they often face numerous challenges with regards to the adoption (and sustainable implementation) of inbound technologies, including amongst others, access to funding, availability of local skills, and a supportive policy environment. Labour-intensive options are typically preferred in developing countries where governments' see the "waste hierarchy approach" as an opportunity to address high unemployment rates. The implementation of alternative waste treatment technologies must be done in a way that ensures compatibility with job creation targets.

Overview of the South African waste sector

Policy framework

The result of this paradigm shift from 'waste' to 'secondary resource', requires a *"change in the governance of waste from protection to re-use*" (Oelofse & Godfrey, 2008:245). South Africa has adopted a largely conservative, protection-based legal definition of waste which is often seen as an obstacle to waste recycling and recovery, as opposed to a more supportive "resource-based" definition. Furthermore, South Africa has seen considerable waste policy development over the past five years, since the promulgation of the National Environmental Management: Waste Act (RSA, 2009) and the National Waste Management Strategy (NWMS) (DEA, 2011). While the Waste Sector Survey (DST, 2013) has shown that a supportive policy framework has the potential to stimulate sector development, growth and innovation, if over-regulated it can hinder or slow innovation. The goal for South Africa must therefore be to find a balance between 'encouraging' and 'controlling' within a waste policy framework.

Waste characterisation

The national Waste Baseline study shows that South Africa generated ±108.5 mT of waste in 2011, of which 97.8 mT (90.2%) was disposed of to landfill (DEA, 2012). Approximately 59.4 mT is general waste, 47.8 mT considered "unclassified" waste, and the remaining 1.3 mT hazardous waste. Only 9.8% of all waste generated in South Africa in 2011 was recycled. However, a considerable portion of the general waste generated in South Africa (>65%) has the potential to be diverted from landfill into recycling or recovery (**Fig 1**).

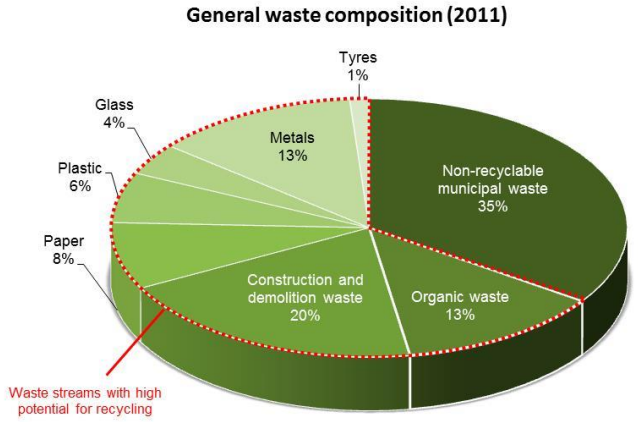

Figure 1: The waste composition for general waste, 2011 (percentage by mass)

Waste Technology

With only 9.8% of waste being diverted from landfill (as at 2011), the dominant technology for South Africa, remains landfilling, often to open and uncontrolled dumpsites. The past 2-3 years has seen the introduction of some alternative waste treatment technologies, including mechanical and biological treatment, however widespread adoption of technologies remains limited. As such, large volumes of potentially recyclable materials are currently being lost to the economy and with it, new jobs.

Value of the waste and recycling sector

The minimum financial value of the formal South African waste sector (public and private) was estimated at R15.3 billion, or 0.51% of GDP (at 2012). At least R8.3 billion of this was Treasury funding to municipalities to deliver municipal waste management services. The majority of the revenue is situated within large enterprises (88.0% of private sector revenue) and metropolitan municipalities (80.4% of public sector revenue). It was also found that 62.0% of the total revenue generated from waste activities in 2012, was done so by companies that had been in the industry for more than 25 years (DST, 2013).

Research undertaken by the CSIR for the Department of Science and Technology, showed that the 9.8% recycling achieved in 2011 unlocked R8.2 billion worth of resources

into the South African economy. However, at least R17.0 billion worth of secondary resources were lost to the economy in 2011 through disposal to landfill. Recovering 100% of the thirteen identified waste streams with high recycling potential, could unlock R25.2 billion worth of resources, per annum, into the local economy, which otherwise would have been lost to landfill. Furthermore, considering the resource value of recovered materials, plus the avoided costs of disposal and the avoided social and environmental costs associated with landfilling, these figures increase significantly to R10.5 billion/annum and R46.5 billion/annum respectively. However, unlocking this resource value in a way that creates maximum local benefit for South Africa's economy, requires a viable local manufacturing sector.

Jobs in the waste and recycling sector

The Waste Sector Survey showed that the formal South African waste sector employs nearly 30,000 (as at 2012), 20,092 in the public sector (mostly local and metropolitan municipalities) and 9741 in the private sector (DST, 2013). The majority of employees within the waste sector are located within large enterprises (77.5% of private waste sector employees) and metropolitan municipalities (64.9% of public sector employees). Waste-related employment within municipalities appears to have levelled-off over the past few years at around ±20,000 persons. The public sector could absorb another ±5000 employees, if current vacant positions in municipalities were filled. However, if South Africa is to achieve Goal 3 of the NWMS, to meaningfully grow the contribution of the waste sector to the green economy, by creating 69,000 new jobs and 2600 additional SMEs and cooperatives participating in waste service delivery and recycling by 2016 (DEA, 2011), government must look towards the private waste sector for growth and employment opportunities.

Maia *et al.* (2011) acknowledge the role that the waste sector can play in growing the green economy, particularly in the areas of emissions and pollution mitigation (recycling), and energy generation (low and high temperature waste-to-energy). Maia *et al.* (2011) suggest that waste-to-energy could generate 55,014 net direct job opportunities (employment potential) in the long-term, and recycling 15,918 job opportunities.

The informal sector

A recent study by the Department of Environmental Affairs estimates that there are ± 62,147 waste pickers in the country (36,680 operating from landfills and 25,467 operating as trolley pushers) (DEA, 2016). This is in line with the Waste Sector Survey (DST, 2013) which noted that while no accurate data exists, the informal sector is estimated to be two to three times the size of formal sector, with an estimated 60,000-90,000 people earning a livelihood from the collection and sorting of recyclables, mostly from paper and packaging waste.

According to PackagingSA (2015), 52.6% of the 3.39 million tonnes of packaging consumed in South Africa in 2014 was recycled. However, an estimated 82.2% (weighted average) of the paper and packaging waste recycled in 2014, was collected by the informal sector (Godfrey *et. al.*, 2016a). The informal

sector was therefore responsible for diverting ±1.47 million tonnes of packaging waste (43.2%) from landfill in 2014, making them a valuable component of the local waste and recycling value chain.

A key question facing South Africa at present, is how to integrate the informal sector into the local waste and secondary resources economy, in light of the opportunities that exist and the need to create new and decent jobs, and the impending extended producer responsibility schemes for paper and packaging, WEEE, and lighting (Godfrey *et al*, 2016).

PROBLEM STATEMENT

South Africa, like many developing countries, is facing the reality of jobless growth, and is in need of growing its economy to support the creation of new employment opportunities (Lowitt, 2007). Statistics South Africa's first quarter 2016 Labour Force Survey, showed that South Africa experienced an unemployment rate of 26.7%, or 36.3% if the expanded unemployment definition is used. This is the highest rate since the Labour Force Survey began in 2008 (StatsSA, 2016). The Labour Force Survey also showed that up to 52.9% of the unemployed had less than a high school (Grade 12) qualification (StatsSA, 2016). The country therefore faces a reality of large numbers of uneducated, unskilled and unemployed citizens.

South Africa's employment challenge is therefore two-fold –

- creating large numbers of low-skilled jobs for the currently unemployed, while at the same time
- growing the economy to create new job opportunities for both an unskilled and skilled workforce.

The waste sector provides the opportunity to achieve both, by offering immediate low-skilled jobs and income opportunities in labour intensive open-spaces cleaning, waste collection, and sorting of recyclables. It also provides opportunities to establish new enterprises through the recovery of valuable secondary resources, thereby creating new job opportunities and supporting the development of a regional secondary resources economy and the strengthening of a local downstream manufacturing economy.

Challenges

However, the current low recycling and recovery rates in South Africa, suggest that obstacles to the diversion of waste away from landfill exist. The South African waste sector identified the following constraints towards alternative waste treatment – the economics of waste management (including financing); legislation (including what some consider to be over-regulation); behaviour/perception with regards to waste as resource; lack of reliable waste information; lack of infrastructure; lack of appropriate skills; and institutional arrangements (DST, 2012).

Further issues which have arisen, which are considered to hinder the sector's ability to harness the opportunities provided through waste diversion, include –

- The lack of full-cost recovery by municipalities, resulting in the under-pricing of landfilling, which makes alternative waste treatment more expensive, relative to landfilling. This could be corrected, by (i) enforcing minimum requirements for landfilling, thereby increasing the cost of landfill construction and operation; (ii) ensuring that municipalities include the full operational and capital costs of landfilling in their gate fees, including future costs; (iii) introducing a landfill tax to artificially inflate landfill gate fees; (iv) providing economic incentives to alternative treatment options to reduce their cost relative to landfilling.
- Lack of willingness by municipalities to do anything other than dispose of waste to landfill (business-as-usual), often disposing of waste to poorly designed, operated and managed dump sites, which are not compliant with national legislation.
- Lack of commitment by government to partner with the private sector to implement alternative waste treatment technologies. This could be achieved through a variety of public-private partnership models that manage the risk for both municipalities and private companies, and fast-track the installation of often expensive technologies.
- A lack of public awareness regarding the benefits of diverting waste from landfill, resulting in the bulk of recyclable waste still being disposed of to landfill.
- A lack of source separation and kerbside collection of recyclables, resulting in the majority of recyclables being sent to landfill, resulting in lower recovery rates and higher contamination of recyclables. Fortunately, for the recycling sector, pickers on landfill recover a significant percentage of recyclables, however, this should be seen as a short-term solution that must be phased out in favour of kerbside collection.

> "*South Africa will never achieve the full potential of a recycling or secondary resources economy, if municipalities don't get the basics of waste management right.*" (Godfrey, 2016b).

Opportunities

Moving waste up the hierarchy away from landfilling towards prevention, reuse, recycling and recovery provides considerable social, economic and environmental opportunities for a country, including opportunities for job creation and enterprise development. Opportunities include -

- Access to valuable resources (circular economy)
- Social benefits (e.g. jobs, livelihoods)
- Off-setting natural resource use
- Reducing the environmental and social impacts of waste, such as greenhouse gas emissions
- Direct savings for businesses

METHODOLOGY

The following section explores the research questions –

- Can South Africa create new jobs in the waste sector?
- Where in the value chain should these jobs be created?
- What types of jobs can be created?

The authors present the key findings of a research project, conducted by the CSIR for the Green Fund on "*Co-operatives as a developmental vehicle to support job creation and SME*

development in the waste sector." (Godfrey, *et. al.*, 2015). The research, conducted during 2014-2015 involved in-depth engagement, through semi-structured interviews, with 30 co-operatives and 18 stakeholder organisations, located across South Africa.

RESULTS

Opportunities for green jobs?

Opportunities for job creation exist in moving waste away from landfilling towards alternative waste treatment, with opportunities across the entire waste hierarchy.

As noted by the Minister of Environmental Affairs in her 2015/2016 budget vote speech, "*The waste sector continues to be a source of job creation co-benefits*" and "*reducing, recovering or minimising waste provides opportunities for socio-economic development; new jobs and businesses; maximising resource recovery for downstream manufacturing growth and reducing reliance on declining natural resources*."

Considering that recycling and recovery rates remain low for South Africa, the waste sector still provides considerable opportunity for new green jobs. Immediate opportunities for job creation exist in open-spaces cleaning (e.g. clearing of illegal dumping sites, street cleaning and sweeping, litter picking), waste collection, and sorting of recyclables. These are all labour intensive activities that require low skills and offer low barriers to entry, and are already being recognised by the South African government through the development of public employment programmes in the sector. The opportunity also exists for South Africa to create comparatively more jobs in the waste sector than developed countries, given the lower minimum wage, high demand for jobs, and supportive policy environment.

This does not mean that the South African waste sector must choose between labour intensive approaches and technology, in fact, quite the opposite. Introducing technology into the sector creates the opportunity to recover more material for downstream manufacturing. For example, owners and operators of material recovery facilities (MRFs) argue that manual, labour intensive sorting systems must be used in order to create jobs. However, results show that significant quantities of recyclable material continue to escape these MRFs, either due to poor visual sorting and material identification, or due to cherry-picking of high-value materials. Introducing technology such as optical sorters, magnets, or eddy current separators, in combination with manual labour, allows facilities to recover greater quantities of valuable secondary resources to be fed into a downstream recycling and manufacturing economy, thereby creating greater numbers of jobs over the entire value chain as opposed to only in collection and sorting.

In addition to opportunities for direct job creation in the waste sector, waste diversion from landfill also provides opportunities to create indirect and induced jobs, through the businesses that supply the sector, and through the ability of workers in direct and indirect jobs to spend their earnings on goods and services. There has been no research undertaken in South Africa to quantify the indirect and induced jobs that could be created in a local waste economy. However, based on international data, and given South Africa's current labour intensive approach to manufacturing, the multiplier effect for South Africa may be higher than developed countries, some suggesting as high as 2-3 times the number of direct jobs.

Where in the value chain?

In addition to immediate opportunities in cleansing, collection and recycling, opportunities for job creation exist along the entire value chain, from waste prevention (cleaner production), through to advanced end-use markets in materials and energy recovery. In order to create sustainable jobs, it is important to strengthen activities along the entire value chain from increased recovery at source through to downstream manufacturing to ensure that both the supply and demand of secondary resources are maintained (**Fig 2**).

Jobs versus livelihoods

The South African government has adopted a strong "formalisation" strategy for the waste sector, focussed on moving informal pickers into co-operatives and SMEs. However, current data suggests that this approach is creating limited long-term, sustainable "jobs". This raises numerous questions with regards to the types of "jobs" that the waste sector can produce, and whether we should in fact be aiming to produce traditional "jobs" with associated benefits, or to support informal collectors, as 'value-chain entrepreneurs', in improving their "livelihoods" through greater access to material, improved working conditions, and better prices. This discussion is particularly relevant to the integration of the informal sector into the waste economy, and the issues of formalisation, integration and professionalization.

Co-operatives as a developmental mechanism

Co-operatives and SMEs have the potential to create significant 'income opportunities' across the value chain, with Government having set the goal of 2600 additional SMEs and cooperatives participating in waste service delivery and recycling by 2016. Co-operatives are a developmental vehicle with strong government and policy support in South Africa. But, with a mortality rate of 91.8% (the dti, 2012), research shows that creating sustainable waste and recycling co-operatives requires long-term support (incubation) and investment by external stakeholders (public and private) due to the low skill level of co-operative members. The findings of

the Green Fund research project (Godfrey *et al*., 2015) shows that co-operatives face numerous challenges specifically relating to the lack of infrastructure (premises, equipment, transport); operational challenges (administration, financial, governance); and weak capability (knowledge and skills). Co-operatives remain vulnerable and weak, despite the low barriers to entry and the significant opportunities that exist in diverting waste away from landfill. It therefore remains questionable as to whether co-operatives are currently creating sustainable jobs

Support to co-operatives is typically needed in (i) access to materials (whether through integration with municipal solid waste management systems, or with material organisations responsible for the management of the waste), (ii) access to markets (linking co-operatives with markets for all materials collected), (iii) business development (ongoing mentorship on the business of running a co-operative).

Skills for the waste sector

Moving waste away from landfilling towards alternative waste treatment will require new skills, including upskilling and reskilling. The Environmental Sector Skills Plan notes that "*Environmental skills planning in South Africa is currently ad hoc, fragmented, and re-active, and is characterised by inefficiency*" (DEA, 2010:5). Furthermore, "*the Waste Management Act requires a re-skilling of all waste practitioners in the country to adopt a 'cradle to cradle approach' to waste management*" (DEA, 2010:12). The Skills Plan identified numerous scarce skills in relation to waste and resources management, cutting across all four categories – High skills (Management); High skills (Specialist Professionals); Intermediate Skills; and Elementary occupation skills. With the sector having been slow to take up alternative technologies, the response to skills development has also been slow. However, the sector is responding to address these skills gaps through various training programmes, and at various National Qualifications Framework (NQF) levels.

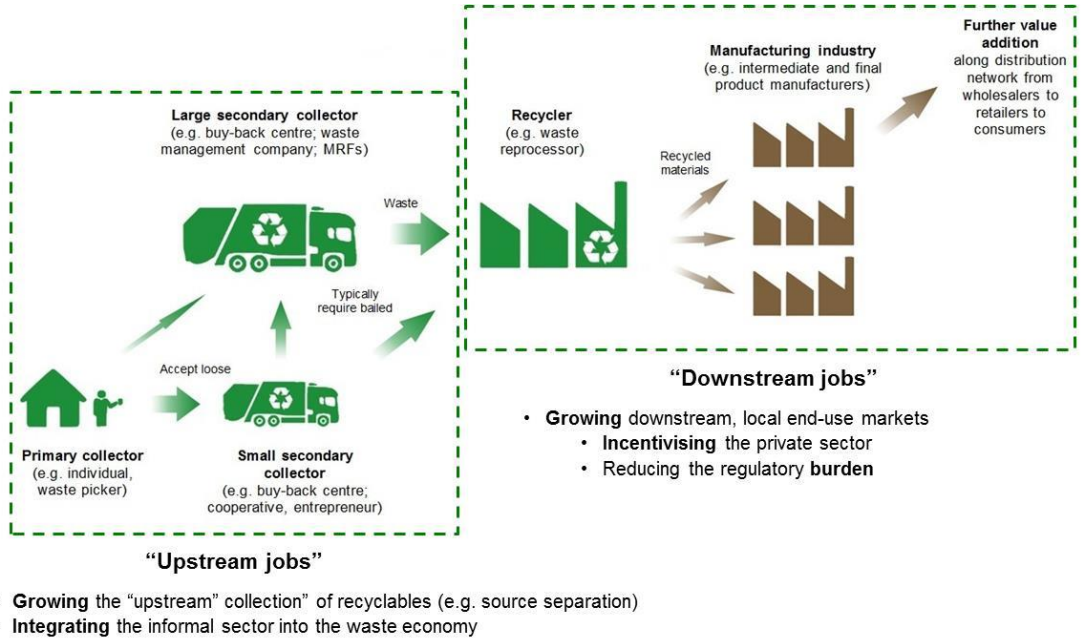

Figure 2. Opportunities for job creation across the entire waste and recycling value chain

CONCLUSIONS / POLICY IMPLICATIONS

The South African waste sector has the potential to generate value-added opportunities that create jobs and improve quality of employment, through the implementation of waste prevention, reuse, recycling and recovery. While the waste hierarchy has been embedded in national policy since the White Paper on Integrated Pollution and Waste Management (RSA, 2000), it is now, more than ever, essential for government to create a safe, stable and conducive environment for waste prevention, reuse, recycling and recovery businesses, to grow and prosper. It is only through private sector growth that the social and economic opportunities of waste prevention and secondary resources recovery can be fully realised, including opportunities for job creation, improved livelihoods and integration of the informal sector.

The following key policy recommendations emerged from the Green Fund / ITC-ILO course on Green jobs in the South African waste sector.

1. Enhancing governmental capacity:
    - The waste sector is highly regulated in South Africa. While continuing to enact legislation, government needs to strengthen capacities at local and provincial level to allow municipalities to take ownership of the NWMS and integrate it into local strategies. Lack of communication, coordination and planning, excessive red-tape, unfunded mandates, and a general knowledge gap, continue to hamper local level implementation of waste management systems.
    - Local government capacity gaps need to be addressed, by e.g. up-skilling staff in municipalities

and setting a minimum skills benchmark for waste management officers;

- While prioritising "waste as a service", government should expand collaboration with the private sector to improve delivery and create space for business opportunities in "waste as resource";
- A lead-by-example attitude should be promoted through the integration of waste management and recycling as part of public procurement practices, the effective and transparent use of waste levies (e.g. plastic levy) and resources allocations to encourage city-cleansing actions.

2. Identifying environmentally sound and job-rich solutions to integrated waste management through policy interventions that:
   - Support the greening of enterprises to reduce commercial and industrial waste generation and create new job opportunities through e.g. cleaner production, or design-for-environment;
   - Challenge the assumptions around technology barriers and provide space for eco-innovation to find labour-intensive affordable solutions, e.g. in the repair or dismantling of WEEE, or the installation of worm farms for organic waste treatment;
   - Prioritise the waste economy as a labour-absorbing sector that has an important role to play in addressing unemployment. Short-term solutions should be focused on employment intensive approaches for solid waste management while investing in e.g. skills development, and research and innovation, to stimulate the growth of a secondary resources industry in the long run;
   - Adopt a careful approach to high temperature waste-to-energy technologies (e.g. incineration, pyrolysis, gasification), as the contribution of waste to electricity is often small compared to the cost of the technology and the trade-off with job creation. The most favourable opportunities for waste-to-energy, particularly in developing countries, are in organic waste and in residual municipal solid waste, ensuring a strong commitment by the public and private sector to maximising early stage recycling;
   - Support local enterprise development in waste reuse, recycling and recovery through, for example economic incentive programmes, that recover value from waste streams. These interventions are needed particularly when the recycling economy competes with the price and availability of raw materials.
   - Establish incentive-based strategies that contribute to changing consumerism patterns and invest in sustainable consumption and production, e.g. "pay-as-you-throw", "extended producer responsibility".

3. Unleashing the potential for SME and co-operative creation:
   - Although private sector plays a key role in moving waste up the hierarchy, three critical factors are preventing businesses growing in the waste sector – the lack of adequate infrastructure and transport systems; the lack of financial support and start-up incentives (linked to excessive regulation), and a general skills gap (ranging from managerial, to specialist, intermediate and elementary).
   - While providing an alternative business model, co-operatives have yet to prove their viability in South Africa. If provided with the right space, organised voice, and business management skills, they could grow from collection to buy-back, sorting and waste reprocessing centres;
   - A major investment is needed in skills development, at all levels of education, for the South Africa labour force to be absorbed by the sector. Career guidance initiatives should contribute to generate a culture of waste entrepreneurship and a mind shift at school level about considering waste and secondary resources management as a career option;
   - As part of a broader decent work agenda, the social inclusion and dialogue deficits should be addressed in South Africa. Business leaders, workers and civil society organisations should play an active role in shaping the greening of the South African economy and ensuring a just transition for women and men into a sector that offers income opportunities, but still shows great deficiencies in terms of decent work conditions.

4. Integrating the informal sector into the waste economy:
    - Recognising the work of waste pickers is crucial for municipalities to achieve zero-waste to landfill cities;
    - There are good examples to learn from, proving that it is possible to upscale working conditions, but without a government-led systemic change, informal workers will remain on the periphery;
    - The role of private sector, co-operatives, NGOs and civil society associations is crucial to give small and informal businesses a voice and negotiating power.

By mainstreaming labour standards and improving working conditions, there are important gains to be achieved in terms of decency of jobs both in the formal and informal waste and secondary resources sector, as demonstrated by successful experiences promoted by private sector, government, NGOs and material organisations in South Africa.

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REFERENCES

DEA (2010). Environmental Sector Skills Plan for South Africa. DEA: Pretoria.

DEA (2011). National Waste Management Strategy. DEA: Pretoria.

DEA (2016). Report on the determination of the extent and role of waste picking in South Africa. DEA: Pretoria.

DST (2012). Current and required institutional mechanisms to support waste innovation. DST: Pretoria

DST (2013). South African Waste Sector – 2012. An analysis of the formal private and public waste sector in South Africa. DST: Pretoria

DST (2014). A National Waste RDI Roadmap for South Africa. Trends in waste management. DST: Pretoria

DTI (2009). Proposed roadmap for the recycling industry: A recycling industry body with relevant working Groups.

DTI (2012). Integrated Strategy on the Development and Promotion of Co-operatives. Promoting an Integrated Co-operative Sector in South Africa, 2012 – 2022.

Godfrey, L., Muswema, A., Strydom, W., Mamafa, T. and Mapako, M. (2015). Evaluation of co-operatives as a developmental vehicle to support job creation and SME development in the waste sector. Technical report: Case Studies. CSIR: Pretoria.

Godfrey, L., Strydom, W. and Phukubye, R. (2016a). Integrating the informal sector into the South Africa waste and recycling economy in the context of Extended Producer Responsibility. CSIR Briefing Note, February 2016.

Godfrey, L. (2016b). Opportunities in the Waste Sector. The Green Economy as a driver of sustainable development and job creation. Mpumalanga Green Economy Roundtable Discussion, 26 August 2016.

ILO (2012). Working towards sustainable development: opportunities for decent work and social inclusion in a green economy. International Labour Office: Geneva.

Lowitt, S. (2007). The employment creation potential of recycling in South Africa. Human Sciences Research Council: Pretoria.

Maia, *et al.* (2011): Green jobs: An estimate of the direct employment potential of a greening South African economy. IDC, DBSA, Trade and Industrial Policy Strategies.

Oelofse, S & Godfrey, L (2008). Defining waste in South Africa: Moving beyond the age of 'waste'. SAJS, 104(7):242-246.

PackagingSA (2015). 2015 Recycling Assessment Report. Prepared by BMI Research, 01 September 2015.

RSA (2009). National Environmental Management: Waste Act, No. 59 of 2008. Gov Gazette 32000, 10 March 2009.

StatsSA (2013). Quarterly Labour Force Survey - Quarter 4, 2012. Statistical release P0211.

StatsSA (2016). Quarterly Labour Force Survey - Quarter 1, 2016. Statistical release P0211.

UNEP (2015). Global Waste Management Outlook. UNEP: Nairobi.

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