

Expert mission on integrated solid waste management (ISWM) to Dar es Salaam

MAT16TZ01

Report of findings - November 2016





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List of Abbreviations

C&D Waste	Construction and Demolition waste
CBO	Community Based Organization
DCC	Dar es Salaam City Council
DLAs	Dar es Salaam (five) Local Authorities or districts
DSM	Dar es Salaam
EfW	Energy from Waste
EIA	Environmental Impact Assessment
EPR	Extended Producer Responsibility
ISWM	Integrated Solid Waste Management
MRFs	Material Recycling Facilities
MWMA	Metropolitan Waste Management Authority
NEMC	National Environmental Management Council
ODA	Overseas Development Assistance
PORALG	President’s Office for Regional Administration and Local Government
SMEC	Snowy Mountains Engineering Corporation (Australian consultancy that carried out a 2013 diagnosis of ISWM in DSM)
SWM	Solid Waste Management
TZS	Tanzanian Shilling (exchange rate 270916: 1 EUR = 2,401 TZS)

Summary

September 5-9, 2016 a group of three Dutch experts on integrated solid waste management (ISWM) visited Dar es Salaam in Tanzania to assess the situation regarding waste management and explore opportunities for cooperation and business. They worked together with the Royal Dutch Embassy in Tanzania.

Dar es Salaam is a major city in East Africa with a population of 4.2 million in 2015 and a population growth of 3% to 4% annually. The 2012 waste production of the city's households, offices, shops and industries was an estimated 4,100 tons/day. Currently only 1,000 tons/day reaches the city's Pugu waste dump. The remainder is either not collected, burnt or dumped illegally. The city's waste production is growing at an estimated 10% per year. Urgent action is required.

Improving the SWM situation in Dar es Salaam will not be easy:

- Environmental awareness among the population is generally low
- There is no National Waste Management Plan
- Waste collection services and waste fee collection are feeble
- The Pugu waste dump is in a deplorable state, and
- Cooperation between the different levels of government leaves much to be desired.

... but there are promising signs:

- The bad situation creates a sense of urgency
- Dar es Salaam has the size for a cost-efficient waste management system, and
- Average waste fees may not have to be raised much to maintain a sustainable waste management infrastructure.

A number of quick wins may help to create momentum and motivation:

- The establishment of waste transfer stations will lower costs
- Source separation of organic waste will open the door to composting which in turn will generate fertilizer for Dar es Salaam's poor soils
- A sizable portion of the waste could be turned into RDF to be incinerated in the local cement kilns
- The (national) introduction of Extended Producer Responsibility (EPR) systems will generate financial resources and lower the burden on municipalities.

In 2013 the President's Office for Regional Administration and Local Government (PORALG, with World Bank support) published a SWM improvement strategy for Dar es Salaam in the framework of the Dar es Salaam Metropolitan Development Project (DMDP). The costs of upgrading the SWM system and operating it for a period of 10 years were estimated at US\$ 310 million. This was beyond the available resources and solid waste management was therefore not included as a focus of the DMDP project.

As an outcome of the current assessment, the Dutch Expert Team proposes to set in motion a modest version of the PORALG strategy:

- Development of a National Waste Management Plan
- Upgrading the Pugu dump to a sanitary landfill
- Development of a full cost recovery waste fee system
- Improvement of waste logistics incl. transfer station(s)
- Development of a pilot EPR scheme; and

- Setting up a Metropolitan Public Authority with DCC and the five districts as shareholders

The Netherlands is willing to support these goals through a series of available instruments, provided the project receives full (organizational and financial) backing of the Tanzanian authorities. Cooperation will also be sought with other bilateral and multilateral organizations.

For the moment, opportunities for the Dutch private sector are limited to SWM improvement services in ODA projects and maybe in waste logistics (trucks and containers). In the medium and long term, opportunities are expected to arise in recycling and the infrastructure to support EPR systems.

1. Introduction

This is a report on a 5-9 September 2016 experts mission on Integrated Solid Waste Management (ISWM) in Dar es Salaam, Tanzania. Team members included Mr. Herman Huisman of Rijkswaterstaat Leefomgeving, Mr. Hans Breukelman of BreAd BV and Mr. Bert Keesman of MetaSus. The goal was to assess the situation regarding waste management in Dar es Salaam and to explore opportunities for future public and private sector cooperation and business in ISWM between the Netherlands and Dar es Salaam. To facilitate the latter, an ISWM workshop was held on September 8 with a broad participation of some 25 representatives of the public and private sector in waste management in Tanzania. For a list of contacts the reader is referred to Annex 1.

This report is not meant as a comprehensive overview of the waste situation in Dar es Salaam. For this, the reader is kindly referred to the 2013 report: “Consultancy services for improvement of solid waste management in Dar es Salaam Local Authorities in support of preparation of the proposed DMDP” by the Snowy Mountains Engineering Corporation. Nor does the report pretend to have scientific value. Rather, it is a working document which will serve as a basis to draft a cooperation strategy between Dar es Salaam and the Netherlands on ISWM.



FIGURE 1. “KEEP THE CITY CLEAN” – ROADSIDE AWARENESS BUILDING IN DAR ES SALAAM

2. Current ISWM situation in Tanzania

2.1 Waste production and expected growth

In 1988 Dar es Salaam (DSM) housed a population of 1.4 million. 27 Years of rapid growth resulted in 4.2 million inhabitants in 2015. The city is expected to reach 6.2 million by 2025. Extrapolations show that by 2030 Dar es Salaam will be the 5th largest in Africa¹. Other sources (e.g. DSM's housing and population census 2012) quote a population of 4.36 million in 2012 and expect the city to reach 5.9 million by 2022. On average a population growth of 3%–4% per year seems to be a generally accepted minimum figure.

There are a number of studies on DSM's waste production in the last 25 years. For 2012 it was estimated that the city's inhabitants, offices, shops, institutions and industries produced a daily 4,100 tons². The most recent report of 2014 mentions a daily waste production of 0.815 kg/capita³. Models predict an annual growth in the city's waste production of 3%. This growth rate cannot be correct as this would imply an unprecedented net reduction of per capita waste production of 1% per year.

In general waste production is firmly related to GDP and in fact both show equal growth rates. Up to now only highly developed countries with dedicated waste management regulations and systems are able to decouple growth in GDP and waste production. Over the last years Tanzania has shown an annual growth in real GDP of 7% with most of this growth taking place in DSM⁴. Taking into account Tanzania's development status, DSM's economic and industrial importance and the fact that the country's rural economy is lagging behind in this national GDP growth, it is safe to assume that Dar es Salaam will show an annual waste growth of close to or even over 10% rather than the 3% mentioned above. The figure below shows a prediction of the combined effect of growth of population and wealth on DSM's daily waste production.

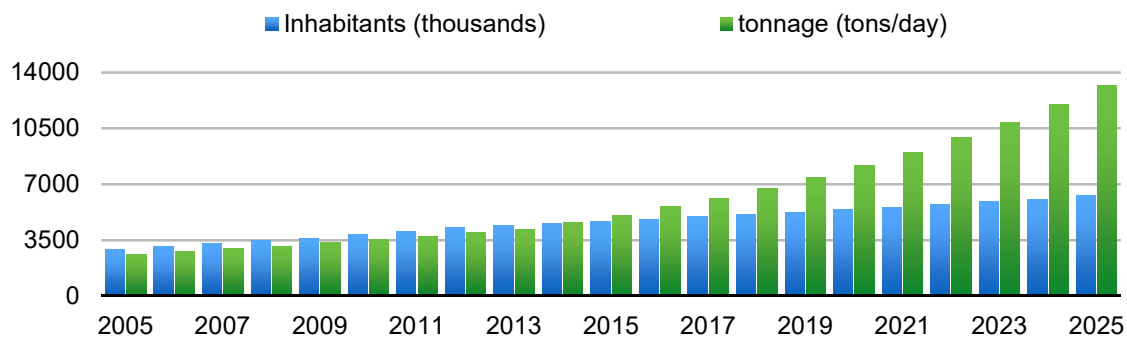


FIGURE 2. EXPECTED GROWTH IN WASTE PRODUCTION OF DAR ES SALAAM UNTIL 2025

The above analysis leads to the following estimates:

- A daily production of 5,600 tons per day this year (2016)

¹ Source: African Development Bank

² Report by the Australian Snowy Mountains Engineering Corporation (SMEC), Sep 2013

³ Dar es Salaam Region, Socio Economic Profile, 2014. Prime Minister's Office for Regional Administration and Local Government

⁴ Financial Times, July 13th, 2016

- A doubling of the tonnage between 2016 and 2023, i.e. in seven years
- A tripling of the tonnage between 2016 and 2028, i.e. in 12 years from now

2.2 Waste composition

The most recent study on Dar es Salaam's household waste composition dates back to 2004. The study concluded that 80% of the waste can be categorized as municipal waste originating from:

- Households 75%
- Institutions 0,5%
- Markets 3,5 %
- Street sweeping 0,5%
- Other sources 0,5%

The other 20% is produced by the private sector (industry and commerce). This distribution may still be valid now in 2016. If so, it would mean that every person in DSM currently produces a daily average of 0.9 kg/day of household waste.

Based on the physical contents of DSM's waste, the same 2004 study provides the following composition:

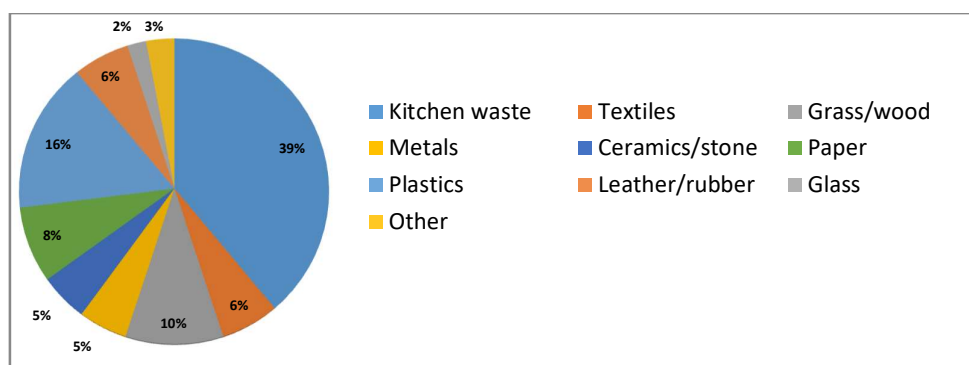


FIGURE 3. COMPOSITION OF DSM'S MUNICIPAL WASTE (2004)

This composition is pretty similar to that in most other developing countries, generally showing organic contents of 50%-65%. When thinking about composting, kitchen waste, grass/wood, and even paper and inert components like sand/ceramics are of interest. The maximum potential for post-collection composting activities is estimated at around 60%.

None of the studies determined the heating value of the waste but it is estimated to be as low as 7 to 9 MJ/kg with moisture contents of between 30% to 40% depending on the time of year. With these figures, the heating value is at the lower end of what could be considered suitable for preparation of Refuse Derived Fuel (RDF).



Waste collection truck in Dar es Salaam



Mini waste collection point



Roadside awareness building



Backyard waste dump



Roadside metal scrap workshop



Recyclables at collection point



Windrow composting



Food stalls on the Pugu waste dump

FIGURE 4. IMAGES OF THE WASTE MANAGEMENT SITUATION IN DAR ES SALAAM

2.3 Current collection and treatment systems

2.3.1. Collection systems

A reliable municipal solid waste collection and transportation system is a cornerstone for good quality waste management services. The responsibilities for city cleaning, waste collection and treatment are distributed between the DCC (Dar es Salaam City Council) and the three districts (DSM's Local Authorities or DLAs), as described in Chapter 3. In general it can be stated that the districts are responsible for city cleaning, waste collection and fee collection at the households and the markets. DCC is responsible for providing an adequate treatment infrastructure.

Dar es Salaam is subdivided into three separate districts as shown in the map below.



FIGURE 5. MAP OF DAR ES SALAAM

The central district is Ilala. It houses the city's business center on the Oceanside, more to the west the airport and, further west, the Pugu Kinyamwezi dumpsite. The northern district is called Kinondoni. Measured by population this is the largest of the three. To the east lies Temeke, the largest district by acreage and home to the Dar es Salaam seaport.

By the end of January 2016 President John Magufuli decided to split up Kinondoni and Temeke and create two additional districts called Ubungu and Kigamboni. At the time of this study the implementation of this change was still under way. This is why a breakdown of waste related figures was not yet available for the five districts. The figures presented in this report therefore refer to the previous situation with three districts. As an example, some waste related characteristics are presented in the Table below.

District	Inhabitants (million)	Surface area (km ²)	Population density (inh/km ²)	# persons per household	# wards	# streets	% below poverty line	% collected 2012
Kinondoni	1.98	501	3,728	4.0	34	180	14%	41%
Ilala	1.36	208	6,476	4.1	26	101	16%	39%
Temeke	1.53	684	2,332	3.9	30	171	29%	27%
Total or average	4.87	1,393	3,486	4.0	90	452	22%	36%
Remarks	Number of inhabitants extrapolated from 2012's census to 2016 Data on households, wards and streets from "Dar es Salaam region socio-economic profile, 2014" issued by the Prime Minister's Office for Regional Administration and Local Government.							

TABLE 1. WASTE RELATED CHARACTERISTICS OF DSM'S DISTRICTS

The population density of the three districts is high with Ilala showing the highest number. This is good news when it comes to setting up and improving a cost efficient waste collection system. The districts show a good primary road system reaching all individual wards. But when it comes to the internal structure of the almost 100 formal wards, the many informal wards and the outskirts of the districts, the roads tend to get narrower and many of them are not paved. This infrastructure is found in most African cities and necessitates a mixed system of both (i) door-to-door collection by compaction trucks; and (ii) a combination of collection by handcarts, collection points and (container)trucks clearing these points.

According to the 2013 SMEC report only some 39% of the households were serviced with waste collection. The 2014 report of the Prime Ministers' Office on DSM's socio-economic profile claims that the city has "managed" 59% of its waste in that year. This figure suggests a firm improvement in only two years, which is considered very doubtful. In fact, our meetings and workshop in September yielded several estimates that the Pugu dumpsite is receiving no more than 1,000 tons/day on average, representing no more than 20% of all generated waste. It may be the case that informal collection of recyclables already reaches considerable volumes adding to the formal collection, but its contribution will not be more than 5%. The other explanation may be that collection services indeed reach 40% to 60% of the households but that a large part of this volume is dumped and littered at illegal sites scattered around the city.

In any case it seems safe to assume that approximately 3,000 tons of waste per day is buried, burned and/or left somewhere in DSM's streets, open spaces, canals, sewers and shores, thus contributing to health problems for local residents, flooding and methane emissions.

In Dar es Salaam, there are three categories of actors in waste collection. The first category is the local districts or DLAs. The second one is collection by community based organizations (CBO's) and the last one is collection carried out by private companies.

Each of the three districts is divided into 20 to 30 formal wards. Adding to this are a number of informal wards and sub-wards. In many cases, the wards are charged with the task to set up community based collection or contracting private collectors. During the mission, it became clear that neighborhood waste collection systems are established and operated based on local preference and past experience. "One size fits all" does not apply to the Dar es Salaam waste collection system. In more affluent, planned areas of the city, waste is generally collected at curb-side from households, commercial establishments, institutions and industry by either the DLAs or the private sector and taken directly to the Pugu dump. In planned and unplanned areas of the city where the population is less affluent and the roads more congested, waste is picked up by handcart for delivery to neighborhood collection points or taken directly to these locations by households. The DLAs or the private sector subsequently pick up the accumulated waste from the neighborhood collection sites for transportation to the Pugu landfill.

It was estimated by the DLAs that there are upwards of 50 to 60 of these neighborhood collection sites across the city. They range from skips to large open areas where waste is dumped resulting in wind-blown litter, open burning and the potential for disease vectors. Many of these points are emptied on a regular or irregular basis by the DLAs or by contracted private companies. A substantial number however seems to have a more or less permanent dumpsite character. The sites are also in use for informal waste recovery operations where CBOs and informal enterprises recover materials for recycling.

In unplanned areas of the city where wards or CBOs have not taken the initiative to collect waste or in areas of the city where collection service is poor, individuals commonly dump their waste into drainage ditches, streams and by the roadside.



FIGURE 6. SOME ILLEGAL COLLECTION POINTS

Industry and commercial establishments are responsible for managing their own solid waste using private sector collection contractors. The DLAs are responsible for collecting wastes from markets and public institutions such as schools and hospitals. It is also common for the DLAs to contract directly with the private sector to deliver services to these institutions on the DLA's behalf.

The capacity of the districts to carry out waste collection themselves is limited. This holds for both the physical capacity and the knowledge and experience. This is not a desirable situation as the relevant departments:

- are not able to deploy collection teams when needed,
- are more or less at the mercy of third parties ...
- without the knowledge to contract, control and award these parties.

A healthy situation would require the districts to carry out at least 30%-40% of all municipal collection services themselves, with third parties taking care of the remainder and offering their services to companies, institutions etc.

The most important private collectors in Dar es Salaam are presented in the table below (random order).

Company	# employ-ees	# trucks	Active in	Active since	Remarks
Green WastePro	350	17	Ilala	2012	<ul style="list-style-type: none"> • Mostly Chinese trucks, newly bought • Interested in recycling (tires, oily waste) • Interested in starting up transfer site and taking over dumpsite operations • Expanding to other cities • Trying to expand to Zanzibar
Tirima	> 100	7	Ilala	2012	<ul style="list-style-type: none"> • European trucks, newly bought (Iveco) • Interested in recycling (composting) • Interested in taking over dumpsite operations • Claims to have won Zanzibar contract
More4Less	20	8	Kinondoni and Temeke	2012	<ul style="list-style-type: none"> • Dutch/Tanzanian shareholders (Fa. Driessen) • European trucks, bought secondhand from Dutch company Cleanmat • Interested in recycling (composting) • Interested in taking over dumpsite operations • Claims to have 100% alternative for landfill
The Recycler	?	?	Private companies	2014	<ul style="list-style-type: none"> • Focus on large industrial, retail and institutional clients • Separate collection at client's sites and recycling • Number of collection points for separate collection • Initiative on maggot based recycling of organics

TABLE 2. OVERVIEW OF PRIVATE COLLECTORS (RANDOM ORDER)

Most companies started their operations four years ago. They tend to be run by enthusiastic managers, committed to their business, willing to improve operations and eager to expand. Experience and access to capital seem to be the most important bottlenecks for further growth. Representatives of the first three companies participated in the workshop that was organized during the mission.

Where CBOs and private collectors do door-to-door collection, they also have to collect the waste fees. These only cover the cost of collection. Monthly fees for households range from 5,000 to 15,000 TZS in Ilala (€ 2-6), 5,000 to 30,000 TZS in Kinondoni and 2,000 to 10,000 TZS in Temeke ⁵. The fees range as a

⁵ 1 EUR is approx. 2.400 TZS

direct function of affluence and serve to subsidize less affluent and unplanned areas. Fees are collected by special revenue collectors working on behalf of the waste collectors. Fees are not paid by the wards or CBOs to the DLAs if they provide trucking to Pugu. It is unclear whether wards have the authority to enter into contracts with the private sector. Wards tend only to enter into one year contracts, because of a lack of trust between the wards and private sector service providers. From the private sector's perspective, the companies are not able to raise capital easily when contracts are not binding and where these contracts are of insufficient length to write-off equipment costs over the length of the contract.

Due to the lack of willingness to pay (also in the richer parts of the city) fee-collection results are in between 40% to 90% of the households resulting in legal court procedures.

When it comes to door-to-door collection the following costs can be calculated, based on the information provided by the collectors.

Cost factor	#	Salary per employee (Tzs/month)	costs
Driver	1	300,000	300,000
Assistant	1	200,000	200,000
Loaders	5	150,000	750,000
Salaries total (Tzs/month)			1,250,000
Salaries total (€/day)			23
Depreciation, maintenance, insurance, interest of vehicles (€/day)			250
Diesel (€/day)	based on 6 ltrs/hr, 10hrs/day, €1 per ltr		60
Total costs (€/day)			333
Costs per ton (€/ton)	based on 15 tons/truck, 2 trips per day		11
Costs per household (€/month)	based on 4 members/household with 0.8 kg/person per day		1.06

TABLE 3. ESTIMATED BREAKDOWN OF WASTE COLLECTION COSTS IN DAR ES SALAAM

The average cost of waste collection per household is estimated at around € 1.10 per month which is consistent with costs in other African cities. Factors influencing this figure are:

- Collection in wealthy wards will be more expensive because the number of households to be serviced in one hour is lower and the amount of waste per address will be higher
- Collection in densely populated areas will be cheaper because collection trucks may be able to do more than two trips per day
- Collection through collection points cleared by trucks will be cheaper even if they are combined with handcart door-to-door collection
- Combining collection with a system of transfer stations will lower collection costs because multiple daily trips become an option

Looking at the fees currently charged to households for collection services alone, they seem to be at a reasonable level of cost coverage.

2.3.2. Transfer stations

Transfer stations are not yet available in Dar es Salaam. This means that every waste collection truck has to take the waste to the Pugu dumpsite, a round-trip distance of 60 kms in usually heavy traffic. Collection trucks (especially compactor trucks) are expensive, have lower capacities, are operated by 6-7 staff and are not fit for maneuvering on badly managed dumpsites. As stated above one DSM collection truck can complete only two rounds per day.

Adding transfer stations to the collection system would generate substantial improvements:

- Fewer trucks and employees to deploy
- Lower costs of fuel
- Long distance transport and maneuvering on dumpsite with dedicated trucks
- Nocturnal collection routes become an option
- Less (but bigger) vehicles at the landfill preventing traffic congestion
- Space for guarded parking, central maintenance and employee facilities
- Separate collection, separation and composting can be accommodated

In general it can be stated that adding transfer stations to the system will not lead to higher costs if an adequate amount of stations are put in the right locations. An expert's guess of the number needed in Dar es Salaam is three. This guess will only be valid in a situation with adequate and full coverage collection services. Adding transfer stations in a partially absent and malfunctioning system such as the one present at the moment in DSM is not expected to contribute to lower costs and higher services.

2.3.3. Treatment and recycling facilities

There are almost no facilities aiming at separation, reuse and recycling available in Dar es Salaam.

As stated above, an extensive informal sector, busy with scavenging and sorting paper, metal and plastic waste is present throughout the city but its importance is limited to 5%-10% of DSM's total waste production. Prices for sorted out plastics are low due to bad international market circumstances. The sector seems to be dealing with this by keeping its products in storage until prices go up. The role of scavengers could grow if they can find a way to organize their workforce and transform into formal companies.

A handful of composting initiatives were encountered, none of them processing more than 500 tons of waste per year. The initiatives can be characterized as small scale pilots started up with lots of good will and external funding but lacking proper cash flows and experience.

One of the composting projects is called Guavay, located at a former site of Borda, the Bremen Overseas Research and Development Association. The site is located next to a heavily polluted illegal collection point. Windrow composting is carried out indoor. Input materials are accepted from various sources without payment i.e. without receiving a cash-in. The only income is the sale of compost being € 2-4 per bag of 20 liters (based on information provided by the initiators). This selling price seems to be remarkably and unrealistically high as the product holds only little nitrogen, phosphate or potassium. If true it would mean that it could provide for a substantial income, which is not the case at this particular initiative. The whole project operates far below break-even, even without accounting for the costs of site and management.

One of the more substantial composting initiatives is the one by the city of Hamburg in Germany. It is currently in its planning phase. When completed it will provide a daily composting capacity for 50-150 tons of organic market waste a day. It will service two of the six larger markets of the city and will be

located on a five ha site near Bagamoyo in Kinondoni in the north of Dar es Salaam. Construction works will hopefully start by the end of 2016 by Gauff, a Germany based construction company. The project is currently awaiting the necessary permits to start construction.

Some remarks on this industry are depicted in the Table below (partially based on ⁶).

Material	Remarks
Glass	Kioo Ltd is the most important glass industry when it comes to recycling. They offer buyback services for whole bottles and broken glass. Recycling of whole glass bottles already occurs at a large scale in Tanzania. Broken glass recycling is still in its infancy, however, as it requires extensive sorting, washing and drying by the sellers.
Metals	Metal recycling has reached maturity with a number of scrap traders like Tarimo Scrap Metal Dealers, Mutu Hardware and Mpemba Industries. They provide input for steel companies like Trishalla Steel Rolling Mills.
Paper	Tanpack Tissue Ltd is the main paper industry in the region, taking in most of the collected and sorted white paper.
Plastics	Plastics recycling in Tanzania seems to be very difficult because of very stringent requirements regarding the reuse of waste related materials in processing new products.
Cement	The cement industry Twiga in Dar es Salaam is owned by Heidelberg Cement, an international group known for its interest in replacing primary fuels by secondary ones. A visit to the plant and meeting with the plant manager learned that they are considering to play a role in waste management. Twiga has tried to use shredded car tires but the calorific value proved insufficient. At the moment the company is preparing tests to run on plastic waste. Low prices for natural gas were mentioned as the most important hurdle at the moment. Twara in Dangote, some 600 km from DSM, is considered to be Twiga's most important competitor.

TABLE 4. TREATMENT OPTIONS FOR RECYCLABLE COMPONENTS OF DAR ES SALAAM'S WASTE

The company “The Recycler” appears to be the only private company at the moment to have potential with regard to recycling. The company services a growing number of larger industries, hotels and retailers with separate collection of glass, plastics, paper etc. and distributing these components to industries.



FIGURE 7. WASTE SEPARATION FOR RECYCLING AT TANZANIA BREWERIES

⁶ “The potential for decent work in waste management and recycling in Tanzania”, Conference Paper, October 2015. Joshua Palfreman.

Construction and demolition waste seems to be generated in substantial quantities in DSM. It is, however, not considered to be a problem as many stakeholders stated this waste is generally used by the inhabitants for improving dirt roads.

2.3.4. Disposal

The Pugu Kyniamwezi dumpsite is the only formal disposal facility in DSM. A visit to the site lead to the following observations:

- The situation on the landfill site can most accurately be described as disastrous with regard to waste management operations as well as living and working conditions.
- The site is located in the outskirts of Ilala, west of the international airport, and measures 65 has.
- The site has no infrastructure for environmental protection. There is no bottom liner and no catchment system for landfill gas and leachate. The waste is dumped in a thin layer, not exceeding six meters. It is not compacted and not covered. Six pieces of equipment are available (bulldozers, compactors and cranes) but only one is in operation due to lack of maintenance, spare parts and fuel.
- There is almost no physical barrier between the waste and the surrounding settlements. A brick wall fencing is under construction (40%) but works only proceed when money is available. A weighing bridge is available and in operation.
- A pilot landfill cell with drainage and a leachate pond has been constructed, equipped with a very thin plastic bottom liner, unfit for this purpose.
- Waste is all around, inside and outside the site's boundaries. Light plastics are lifted by turbulent winds and transported up to the clouds (and airplanes) through thermals and transported over long distances.
- Waste is floating in surface water, leading to the formation of leachate. These are optimized reproduction conditions for flies and mosquitos.
- The internal roads are accessible in the dry season. Conditions in the rainy seasons will be much worse bringing operations to a halt and leading to reduced capacity.
- Several hundred scavengers are working, eating and living on the site under inhuman conditions.
- The tipping fee is 1,500 Tzs (€0.60) per ton, with all municipal waste being exempted from payment. The average daily tonnage reaching the dump site is said to be 1,000 tons. Assuming 50% of the waste at Pugu is of municipal origin, this leads to an annual turnover of ± €100,000. This is indeed barely enough to cover some salaries and limited expenditures for fuel and repairs.

It is recommended to expand the capacity of the Pugu waste dump within the present limits, to remediate the present disastrous conditions and to improve operations. If done in a proper way, the transformation to a landfill site may extend the “life expectancy” up to 30 years from now.

2.3.5. Hazardous waste

The DSM region has no formal capacity for the disposal of hazardous waste produced by hospitals, industry and agriculture. There is no public registry or monitoring system keeping track of these materials and most of these materials are therefore expected to be disposed of or incinerated in improper ways. Controlling this waste, directing it to the landfill site and treating it in separate cells would be a vast step forward.

2.4 Costs, fees and affordability

2.4.1 Costs: present and future

With 50% of the households in Dar es Salaam being serviced with some kind of waste collection (door-to-door or less) and transport, the overall operating costs of this part of the system are estimated at no more than €5 million per year. Only some 20% of the collected municipal waste reaches the dumpsite. The costs of final disposal of this waste are approximately €50,000 per year. Currently these are fully covered by the tipping fees imposed on industrial waste. All this leads to an overall estimate for present annual costs of the municipal waste management system of € 5 million. Adding to this figure the costs for non-municipal waste would lead to annual costs staying well below € 10 million.

These are of course only the direct costs. Indirect costs for the effects of littering and open burning of thousands of tons of waste per day are not accounted for.

A proper waste management system for municipal waste entailing:

- 100% collection coverage
- optimized transfer and transport systems
- 100% of the waste being processed on a properly engineered and operated Pugu landfill site

... will need investments of approximately € 50 million and would lead to overall costs (capex and opex) of € 25 million per year. Adding to this figure the costs for non-municipal waste would lead to annual costs of no more than € 40 million.

According to these figures one could expect the waste management market of DSM to grow from € 10 million a year at this moment to € 40 million a year by the time proper systems will be introduced.

2.4.2 Waste fees: present and future

Households are charged €2-12 per month in order to cover the costs of waste collection and transport. With the assumption of less than 50% of the population being serviced, with average fees amounting to € 3 per month and with less than 50% of these fees being paid, a total fee income in the present system may be around € 10 million. This turnover is (more than) sufficient to cover the present annual costs estimated above.

To be able to cover the costs of a proper future waste system, a new system for fee collection and management will have to be designed and implemented. It is recommendable to:

- aim at 100% cost coverage of the overall system; no more and no less (full cost recovery system)
- implement this full cost recovery for the entire chain of city cleaning, waste collection, transfer/transport, treatment and disposal, including all organizational and communication costs
- put the responsibility and actual collection of the fees into the hands of the public authorities
- implement obligatory fee payments for all households regardless of whether they make use of the municipal services or not
- combine this obligation (of course) with the implementation of 100% access to collection services and an extensive communication program on the importance of the system and the civil responsibility to join and pay
- consider a system of differentiated fees, taking into account the affordability for lower income households

- combine the fee collection with the existing billing schemes for electricity, practiced by Tanesco, thus providing simpler invoicing, collection and enforcement

Annual overall costs of € 25 million combined with 100% cost coverage would lead to an average monthly fee per household of approximately € 2; equaling the lowest fee rate in the present fee system.

The estimate that an extended, improved and state of the art system of SWM may be payable without having to raise fees may seem counter-intuitive. Taking into consideration that (i) only a small percentage of the population is currently paying, (ii) cash-ins are mainly in the hands of CBO's and private companies, (iii) almost no operations are optimized and (iv) an overall metropolitan management is lacking, this may not be so strange after all.

2.4.3 Affordability

In recent years Dar es Salaam has been able to produce some wealth for its population. This is reflected by the share of 20% of the population living below the poverty line and by the relatively low average of persons per household. A report of Oxford Economics ⁷ states that Dar es Salaam is expected to register the fastest growth in Africa in the number of households in the emerging middle class (US\$ 5,000 - \$20,000 per year in revenue). This is a positive sign when it comes to the affordability of proper waste management systems.

The current per capita annual income of Dar's inhabitants is ± 2,200,000 Tzs (€ 880). With four persons per household this leads to a monthly income per household of almost € 300. Combining average costs with average income yields that DSM's inhabitants have to spend 0.7% of their income on waste management. This is acceptable considering the fact that international standards for developing countries describe 1% as affordable.

Poor households living on one salary of only 150,000 Tzs per month (€ 60, e.g. the loaders of waste collection trucks) have to contribute 3%-4% of their family income which is rather high. For these and poorer households, authorities could introduce waste fees below € 2/month or even exemptions. The fees levied on wealthier households will be able to compensate these reductions if the present fee differentiation is continued.

The overall impression is that the metropolitan area of Dar es Salaam has a solid economy of scale for improving its waste management services without having to raise fees. The suggested strategy for the authorities is: make households pay what they already legally have to pay and provide them with a service they already have a right to.

The way up starts with investments which have to be recuperated with future fee payments. This will lead to a cash flow shortage during the first five years which may reach a low of € 20-30 million. Financing of this cash shortage may not be too difficult if it is part of a solid integrated program including guaranteed fee collection and institutional improvements with regard to organization and governance.

⁷ theafricareport.com : Africa's 15 richest cities in 2030.

3. Policies, laws and regulations

3.1 National and municipal laws, bylaws and responsibilities⁸

The two pieces of official environmental legislation that relate to waste management and recycling in Tanzania are the Environmental Management Act (2004) and the Solid Waste Management Regulations (2009). On paper, both acts portray a legislative framework that if enforced and implemented correctly would lead to an ideal waste management and recycling strategy in Tanzania. In practice, however, the legislation is little more than rhetoric. From the lack of detail on enforcement procedures and penalties to the absence of an implementation strategy (or even the very infrastructure that is referenced in the acts which in reality does not exist), the legislation is wholly inadequate to address Dar es Salaam's waste crisis currently governed by fragmented sector pieces of legislation that are not yet harmonised.

Part IX of the Environmental Management Act does focus on waste management by charging local government with the duty to manage and minimize solid waste at source. Part IX has five main sections: 1) Solid Waste, 2) Litter, 3) Liquid Waste, 4) Gaseous Waste, and 5) Hazardous Waste.

This Part of the Act sets basic standards for the collection of waste including source separation and the use of appropriate waste containers. The Act goes on to assign responsibility for waste management to the local authorities and requires that they must carry out regular studies into the management of wastes including waste quantity and composition to guide the development of appropriate methods for sorting, storage and disposal. The local authorities also have the prime responsibility for managing waste collection in both urban and peri-urban areas and for establishing waste transfer and final disposal facilities. The local authorities must also oversee and ensure that industry appropriately manages all solid waste generated from their activities.

The Dar es Salaam Local Authorities (DLAs) also have oversight for the management of special and hazardous wastes. The Environmental Management Act establishes the National Environmental Management Council (NEMC) as a statutory body to advise and coordinate environmental management issues including evaluating development policies, plans and activities that could have an impact on the environment. They have a responsibility to ensure that waste management proposals and projects meet a reasonable test through Environmental Impact Assessments. From that perspective, PORALG project elements such as the proposed transfer station and the landfill upgrade (as described in the SMEC report) are likely subject to EIA requirements.

Other relevant legislation such as the one dealing with land use planning, the intake of water, forestry, wildlife, local government, land acquisition and public health all have a bearing on the solid waste management system.

At the local level, the DCC is responsible for overall coordination, planning, financing, operation, maintenance, closure and post-closure care at the city landfill and dump sites. The three (recently expanded to five) local districts are responsible for waste collection, finance, fee collection, local waste recovery, recycling and composting as well as waste transportation. It is not clear whether DCC or the

⁸ Partially based on a study by Joshua Palfreman: "Waste Management and Recycling in Dar es Salaam, Tanzania", funded by the University of London and WASTEdar, 2011.

DLAs would have the responsibility for shared infrastructure such as transfer stations, material recovery facilities (MRFs), composting sites or Energy from Waste (EFW) facilities.

As described in chapter 2, there are 26 planned wards, 64 unplanned wards and several hundreds of sub-wards that have been assigned the responsibility for the collection of solid waste and related fee collection. The wards authorize the formation of community-based organizations (CBOs) to establish and operate waste collection systems, neighborhood waste collection sites and to collect fees. In practice, they also enter into contracts with private sector service providers to collect waste directly from households or from the neighborhood collection sites. It is not clear whether they have clear authority to do so. It is a challenge to build reasonable capacity across the many wards and sub-wards for the collection and initial handling of wastes. It is also a challenge for the private sector to be able to establish good working relationships and a shared understanding of appropriate levels of service given the lack of capacity and authority.

As for other types of waste, the responsibilities appear to be scattered among different authorities. As an example, the Ministry of Health is responsible for health care waste, whereas the the Ministry of Public Works is in charge of construction and demolition waste.

3.2 National planning

Currently there is no National Waste Management Plan in Tanzania. According to Mrs. Magdalena Mtenga of the Vice President's Office there has been an attempt to develop such plan, but due to unclear reasons (competence issues between Governmental institutions? Lack of capacity?) this plan hasn't been finalized.

The development of a National Waste Management Plan is considered by the Expert Team as an essential step towards truly sustainable waste management in Tanzania. Apart from defining priorities and assigning responsibilities, such plan would create a stable basis for medium and long term investments in the waste sector. It is not quite clear who should take the initiative to restart the process towards a National Waste Management Plan: the Environmental Department of the Vice President's office, the President's office or the National Environmental Management Council. Tentatively, the Environmental department of the Vice President's office should take the lead in this process.

4. Private sector opportunities

4.1 Waste related private sector in Dar es Salaam

Apart from the waste collection and transport companies mentioned in Table 2, there is not yet a sector of equipment or service suppliers to the waste sector in Tanzania. The Tanzania Association of Environmental Engineers (TAEs, <http://taees.org>) was thought to be an inroad to private companies offering environmental services. A meeting was set up but most members turned out to be non-governmental organizations. For lack of a private sector in environmental technology, it appears that in Tanzania most people with an education in the environmental field end up working in NGO's. Not surprisingly, there is no Association of Environmental Technology Suppliers and no annual trade show in the field.

On the one hand, the fact that in Tanzania the private waste sector is still in its infancy means good news for first movers. Assuming there is a market for their products and services, competition is not a factor. On the other hand, a Dutch waste technology company wishing to start business in Tanzania needs a good local partner, which are hardly available. The search for such partner needs an innovative approach.

Such approach has been followed by the Dutch company Regain (Mr. Ton Driessen), who has teamed up with Dar es Salaam based Mr. Nelson Kihongo and Mr. Abeid Joachim to form the Tanzanian waste company More 4 Less. In 2012 they started to collect PET in Dar es Salaam, first exporting it to Germany and later to Viet Nam. When in 2015 the world market for recycled PET crashed, they decided to import their first (Cleanmat) waste truck and enter the waste collection business in Dar es Salaam. Since then their market share of collection routes in Dar es Salaam is growing (now standing at five garbage trucks and two street sweeping vehicles).

The Table below provides an overview of current business opportunities and an estimation of opportunities that may arise in the medium and long term in Dar es Salaam.

Horizon	Business opportunities
Short term	<ul style="list-style-type: none">• Consultancy assignments related to ODA projects• Waste collection equipment (vehicles, containers etc)• Civil works for construction companies• Waste transfer stations• Trading of recyclables (e.g. PET, spent tires, glass, paper)
Medium term	<ul style="list-style-type: none">• Recycling equipment• Composting installations• Installations to produce RDF to be incinerated in cement kilns• Equipment to treat special waste such as hospital waste and C&D waste
Long term	<ul style="list-style-type: none">• Suppliers of equipment related to EPR systems• Waste administration software

TABLE 5. WASTE RELATED BUSINESS OPPORTUNITIES IN DAR ES SALAAM

4.2 Dutch programs applicable in Tanzania

At this point, opportunities for Dutch waste related companies in Tanzania will oftentimes be related to (policy) advice or otherwise strengthening of the public sector. For such services it is important to know the Dutch set of instruments to promote cooperation and business with Tanzania. The Table below provides an overview.

Instrument	Description
Matchmaking facility	Development of the local private sector by establishing long-term business relationships (investments, trade, transfer of expertise) between local and Dutch companies through tailor-made matchmaking. Tanzanian SMEs with a solid financial base, at least 10 employees, and which are registered for at least 2 years are eligible for participation.
Netherlands Fellowship Programmes	The Netherlands Fellowship Programs (NFP) promote capacity building within organizations by providing fellowships for training and education for professionals. The NFP is initiated and fully funded by the Dutch Ministry of Foreign Affairs from the budget for development cooperation. Tanzania is a priority country, meaning it will receive relatively more fellowships.
PUM Netherlands senior experts	SME's and NGO's in a.o. Tanzania can make temporary use of the experience and skills of a retired Dutch manager or expert. The experts are independent and do their work as volunteers; in other words, they do not receive a fee for their services.
FDW Sustainable Water Fund	Through the Sustainable Water Fund the Netherlands promotes public-private partnerships in the water sector in developing countries such as Tanzania. The goal is to improve water safety and availability. In the current third call waste related projects are welcome in case they contribute to water safety. Typical subsidy amounts per project range from 1 to 4 million euros.
Develop 2 Build / DRIVE	With DRIVE the Netherlands facilitates investments in infrastructural projects that contribute towards a good business climate and entrepreneurship in the area of water, climate, food security and sexual and reproductive health (SRHR). Waste related projects may qualify if they contribute to the goals. Through DRIVE support Dutch companies can come up with a more competitive offer in infrastructural tenders. Develop 2 Build supports preparatory studies towards DRIVE or otherwise funded projects.
DHI Program	The DHI scheme supports Dutch enterprises wishing to invest in or execute a project in emerging markets and in developing countries such as Tanzania. There are three modules: 1/ Demonstration projects: presentation of a technology, capital goods or service in one of the DHI countries; 2/ Feasibility studies: assessment of the profitability of a foreign investment in a product or service; and 3/ Investment preparation studies: assessment of the technical and commercial profitability of an investment in a company in one of the DHI countries.
Private Sector Development (PSD) support	PSD Instruments of the Dutch Embassy in Tanzania consist of several tools which add to local capacity building and simultaneously support Dutch organizations and companies in doing business in Tanzania. These instruments can be used to contribute to local development and to support investments of Dutch companies. Matchmaking, government to government assistance, training of managers and entrepreneurs, trade missions from and to Tanzania, transfer of knowledge between educational or knowledge institutes such as universities are some examples of those initiatives.
Dutch Good Growth Fund	The Dutch Good Growth Fund provides customised finance to Dutch SMEs doing business in developing countries and emerging markets. The DGGF supplements private investments through guarantees and direct financing with a repayment obligation, such as loans and equity investments in projects. It can also provide export credit insurance and export financing.

TABLE 6. DUTCH POLICY INSTRUMENTS APPLICABLE IN TANZANIA⁹

⁹ See also the tab "Subsidies and programmes" on the RVO website (<http://english.rvo.nl/>)

4.3 International programs of banks and organizations

The Table below shows multilateral organizations and some NGO's active in Tanzania, including their activities in integrated solid waste management. These programs can also generate opportunities for Dutch product and service providers.

Institution	Description
World Bank	The World Bank is involved in an urban development program in eight secondary and 18 smaller cities in Tanzania. One of the focus areas is ISWM. Besides, WB is supporting Tanzania in the framework of the Dar es Salaam Metropolitan Development Project. One of the preparatory studies that was undertaken was the 2012 "Consultancy Services for Improvement of SWM in Dar es Salaam [...]" (the so called "SMEC Report"). As a result, it was concluded that upgrading the waste management system would require an investment of US\$ 310 million over a period of 10 yrs (CAPEX US\$ 110 million; OPEX US\$ 20 million/yr) ¹⁰ . This exceeded the funds available so SWM was left out of the program. Besides, for the World Bank to engage in an ISWM program for Dar es Salaam, a requirement would be that a Dar Metropolitan Authority would be created.
African Development Bank	Currently the African Development Bank has no projects in SWM in Tanzania. However, AfDB would be most interested to participate in activities in this area. Projects are always financed through national ministries and the Ministry of Finance. There is no ceiling to funding and the interest rate is 0%.
Climate and Clean Air Coalition (CCAC) / ISWA	ISWA has been working in Tanzania on behalf of the Climate and Clean Air Coalition (CCAC) since 2014. Focus areas include: (1) Community capacity building in waste separation and the payment of waste fees; (2) Establishment of large scale composting facility in Kinondoni (lead by the city of Hamburg); (3) Capacity building on climate financing; and (4) Support to improve waste disposal practices at Pugu dumpsite and the planning of new landfills.
City of Hamburg, Germany	(part of the CCAC/ISWA project) Development of a composting facility in the Kinondoni district for 50-150 tons a day (see also 2.3.3)
Bremen Overseas Research and Development Association (BORDA)	BORDA used to have projects in waste management in Tanzania (e.g. composting), but is currently working mainly on decentralized waste water treatment.

TABLE 7. MULTILATERAL ORGANIZATIONS AND NGO'S WORKING ON WASTE IN TANZANIA

4.4 Dutch support in Tanzania

The Royal Dutch Embassy in Dar es Salaam is actively promoting sustainable waste management in Tanzania. The contact person for waste related programs is Mr. Eugene Gies.



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¹⁰ This figure is considered an exaggeration by the Dutch Expert Team.

5. SWOT Analysis

In the Table below an analysis is provided of the current strengths, weaknesses, opportunities and threats related to the waste management system in Dar es Salaam.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Dar es Salaam's healthy GDP growth • DSM is a large metropolitan area providing economy of scale • Waste legislation is in place • Growing interest in setting up proper SWM services • End users for RDF, paper, plastics, metals within DSM 	<ul style="list-style-type: none"> • Low service levels with regard to collection • Feeble system of fee collection • Lack of strong organizational structures • General lack of knowledge and experience among public authorities and private actors • Political competition between districts, DSM city council and government • Lack of enforcement of rules • Energy prices are low • Weak environmental awareness among the population
Opportunities	Threats
<ul style="list-style-type: none"> • The President of Tanzania Mr. John Magufuli has shown promising signs of awareness of the urgency of the waste problem • Developing a proper SWM system is affordable in Dar es Salaam • Multilateral organizations start to invest in waste management • Some low hanging fruit in waste management 	<ul style="list-style-type: none"> • Initiatives claiming zero waste options are proposed regularly by foreign companies but are considered unrealistic and will actually disrupt the development of serious SWM systems • Risk of corruption

TABLE 8. SWOT ANALYSIS WASTE MANAGEMENT IN DAR ES SALAAM

6. Conclusions and recommendations for follow-up

6.1. Conclusions

- Solid waste management is a very serious and urgent problem in Dar es Salaam. The waste in the streets and in the many illegal waste dump sites threatens the sewerage system, with periodic outbreaks of cholera as a result. On top of this, it is estimated that the waste output of the city is growing at an alarming rate of approximately 10% per year.
- The logistics of waste collection is a patchwork of many different systems, implemented irregularly and not optimized in a sense that no use is made of waste transfer stations
- The Pugu waste dump site is in bad need of upgrading to the level of a sustainable landfill. The good news is that if properly planned, designed and managed, the site has a remaining capacity of several decades
- There is no National Waste Management Plan and no central funding mechanism for waste infrastructure. In many ways, a National Waste Management Plan is a necessary cornerstone for the development of a sustainable waste management service. One important aspect is that it will give financial institutions the confidence that it is potentially profitable to invest in the waste sector in Tanzania
- Public organizations tend to be poorly organized, trained and equipped. It would be preferable that the public organizations responsible for waste management would carry out part of the work themselves
- In the Dar es Salaam area, there is a tendency of decentralization which is counterproductive for effective waste management. On the other hand, a tour of several Dar es Salaam districts and the participants' input in the 8 September workshop learned that the districts are willing to participate in a regional waste management scheme if managed cost-effectively and properly. The development of a Metropolitan Waste Authority in Dar es Salaam would be a big step forward towards sustainable waste management in the city
- Waste fees are oftentimes not collected and the authorities are not taking the lead in this. This means that the costs of waste management are not covered, causing a vicious circle of a lack of funds and deteriorating quality of waste services. However, the good news is that (as calculated in this report) the current average waste fee levels are actually sufficient to cover the costs of a much better and sustainable system. Provided of course that all fees are collected. This may be promoted in innovative ways, for instance, by charging waste fees on the electricity bill (and cutting of power in case the waste fee isn't paid). Some stratification according to socio-economic circumstances may be recommendable
- Thus far, private sector input in waste management in Dar es Salaam is modest and pretty much limited to waste collection and transport
- There are hardly any initiatives in the area of composting and / or recycling. There is however quite some informal separate collection of plastics and paper
- There appear to be opportunities for incineration of waste (RDF) in the cement industry, and processing of recyclables in the paper, metal and glass industries
- No systems for Extended Producer Responsibility are in place yet in Tanzania. The introduction of such EPR systems is considered an opportunity for Tanzania to inject money into the waste system and at the same time lower the burden on municipalities

6.2. Recommendations for follow-up

For the coming years it is recommended to strengthen the public waste sector in Tanzania, with some exports promotion in the slipstream of such program. The role of the Dutch private sector will for the time being be modest, especially directed towards supporting public sector institutions. Some opportunities are expected to arise for delivery of waste collection and street sweeping equipment.

The Table below shows the proposed follow-up strategy for the Netherlands.

Project Phase ↓	Private Sector Development incl. Government-to-Government	Develop 2 Build / DRIVE
Phase 1: First Government-to-Government program (G2G) (4 months)		
	Building the Dar es Salaam ISWM Coalition	
GO/NO GO decision		
Phase 2 (if GO)	Second G2G Program (2 years)	Develop 2 Build (8 months)
Phase 3	Supervisory role of the G2G project coordinator in the Develop 2 Build project→	Develop 2 Build: 1. Pugu landfill 2. Logistics / transfer stations 3. Study full coverage fee system
	Development and adoption of a National Waste Management Plan for Tanzania	GO/NO GO decision
	Development of Metropolitan Waste Authority	If GO: Implementation project (five years)
	Exports promotion (e.g. in- and outbound trade missions) (co-funded under the PSD program)	Stepwise introduction of sustainable ISWM system in Dar es Salaam, possibly with DRIVE support and/or involvement of multilateral organizations such as World Bank, African Development Bank, ISWA

TABLE 9. PROPOSED COOPERATION STRATEGY NETHERLANDS – DAR ES SALAAM ON ISWM

The Expert Team proposes an ambitious strategy to improve the waste management situation in Dar es Salaam, taking into account the following:

- The severity and size of the waste problem in Dar es Salaam
- Dar es Salaam has the critical mass to make a sustainable waste system work cost-effectively
- There are relatively few vested interests to prevent a new system from being implemented
- Waste management is a relatively easy sector to implement drastic changes
- The Netherlands has the experience and the support base to help Tanzania in this endeavor
- The Dutch PSD/G2G and the Develop2Build programs are suitable support instruments
- In case the upgrading of the ISWM system in Dar es Salaam with Dutch support turns out to be a success, it will be a worldwide showcase for Dutch expertise and technology in waste management

In the PORALG / World Bank strategy which was formulated in the framework of the Dar es Salaam Metropolitan project, the upgrade of Dar es Salaam's waste system and subsequent operation for 10 years were calculated at a cost of US\$ 310 million. Because of this high cost it was not included in the DMDP action program. The plan which the Expert Team is proposing can be considered a modest version of the PORALG strategy, with a clear focus on key elements of the SWM system and without the operational support.

It is tentatively proposed that the Netherlands takes the lead in this sustainable ISWM program in Dar es Salaam, together with a strong actor in Tanzania.

As shown in Table 9, it is proposed to follow a two pronged approach of a PSD/G2G and a Develop2Build / DRIVE program. The two Government-to-Government programs have goals in themselves but are also meant as support for the D2B/DRIVE efforts.



You are cordially invited to join the LinkedIn Group "Solid waste cooperation between Tanzania and the Netherlands" at:

<https://www.linkedin.com/groups/12001634>

7. Sources

- Joshua Palfreman (2011): "Waste Management and Recycling in Dar es Salaam, Tanzania", funded by the University of London and WASTEdar.
- M.P. Membe of the Dar es Salaam City Council (2015), "Solid Waste Management in Dar es Salaam, Tanzania", Presentation on the Tanzania's CCAC strategy, Antwerp, Belgium, 7-9 September 2015.
- Prime Minister's Office Regional Administration and Local Government (2013), "Consultancy Services for Improvement of Solid Waste Management in Dar es Salaam Local Authorities in Support of Preparation of the Proposed DMDP", SMEC.

Annex 1. List of contacts

M = Meeting with (member of) Expert Team?

W = Participated in the 8 September Workshop?

M?	W?	Organization	Representative
1		African Development Bank	Mrs. Tonia Kandiero
	1	BORDA	Mrs. Joyce Musira
	1	Bremen Overseas R&D Organization	Mrs. Jutta Camargo
1		Center for Community Initiatives	Mr. Tim Ndezi P.
1		Dar es Salaam City Council	Mrs. Sipora J. Liana
1	1	Dar es Salaam City Council	Mr. Alexander Fecher
1		Embassy of the Netherlands	Mr. Jaap Frederiks
1	1	Embassy of the Netherlands	Mr. Eugene Gies
1	1	Embassy of the Netherlands	Mr. Ulrich Juhudi
1		Embassy Tanzania in The Hague	Mrs. Agnes K. Tengia
1	1	Green Waste Pro	Mr. Allan Sudi
	1	GVAVAY	Mr. Willium Azariah
	1	GVAVAY	Mr. Ahad Katera
1	1	Ileje Environment	Mr. Kaisi Kyamba
1	1	Kinondoni District Council	Mr. Abillu Peter
1	1	Kinondoni District Council	Mr. Mathias Kapizo
1	1	Kisiwani Environmental Group	Mr. Yahaya Mkanga
1	1	Kisiwani Environmental Group	Mr. Godfrey Morandi
1	1	More 4 Less	Mr. Nelson Kihongo
1	1	More 4 Less	Mr. Abeid Joachim
1		NEMC National Environmental Management Council	Mr. Vedast Makota
1		NEMC National Environmental Management Council	Mr. Arnold C. Kisiraga
1	1	People's Development Forum (PDF)	Mr. Ndaisaba George
1	1	Pugu dumpsite	Mr. Richard Kisheve
1	1	SAWA Sanitation and Water Action	Mr. Upendo Judica
1	1	SAWA Sanitation and Water Action	Mr. Yahaya Lwindi
1	1	TAEES	Mr. Hamisa Mulokozi
1	1	Tanzania President's Office	Mr. Emmanuel Ndyamukama
1	1	Tanzania President's Office	Mr. Kasulwa Mvano
1		TaWaSaNet	Mr. Darius Mhawi
1		Temeke District	Mr. Eric Kilangwa
1		Temeke District	Mr. Ally S. Hatibu
	1	The Citizen Newspaper	Mrs. Saumu Mwalimu
	1	The Guardian Newspaper	Mr. Bilham Kimati
1		The Recycler	Mr. Philipo Stephen
		The Recycler	Mr. Matthew Haden
1	1	Tirima Enterprise Ltd	Mr. Mussa Chanzi
	1	Tirima Enterprise Ltd	Mr. Robert Ngeleshi
1		Twiga Cement	Mr. Richard Magoda
1		Twiga Cement	Mr. Tom Dijkstra
1		UNIDO	Mr. Gerald Runyoro
1	1	UNIDO	Mr. Victor Akim
1		Vice President's Office	Mrs. Magdalena Mtenga
1		World Bank	Mr. Eric Dickson
36	27		